

Matthew Rimmer *Editor*

Intellectual Property and Clean Energy

The Paris Agreement and Climate Justice



Springer

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Preface

The People's Climate March, Flood Wall Street and the New York Climate Summit

This book on *Intellectual Property and Clean Energy: The Paris Agreement and Climate Justice* was conceived of on the streets of New York, as I joined the People's Climate March in 2014.

The People's Climate March on the 21st September 2014 was organized and designed to galvanize popular support for the United Nations Climate Summit being held in New York on the 23rd September 2014. The event was massive, with hundreds of groups, and hundreds of thousands of people, participating in the event. 400,000 people joined the parade in New York. The People's Climate March was supported by hundreds of other companion events around the world, calling for climate action.

I joined the Science Stands contingent at the People's Climate March. The group marshalled outside the Hayden Planetarium at the American Museum of Natural History. There was a platoon of scientists, wearing white lab coats and carrying placards. The scientists wheeled along a blackboard, depicting the state of climate science. The board declared, 'The "Debate" is Over. The Facts are In. The Evidence is Clear. Science Stands for Climate Action'. The group carried a large banner as well entitled, 'The Debate is Over'. There were also a bevy of charts—'CO₂ is rising!', 'The Oceans are acidifying!', 'Glaciers are melting!' Citing Bill Murray's character in *Ghostbusters*, the scientists also carried a banner, 'Back off Man, I am a Scientist'.

The event also featured a number of other sections. Frontline groups included those people who were most impacted by climate change—such as Indigenous communities and environmental organizations. Generational groups included labour organizations, families, parents and their children, and elders. Environmental groups covered renewable energy, food activists and water defenders. There was a section for protest groups. There was an interfaith group. There were also miscellaneous groups—covering various geographical entities from throughout the United States. There was also a range of other events in the United States and around the world.

Reflecting upon the People's Climate March, Bill McKibben stressed the importance of the popular demonstration of support of climate action at an international level. He noted: 'Day to day this resistance is rightly scattered, local and focused on the more mundane: installing a new zoning code, putting in a solar farm, persuading the church board to sell its BP stock'. In his view, the People's Climate March in New York was a great moment to 'show the world how big [the climate justice movement had] gotten'.

The People's Climate March on the 21st September 2014 in New York was followed by a dramatic protest outside Wall Street called Flood Wall Street on the 22nd September 2014. The Flood Wall Street event was designed to 'target corporate polluters and those profiting from the fossil fuel industry'. The protest was a rather more rebellious companion to the People's Climate March. Jonathan Smucker and Michael Premo considered the contrast between the People's Climate March and the Flood Wall Street protest. The pair noted that a few were critical of the popular, inclusive march: 'The People's Climate March was cast as a depoliticized, corporate-friendly sell-out, in contrast to more militant direct action, which Flood Wall Street soon emerged to organize'. However, Smucker and Premo maintained that the events were complementary: 'The emergent climate justice movement is stronger now because of the People's Climate March, the Climate Justice Alliance and Flood Wall Street—and because of the overall positive interplay between these complementary efforts'.

Flood Wall Street was of a different character to the People's Climate March. The event was designed to highlight the role of Wall Street in fuelling the climate crisis. The event certainly had echoes of the Occupy Wall Street movement. Flood Wall Street employed art, music and theatre. The event appeared to be a carnivalesque of culture jamming. The protestors wore the colour blue as a symbol of climate change induced flooding. The Flood Wall Street protestors also engaged in civil disobedience. There were ongoing contests between the protestors and police over the space surrounding Wall Street—with a number of arrests. The protestors at one point released an inflatable Carbon Bubble. In an action defying irony, the New York Police deflated the balloon on the horns of the Wall Street Bull. Flood Wall Street also featured a protestor dressed as a Polar Bear. The New York Police arrested the protestor dressed as a Polar Bear, and led him away in handcuffs, while he was still wearing his costume. Two women dressed as Captain Planet were also arrested at the event.

In the wake of the 400,000 strong Climate March in New York and the Flood Wall Street protest, the United Nations hosted a Climate Summit in New York on the 23rd September 2014. The event was intended to be a catalyst for the development of a binding, fair and ambitious international agreement upon climate change.

In his opening address, United Nations Secretary-General Ban Ki-moon observed: 'We are not here to talk. We are here to make history'. The Secretary-General warned that 'today the dreams of people throughout the world hang in the balance'. He stressed that 'climate change threatens hard-won peace, prosperity, and opportunity for billions of people'. Ban Ki-moon emphasized that climate change posed significant challenges: 'The human, environmental and

financial cost of climate change is fast becoming unbearable'. Ban Ki-moon hoped that there were also opportunities to develop a clean, healthy, fair and stable world: 'A low-carbon, climate-resilient future will be a better future'. He called for public and private investment in climate solutions, such as renewable energy: 'We must work together to mobilize money and move markets'. He noted: 'Economists have shown that this comes at minimal extra cost, while the benefits to our people and our planet are monumental'. Ban Ki-moon also insisted: 'We must begin to capitalize the Green Climate Fund'. He also advocated a price on carbon: 'There is no more powerful way to drive the market transformation we need'. Accordingly, Ban Ki-moon urged the members of the United Nations: 'We must invest in climate-resilient societies that protect all, especially the most vulnerable'. He emphasized: 'I ask all Governments to commit to a meaningful, universal climate agreement in Paris in 2015, and to do their fair share to limit global temperature rise to less than 2°C'.

Echoing his predecessor, Mike Bloomberg, the New York Mayor Bill de Blasio warned of the existential threat posed by climate change. He promised that New York would lead cities around the world in climate action. The New York Mayor was focused upon civic environmentalism, and promised to improve energy efficiency in the city, and cut carbon emissions.

Rajendra K. Pachauri, Chairman of the Intergovernmental Panel on Climate Change (IPCC), also address the Opening Ceremony of the United Nations Climate Summit. He presented a summary of the IPCC's Fifth Assessment Report. Pachauri had three main messages. First, Pachauri observed that 'Human influence on the climate system is clear—and clearly growing'. He noted: 'We have abundant evidence that we are changing our climate'. Pachauri observed: 'The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, and sea level has risen'. Second, he recommended that there was a need for a timely response: 'We must act quickly and decisively if we want to avoid increasingly destructive outcomes'. He made a sobering warning. Third, Pachauri insisted: 'We have the means to limit climate change and build a better future'. In particular, he highlighted the importance of clean technologies, renewable energy, energy efficiency and stopping deforestation. Pachauri commented: 'There are costs of taking action—but they are nothing compared to the cost of inaction'.

In his address to the United Nations, Climate Reality leader Al Gore cited Wallace Stevens: 'After the last no comes a yes, and on that yes, the future world depends'. He was confident that we can solve the climate crisis.

The actor and United Nations Messenger of Peace Leonardo DiCaprio presented a powerful speech about the dangers of climate denial. He called for substantive climate action, including a price on carbon and an end to fossil fuel subsidies:

We need to put a pricetag on carbon emissions, and eliminate government subsidies for coal, gas, and oil companies. We need to end the free ride that industrial polluters have been given in the name of a free-market economy, they don't deserve our tax dollars, they deserve our scrutiny. For the economy itself will die if our ecosystems collapse.

Leonardo DiCaprio emphasized that ‘renewable energy is not only achievable but good economic policy’. He observed: ‘New research shows that by 2050 clean, renewable energy could supply 100% of the world’s energy needs using existing technologies, and it would create millions of jobs’. In his speech, Leonardo DiCaprio emphasized the need to respect ethics, human rights and climate justice: ‘This is not a partisan debate; it is a human one’. Leonardo DiCaprio insisted that ‘clean air and water, and a liveable climate are inalienable human rights’.

To conclude the opening ceremony, Kathy Jetnil-Kijiner from the Marshall Islands warned of the impact of climate change upon small island states: ‘We deserve to do more than just survive. We deserve to thrive’. She delivered a moving poem to her daughter—lyrically expressing the profound impact that climate change would have upon future generations.

Witnessing the striking sequence of the People’s Climate March, Flood Wall Street and the New York Climate Summit has provided the inspiration for this consideration and contemplation of the future of the Paris Agreement 2015.

Brisbane, Australia

Matthew Rimmer

Chapter 1

Introduction: The Road to Paris: Intellectual Property, Human Rights, and Climate Justice



Matthew Rimmer

Abstract As well as outlining the structure and organisation of the collection, this introduction seeks to contextualise the debate over intellectual property and climate change. As a foundation to the collection, it provides an overview of the negotiation, agreement, and implementation of the Paris Agreement 2015. It offers a literature review in respect of international climate law, human rights, and technology transfer. The introduction highlights key research and scholarship on intellectual property and environmentally sound technologies. It outlines the relevance of various disciplines of intellectual property to the debate over climate change. In particular, it looks at the role and function of patent law, trademark law, consumer law, design law, copyright law, trade secrets, open licensing, as well as plant breeders' rights, access to genetic resources, and Indigenous knowledge. It examines climate litigation in the field of intellectual property. The introduction considers the scope for law reform to ensure that intellectual property laws are better adapted to promote substantial and meaningful action in respect of climate change. It also explores how innovation law and policy may best promote climate justice and human rights.

Keywords Paris Agreement 2015 · Intellectual property · Human rights
Climate justice · Innovation law and policy · Climate litigation
Climate policy · Renewable energy · International law · Diplomacy
Climate change

1 Introduction

In their grand overview of international climate change law, Daniel Bodansky, Jutta Brunnée, and Lavanya Rajamani highlight the wicked, intractable policy problems posed by climate change:

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Climate change poses a complex, polycentric, and seemingly intractable policy challenge—a challenge some have characterized as ‘super wicked’. United Nations Secretary General Ban Ki-moon characterized it as the ‘defining issue of our age’. Certainly, it is one of the most difficult policy problems ever faced.¹

Bodansky and his collaborators highlight several factors responsible for making climate change an intractable public policy, noting that ‘it is planetary in scope and—due to its long-term and potentially irreversible consequences—intergenerational in its impact’ and ‘it is caused by a wide range of production and consumption processes.’² There have been a number of perspectives on the climate change problem—particularly looking at the issue as an environmental problem; an economic problem; and an ethical problem. International climate law has focused on climate mitigation; climate adaptation; climate finance; and international oversight.

One of the outstanding topics under discussion at the Paris negotiations was intellectual property and climate change. Patent law plays a critical role in providing incentives for renewable energy, and access to critical inventions for the greater public good. Designs law plays a significant role in respect of sustainable, green design. Trade mark law is significant in terms of green trade marks, eco labels, and greenwashing. Climate activists often engage in culture-jamming in respect of corporate and government representations about the environment. Copyright law plays a key part in respect of access to environmental information. Open licensing is important in terms of open data, open education, and open innovation in the area of the environment and climate change. Plant breeders’ rights impact on intellectual property and food security. Access to genetic resources raises questions about biodiversity and climate change. Climate change raises important issues in respect of Indigenous rights, traditional knowledge and Indigenous intellectual property. While there has accord on a number of topics in the international climate talks in Paris 2015, there remained discord over the policy settings on intellectual property, technology transfer, and climate change.

This collection focuses upon the inter-relationship between intellectual property, technology transfer, and climate change in the context of international environmental and climate law. This introduction provides an overview of the Paris Agreement 2015, and the complex array of reactions to this international climate agreement. This overview also examines the discussion over human rights and climate justice at the Paris negotiations. Such a discourse has important implications for the technical questions of climate finance, development, and technology transfer. The introduction also provides a literature review of the debate over intellectual property, technology transfer, and climate change in light of the Paris Agreement 2015.

¹Bodansky et al. (2017, p. 2).

²Ibid., 2.

2 The Paris Agreement 2015

Paris was the host of the 2015 United Nations Climate Change Conference (COP 21/ CMP 11). The event was held from the 30th November 2015 to the 15th December 2015. The negotiations resulted in the development of the Paris Agreement 2015.³

The politics of international climate change negotiations have been byzantine affairs of intrigue and realpolitik.⁴ There was a complex web of geopolitics and international relations in the negotiations over the Paris Agreement 2015. There were an array of existing negotiating groups—including the Group of 77 and China, the European Union, the Umbrella Group (which included Australia, Canada, New Zealand, Japan, the United States, Norway, and Iceland), and the Environmental Integrity Group.⁵ Moreover, there was the Least Developed Countries Group and the Alliance of Small Island States (AOSIS) representing countries particularly vulnerable to climate change. The Paris negotiations were further complicated by additional groupings—such as the Like-Minded Developing Countries, the ‘BASIC’ group of Brazil, South Africa, India, and China, and various groupings of progressive Latin American and Caribbean countries. Moreover, there was significant input from non-state actors—including business peak bodies, civil society, and representatives of Indigenous communities.

The Paris Agreement 2015 went through a number of draft negotiating texts. Christiana Figueres, the Executive Secretary of the United Nations Framework Convention on Climate Change (2010–2016), emphasized that the international climate agreement was the culmination of much debate and compromise.⁶ She commented:

The economic transformation that will ensue as a result of the Paris Agreement will be accelerated by new technology and innovative financial instruments, but it is the direct result of the intentional collective decision of all governments of the world to move our global economy beyond fossil fuels as the predominant source of energy and growth, to one powered primarily by renewable energy.⁷

Figueres stressed: ‘The energy revolution of the twenty-first century, at the heart of the economic transformation we are already seeing, is a policy-driven revolution.’⁸

There was culture-jamming by civil society activists of polluting companies at the international climate talks.⁹ The activists employed some of the tactics of the

³Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

⁴Downie (2014).

⁵Bulmer et al. (2017, pp. 50–73).

⁶Figueres (2017, pp. v–vii).

⁷Ibid., p. v.

⁸Ibid., p. v.

⁹Sierzputowski (2015).

Adbusters movement—in terms of appropriating and subverting official advertisements. A ‘Brandalism’ project posted ‘subvertisements’ around Paris, criticising companies and institutions, which were engaged in greenwashing. 82 artists from across 18 countries distributed 600 posters, which were hung behind bus stops within the city. There was a parody of a Volkswagen advertisement, with the caption ‘We’re sorry that we got caught’. This referred to the German company’s misleading and deceptive conduct in respect of its carbon emissions. There was a parody of an Exxon advertisement, with the caption ‘We Knew about the Impact of Fossil Fuels but Publicly Denied It.’ Another poster said, ‘Same Bullshit, Different Conference’ about the Solutions for COP21. A further poster stressed ‘Profit First, Environment Second.’ There was a poster on ‘Les Nouveaux Entrepreneurs’. There was also a satire of the Air France advertising campaign with the caption ‘Tackling Climate Change? Of course Not. We’re an Airline.’ A number of the other posters referenced other corporate sponsors of the event, including Dow Chemicals and GDF Suez (Engie). Brandalism’s Joe Elan commented: ‘By sponsoring the climate talks, major polluters such as Air France and GDF-Suez-Engie can promote themselves as part of the solution—when actually they are part of the problem.’¹⁰ A Video captured and recorded the events of the Brandalism culture-jamming intervention.¹¹ Australia’s climate angels also participated in the civil society protests over the Paris negotiations.¹²

As the Paris Agreement 2015 was being settled, there was significant ‘Red Line’ protests outside the venue in Paris.¹³ Thousands of people demonstrated that they would continue to press for climate justice—no matter what the heads of state decided.

There has been a diversity of views and perspectives about the final text of the Paris Agreement 2015 within academic circles. While some commentators were pleased about the consensus on climate action, others were concerned that the agreement did not go far enough in embracing ambitious climate goals and principles of human rights and climate justice. There was also a significant concern about the treatment of loss and damage.¹⁴ As the Profiles of Paris highlights, there are multiple voices in respect of the history of the negotiation of the Paris Agreement 2015 negotiations.¹⁵ There is a polyphonic debate about the significance of the Paris Agreement 2015, and its legacy—with opinions about the agreement ranging from the positive to neutral to pessimistic.

The Paris Agreement 2015 was presented as a ‘Grand Climate Bargain’.¹⁶ Taking a qualified view of the Paris Agreement 2015, Professor Daniel Bodansky

¹⁰Ibid.

¹¹Brandalism (2015).

¹²ClimActs (2015), Dubecki (2015).

¹³BBC News (2015).

¹⁴Burkett (2016, pp. 118–129).

¹⁵Kinley (2018).

¹⁶Arup and Hannam (2015).

has argued that the deal is a cause of celebration.¹⁷ He observes: ‘The Paris Agreement seeks a Goldilocks solution that is neither too strong (and hence unacceptable to key states) nor too weak (and hence ineffective)’.¹⁸ Bodansky comments: ‘If Paris indeed proves historic it will be because it institutionalizes a new paradigm that, over time, catalyzes ever stronger global action to combat climate change.’¹⁹

Helpfully, Bodansky breaks down the Paris Agreement 2015 into eight key salient features. First, he stressed that ‘it is a legally binding instrument (albeit with many nonbinding elements), in contrast to the Copenhagen Accord, which was a political deal.’²⁰ Second, Bodansky stresses that the Paris Agreement 2015 is global: ‘It applies not only to developed countries, like the Kyoto Protocol,²¹ but also to developing countries, which account for a growing share of global emissions.’²² Third, he emphasizes that the Paris Agreement 2015 specifies the same core obligations for all countries: ‘In doing so, it abandons the static, annex-based approach to differentiation in the United Nations Framework Convention on Climate Change (UNFCCC)²³ and the Kyoto Protocol, in favor a more flexible, calibrated approach, which takes into account changes in a country’s circumstances and capacities and is operationalized differently for different elements of the regime.’²⁴ Fourth, the Paris Agreement 2015 ‘establishes a long-term, durable architecture, in contrast to the Copenhagen Accord,²⁵ which involved one-shot pledges addressing only the period up to 2020.’²⁶ Fifth, ‘the long-term architecture institutionalizes an iterative process, in which, every five years, parties will come back to the table to take stock of their collective progress and put forward emission reduction plans for the next five-year period.’²⁷ Sixth, the Paris Agreement 2015 ‘sets an expectation of progressively stronger action over time.’²⁸ Seventh, the Paris Agreement 2015 ‘establishes a common transparency and accountability framework that reflects Justice Brandeis’s admonition, sunlight is the “best of disinfectants.”’²⁹ Finally, Bodansky hopefully predicted that the Paris Agreement 2015 ‘appears to

¹⁷Bodansky (2016, pp. 288–319).

¹⁸Ibid.

¹⁹Ibid.

²⁰Ibid.

²¹Kyoto Protocol to the United Nations Framework Convention on Climate Change 1997, Opened for signature 16 March 1998, 2303 UNTS 148 (entered into force 16 February 2005) (‘Kyoto Protocol’).

²²Bodansky (2016, pp. 288–319).

²³United Nations Framework Convention on Climate Change 1992, Opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

²⁴Bodansky (2016, pp. 288–319).

²⁵Copenhagen Accord 2009, UN Doc. FCCC/KP/CMP/2009/L.9 (December 18, 2009).

²⁶Bodansky (2016, pp. 288–319).

²⁷Ibid.

²⁸Ibid.

²⁹Ibid.

command universal, or near universal, acceptance.’³⁰ (The Trump administration, though, certainly did not accept the agreement). There has been significant discussion about the legal form of the Paris Agreement 2015.³¹

In his new book, *The Madhouse Effect*, climate scientist Michael Mann was optimistic about global co-operation in light of the Paris Agreement 2015.³² He observes:

In the wake of the Climate Change Conference in Paris, there was a collective feeling of euphoria throughout the world that maybe, just maybe, we’re now finally read to turn the corner in confronting the climate challenge. The summit produced for the first time a deal that would aim to keep warming lower than the dangerous 2 degree Celsius limit, with an aspirational goal of an even lower limit (1.5 degree Celsius), in recognition of the threat of near-term global sea-level rise. For the first time, there was unanimous buy-in from all (197) participating nations to lower their carbon emissions in the years ahead, including industrial nations and developing countries alike.³³

Mann observed that the ‘agreement puts in place a framework for negotiations on more stringent reductions at subsequent conferences.’³⁴ He was hopeful that ‘a path to averting catastrophic warming of the planet now seems possible’.³⁵

David Suzuki and Ian Hanington had somewhat more mixed views about the Paris Agreement 2015.³⁶ The environmentalists comment that ‘the Paris Agreement, in process and outcome, was a dramatic improvement—a product of the growing urgency to act on the defining issue of our time.’³⁷ Nonetheless, Suzuki and Hanington observe that commitments have not necessarily been honoured in the past. Moreover, the writers lament that compromises in the agreement resulted in a number of shortcomings—such as assigning liability for past emissions and adequately addressing compensation for ‘loss and damage’. Nonetheless, Suzuki and Hanington conclude: ‘Despite these shortcomings, the Paris Agreement was a leap forward in the fight against climate change.’³⁸ They stress that success will require ‘ongoing pressure to ensure targets are met and become more ambitious over time.’³⁹

Andrew Higham highlighted the gap between the Paris Agreement 2015, and the climate reality of a warming world.⁴⁰ He stressed the grand ambition of the international agreement: ‘The Paris Outcome promises to deliver an orderly transition within half a century to a state in which human activity is in balance with the

³⁰Ibid.

³¹Lawrence and Wong (2017, pp. 276–286).

³²Mann and Toles (2016).

³³Ibid., pp. 140–141.

³⁴Ibid., p. 142.

³⁵Ibid., p. 142.

³⁶Suzuki and Hanington (2017).

³⁷Ibid., p. 1.

³⁸Ibid., p. 32.

³⁹Ibid., p. 32.

⁴⁰Higham (2017, pp. 413–416).

climate system, such that the most vulnerable communities and ecosystems are protected and spared from the worst impacts of climate change.’⁴¹ He observed that such hopes are ‘in sharp contrast to a world in which in any hope of sustainable development is thwarted by the irrevocable impacts of climate change.’⁴²

A number of civil society groups expressed caveats and reservations that the Paris Agreement 2015 was insufficiently ambitious. Tim Gore, Oxfam International’s policy head, feared that developed countries had overwhelmed developing countries at the Paris international climate talks.⁴³ He observed: ‘We’ve really seen the kind of brutal nature of the power politics of these talks.’⁴⁴ While recognising the reference to 1.5° was ‘an important moral victory’ he was concerned that the announcement would be hollow without ‘a significant increase in action in the years ahead’.⁴⁵

The Paris Agreement 2015 has swiftly come into force. Over 55 Parties covering more than 55% of Global Greenhouse Gas Emissions have ratified the Paris Climate Change Agreement.⁴⁶ Patricia Espinosa, the new Executive Secretary of the UN Framework Convention on Climate Change (UNFCCC), commented: ‘The speed at which countries have made the Paris Agreement’s entry into force possible is unprecedented in recent experience of international agreements and is a powerful confirmation of the importance nations attach to combating climate change and realizing the multitude of opportunities inherent in the Paris Agreement.’⁴⁷ UN Secretary-General Ban Ki-moon observed: ‘Strong international support for the *Paris Agreement* entering into force is testament to the urgency for action, and reflects the consensus of governments that robust global cooperation is essential to meet the climate challenge.’⁴⁸

Kumi Naidoo—then of Greenpeace International, and now Secretary General of Amnesty International—noted: ‘This deal puts the fossil fuel industry on the wrong side of history.’⁴⁹ He stressed that ‘the human race has joined in a common cause, but it’s what happens after this conference that really matters’.⁵⁰ Jennifer Morgan of Greenpeace International, said: ‘The unprecedented speed of the entry into force of the Paris Agreement demonstrates that Paris was not a one-off deal, but rather a long-term commitment to climate action.’⁵¹

⁴¹Ibid., p. 413.

⁴²Ibid., p. 413.

⁴³Arup and Hannam (2015).

⁴⁴Ibid.

⁴⁵Ibid.

⁴⁶UNFCCC (2016).

⁴⁷Ibid.

⁴⁸Ibid.

⁴⁹Kinley (2018).

⁵⁰Kinley (2018).

⁵¹Milman (2016).

350.org Executive Director May Boeve commented: ‘The entry of the Paris climate agreement represents a turning point in the fight against climate change: the era of fossil fuels is finally coming to an end.’⁵² She hoped that ‘investors and governments have a responsibility to both divest from climate destruction and accelerate the just transition to an 100% renewable energy economy.’⁵³ Michael Brune, executive director of the Sierra Club, observed that the Paris Agreement 2015 was a significant achievement:

After years of tireless dedication and work toward an international climate deal, the Paris agreement has finally jumped off the page and into reality. Now that the agreement is a reality, we must finally align our global energy and economic policies to meet these goals and end subsidies for outdated fossil fuels, transition to 100 percent clean energy, and stop harmful trade agreements like the Trans-Pacific Partnership that run counter to the goals of the Paris Agreement.⁵⁴

He insisted that there was a need for a better alignment between the climate agreement, and mega-regional trade agreements, such as the Trans-Pacific Partnership 2015.⁵⁵

Christiana Figueres, former executive secretary of the United Nations Framework Convention on Climate Change 1992 and a key architect of the Paris deal, said the deal should be met with ‘unbridled optimism’:

We now we have our starting signal – this is the “go” toward a low carbon future, That future is going to be exciting: ending the dominance of fossil fuels will deliver an abundance of innovation and opportunity for all of us. We can deliver cleaner air, healthier cities and a new kind of ‘industrial’ revolution underpinned by technologies that enable us to live a prosperous life within the boundaries our planet can sustain. To achieve that, we must now increase our ambition to ensure the legacy of this moment is sealed as a positive pivot point in history.⁵⁶

Her comments highlight the need to boost research, development, and diffusion of clean technologies to achieve a transition to a low-carbon economy to address the wicked global problem of climate change.

During the G20 negotiations, China and the United States agreed to ratify the Paris Agreement 2015. In his last speech to the United Nations General Assembly in 2016, President Barack Obama commented upon the Paris Agreement 2015, market incentives, and access to green technologies:

We need to follow through on our efforts to combat climate change. If we don’t act boldly, the bill that could come due will be mass migrations, and cities submerged and nations displaced, and food supplies decimated, and conflicts born of despair. The Paris Agreement gives us a framework to act, but only if we scale up our ambition. And there must be a

⁵²350.org (2016).

⁵³Ibid.

⁵⁴Milman (2016).

⁵⁵The Trans-Pacific Partnership 2015 <http://dfat.gov.au/trade/agreements/tpp/Pages/trans-pacific-partnership-agreement-tpp.aspx>.

⁵⁶Ibid.

sense of urgency about bringing the agreement into force, and helping poorer countries leapfrog destructive forms of energy.⁵⁷

Obama stressed that: ‘For the wealthiest countries, a Green Climate Fund should only be the beginning’.⁵⁸ In his view, ‘We need to invest in research and provide market incentives to develop new technologies, and then make these technologies accessible and affordable for poorer countries’.⁵⁹ Obama noted the important connection between climate action and development: ‘Only then can we continue lifting all people up from poverty without condemning our children to a planet beyond their capacity to repair.’⁶⁰ Obama called for ‘inclusive and sustainable’ models for the global marketplace, and ‘inclusive and accountable’ models of governance.⁶¹

Subsequently, President Barack Obama has hailed ratification of the Paris Agreement 2015 as a ‘turning point’ in the fight against global warming.⁶²

Today is a historic day in the fight to protect our planet for future generations. This gives us the best possible shot to save the one planet we got. With optimism and faith and hope, we are proving it is possible.⁶³

There has been a rapid reversal of the position of the United States under the leadership of President Donald Trump.⁶⁴ In June 2017, Trump explained his rationale for the departure of the United States from the Paris Agreement 2015:

As President, I can put no other consideration before the wellbeing of American citizens. The Paris Climate Accord is simply the latest example of Washington entering into an agreement that disadvantages the United States to the exclusive benefit of other countries, leaving American workers - who I love - and taxpayers to absorb the cost in terms of lost jobs, lower wages, shuttered factories, and vastly diminished economic production.⁶⁵

Trump said that ‘the United States will cease all implementation of the non-binding Paris Accord and the draconian financial and economic burdens the agreement imposes on our country’.⁶⁶ In particular, he emphasized that this would involve ‘ending the implementation of the nationally determined contribution and, very importantly, the Green Climate Fund which is costing the United States a vast fortune’.⁶⁷ Belatedly, Nicaragua and Syria joined the Paris Agreement 2015, leaving only the United States as the only country not participating in the international climate agreement.⁶⁸ The withdrawal of the United

⁵⁷Obama (2016).

⁵⁸Ibid.

⁵⁹Ibid.

⁶⁰Ibid.

⁶¹Ibid.

⁶²Milman (2016).

⁶³Ibid.

⁶⁴Trump (2017).

⁶⁵Ibid.

⁶⁶Ibid.

⁶⁷Ibid.

⁶⁸Reuters (2017).

States is part of a larger pattern of behaviour by the Trump administration towards multilateral institutions and international agreements. There has been much academic discussion about the impact of the United States retreat from the Paris Agreement 2015.⁶⁹

In spite of the departure of the Federal United States Government, a coalition of states in the United States has promised to implement the Paris Agreement 2015. In response to Trump's decision to withdraw the United States from the Paris Agreement 2015 on climate change, Governors Andrew Cuomo, Jay Inslee, and Jerry Brown created The United States Climate Alliance.⁷⁰ This bi-partisan coalition of states is 'committed to the goal of reducing greenhouse gas emissions consistent with the goals of the Paris Agreement 2015'.⁷¹ In its view, 'Smart, coordinated state action can ensure that the United States continues to contribute to the global effort to address climate change.'⁷² Moreover, Michael Bloomberg and Carl Pope have promoted the role of cities, businesses, and citizens in climate action.⁷³ Some commentators like Luke Kemp have considered ways and means to limit the climate impact of the Trump administration.⁷⁴

Some other key nations—such as China and the members of the European Union—have strengthened their commitments to the Paris Agreement 2015.⁷⁵ There remain worries about the 'emissions gap' in terms of the need for increased climate action to meet the Paris Agreement 2015 goals.⁷⁶ The new United Nations Secretary-General Antonio Guterres has promised to encourage the implementation of the Paris Agreement 2015, raising climate finance, and the distribution of clean technologies.⁷⁷

At the Marrakech Climate Change Conference in 2016 (COP22), there was further discussion of the implementation of the Paris Agreement 2015, and international co-operation in respect of climate change. There was the Marrakech Action Proclamation for Our Climate and Sustainable Development 2016, and the Marrakech Partnership for Global Climate Action 2016.⁷⁸

At the Bonn Climate Conference in 2017 (COP23), hosted by Germany and presided over by Fiji, there were further resolutions in respect of the

⁶⁹Pickering et al. (2017), Harvey (2017).

⁷⁰The United States Climate Alliance <https://www.usclimatealliance.org/> Accessed 1 May 2018.

⁷¹Ibid.

⁷²Ibid.

⁷³Bloomberg and Pope (2017).

⁷⁴Kemp (2017).

⁷⁵Boffey and Neslen (2017).

⁷⁶UN Environment (2017).

⁷⁷Guterres (2017).

⁷⁸Marrakech Climate Change Conference, COP 22, November 2016, http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567/php/view/decisions.php#c Marrakech Action Proclamation for Our Climate and Sustainable Development 2016, http://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/marrakech_action_proclamation.pdf and the Marrakech Partnership for Global Climate Action 2016 http://unfccc.int/files/paris_agreement/application/pdf/marrakech_partnership_for_global_climate_action.pdf.

implementation of the Paris Agreement 2015.⁷⁹ A number of international leaders reinforced the need for global climate action.⁸⁰ The new United Nations Secretary-General Antonio Guterres emphasized: ‘The catastrophic damage of climate change is upon us and when the frontline is devastated, the whole army is lost.’⁸¹ He commented: ‘We must stop making bets on an unsustainable future’.⁸² The German Chancellor Angela Merkel stressed that ‘climate change is an issue determining our destiny as mankind—it will determine the wellbeing of all of us.’⁸³ The French President Emmanuel Macron warned: ‘Climate change adds further injustice to an already unfair world.’⁸⁴ President Ali Bongo Ondimba of Gabon, representing African nations, said the need for faster action was urgent: ‘Africa suffers the loss and damage on a daily basis.’⁸⁵ Baron Waqa, president of Nauru and representing small island states, commented: ‘It is now time for the developed countries to live up to their responsibilities.’⁸⁶ There was also discussion about providing better representation of Indigenous peoples in the international climate talks.⁸⁷

As the United States retreated from its international climate obligations under President Donald Trump, China and the European Union have sought to strengthen their commitments in implementing the Paris Agreement 2015.⁸⁸

In 2018, Antonio Guterres has stressed that climate change is the greatest threat to humanity.⁸⁹ He wished: ‘What the world needs is a race to the top—with political will, innovation, financing and partnerships.’⁹⁰

Laurent Fabius, the President of COP21, was hopeful that the Paris Agreement 2015 would inspire other international agreements:

In the future, might not areas as essential as biodiversity, water, health, access to data and migration be examined using methods inspired by the Paris Conference? More generally, it is now both necessary and possible to base international negotiations in many different fields on three pillars that together provide solid support: international agreement, voluntary commitments from States, and building alliances with civil society.⁹¹

⁷⁹Bonn Climate Change Conference, COP23, November 2017, http://unfccc.int/meetings/bonn_nov_2017/session/10376/php/view/decisions.php and the Fiji Momentum for Implementation 2017, Decision 1/ CP.23, 18 November 2017, <http://unfccc.int/resource/docs/2017/cop23/eng/113.pdf>.

⁸⁰Carrington (2017).

⁸¹Ibid.

⁸²Ibid.

⁸³Ibid.

⁸⁴Ibid.

⁸⁵Ibid.

⁸⁶Ibid.

⁸⁷Watts (2017).

⁸⁸Boffey and Neslen (2017).

⁸⁹Guterres (2018).

⁹⁰Ibid.

⁹¹Kinley (2018).

Fabius suggested: ‘From this point of view as well, the Paris Conference and Agreement has opened new horizons.’⁹²

3 Climate Justice

Professor Andrew Guzman makes the point in his book *Overheated* that there is a need to address the human costs of climate change.⁹³

There has been significant build-up of advocacy to address the relationship between human rights and climate change in international climate talks.⁹⁴

Human rights leaders pressed for strong language to be included on human rights in the Paris Agreement 2015. Craig Mokhiber of the Office of the High Commissioner for Human Rights stressed: ‘The climate crisis is a human rights crisis. It needs to be addressed as such, and it needs to start right here in Paris.’⁹⁵ John Knox, the United Nations Special Rapporteur on Human Rights and the Environment, commented: ‘There is a relationship between human rights and climate change—Paris can’t do anything about pretending that relationship doesn’t exist.’⁹⁶

Hindou Oumarou Ibrahim—the co-chair of the International Indigenous Peoples Forum on Climate Change—recalls:

We were convinced that Indigenous peoples’ knowledge could be part of the solution to climate change. But to be able to share our knowledge, the very knowledge of those who have lived in the heart of nature for millennia, we need to protect our communities, to have our basic and essential rights respected.⁹⁷

Victoria Tauli-Corpuz, the UN Special Rapporteur on the Rights of Indigenous Peoples, warned: ‘You cannot bargain away human rights.’⁹⁸

The Paris Agreement 2015 makes fleeting references to human rights and climate justice. The preamble notes, ‘acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.’⁹⁹ The preamble also notes ‘the importance of ensuring the integrity of all

⁹²Kinley (2018).

⁹³Guzman (2013).

⁹⁴Mayer (2016, 109–117).

⁹⁵Rowling (2015).

⁹⁶Ibid.

⁹⁷Kinley (2018).

⁹⁸Rowling (2015).

⁹⁹Paris Agreement 2015.

ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth, and noting the importance for some of the concept of “climate justice”, when taking action to address climate change.¹⁰⁰

As Stephen Humphreys has noted, there has long been tensions between the discourses of human rights and climate change.¹⁰¹ Humphreys observed that ‘human rights and climate change draw on quite different vocabularies, each with their own referential history and associations: terms familiar from one register may jar in the other, or mean different things to different audiences.’¹⁰² Nonetheless, human rights and climate change have a strong inter-relationship. Humphreys observes that ‘climate change will undermine—indeed, is already undermining—the realisation of a broad range of internationally protected human rights: rights to health and even life; rights to food, water, shelter and property; rights associated with livelihood and culture; with migration and resettlement; and with personal security in the event of conflict.’¹⁰³

Mary Robinson has been concerned about the inter-relationship between climate change and human rights.¹⁰⁴ She has aspired to frame the debate on climate change not as merely a scientific or environmental problem, but as an issue of development and human rights: ‘Climate change is a problem caused by people, with impacts on people, and must be solved by people’.¹⁰⁵ In September 2013, Mary Robinson brought together a diverse group of advocates, activists, scholars and elders to write a Declaration on Climate Justice.¹⁰⁶ That document sought to inspire transformative leadership on climate action.¹⁰⁷ Mary Robinson discussed the complex relationship between the Paris Agreement 2015, climate justice, and human rights:

I am pleased that the agreement is more people centred than its parent Convention, building on our growing understanding of climate change as a social, economic and environmental issue. While falling short of adopting a rights based approach to the implementation of the provisions of the agreement, the Paris Agreement recognises the need to respect and promote human rights, the rights of indigenous peoples, gender equality, women’s empowerment and intergenerational equity to achieve a just transition.¹⁰⁸

Mary Robinson has stressed that climate justice must play a key role in the implementation of the Paris Agreement 2015.¹⁰⁹ She noted that ‘Climate justice is

¹⁰⁰Paris Agreement 2015.

¹⁰¹Humphreys (2010a).

¹⁰²Humphreys (2010b, 1–33 at 8).

¹⁰³Ibid. 1.

¹⁰⁴Robinson and Robinson (2012).

¹⁰⁵Robinson (2014), 15–17.

¹⁰⁶Mary Robinson Foundation—Climate Justice and the World Resources Institute (2013), Declaration on Climate Justice. The High Level Advisory Committee to the Climate Justice Dialogue, 23 September, <http://www.mrfcj.org/our-work/equity-and-climate-justice/declaration-climate-justice.html> Accessed 1 May 2018.

¹⁰⁷Rimmer (2015, pp. 189–212).

¹⁰⁸Robinson (2015).

¹⁰⁹Robinson (2016). For a summary of the presentation, see Talberg (2016).

no longer a narrative only used by civil society.’¹¹⁰ She emphasized that the discourse of climate justice is ‘now part of the lexicon of at least 24 world leaders, eight business organisations and 27 countries.’¹¹¹

Henry Shue has lamented that climate negotiators from affluent, developed nations have been reluctant to address larger questions in respect of climate justice and human rights.¹¹² He has helped promulgate a Declaration on Climate Justice as part of an initiative of the Mary Robinson Foundation-Climate Justice and the World Resources Institute.¹¹³

Al Gore frames the debate over climate change as a moral crisis and struggle.¹¹⁴ He draws comparisons to past civil rights struggles: ‘As each of these moral causes gained more supporters, the changes they called for were met with increasingly fierce opposition.’¹¹⁵ He observes that we have reached a tipping point in the great moral cause that is the climate movement: ‘Every day now, millions more are awakening to the realization that it is wrong to destroy the future of the human race, and it is right to give future generations the well-being, justice, prosperity, and hope to which they are rightfully entitled.’¹¹⁶ He reflects upon the Paris negotiations: ‘The global agreement reached in Paris at the end of 2015 is encouraging not only because of the universal commitment from governments but also because it amplified the signal to investors, industries, businesses, and institutions that the entire world is poised to move quickly to a sustainable and renewable future’.¹¹⁷

In the wake of the Paris Agreement 2015, Christine Milne of the Global Greens has argued that there is a need for a combination of energy transformation, social justice, and protection of nature.¹¹⁸

In his landmark book on climate change and philosophy, Stephen M. Gardiner contends that traditional theories—such as cost-benefit analysis, and theories commons—are inept at accounting for climate change.¹¹⁹ He argues that robust theories of climate change need to take into account intergenerational justice. His later work seeks to develop a stronger discourse of environmental ethics.¹²⁰

Kate Dooley and Gita Parihar contend that human rights and equity should be governing values for the international climate regime.¹²¹ They observed that

¹¹⁰Ibid.

¹¹¹Ibid.

¹¹²Shue (2014).

¹¹³Ibid., 340–342.

¹¹⁴Gore (cast), Cohen and Shenk (directors), *Actual Films and Participant Media* (production companies), Paramount Pictures (distributors) (2017), Gore (2017).

¹¹⁵Gore (2017, p. 309).

¹¹⁶Ibid., p. 311.

¹¹⁷Ibid., p. 26.

¹¹⁸Milne (2017).

¹¹⁹Gardiner (2011).

¹²⁰Gardiner and Thompson (2017), Gardiner and Weisbach (2016).

¹²¹Dooley and Parihar (2017, pp. 136–154).

‘climate change is overwhelmingly seen as a moral and ethical problem due to the fact that those who contributed least to the problem will be the most impacted.’¹²² They maintain that justice and fairness should underpin a comprehensive integrity framework for governing the international climate regime.

Bridget Lewis has suggested that ‘the values and objectives of good governance and human rights are sympathetic and mutually supportive.’¹²³ She has recommended that ‘more explicit references to human rights and strategies for their implementation are required to improve the effectiveness of the regime, especially in addressing the needs of those who are most vulnerable to the effects of climate change and in ensuring that action taken to combat climate change does not cause further interference with human rights.’¹²⁴

Annalisa Savaresi is hopeful that there can be greater synergies between the climate change and the human rights regimes.¹²⁵

Tracey Skillington has highlighted the need for a transnational order of climate justice in the Anthropocene: ‘Transnationally felt, deteriorating global climate conditions have the effect of making individual sovereign states appear too small to resolve the growing range of problems they present to humanity at large.’¹²⁶ She contends that the ‘formation of a whole series of new legal reforms and deliberative instruments specializing in the fundamental functions of securing peace and protecting the human rights of all peoples are essential.’¹²⁷

In her study of the Paris Agreement 2015, Judith Blau considers the relationship between climate change, solidarity, and human rights.¹²⁸ She highlights how access to technology is central to the agreement: ‘It is the international treaty that binds states to make the transition from fossil fuels—namely fuels that are responsible for emissions that warm the earth—to renewable energy and establishes guidelines for rich countries—largely responsible for emissions now in the atmosphere—to aid poor countries acquire technologies for renewable energy, notably solar, wind, and tidal technologies.’¹²⁹ Judith Blau stresses that ‘the fate of humanity depends on international solidarity and solidarity itself depends (paradoxically) on the universal recognition of both equality and difference.’¹³⁰

Catriona McKinnon is concerned about the particular problem of inter-generational justice.¹³¹ She warns of the self-interested exploitation of the current poor and future generations: ‘If we fail to make the cuts required within the

¹²²Ibid., p. 136.

¹²³Lewis (2017, pp. 177–196 at 179).

¹²⁴Ibid., p. 193.

¹²⁵Savaresi (2017, pp. 31–42).

¹²⁶Skillington (2017, p. 231).

¹²⁷Ibid., p. 255.

¹²⁸Blau (2017).

¹²⁹Ibid., vii.

¹³⁰Ibid., p. 107.

¹³¹McKinnon (2012).

next couple of decades... we, the particular cohort of people alive now, will have failed to do justice to the whole human race'.¹³²

In a series of books, David Boyd has contended that there is a need to recognise a right to a healthy environment in national constitutions.¹³³ His framework could be useful in addressing environmental injustices and climate injustices. The United Nations has been pushing towards the recognition of a right to a healthy environment in 2018.¹³⁴ John Knox, the United Nations Special Rapporteur on Human Rights and the Environment, is hopeful that the Human Rights Council will support his proposal for such a framework.¹³⁵ There has also been a larger discussion about the rights of nature and wild law.¹³⁶

Naomi Klein has been interested in the rise of the climate justice movement.¹³⁷ She contends that 'if enough of us stop looking away and decide that climate change is a crisis worthy of Marshall Plan levels of response, then it will become one, and the political class will have to respond, both by making resources available and by bending the free market rules that have proven so pliable when elite interests are in peril'.¹³⁸ She argues that 'climate change could become a catalysing force for positive change'.¹³⁹ Klein argues that Trump's rejection of the Paris accord can be a spur for communities, provinces, and cities to take action on climate change into their own hands.¹⁴⁰

Bill McKibben has contended that fossil fuel divestment is a means of striving towards climate justice.¹⁴¹ He has advocated that universities, schools, charities, religious organisations, cities, and governments should divest themselves of stocks in coal, oil, and gas.

There has been a growing interest in the use of climate litigation address climate justice. In *Nature's Trust*, Professor Mary Christina Wood considers human rights arguments in the context of climate law and justice.¹⁴² Her work highlights the prospects of using the public trust doctrine to seek redress against climate inaction through atmospheric trust litigation. Professor Jacqueline Peel of the University of Melbourne and Dean Hari Osofsky of Penn State Law and International Affairs have undertaken comparative studies of the role of climate litigation in respect of the regulation of clean energy.¹⁴³ The pair suggest that 'a move from climate litigation as

¹³²Ibid., p. 137.

¹³³Boyd (2012, 2014, 2015a, b, 2017).

¹³⁴Watts (2018).

¹³⁵Knox (2018a, b).

¹³⁶Maloney and Burdon (2014), Rogers and Maloney (2017).

¹³⁷Klein (2014).

¹³⁸Ibid.

¹³⁹Ibid.

¹⁴⁰Klein (2017).

¹⁴¹McKibben (2013).

¹⁴²Wood (2014).

¹⁴³Peel and Osofsky (2015).

a prospective regulatory tool to one that is retrospectively focused may help to force hard regulatory choices.¹⁴⁴ The Sabin Center for Climate Change Law at Columbia Law School has sought to provide an observatory, which provides a comprehensive global map of climate litigation around the world.¹⁴⁵

Tim Stephens argues that international environmental law has been ill-designed for the Anthropocene.¹⁴⁶ He contends that there is a need to reimagine international environmental law in order to better address the global challenges of climate change.

4 Intellectual Property

There has been a long history of policy debate over intellectual property and the environment. There is a significant literature on intellectual property, access to genetic resources, and biodiversity.¹⁴⁷ Such research has been particularly focused upon the Convention on Biological Diversity 1992, the Bonn Guidelines 2001, and the Nagoya Protocol 2010.¹⁴⁸ There has also been a related debate over the protection of traditional knowledge and Indigenous intellectual property relating to the environment.¹⁴⁹

There has been a burgeoning literature on intellectual property, and climate change. There has been some practically-minded books published on intellectual property management of clean technologies. Eric Lane has published a classic guide to *Clean Tech Intellectual Property*—particularly focusing upon eco-marks, green patents, and green innovation.¹⁵⁰ Andree Kirchner and Iris Kirchner-Freis have published an edited collection on *Green Innovations and IPR Management*.¹⁵¹

There has been some empirical research in terms of the impact of intellectual property in respect of access to clean technologies. John Barton from Stanford Law School undertook some important early studies of patent law and clean technologies.¹⁵² The International Centre for Trade and Sustainable Development, the

¹⁴⁴Ibid., 339.

¹⁴⁵Sabin Center for Climate Change Law, Climate Change Litigation Databases, <http://climatecasechart.com/> Accessed 1 May 2018.

¹⁴⁶Stephens (2017), pp. 31–54).

¹⁴⁷Lawson (2012), McManis (2014), McManis and Ong (2018), Lawson and Adhikari (2018).

¹⁴⁸Convention on Biological Diversity 1992, opened for signature 5 June 1992, 1760 U.N.T.S. 79 (entered into force 29 December 1993); Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization, in Report Secretariat of the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity, UN Doc. UNEP/CBD/COP/6/20 (2002); and Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, 2010.

¹⁴⁹Robinson (2010), Robinson et al. (2017).

¹⁵⁰Lane (2011).

¹⁵¹Kirchner and Kirchner-Freis (2013).

¹⁵²Barton (2007).

European Patent Office, and the United Nations Environment Programme published some influential studies on patent landscapes.¹⁵³ The World Intellectual Property Organization has increasingly engaged in Big Data analytics, and has chartered particular patent fields of clean technologies.¹⁵⁴ The Intergovernmental Panel on Climate Change has also considered the empirical evidence relating to intellectual property and climate-related technologies.¹⁵⁵ Adam Jaffe and his colleagues at the Motu Economic and Public Policy Research have surveyed the diffusion of green technology.¹⁵⁶ Claude Henry and Joseph Stiglitz have been concerned about the relationship between intellectual property, dissemination of innovation, and sustainable development.¹⁵⁷

There has been an interest in applying the principles and theories of open source licensing to the fields of the environment and climate change. Nobel Laureate Elinor Ostrom's work on the commons has been influential in making sense of both environmental commons and information commons.¹⁵⁸ In their work on *Green Governance*, Burns Weston and David Bollier explore the law of the commons.¹⁵⁹ They highlight the rise of eco-digital commons—such as the Open Source and Hardware Design Alliance, Open Source Ecology, and the Global Innovation Commons.¹⁶⁰ This work is further conceptualized in the books, *Think Like a Commoner* and *The Wealth of the Commons*.¹⁶¹ Robert Cunningham has investigated the rise of information environmentalism.¹⁶²

At a more theoretical level, Professor Abbe Brown from the University of Aberdeen has considered intellectual property, environmental technologies, and climate change.¹⁶³ She has highlighted how such issues have raised larger considerations in respect of equity and justice.¹⁶⁴ Brown suggests: 'Human rights can ultimately identify the goal in mind; IP can encourage the development of technologies which can deliver this; and competition can provide a means of identifying if there is only one technology which can deliver the goal or if there is a relevant substitute'.¹⁶⁵

¹⁵³Karachalios et al. (2010), European Patent Office (2007), European Patent Office and United Nations Environment Programme (2013), European Patent Office and United Nations Environment Programme (2014).

¹⁵⁴Helm et al. (2014).

¹⁵⁵Intergovernmental Panel on Climate Change (2014). See also Phelan and Rimmer (2014).

¹⁵⁶Allen et al. (2014).

¹⁵⁷Henry and Stiglitz (2010, pp. 237–251).

¹⁵⁸Ostrom (1990).

¹⁵⁹Weston and Bollier (2013).

¹⁶⁰Ibid., pp. 165–167.

¹⁶¹Bollier (2014), Bollier and Helfrich (2012).

¹⁶²Cunningham (2014).

¹⁶³Brown (2013a, b, 2016, 2017).

¹⁶⁴Brown (2018).

¹⁶⁵Brown (2013a, b, pp. 198–222 at 205).

Professor Keith Maskus from the University of Colorado and Professor Ruth Okediji from Harvard University have considered legal and economic perspectives on international technology transfer—looking at environmentally sound technologies.¹⁶⁶ They consider alternatives to traditional patent incentives and licensing to encourage research and development by developing countries.

The TRIPS Agreement 1994 has resulted in the linkage of intellectual property and trade.¹⁶⁷ There have been sprawling debates in the TRIPS Council over intellectual property, trade, and climate change.¹⁶⁸ Wei Zhuang has discussed intellectual property rights and climate change through the lens of international trade law.¹⁶⁹ Agnieszka Machnicka has also discussed the tensions between the TRIPS regime and climate change in the international economic order—reflecting upon the peculiarities of climate adaptation and climate mitigation technologies.¹⁷⁰ Panagiotis Delimatsis has considered more broadly the relationship between climate change and trade law.¹⁷¹

There has been some larger scale collections, bringing together literature in the growing field of intellectual property and climate change. Peter Menell and Sarah Tran have gathered together key works on intellectual property, innovation, and the environment.¹⁷² Joshua Sarnoff has likewise produced a research handbook on intellectual property and climate change.¹⁷³ In this collection, authors from around the world tackle topics such as international law, patent law, green trade marks, copyright law, and trade secrets law. The research handbook also considers larger public policy issues in respect of climate finance, innovation law and policy, government procurement, standard-setting, and competition law. This collection also considers climate policy in particular contexts—such as smart grid deployment; energy; transportation; food; and natural resources.

Since the establishment of the United Nations Framework Convention on Climate Change 1992, and the development of the Kyoto Protocol to the United Nations Framework Convention on Climate Change 1997, there has been discussion about technology transfer.¹⁷⁴ At successive international climate conferences, there has been unresolved debates over the proper relationship between intellectual property, technology transfer, and climate change. The United States, the European Union, and key developed states have pushed for high levels of intellectual property protection

¹⁶⁶Maskus and Okediji (2014, pp. 392–414).

¹⁶⁷Marrakesh Agreement Establishing the World Trade Organization, opened for signature 15 April 1994, 1867 UNTS 3 (entered into force 1 January 1995) annex 1C ('Agreement on Trade-related Aspects of Intellectual Property Rights'—TRIPS Agreement 1994).

¹⁶⁸Rimmer (2016, pp. 200–229).

¹⁶⁹Zhuang (2017, pp. 95–96).

¹⁷⁰Machnicka (2016, pp. 415–443).

¹⁷¹Delimatsis (2016).

¹⁷²Menell and Tran (2014).

¹⁷³Sarnoff (2015).

¹⁷⁴United Nations Framework Convention on Climate Change 1992, Opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

and enforcement in respect of clean technologies. The BASIC group of countries (Brazil, South Africa, India, and China) and the Group of 77 have advocated the need for intellectual property flexibilities in respect of green technologies. Least developed countries, small island states, and nations vulnerable to climate change have called for access to clean technologies, free of intellectual property constraints and restrictions.

In the face of disagreement over text on intellectual property, the Copenhagen Accord 2009 put forward a technology mechanism—the Climate Technology Centre and Network.¹⁷⁵ The Cancún Agreements 2010 helped clarify the establishment of a new Climate Technology Centre and Network.¹⁷⁶ There was further debate over intellectual property, development, and technology transfer in 2011—but that was not crystallized in the Durban Decisions 2011.¹⁷⁷ After the Doha Climate Gateway 2012, the UNFCCC Climate Technology Centre and Network was formally established, with the United Nations Environment Programme winning the competition to host the Centre.¹⁷⁸ The Warsaw Opportunity 2013 saw further inconclusive discussions over intellectual property.¹⁷⁹ The United Nations Climate Summit 2014 and the Lima Call to Climate Action 2014 sought to prepare the framework for the Paris negotiations.¹⁸⁰

There was significant debate over intellectual property, technology, and finance in the Paris negotiations. However, it proved to be difficult to reach consensus on the final text between the various nations involved in the discussions. The Paris Agreement 2015 notes that countries should take ‘full account of the specific needs and special situations of the least developed countries with regard to funding and transfer of technology.’¹⁸¹ There is text on technology transfer and climate finance—although no direct discussion of intellectual property rights. Some have been critical of the regime on technology transfer. Margaretha Wewerinke-Singh and Curtis Doebbler lament: ‘Once again, it would appear the Paris Agreement adds little to the obligations on technology transfer that already exist in the UNFCCC.’¹⁸²

¹⁷⁵Copenhagen Accord 2009, UN Doc. FCCC/KP/CMP/2009/L.9 (December 18, 2009).

¹⁷⁶Cancún Agreements 2010, Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention, CP.16, http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf and Outcome of the Work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its Fifteenth Session, -/CMP.6 http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_kp.pdf.

¹⁷⁷Durban Decisions 2011, CP.17, http://unfccc.int/meetings/durban_nov_2011/meeting/6245/php/view/decisions.php.

¹⁷⁸Doha Climate Gateway 2012, COP. 18/CM 18, https://unfccc.int/key_steps/doha_climate_gateway/items/7389.php.

¹⁷⁹Warsaw Opportunity 2013, CP. 19, http://unfccc.int/meetings/warsaw_nov_2013/meeting/7649.php.

¹⁸⁰United Nations Climate Summit 2014, New York, 23 September 2014, <http://www.un.org/climatechange/summit/2014/09/2014-climate-change-summary-chairs-summary/> and <http://www.un.org/climatechange/summit/action-areas/> and Lima Call for Climate Action 2014, CP. 20, http://unfccc.int/meetings/lima_dec_2014/meeting/8141/php/view/decisions.php.

¹⁸¹The Paris Agreement 2015.

¹⁸²Wewerinke-Singh and Doebbler (2016, pp. 1486–1517 at 1510).

Wei Zhuang has noted that were efforts in COP22 to reinforce the technology mechanism:

With a view to enhancing the development and transfer of EST's, the COP-22 adopted several decisions in Marrakesh in November 2016, including (1) Decision - /CP.22 Enhancing climate technology development and transfer through the Technology Mechanism and (2) Decision - /CP.22: Linkages between the Technology Mechanism and the Financial Mechanism of the Convention. Meanwhile, on 16 November 2016, Canada, Denmark, the European Union, Germany, Italy, Japan, Korea, Switzerland and the United States pledged more than \$23 million to support technology transfer in developing countries through Climate Technology Centre and Network with a view to accelerating the development and transfer of innovative ESTs.¹⁸³

The Marrakech Action Proclamation for our Climate and Sustainable Development 2016 stressed: 'We call for an increase in the volume, flow and access to finance for climate projects, alongside improved capacity and technology, including from developed to developing countries.'¹⁸⁴

At the Bonn Climate Conference in 2017 (COP 23), there was a review of the effective implementation of the Climate Technology Centre and Network.¹⁸⁵ There was a decision on enhancing climate technology development and transfer through the Technology Mechanism.¹⁸⁶

Nobel Laureate Joseph Stiglitz and his colleagues have contended that there should be greater efforts to reform intellectual property law, policy, and practice to address sustainable development goals.¹⁸⁷ The researchers highlight global issues—such as food security, access to medicines, education, and climate change. Stiglitz and his colleagues conclude:

Developing countries have made many attempts in recent years to put the relationship between IPR and climate change on the table. Although the limited evidence does not yet appear to demonstrate general negative impacts on access, evidence that IPR may be used to price developing countries out of cutting edge climate research should be taken seriously by policymakers concerned to enhance the learning capacities of developing economies.¹⁸⁸

¹⁸³Zhuang (2017, pp. 95–96).

¹⁸⁴Marrakech Climate Change Conference, COP 22, November 2016, http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567/php/view/decisions.php#c Marrakech Action Proclamation for Our Climate and Sustainable Development 2016, http://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/marrakech_action_proclamation.pdf and the Marrakech Partnership for Global Climate Action 2016 http://unfccc.int/files/paris_agreement/application/pdf/marrakech_partnership_for_global_climate_action.pdf.

¹⁸⁵Bonn Climate Change Conference, COP23, November 2017, http://unfccc.int/meetings/bonn_nov_2017/session/10376/php/view/decisions.php and Bonn Climate Change Conference, Review of the effective implementation of the Climate Technology Centre and Network, 14/COP23.

¹⁸⁶Bonn Climate Change Conference, COP23, November 2017, http://unfccc.int/meetings/bonn_nov_2017/session/10376/php/view/decisions.php and Bonn Climate Change Conference, Enhancing climate technology development and transfer through the Technology Mechanism, 15/COP23.

¹⁸⁷Baker et al. (2017).

¹⁸⁸Ibid., p. 53.

Stiglitz and his collaborators stress that ‘the design of IPR regimes—in developed and developing countries alike—will be an important factor in the success or failure of countries in meeting these objectives [in respect of the United Nations Sustainable Development Goals].’¹⁸⁹

5 Chapter Outline

Building upon past work,¹⁹⁰ this collection is concerned with the inter-relationship between intellectual property, climate change, and human rights. In other words, it is focused upon questions about climate justice relating to research and development, technology, and innovation. The International Council on Human Rights Policy has highlighted the how questions about access to clean technologies are bound up with issues of climate ethics, human rights, and climate justice.¹⁹¹ The Council highlights the need for technology transfer:

The impacts of climate change call for access to technologies, in particular in places where these impacts will wreak havoc with current livelihoods, dwelling places, food and water sources and economic systems. These technological needs, broadly speaking, involve ‘adaptation’ to climate change. However, climate change also involves another urgent set of technology needs to mitigate its effects.¹⁹²

The Council suggests that ‘human rights can provide an effective means of focusing and prioritizing areas for climate change intervention’.¹⁹³ Indeed, the Council stresses that ‘human rights offer a strong ethical and legal basis from which technology transfer might be approached.’¹⁹⁴ The Council contends: ‘The transfer of clean energy-generating and energy efficiency technologies, including know how within a non-prohibitive IP regime must be seen as indispensable to the satisfaction of basic human rights in a climate constrained future.’¹⁹⁵

This collection considers the outcomes of the Paris Agreement 2015—particularly focusing upon intellectual property, technology transfer, and innovation. Many of the contributions evolved out of a 2015 research workshop held in Canberra on ‘The Road to Paris: Intellectual Property and Climate Change.’ The presenters had the opportunity to revise their work in light of the final text of the Paris Agreement 2015. Further contributions were sought to provide an inclusive and diverse coverage of the field of intellectual property, human rights, and climate change.

¹⁸⁹Ibid., p. 49.

¹⁹⁰Rimmer (2011).

¹⁹¹The International Council on Human Rights Policy (2016, pp. 126–157).

¹⁹²Ibid., p. 132.

¹⁹³Ibid., p. 132.

¹⁹⁴Ibid., p. 128.

¹⁹⁵Ibid., p. 155.

Part I focuses upon the framework of international climate law. Chapter 2 considers the treatment of intellectual property, technology transfer and climate change under the Paris Agreement 2015. Chapter 3 by Felicity Deane and Evan Hamman explores the Paris Agreement 2015, climate finance and transparency. Chapter 4 by Anna Huggins and Bridget Lewis focuses upon the Paris Agreement 2015, sustainable development and human rights. Chapter 5 by Alexandra Phelan considers the nexus between intellectual property, climate change, and human rights—particularly focusing upon the right to health and access to medicines.

Part II considers patent law, and its application in respect of environmentally sound technologies. In Chap. 6, Heather Ann Forrest and Peter Lawrence consider intellectual property rights and climate change in light of larger questions about intergenerational justice. In Chap. 7, Kane Wishart explores intellectual property management—focusing upon Australia’s clean technology sector. In Chap. 8, Kanchana Kariyawasam and Matthew Tsai investigate intellectual property, climate change and technology transfer in South Asia. Chapter 9 considers the complexities of patent law, climate change, and geoengineering.

Part III focuses upon trademark law and related rights—looking at issues such as eco-labels, sustainable design and greenwashing. In Chap. 10, Margaret Chon explores trademark goodwill and green global value networks. In Chap. 11, Kim Sheehan examines the pernicious problem of greenwashing—misleading and deceptive representations made about the environmental qualities of goods and services. In Chap. 12, Maree Sainsbury considers green and sustainable design, and the role of designs law in providing protection for such works. In Chap. 13, Tim Hollo relies upon empirical research in his analysis of the role of creative artists and copyright industries in climate change action.

Part IV focuses upon privacy and trade secrets. In Chap. 14, Bruce Baer Arnold considers the protection of personal privacy in an era of smart grids and surveillance. In Chap. 15, Darshana Sumanadasa considers some of the conflicts over confidential information and trade secrets relating to green technologies.

Part V explores open access, open data, open education, and open innovation in the context of climate change. It considers whether the principles and practices of the open source revolution can be applied to renewable energy, environmentally sound technologies, and green technologies. In Chap. 16, Angela Daly and Caitlin Archbold consider community renewable energy. They consider the prospects for energy democracy in light of the Paris Agreement 2015. Building upon his theoretical work on information environmentalism, Robert Cunningham examines the case of climate change and open data in Chap. 17. In Chap. 18, Bernadette Hyland-Wood considers open government data—particularly relating to the environment and the climate. Chapter 19 provides a case study of Tesla, and examines how the company has used open licensing to make its technologies more accessible.

Part VI considers plant breeders’ rights, food security, access to genetic resources, and Indigenous Knowledge. An important thread of this part is the focus upon intellectual property, access to genetic resources, informed consent, and benefit-sharing. In Chap. 20, Hope Johnson analyses the Paris Agreement 2015’s

research and development paradigm for climate-smart agriculture In Chap. 21, Charles Lawson explores the fraught relationship between intellectual property, biodiversity, and climate change. In Chap. 22, Rowena Maguire looks at Benefit Sharing under the REDD + Mechanisms, considering in particular the implications for women. Chapter 23 looks at the use of atmospheric trust litigation in Alaska as a means of protecting Indigenous rights and traditional knowledge, as well as a method of promoting intergenerational justice.

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Part I
International Law

Chapter 2

The Paris Agreement: Intellectual Property, Technology Transfer, and Climate Change



Matthew Rimmer

Abstract In the lead up to the Paris Agreement 2015, the United Nations Secretary-General Ban Ki-moon has commented: ‘Intellectual property, technology transfer, and financing are among a wide range of topics that must be addressed in the context of climate change and sustainable development’. The Paris Climate Talks considered a number of issues related to intellectual property, technology transfer, and finance. Draft Article 56.3 laid down a number of options. The first option suggested a number of possibilities to facilitate technology transfer. Item A suggested that developed countries ‘provide financial resources to address barriers caused by intellectual property rights (IPRs) and facilitate access to and the deployment of technology, including inter alia, by utilizing the Financial Mechanism and/or the establishment of a funding window under the Green Climate Fund/the operating entities of the Financial Mechanism.’ Item B called for ‘an international mechanism on IPRs to be established to facilitate access to and the deployment of technology to [developing country Parties].’ Item C asked for other arrangements to be established to address intellectual property rights—such as ‘collaborative research and development, shareware, commitments related to humanitarian or preferential licensing, fully paid-up or joint licensing schemes, preferential rates and patent pools.’ Item D suggested that ‘funds from the Green Climate Fund will be utilized to meet the full costs of intellectual property rights (IPRs) of environmentally sound technologies and know-how and such technologies will be provided to developing country Parties free of cost in order to enhance their actions to address climate change and its adverse impacts.’ The second option was that ‘Parties recognize that IPRs create an enabling environment for the promotion of technology innovation in environmentally sound technologies.’ The third option favoured by developed countries is that ‘IPRs are not to be addressed in this agreement.’ The fourth option was for ‘Developed country Parties to make available Intellectual Property (IP) through multilateral institutions as public good, through purchase of intellectual property.’ The Paris Climate Talks saw a number of announcements on innovation—including Mission Innovation, and the

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International Solar Alliance. At the Paris talks, Indian Prime Minister Narendra Modi contended that: ‘Our innovation initiative should be driven by public purpose, not just market incentives, including on IP.’ He emphasized that: ‘We need to scale up the Green Climate Fund that will improve access to technology and intellectual property.’ For his part, US President Barack Obama flagged that he was willing to engage in a dialogue over matters of technology transfer. In the end, there was text on technology transfer in the Paris Agreement 2015—but no substantive text on intellectual property and climate change.

Keywords The Paris Agreement 2015 • Intellectual property • Technology transfer • Climate change • Green Climate Fund • Climate finance
UNFCCC Climate Technology Centre and Network • International law
Diplomacy • Open Innovation • Commons

1 Introduction

In the preparations for the Paris Agreement 2015,¹ the United Nations Secretary-General Ban Ki-moon commented: ‘Intellectual property, technology transfer, and financing are among a wide range of topics that must be addressed in the context of climate change and sustainable development’.²

There has been a longstanding debate over patent law, the environment, and climate change in international climate talks.³

At the Copenhagen Climate Talks, developed countries pushed for strong protection and enforcement of intellectual property rights. Developing countries put forward a number of options—including technology transfer; public sector licensing, patent pools, differential pricing, and shared licensing; patent exclusions and exemptions; compulsory licensing; and a technology mechanism. Least developed countries, small island states, and nations vulnerable to climate change asked for intellectual property to be placed in the public domain.⁴ There has been a lack of consensus in respect of these options in respect of intellectual property.

In response to a proposal from India and the UK Carbon Trust, the Copenhagen Accord 2009 laid the framework for the establishment of the UNFCCC Climate Technology Centre and Network.⁵ After further discussion at subsequent climate talks, the United Nations Environment Programme was selected to be the host of the

¹Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

²The Tribune India (2014).

³Rimmer (2014).

⁴Rimmer (2018); and Antons and Logan (2018).

⁵Copenhagen Accord 2009, UN Doc. FCCC/KP/CMP/2009/L.9 (December 18, 2009).

Climate Technology Centre. The Technology Mechanism is now operational.⁶ There have been concerns, though, that fossil fuel interests have infiltrated the decision-making processes of the UNFCCC Climate Technology Centre and Network.⁷

In addition to the UNFCCC Climate Technology Centre and Network, the international climate talks established the Green Climate Fund. Amongst other things, the Green Climate Fund was designed to provide financial support for projects, programme, policies, and other activities in developing countries, including in relation to technology development and transfer.⁸ There have been worries, though, about corporate capture of the Green Climate Fund.⁹

There has been further inconclusive debate over policy settings in respect of intellectual property and climate change during the negotiations at the Cancun Agreements 2010, the Durban Decisions 2011, the Doha Climate Gateway 2012, the Warsaw Opportunity 2013, the United Nations Climate Summit 2014, and the Lima Call to Climate Action 2014.¹⁰

There has been a growing academic literature on the complex relationship between intellectual property and climate change.¹¹ Eric Lane has considered intellectual property litigation in respect of green technologies.¹² Professor Abbe Brown has explored the topic of intellectual property and environmental technologies.¹³ Peter Menell and Sarah Tran have collected key works in the field of intellectual property, innovation, and the environment.¹⁴ Professor Joshua Sarnoff has highlighted the importance of the debate over intellectual property, clean technologies, and climate change.¹⁵ He commented: ‘Over the next few decades,

⁶UNFCCC Climate Technology Centre and Network <https://www.ctc-n.org/> Accessed 1 May 2018.

⁷Slezak (2017), Corporate Accountability, and others (2017).

⁸Green Climate Fund, <http://www.greenclimate.fund/home> Accessed 1 May 2018.

⁹Slezak (2017), Corporate Accountability, and others (2017).

¹⁰Cancún Agreements 2010, Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention, CP.16, http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf and Outcome of the Work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its Fifteenth Session, -/CMP.6 http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_kp.pdf; Durban Decisions 2011, CP.17, http://unfccc.int/meetings/durban_nov_2011/meeting/6245/php/view/decisions.php; Doha Climate Gateway 2012, COP. 18/CM 18, https://unfccc.int/key_steps/doha_climate_gateway/items/7389.php; Warsaw Opportunity 2013, CP. 19, http://unfccc.int/meetings/warsaw_nov_2013/meeting/7649.php; United Nations Climate Summit 2014, New York, 23 September 2014, <http://www.un.org/climatechange/summit/2014/09/2014-climate-change-summary-chairs-summary/> and <http://www.un.org/climatechange/summit/action-areas/>; and Lima Call for Climate Action 2014, CP. 20, http://unfccc.int/meetings/lima_dec_2014/meeting/8141/php/view/decisions.php.

¹¹Rimmer (2011a).

¹²Lane (2011).

¹³Brown (2013).

¹⁴Menell and Tran (2014).

¹⁵Sarnoff (2016a, pp. 1–2).

tens of trillions of dollars will be needed for the development and dissemination of a wide range of new technologies to upgrade infrastructure and to mitigate and adapt to the effects of climate change (climate change technologies).¹⁶ He observed that there is a need to consider the interactions of climate change with the global intellectual property, innovation, human rights and international trade systems. Wei Zhuang has examined intellectual property and climate change, in light of the TRIPS Agreement 1994 and international trade law.¹⁷ Dean Baker, Arjun Jayadev and Joseph Stiglitz have considered the linkages between intellectual property, innovation, sustainable development, and climate change.¹⁸ Dalindyabo Shabalala has also highlighted development issues in the context of debates over intellectual property and climate change.¹⁹ International climate lawyers have also considered intellectual property as part of the larger matrix of international climate law.²⁰

There was significant debate over intellectual property, finance, and technology transfer at the Paris international climate talks.²¹ Robert N. Stavins from the Kennedy School of Government at Harvard University observed that intellectual property was ‘a very contentious issue in the international climate negotiations leading up to the summit in Paris in December.’²² He noted that India led a push for technology transfer of intellectual property rights for clean energy technologies to developing nations to accelerate their diffusion. Professor Stavins questioned this strategy: ‘In the long term, if there are no property rights, it will destroy the incentive to develop the next generation of technologies.’²³ By contrast, Adam Jaffe, the director of the research foundation Motu Economic and Public Policy Research in Wellington, New Zealand, argued that technology diffusion is not yet a problem: ‘Today the problem is inventing the thing.’²⁴ He suggested that finance and know-how are bigger obstacles to the spread of clean energy systems in developing countries. Professor Bronwyn Hall of University of California, Berkeley and Christian Helmerts of the Center for Economic Performance in London, argued that ‘patent protection may not be the optimal instrument for encouraging innovation.’²⁵

This analysis will consider a number of inter-related issues over intellectual property, technology transfer, and climate change in respect of the Paris Agreement 2015. Part 2 looks at the option of climate finance. Part 3 explores the operation of the Green Climate Fund. Part 4 explores the discussion of the creation of an Intellectual Property Mechanism under the Paris Agreement 2015. Part 5 explores the option of Open Innovation. Part 6 engages in an analysis of the promotion of

¹⁶Ibid.

¹⁷Zhuang (2017).

¹⁸Baker et al. (2017).

¹⁹Shabalala (2016).

²⁰Zahar et al. (2013), Farber and Petters (2016), Klein et al. (2017).

²¹Porter (2016).

²²Ibid.

²³Ibid.

²⁴Ibid.

²⁵Ibid.

intellectual property as Public Goods in the international climate talks. Part 7 discusses Intellectual Property Promotion and Enforcement under the Paris Agreement 2015. Part 8 evaluates the ‘No Text’ position of a number of nation states, business associations, and multinational companies. Part 9 provides an analysis of the text of the Paris Agreement 2015 dealing with technology transfer. The conclusion considers the future of the debate over intellectual property, technology transfer and climate change under the framework of the Paris Agreement 2015.

2 Climate Finance

One option put forward was that developed countries ‘provide financial resources to address barriers caused by intellectual property rights (IPRs) and facilitate access to and the deployment of technology, including inter alia, by utilizing the Financial Mechanism and/or the establishment of a funding window under the Green Climate Fund/the operating entities of the Financial Mechanism [and the Climate Resilience and Sustainable Development Mechanism].’²⁶

In its submissions during the Durban debate, China stressed the nexus between intellectual property, finance, and technology.²⁷ China commented: ‘The effective and timely fulfillment by developed countries of their commitments on finance, technology and capacity building support is crucial for developing countries to enhance their actions.’²⁸ China emphasized: ‘In this regard, there should be a clear roadmap for developed countries to ratchet up their financial support in the period of 2013–2020 in order to meet the goal of providing 100 billion dollars per year by 2020 and the technology related IPRs shall be appropriately addressed.’²⁹

While the final text of the Paris Agreement 2015 does address climate finance, it does not clearly link that issue to intellectual property. Article 9 of the Paris Agreement 2015 deals with the topic of climate finance. Article 9.1 addresses the provision of finance resources by developed country parties to assist developing country parties with respect to both climate mitigation and adaptation. Article 9.2 notes that other countries are encouraged to provide support. Article 9.3 emphasizes that developed country parties should continue to take the lead in mobilizing climate finance. Article 9.4 focuses on the subject of finance and prioritization. Articles 9.5–9.7 consider information and assessment. Article 9.8 deals with institutions—the financial mechanism, the adaptation fund, and the Standing Committee on Finance. Article 9.9 deals with access to climate finance. Jorge

²⁶Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

²⁷China (2013).

²⁸Ibid.

²⁹Ibid.

Gastelumendi and Inka Gnittke provide a detail analysis of these measures, and some of the issues which were left out of the final text in the negotiations.³⁰

The Carbon Brief provided a summary of the treatment of climate finance in the agreement:

The agreement places a legal obligation on developed countries to continue to provide climate finance to developing countries. It also encourages other countries to provide support voluntarily — a compromise between the highly polarized positions that have taken centre stage at the negotiations.³¹

Notably, many of the details were moved out of the agreement and placed into the more flexible decisions. Theoretically, climate finance could be deployed in certain circumstances to address intellectual property and clean technologies.

The South Centre observed of the Paris Agreement 2015 negotiations on climate finance:

Prior to the final outcome in the Paris Agreement, the thrust of the developed countries position on the issue of finance was to increase the scope of countries (to include developing countries) who should be ‘donors’ of climate finance... Many developing countries including the LMDC preferred the reference to the provision of financial resources by developed countries instead of the focus on the “mobilisation” of climate finance. The Paris Agreement provides for both the provision of support by developed countries and the mobilisation of climate finance.³²

The South Centre also considered the text on climate finance, which was excluded from the final deal.

Ara Azad and Ava Azad have considered the relationship between energy access, climate justice, and financing innovation.³³ They contend: ‘Shifting considerations from domestic funding schemes to international ones, a climate-just future must involve the funding by developed countries of developing countries’ energy and environmental security in a manner that protects developing countries’ sovereignty and flexibility while still addressing their unique needs’.³⁴

There has been a boom in clean energy investment in the wake of the Paris Agreement 2015—with China leading the way.³⁵ There remains, though, some climate finance gaps.

At the end of 2017, the new United Nations Secretary-General Antonio Guterres has called for greater support for climate finance.³⁶ He stressed: ‘Finance could be, should be and will be the decisive factor—the difference between winning and losing the war.’³⁷ Guterres stressed that ‘the opportunities for productive and

³⁰Gastelumendi and Gnittke (2017, pp. 239–257).

³¹The Carbon Brief (2015).

³²Raman (2016).

³³Azad and Azad (2016, pp. 85–123); Abate (2016).

³⁴Azad and Azad (2016, p. 121); Abate (2016).

³⁵Bloomberg New Energy Finance (2018).

³⁶Guterres (2017).

³⁷Ibid.

profitable, low-carbon, climate-resilient investment are vast.’³⁸ The United Nations Secretary-General noted: ‘Renewables are now cheaper than coal-powered energy in dozens of developed and developing countries, creating the basis for sustainable energy for all.’³⁹ He was also concerned about the distortions in state subsidies for fossil fuels: ‘It is also a fact that fossil fuels remain heavily subsidized—meaning we are investing in our own doom.’⁴⁰ Guterres emphasized: ‘We don’t have to wait to run out of coal and oil to end the age of fossil fuels.’⁴¹ He called for greater investment in clean technologies: ‘We need policy makers and central banks, stock exchanges, pension funds, rating agencies and all financial actors to align investments with the needs of climate action and sustainable development.’⁴²

3 Green Climate Fund

One option recommended patent buy-outs by the Green Climate Fund: ‘In accordance with Article 4.3, 4.5 and 4.7 of the Convention, funds from the Green Climate Fund will be utilized to meet the full costs of intellectual property rights (IPRs) of environmentally sound technologies and know-how and such technologies will be provided to developing country Parties free of cost in order to enhance their actions to address climate change and its adverse impacts.’⁴³

It is notable that India has been vocal supporting the use of financial resources to provide access to clean technologies. Prakash Javadekar, India’s Minister for Environment, Forests and Climate Change, has highlighted the need to address intellectual property, finance, and technology transfer.⁴⁴ He commented that there were some issues that could not be wished away:

The first issue is cost. Who will pay the extra cost of solar power, for example? In countries (such as India) where indirect taxation is higher, the poor will end up paying more. So the world must come up with real contributions to the Green Climate Fund (GCF), which now has pledges worth a little over US\$10 billion.

The second issue is technology. New technologies can bring down costs. We understand the need to protect IPR (Intellectual Property Rights). So we are telling the industrialised world, pay your own companies for IPR from GCF. We must get technologies free of IPR cost.⁴⁵

³⁸Ibid.

³⁹Ibid.

⁴⁰Ibid.

⁴¹Ibid.

⁴²Ibid.

⁴³Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

⁴⁴Gupta (2015).

⁴⁵Ibid.

India warned that the climate talks in Paris would hinge upon finance.⁴⁶ India commented: ‘If the developed world is ready to provide technology free of IPRs, it can be a win-win situation for all. We’ll walk our own path on INDCs (Intended Nationally Determined Contributions) but if technology free of IPRs is provided, we will walk the extra mile.’⁴⁷

An overview of the Paris International Climate Talks chartered the geopolitics in respect of intellectual property, finance, and climate change: ‘Parties are debating how to create enabling environments in developing countries and remove barriers to technology development and transfer.’⁴⁸ The LMDCs, China, and other developing countries call for specific arrangements and funding to facilitate access to intellectual property. They also wanted scope for technology transfer in the Green Climate Fund. AOSIS called to link technology transfer and development under the Paris Agreement 2015 ‘to existing institutions under the financial mechanism’.⁴⁹

In his speech to the Paris Climate Summit, India’s Prime Minister Narendra Modi directly addressed the topic of intellectual property and climate change. He emphasized:

Developed countries must fulfill their responsibility to make clean energy available, affordable and accessible to all in the developing world. This is in our collective interest. So, we look to the developed countries to mobilize 100 billion US Dollars annually by 2020 for mitigation and adaptation in the developing countries. They must fulfill their commitment in a credible, transparent and meaningful manner. Energy is a basic human need. So, we need an ambitious technology initiative, driven by a public purpose, not just market incentives. This includes intellectual property. For this, we need to scale up Green Climate Fund that will improve access to technology and intellectual property.⁵⁰

Modi emphasized in his speech: ‘We will succeed if we have the wisdom and courage to craft a genuinely collective partnership that balances responsibilities and capabilities with aspirations and needs.’⁵¹

The South Centre commented on the ambition of India and others to bring together technology and finance: ‘The real value for developing countries is the establishment of the technology framework that includes ‘the assessment of technologies that are ready for transfer’ (as reflected in paragraph 68 of the COP 21 decision).’⁵² In addition, the South Centre was hopeful that ‘there is now a link established between the Technology Mechanism and the Financial Mechanism to allow for collaborative approaches in R and D and for facilitating access to technologies, which somewhat reflects the call by India to provide financial resources to

⁴⁶Climate Home (2014).

⁴⁷Live Mint (2016).

⁴⁸European Parliament, Directorate-General for Internal Policies (2014).

⁴⁹Ibid.

⁵⁰Modi (2015).

⁵¹Ibid.

⁵²Raman (2016).

address barriers related to IPRs and facilitate access to technologies.⁵³ Nonetheless, the South Centre recognised: ‘The IPR issue has been a long-standing battle between developed and developing countries under the UNFCCC process, with strong opposition by developed countries led by the US in particular, to even mention the word “IPRs”’.⁵⁴

In the lead-up to COP23, the Director General of the Confederation of Indian Industry (CII) Chandrajit Banerjee has emphasized the need for Indian Government intervention for ‘the availability of low-emission technology free of intellectual property rights, which is an essential requirement for industries to reduce greenhouse gases’.⁵⁵

Despite the lobbying and pressure from India and developing countries, the Green Climate Fund does not seem to have engaged with the question of intellectual property. The Report of the Green Climate Fund in 2016 shows some consideration of technology development and transfer—but no specific action on intellectual property.⁵⁶ There is some discussion about the interaction between the finance mechanism and the technology mechanism—but the role of intellectual property remains obscure.

4 Intellectual Property Mechanism

An ambitious option proposes: ‘An international mechanism on IPRs to be established to facilitate access to and the deployment of technology to [developing country Parties] [Parties not included in annex X].’⁵⁷ This option is an interesting one. Thus far, the topic of intellectual property has been dealt with as a subset of other issues—such as technology transfer, finance, and innovation. As a result, the issue of intellectual property has not necessarily been addressed in an independent and dedicated fashion in the international climate talks.

Ahmed Abdel Latif of the International Centre for Trade and Sustainable Development and the International Renewable Energy Agency (IRENA) has maintained: ‘Ultimately, intellectual property rights should be seen in a broad context of appropriate policies, adequate institutions, and resources that both encourage low-carbon innovation and ensure that its benefits are widely diffused’.⁵⁸ In his view, ‘The importance of intellectual property rights should be neither overestimated nor underestimated’.⁵⁹ Latif acknowledged that ‘intellectual property

⁵³Ibid.

⁵⁴Ibid.

⁵⁵Goswami (2017).

⁵⁶Green Climate Fund (2016).

⁵⁷Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

⁵⁸Latif (2015).

⁵⁹Ibid.

rights cannot be ignored'.⁶⁰ Nonetheless, he maintained that the discussion of the issues must be structured and incremental. There was a need, in his view, to focus on 'practical measures and initiatives', 'empirical evidence' and 'concrete cases'.⁶¹ Latif feared that, without such a debate, 'agreement on low-carbon technologies and intellectual property rights is likely to remain elusive, whether at the WTO or the UN Framework Convention on Climate Change'.⁶²

In a second reply, Latif stressed: 'Conditions differ significantly from country to country and from one economic sector to another'.⁶³ He noted: 'Such diversity suggests that a broad range of options and measures should be considered for addressing the linkages between intellectual property and climate change, but that no "silver bullet" will address all the issues'.⁶⁴ Latif argued: 'The problems that surround intellectual property and climate can only be addressed through an incremental, bottom-up approach based on empirical evidence about access to clean-energy technology in specific countries and economic sectors'.⁶⁵

Latif maintained: 'In discussions of climate change and intellectual property rights, it's important to maintain a focus on the actual views and needs of technology recipients in the Global South'.⁶⁶ He said: 'The Climate Technology Centre and Network, an entity established under the auspices of the United Nations to accelerate the transfer and diffusion of climate change technologies to developing countries, has received more than 30 requests for technical assistance from developing countries—and none of these requests has concerned intellectual property rights'.⁶⁷ Latif hoped: 'If such requests emerge in the future, the Centre and Network should be in a position to assist countries in a pragmatic, solution-oriented manner'.⁶⁸ He observed 'Such assistance should ensure that nations can avail themselves of all options available under existing international intellectual property rules'.⁶⁹

Professor Carlos Correa has recommended a number of strategies.⁷⁰ He has maintained 'expanding low-carbon energy systems in developing countries requires that relevant technologies be diffused in a timely fashion'.⁷¹ Correa suggested that governments could and should support 'the development of technologies as a public good'.⁷² He has called upon patent offices to apply rigorous standards to the

⁶⁰Ibid.

⁶¹Ibid.

⁶²Ibid.

⁶³Ibid.

⁶⁴Ibid.

⁶⁵Ibid.

⁶⁶Ibid.

⁶⁷Ibid.

⁶⁸Ibid.

⁶⁹Ibid.

⁷⁰Correa (2015).

⁷¹Ibid.

⁷²Ibid.

assessment of patent applications. Moreover, Correa called for the use of compulsory licensing to provide access to patented inventions in respect of clean technologies.

In his second rejoinder, Carlos Correa emphasized that ‘intellectual property rights are a *problem* for developing countries seeking to gain access to low-carbon energy technologies.’⁷³ He commented: ‘It’s not constructive for developed countries to exhibit such unwillingness to address in international fora (whether the World Trade Organization or the UN Framework Convention on Climate Change) issues related to intellectual property and climate change’.⁷⁴ Correa stressed: ‘The message their unwillingness sends is that the *status quo* in relation to intellectual property is not debatable and that the legitimate concerns of developing countries are not even worthy of discussion.’⁷⁵ He maintained that it was inappropriate for developed countries to deny a problem exists: ‘But a problem *does* exist—insofar as the system of private appropriation of innovations may delay for 20 years (the normal duration of a patent) the introduction of new technologies into developing countries (the majority of the world).’⁷⁶ He insisted: ‘Climate change is one of the greatest challenges that humanity has faced and addressing it requires building a long-term vision grounded in equity and solidarity.’⁷⁷ He stressed: ‘A responsible international community cannot simply avoid the problems that surround intellectual property rights and climate change; rather, nations should encourage a serious discussion of these issues and make sure to involve all stakeholders, including in particular scientists and civil society.’⁷⁸

In his third piece, Correa concludes: ‘The international community will do little to address the problems associated with intellectual property and green technology if these problems are dismissed or minimized.’⁷⁹ He fears that ‘this could make it much harder to achieve goals for climate mitigation and adaptation.’⁸⁰ Correa maintains that ‘it would be wise if all countries, developed and developing alike, agreed to concrete actions that removed actual and potential obstacles to the diffusion of green technologies.’⁸¹ Correa stressed that ‘intellectual property rights by their very nature confer on private firms the power to decide who may use a technology and under what conditions’.⁸² He warned: ‘This power must be subordinated to a global interest—that of achieving environmental sustainability for the entire planet.’⁸³

⁷³Ibid.

⁷⁴Ibid.

⁷⁵Ibid.

⁷⁶Ibid.

⁷⁷Ibid.

⁷⁸Ibid.

⁷⁹Ibid.

⁸⁰Ibid.

⁸¹Ibid.

⁸²Ibid.

⁸³Ibid.

Correa has since become the Executive Director of the South Centre—a Geneva-based think-tank and intergovernmental organisation, representing developing countries.

Professor Frederick Abbott has drawn comparisons between the debate over access to essential medicines, and the discussion in respect of clean technologies.⁸⁴ He noted that it is ‘an important question is whether intellectual property will represent a meaningful obstacle to low- and middle-income countries as they seek to acquire the technologies necessary to reduce carbon emissions or mitigate the effects of climate change.’⁸⁵ Abbott said that ‘it is reasonable to assume that, going forward, low- and middle-income countries will face additional obstacles related to patents and other types of intellectual property.’⁸⁶ He noted a range of options—including compulsory licensing, government use, voluntary licensing, patent pools, and joint ventures. Abbott stressed that there was a need to consider other factors that could prevent access to clean technologies.⁸⁷ He has previously called for there to be a UNFCCC-WIPO-WTO Declaration on Intellectual Property and Climate Change—much like there was for the Doha Declaration on the TRIPS Agreement and Public Health 2001.

In his rejoinder, Frederick Abbott stressed: ‘An important issue to keep in mind when answering this question is that intellectual property rights bear on how capital will be aggregated to combat climate change.’⁸⁸ He noted: ‘For example, government subsidies play an important role in promoting innovation—and when governments provide funding for research and development, the public should be assured of access to the benefits that result.’⁸⁹ Abbott wondered: ‘But should research and development funded by the public in one country result in “free” access to technology’s benefits in other countries, regardless of their location on the development spectrum?’⁹⁰ He commented: ‘How should R&D costs be allocated fairly among nations?’⁹¹ Abbott noted that ‘history suggests a bit of skepticism regarding the idea that global public funding will adequately address climate change’.⁹² He said that essential ‘private-sector investment depends on incentives’.⁹³ In his view, ‘Patents allow above-market returns and thus are a means to attract investment to particular technologies or sectors.’⁹⁴ Nonetheless, he

⁸⁴Abbott (2015).

⁸⁵Ibid.

⁸⁶Ibid.

⁸⁷Ibid.

⁸⁸Ibid.

⁸⁹Ibid.

⁹⁰Ibid.

⁹¹Ibid.

⁹²Ibid.

⁹³Ibid.

⁹⁴Ibid.

commented that ‘patents aren’t something whose use should go unregulated—the public interest must be defended.’⁹⁵ Abbott said: One of the patent system’s main difficulties is that proponents of strong patent protection often portray patents as an untouchable property right’.⁹⁶ He argued that all forms of property are regulated.

Finally, Abbott promotes a competition approach to intellectual property and clean technologies: ‘With respect to climate change mitigation and alternative energy technologies, an active market for these technologies may be established if there is sufficient competition among privately developed technological solutions’.⁹⁷ He said: ‘This should limit opportunities for suppression or excessive pricing’.⁹⁸ Abbott warned: ‘If things seem to be otherwise, it’s important to ensure that competition law enforcement is robust enough to address the situation—and this includes ensuring that developing countries have sufficient resources to police against anticompetitive abuse.’⁹⁹ Abbott concluded: ‘In the end, the optimal approach may be for competitive private markets to operate alongside a publicly funded system for research, development, and technology transfer.’¹⁰⁰ He said: ‘Let a thousand technologies bloom.’¹⁰¹

There are clearly a diversity of possible models for an intellectual property mechanism in the international climate regime.

5 Open Innovation

Another key option calls for intellectual property sharing—‘Other arrangements to be established to address IPRs, such as collaborative research and development, shareware, commitments related to humanitarian or preferential licensing, fully paid-up or joint licensing schemes, preferential rates and patent pools.’¹⁰²

There has been a number of open source ventures in the field of renewable energy and clean technology (with mixed success).

The Eco-Patent Commons was established in January 2008.¹⁰³ David Kappos from IBM provided significant impetus for the project—until such time as he became the Director of the United States Patent and Trademark Office (USPTO). The organisation involved the pledge of about 100 patents by 11 companies—including Bosch, Dow, Fuji-Xerox, HP, IBM, Nokia, Pitney Bowes, Ricoh, Sony,

⁹⁵Ibid.

⁹⁶Ibid.

⁹⁷Ibid.

⁹⁸Ibid.

⁹⁹Ibid.

¹⁰⁰Ibid.

¹⁰¹Ibid.

¹⁰²Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

¹⁰³Rimmer (2011a, pp. 318–326).

Taisei and Xerox. There was high hopes that the Eco-Patent Commons would help accelerate the sharing of clean technologies.¹⁰⁴ The Environmental Law Institute became the host organisation in 2013. The Board said that the Eco-Patent Commons would cease operations—effective as of the 18 May 2016.¹⁰⁵ There seemed to be a failure of the Eco-Patent Commons to achieve a significant critical mass. Jorge Contreras, Christian Helmers, and Bronwyn Hall suggested that the Eco-Patent Commons suffered from a number of structural and organisational issues.¹⁰⁶ Moreover, there were issues in terms of the quality and value of the patents, and the utilisation of the patents. This does show how difficult it is to achieve economics of scale even in relation to commons projects.

Since its foundation in 2001, the Creative Commons movement has sought to apply open licensing strategies across an array of fields of cultural and scientific production.¹⁰⁷ The Creative Commons experimented with the GreenXchange in 2009 and 2010.¹⁰⁸ The project was designed to be a web-based marketplace where companies could collaborate and share intellectual property. However, this project does not seem to be currently active. The Creative Commons movement has also promoted open access, open data, and open education. Such models have been useful in respect of the dissemination of environmental and climate data and knowledge.

In the United States, a stand-out figure has been Elon Musk, the entrepreneur of Tesla, SolarCity, and SpaceX.¹⁰⁹ The entrepreneur has promoted an open innovation model in respect of electric vehicles, batteries, the Powerwall, the Powerpack, and the GigaFactory. On the 12th June 2014, Elon Musk, the chief executive officer of the electric car manufacturer, Tesla Motors, announced in a blog that ‘all our patents belong to you.’¹¹⁰ He explained that the company would adopt an open source philosophy in respect of its intellectual property in order to encourage the development of the industry of electric cars, and address the carbon crisis. Elon Musk made the dramatic, landmark announcement:

Yesterday, there was a wall of Tesla patents in the lobby of our Palo Alto headquarters. That is no longer the case. They have been removed, in the spirit of the open source movement, for the advancement of electric vehicle technology.¹¹¹

Elon Musk observed that ‘Tesla Motors was created to accelerate the advent of sustainable transport.’¹¹² He maintained: ‘If we clear a path to the creation of

¹⁰⁴See for instance Van Hoorebeek and Onzivu (2010).

¹⁰⁵Eco-Patent Commons (2016).

¹⁰⁶Contreras et al. (2018).

¹⁰⁷Stacey and Hinchcliff Pearson (2017).

¹⁰⁸Rimmer (2011a, pp. 327–332).

¹⁰⁹Vance (2015).

¹¹⁰Musk (2014). See also Musk (2015).

¹¹¹Ibid.

¹¹²Ibid.

compelling electric vehicles, but then lay intellectual property landmines behind us to inhibit others, we are acting in a manner contrary to that goal.’¹¹³ Elon Musk promised: ‘Tesla will not initiate patent lawsuits against anyone who, in good faith, wants to use our technology.’¹¹⁴ In his address, Elon Musk commented: ‘We believe that applying the open source philosophy to our patents will strengthen rather than diminish Tesla’s position in this regard.’¹¹⁵ In his address, Elon Musk emphasized the need to build clean technologies to address the problem of climate change. This statement has attracted a wide range of interest, because it raises important issues in respect of intellectual property; open source strategies; business; and innovation in clean technologies to address climate change.¹¹⁶

Notably, in the Paris Agreement 2015 discussions, Elon Musk played a significant role in the efforts to reconcile the positions of the United States and India over access to clean technology.¹¹⁷

There is a need to further experiment with models of Open Innovation in respect of clean technologies.¹¹⁸ The Eco-Patent Commons, the GreenXchange, and Elon Musk’s Open Innovation should be emulated and scaled up. In *Green Governance*, Burns Weston and David Bollier consider the rise of the commons movement globally—with specific reference to eco-commons.¹¹⁹ Weston and Bollier provided a fascinating case study of the Global Innovation Commons:

The idea behind the project is to let entrepreneurs and national governments query the database on a country-by-country basis to identify useful technologies that are in the public domain. When identified, these technologies for energy, water, and agriculture are prime candidates for being developed at lower costs than patented technologies.¹²⁰

Weston and Bollier comment: ‘Despite inevitable resistance, eco-digital commons will surge ahead because, consistent with human rights values, they empower people to take responsibility to achieve better, more responsive, and more flexible solutions in the face of costly and deteriorating performance by large-scale State and Market institutions’.¹²¹

There has been an interest in expanding co-operative solutions in respect of intellectual property and clean technology development.¹²² There has been discussion as to whether an open innovation model should be encouraged at a global level in international climate talks. Bassem Awad has argued that there should be a

¹¹³Ibid.

¹¹⁴Ibid.

¹¹⁵Ibid.

¹¹⁶For a substantive discussion, see Chapter 19 by Rimmer.

¹¹⁷Gore, Cohen, Shenk (directors), *Actual Films and Participant Media*, Paramount Pictures (2017), Gore (2017).

¹¹⁸Raiser et al. (2017).

¹¹⁹Weston and Bollier (2013).

¹²⁰Ibid., pp. 166–7.

¹²¹Ibid., p. 167.

¹²²Morales (2017).

formal collaborative mechanism for climate change technology.¹²³ He contends: ‘Green patent pledge mechanisms may provide policy makers with a new answer to the old concern of how to accelerate the transfer and dissemination of affordable climate-friendly technologies among developed and developing countries.’¹²⁴ This could be a promising policy solution.

6 Public Goods

A mooted option was for ‘Developed country Parties to make available Intellectual Property (IP) through multilateral institutions as public good, through purchase of IP.’¹²⁵ This would fit into a larger theoretical perspective about the importance of information environmentalism and the knowledge commons.¹²⁶

A number of developing countries and civil society organisations raised arguments about intellectual property and public goods. India, Progressive Latin American Countries, Like-Minded Developing Countries (LMDC), Least Developed Countries, Small Island States, and Countries Vulnerable to Climate Change were all keen to consider intellectual property in light of the larger public interest in access to clean energy technologies, and climate change.

The South Centre—a think-tank based in Geneva focused upon the concerns of developing countries—has also been active in discussions of intellectual property, clean energy, and climate change.¹²⁷ The South Centre observed of the Paris Agreement 2015 negotiations on intellectual property and technology transfer:

In the negotiations on technology transfer, the LMDC had called for the establishment of a global goal on the transfer of technologies by developed countries and know-how as well as for the provision of financial resources for collaborative research and development of environmentally sound technologies and enhancing accesses of developing countries to such technologies that match their technology needs.¹²⁸

Meenakshi Raman of the South Centre noted: ‘There was also a proposal from India for developed countries to provide financial resources to address barriers related to intellectual property rights (IPRs) and facilitate access to technologies.’¹²⁹ Moreover, Raman observed: ‘The African Group proposed a technology framework to be adopted that will provide direction and guidance in relation to technology assessments, including in identifying options for enhancing access and to address

¹²³Awad (2015).

¹²⁴Ibid.

¹²⁵Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

¹²⁶Cunningham (2014).

¹²⁷The South Centre, <https://www.southcentre.int/> and Raman (2016).

¹²⁸Raman (2016).

¹²⁹Ibid.

barriers.’¹³⁰ Developed countries opposed this cluster of proposals. The South Centre recommended: ‘For the developing countries, they should invoke the overall context of what will make a low carbon pathway a reality—finance, technology transfer, capacity building plus adaptation, loss and damage, all in context of sustainable development and poverty eradication.’¹³¹

In the lead-up to COP23, African civil society insisted that ‘the demand to Annex 1 countries should include development of green industries and initiatives in Africa, address challenges of intellectual property rights and limited financing hindering technology transfer.’¹³²

The Climate Action Network International—a large network of civil society climate organisations—has made a submission for the Paris Climate Talks, commenting:

The question of whether IPR can be a barrier to tech transfer has slowed progress at the TEC since its inception. Progress on the issue should be promoted, as a first step, by identifying existing programs and policies, especially in developed countries, on reducing intellectual property barriers, increasing access to, and reducing cost of, intellectual property protected knowledge and goods, enabling near term incremental innovation in developing countries and facilitating licensing, especially in developed countries.¹³³

The Climate Action Network has also promoted the use of open innovation and open source licensing.

Least developed countries, nations vulnerable to climate change, and small island states were particularly keen on viewing climate technology as part of the commons and public domain—as public goods to address climate adaptation, climate mitigation, and loss and damage.

7 Intellectual Property Promotion and Enforcement

Another option was focused upon intellectual property promotion and enforcement. It calls on ‘Parties to recognize that IPRs create an enabling environment for the promotion of technology innovation in environmentally sound technologies.’¹³⁴

The United States Government, the United States Congress, and flagship United States technology companies have had deep abiding concerns about intellectual property infringement in respect of clean technologies. The legal action by the United States Department of Justice against Sinovel over the theft of the trade secrets from the United States clean technology company, AMSC, highlights the seriousness of the problem.

¹³⁰Ibid.

¹³¹Ibid.

¹³²Ntungwe Ngalame (2017).

¹³³Climate Action Network (2014).

¹³⁴Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

In its 2014 Special 301 Report, the United States Trade Representative emphasized the need for strong IPR protection in its discussion of intellectual property and the environment.¹³⁵ The USTR emphasized in its discussion of intellectual and the environment:

Strong IPR protection is vital for development, and is critical to responding to environmental challenges, including climate change. IPR protection is essential to facilitate access to today's technologies, and to promote tomorrow's innovation. IPR provides incentives to invest in green technologies, and can promote economic growth and create jobs in the green technology sector.¹³⁶

There is a distinct desire by the USTR to protect the intellectual property rights of flagship United States companies engaged in renewable energy and clean technologies. The USTR warned that businesses would be reluctant to invest in clean technologies without effective protection and enforcement of intellectual property rights. The USTR also asserted that intellectual property rights underpinned university research in the green technology sector.

Under President Barack Obama, the USTR was critical of the use of intellectual property flexibilities to provide access to clean technologies: 'In the absence of such technologies, society may be deprived of critical advances to meet environmental challenges, including the mitigation of, and adaptation to, climate change'.¹³⁷ The United States continues to 'work to ensure robust IP protection and enforcement, which gives inventors and creators the confidence to: engage in foreign direct investment, joint ventures, local partnerships, and licensing arrangements; collaborate with foreign counterparts; to open research facilities in markets abroad; establish local operations and work with local manufacturers and suppliers; create jobs, including local worker training; and invest in infrastructure for the production, adoption, and delivery of green technology goods and services, without fear of misappropriation of their IPR.'¹³⁸ The United States contends: 'Strong IPR protection is, therefore, not only critical to the objective of addressing environmental challenges and developing a global response to climate change, but to national economic growth.'¹³⁹ The United States promotes 'strong IPR protection and enforcement as an environmental as well as an economic imperative, providing critical developmental benefits for developing and least-developed countries in particular.'¹⁴⁰

The Intellectual Property Owners Association has pushed for an intellectual property maximalist approach to intellectual property and clean technologies.¹⁴¹ Susan Wilson of the Association has complained to the USTR in the Special 301 process:

¹³⁵United States Trade Representative (2014).

¹³⁶Ibid.

¹³⁷Ibid.

¹³⁸Ibid.

¹³⁹Ibid.

¹⁴⁰Ibid.

¹⁴¹Intellectual Property Owners Association (2015).

At the UNFCCC, calls to weaken the global intellectual property framework protecting the related innovations have been a regular theme. Intellectual property rights (IPR) have been unfairly portrayed by some as a barrier to the necessary technology transfer, either by limiting the availability of the technology altogether or making it more expensive to secure. However, there is limited, if any, evidence that IPR is a barrier.¹⁴²

In particular, the Association has complained about India, Ecuador and their promotion of intellectual property flexibilities in respect of clean technologies.

At a Special 301 hearing, Executive Director Herb Wamsley complained of the push for patent exceptions and limitations:

Demands to erode or even extinguish IP rights are commonplace at the World Health Organization, to the U.N. Framework Convention on Climate Change, the World Trade Organization, and the Post-2015 Development Agenda. Proposals range from explicit exclusions from patentability and widespread compulsory licensing to more subtle but also dangerous appeals for the removal of so-called IP barriers and concessional licensing.¹⁴³

Chris Moore of the National Association of Manufacturers also complained of a ‘manufacturing policy that encourages the compulsory licensing of green technology.’¹⁴⁴

BINGO—Business and Industry groups—have submitted: ‘It is crucial that the Paris outcome will animate all countries to make ongoing improvements to achieve the widest possible diffusion of appropriate efficient technologies.’¹⁴⁵ BINGO stressed: ‘It will be vital to create an environment that facilitates the diffusion of such technologies as widely as possible by removing trade barriers, enhancing R&D cooperation and maintaining IPR’.¹⁴⁶ BINGO observed: ‘Public and private sectors in both developed and developing countries should work together, including through the Technology Mechanism (TEC and CTCN).’¹⁴⁷ BINGO stressed: ‘We hope that those negotiations can be accelerated and an agreement reached that encourages international commerce in efficient and clean energy products and services, enhancing the deployment of technologies that will be needed to attain Paris outcome ambit.’¹⁴⁸

The US Business Council for Sustainable Energy has pushed for strong intellectual property rights at the Paris international climate talks.¹⁴⁹ The Business Council for Sustainable Energy’s President Lisa Jacobson issued a statement on the submission of the United States’ pledge to reduce greenhouse gas emissions to the United Nations Framework Convention on Climate Change 1992: “The deployment of clean energy technologies—both commercially available and next-generation

¹⁴²Wamsley (2015).

¹⁴³Ibid., p. 78.

¹⁴⁴Moore (2015).

¹⁴⁵Business and Industry Non-Government Organizations (BINGO) (2015).

¹⁴⁶Ibid.

¹⁴⁷Ibid.

¹⁴⁸Ibid.

¹⁴⁹United States Business Council for Sustainable Energy (2015).

solutions—will play a key role in the United States meeting this 2025 target.’¹⁵⁰ She said: ‘The Council’s low-carbon technology solutions will be best supported through a Paris agreement that includes a commitment to helping developing countries create the necessary enabling environments, and strengthens the absorptive capacity that will incentivize innovation and establish sustainable markets for doing business.’¹⁵¹ Jackson commented: ‘A strong intellectual property regime will ensure that both technology avenues—existing and next-generation—are available.’¹⁵² The position paper elaborates upon this issue.¹⁵³ The council contends: ‘When the private sector makes investment decisions, it assesses a potential market based on elements such as policy stability, sound infrastructure, open markets, and effective legal frameworks that encourage competition and innovation and that protect intellectual property rights (IPRs).’¹⁵⁴ The Council insisted: ‘The protection of IPRs is an enabler, not a barrier, to supporting innovation and investment in developing countries’.¹⁵⁵ The Council stressed: ‘Foreign direct investment, commercial cooperation agreements, joint ventures, licensing and local training, and technology cooperation are critical conduits for sharing clean energy technologies.’¹⁵⁶ The Council argued: ‘This kind of trade and investment activity, supported by IPR protection, creates investor confidence; opportunities for partnerships, jobs and training; and supply chains that support the sharing and transfer of good business practices and technological know-how.’¹⁵⁷

Norine Kennedy of the United States Council for International Business said: ‘We must work together to develop domestic innovative capacity and the ability to absorb, use, and deploy technologies that respond to local needs.’¹⁵⁸ She warned: ‘Without meaningful IP protection, technologies will not be developed and deployed to those that really need them, nor can they be shared with commercial partners, customers, and suppliers in developed and developing countries.’¹⁵⁹

Yves Lapierre, commissioner and CEO of the French Institut National de la Propriété Industrielle (INPI),¹⁶⁰ told participants at forum on European intellectual property policy about the socio-economic role of intellectual property in innovation and sustainable growth.¹⁶¹ His presentation focused on the United Nations Framework Convention on Climate Change (UNFCCC) conference known also as

¹⁵⁰Ibid.

¹⁵¹Ibid.

¹⁵²Ibid.

¹⁵³United States Business Council for Sustainable Energy (2014).

¹⁵⁴United States Business Council for Sustainable Energy (2015).

¹⁵⁵Ibid.

¹⁵⁶Ibid.

¹⁵⁷Kennedy (2014).

¹⁵⁸Ibid.

¹⁵⁹Ibid.

¹⁶⁰The organisation has previously undertaken work in this area: INPI (2013).

¹⁶¹Voltolini (2015).

COP21. INPI is an enabler of the UNFCCC as a founding partner of Solutions COP21—an initiative aimed at highlighting solutions in the fight against climate change and its impact. Against this background, Lapierre explained to the audience about collaborative innovation projects under a sustainable and inclusive framework. He said that businesses of advanced and emerging countries would meet during the COP21 and would be able to create collaborative innovation projects that ensure the protection of intellectual property rights in line with social and environmental responsibility, using, for example, geographical indications, natural resources and technology transfer agreements. Additionally, Lapierre encouraged a new vision of IP rights, without the traditional North and South perspectives. He declared, also, that the public would benefit from the promotion of sustainable growth.

8 No Text

One option favoured by developed countries is that ‘IPRs are not to be addressed in this agreement.’¹⁶² One negotiator has complained that intellectual property is a taboo topic in the international climate talks. At Warsaw, the Egyptian lead negotiator, speaking for the Like Minded Developing Countries, said:

Like the Harry Potter series character, in Doha, IPR was the ‘word which should not be named’. But we live in the real world not in a fictional world. In this real world we live in, we need to address this issue of IPRs in a pragmatic manner, not run away from this issue.¹⁶³

Both the European Union and the United States engaged in blocking tactics on the topic of intellectual property at the Paris international climate talks.

The Corporate Europe Observatory leaked the negotiating notes of European Union Delegation on intellectual property and trade at the international climate talks in Paris.¹⁶⁴ The Delegation insisted: ‘The EU’s overall objective is to have COP decisions without any explicit mention of trade and IPR issues and to minimize discussions on trade-related issues.’¹⁶⁵ The Delegation emphasized that ‘any attempt to create any kind of new provision/agenda item/work programme/mechanism on trade/IPR at the UNFCCC discussions cannot be accepted.’¹⁶⁶

The European Union Delegation worried: ‘Regarding trade in general, many countries have tried to introduce parallel discussions concerning trade issues under the UNFCCC, in particular within the framework of the discussions concerning the “impact of the implementation of response measures”.’¹⁶⁷ The European Union Delegation asserted: ‘As a matter of principle, the UNFCCC is not the appropriate

¹⁶²Ad Hoc Working Group on the Durban Platform for Enhanced Action (2015).

¹⁶³Sethi (2013).

¹⁶⁴Corporate Europe Observatory (2015).

¹⁶⁵Ibid.

¹⁶⁶Ibid.

¹⁶⁷Ibid.

forum to discuss trade measures and to elaborate on additional disciplines'.¹⁶⁸ The European Union Delegation also promised to oppose discussion of trade measures under UNFCCC. The European Union Delegation insisted:

Regarding intellectual property rights (IPR), many countries keep proposing to introduce references to the role of IPR as a barrier to the dissemination of innovation and provisions promoting transfers of technology that do not sufficiently safeguard the voluntary nature of such activities. Accepting such language would create the strong risk of weakening IPR as an incentive to innovation in the area of climate related technologies.¹⁶⁹

The European Union Delegation maintained that 'the introduction of IPR issues into the discussions must also be strictly opposed'.¹⁷⁰ In their view, 'Other fora (WTO, World Intellectual Property Organization—WIPO) are dedicated to IPR'.¹⁷¹ The European Union Delegation argued: 'Any decision under UNFCCC to weaken or alter the international or national IPR regime as well as of mechanisms forcing transfers of technology would do more harm than good. IPR should not be presented as "barriers"; on the contrary, they are a tool to attract investment and to reward much needed innovation to fight against climate change'.¹⁷²

Such a position is at odds with other sentiments within the European Union, which have been supportive of technology transfer and the sharing of clean energy developments.¹⁷³

In the lead-up to COP23, the European Parliament has further considered new challenges in implementing the Paris Agreement 2015 in view of the COP23 Climate Change conference.¹⁷⁴ A policy paper noted: 'Similar to China, India sees the importance of addressing intellectual property rights (IPR) in the context of technology transfer'.¹⁷⁵

A multi-associational letter was sent to the United States Secretary of State John Kerry, the United States Trade Representative Michael Froman, and the United States Secretary of Commerce, Penny Pritzler.¹⁷⁶ The signatories included the Alliance for Clean Technology Innovation, the Biotechnology Industry Association, the Business Council for Sustainable Energy, Corn Refiners Association, Information Technology Industry Council, National Association of Manufacturers, National Foreign Trade Council, Northeast Clean Energy Council,

¹⁶⁸Ibid.

¹⁶⁹Ibid.

¹⁷⁰Ibid.

¹⁷¹Ibid; see also World Intellectual Property Organization (2017a, b).

¹⁷²Ibid.

¹⁷³Rimmer (2011b).

¹⁷⁴European Parliament, Directorate for Internal Policies (2017).

¹⁷⁵Ibid., p. 66.

¹⁷⁶Alliance for Clean Technology Innovation, Biotechnology Industry Association, Business Council for Sustainable Energy, Corn Refiners Association, Information Technology Industry Council, National Association of Manufacturers, National Foreign Trade Council, Northeast Clean Energy Council, U.S. Chamber of Commerce and the United States Council for International Business (2015).

the U.S. Chamber of Commerce and the United States Council for International Business. There are some surprising inclusions in the membership of the associations. Although it does include clean technology companies like Vestas, the Alliance for Clean Technology Innovation also involved fossil fuel company ExxonMobil (which has been embroiled in a controversy over climate denial). The United States Chamber of Commerce has opposed national and international climate action, and has often been a source of disinformation about climate change. As such, it seems strange that the United States Chamber of Commerce would want to intercede on issues such as intellectual property and clean technologies.

This letter provides a vision of strong protection of intellectual property rights in respect of clean technologies.

The letter was aggrieved about the possibility of intellectual property flexibilities being included in the final text of the Paris Agreement 2015. The group complained that several countries and NGOs had sought to promote intellectual property flexibilities in international climate decisions:

We urge you to avoid all references to IPR, positive or negative, in the agreement or decision text. This is particularly critical with respect to references that relate to IPR and finance, which could be viewed as an institutional mechanism to engage in compulsory licensing.¹⁷⁷

The letter called upon the United States delegation to block the discussion of intellectual property at the Paris climate negotiations. The letter was fearful that the inclusion of text on intellectual property flexibilities ‘would not only undermine previously agreed global IPR standards as reflected in the TRIPS agreement in particular, but would be counterproductive from a perspective of addressing the effects and underlying causes of global climate change’.¹⁷⁸

The multi-association letter maintained that there were several reasons why the United States Delegation should oppose intellectual property flexibilities. First, the associations maintained that ‘continued strong global IPR protection is key’ to the United States preserving its leadership in clean technologies.¹⁷⁹ The lobby groups raised the threat of China and India outstripping the United States in clean technology innovation.¹⁸⁰ Second, the associations asserted that ‘strong IPR protection encourages private sector investment in new technologies and innovation, helps companies market and thus monetize their competitive technological edge, yet at the same time rewards the sharing of knowledge and inventions, rather than inhibiting or punishing it.’¹⁸¹ Third, the multi-associational group engaged in a strange slippery slope argument. The United States Chamber of Commerce and the other organisations warned that the ‘failure to keep IPR issues out of a UNFCCC or

¹⁷⁷Ibid.

¹⁷⁸Ibid.

¹⁷⁹Ibid.

¹⁸⁰Ibid.

¹⁸¹Ibid.

other UN climate change or sustainable development agreement or decision will result in significant legal, institutional and practical confusion precisely because such IPR issues are already well-regulated at the WTO and elsewhere'.¹⁸² Apparently, this letter was influential, and informed the bargaining position of the United States Government in the international climate talks.

The United States Chamber of Commerce has made similar arguments about the need for 'strong' intellectual property rights at COP23.¹⁸³ Their involvement is curious—given the longstanding opposition of the United States Chamber of Commerce to comprehensive climate action.

There has been significant institutional forum-shifting in the debate over intellectual property and climate change.

In addition, there has been a public discussion over policy settings in respect of intellectual property, trade, and clean technologies.¹⁸⁴ The TRIPS Agreement 1994 has provided a framework for discussions over intellectual property, clean technologies, and climate change.¹⁸⁵ There has been a dialogue in the TRIPS Council in the World Trade Organization (WTO) over intellectual property, technology transfer, and climate change.¹⁸⁶ In 2013, Ecuador initiated the debate in the TRIPS Council on the topic of intellectual property, climate change, and development.¹⁸⁷ Ecuador focused upon environmentally sound technologies: 'The issue of technology and its transfer is a fundamental aspect of the fight against climate change and adaptation to and mitigation of its harmful effects.'¹⁸⁸ The Latin American country observed: 'The issue of intellectual property rights and the debate over technological co-operation is becoming a fundamental aspect of how best to adapt to and combat the harmful effects of climate change, particularly for developing countries.'¹⁸⁹ Ecuador argued: 'It is therefore essential to reorient the world intellectual property regime in the context of adaptation and/or mitigation of the harmful effects of climate change.'¹⁹⁰ Ecuador mooted a number of policy options to provide access to clean technologies—including compulsory licensing, crown use, voluntary licensing, exemptions for patentability, patent term reductions, and open licensing. In conclusion, Ecuador called for an over-arching declaration on intellectual property and climate change. There were also contributions from a range of

¹⁸²Ibid.

¹⁸³Eule (2017).

¹⁸⁴Lane (2011), Rimmer (2011a), Brown (2013), Menell and Tran (2014).

¹⁸⁵Marrakesh Agreement Establishing the World Trade Organization, opened for signature 15 April 1994, 1867 UNTS 3 (entered into force 1 January 1995) annex 1C ('Agreement on Trade-related Aspects of Intellectual Property Rights'—TRIPS Agreement 1994).

¹⁸⁶Rimmer (2016b), Delimatsis (2016), Zhuang (2017).

¹⁸⁷World Trade Organization (2013a, b, c).

¹⁸⁸Ibid.

¹⁸⁹Ibid.

¹⁹⁰Ibid.

other countries—with support from developing countries; debate amongst the BRICS countries and opposition from the United States, the European Union, and Japan. There was further debate in the TRIPS Council in 2014 over the topic of intellectual property and climate change.¹⁹¹ The WTO has sought to boost literacy about the public policy debate over intellectual property and climate change.¹⁹²

There have been larger debates about mega-regional agreements such as the Trans-Pacific Partnership, the Trans-Atlantic Trade and Investment Partnership, and the Trade in Services Agreement. Such trade agreements have the potential to impact upon the relationship between intellectual property, the environment, and climate change.¹⁹³

9 The Paris Agreement 2015 and Technology Transfer

As Professor Keith Maskus and Professor Ruth Okediji have noted, there has been a long tradition of debate in law and economics on international technology transfer in environmentally sound technologies.¹⁹⁴

The International Council on Human Rights Policy has highlighted the importance of technology transfer to debates over climate change, human rights, and climate justice.¹⁹⁵ The Council traces the history and evolution of the debate over technology transfer within the international climate framework, noting: ‘Human rights concerns were reiterated in the Paris Agreement of late 2015’.¹⁹⁶ The Council is interested in framing the discussion about technology transfer in terms of larger concerns about human rights. The Council observed:

Technology transfer is needed both to help poorer and more vulnerable countries and communities adapt to the now inevitable consequences of climate change in the short term, and to assist them in moving on to low-carbon development pathways in the longer term. Human rights are relevant to the technology questions that arise in both these policy areas: adaptation policies in the short term and mitigation measures over the long term. Highlighting the human rights benefits of technological interventions may create a space for re-framing and circumventing the unsustainable dynamic that has largely characterized debate of this subject. Human rights offer a strong ethical and legal basis from which technology transfer might be approached.¹⁹⁷

The Council notes: ‘Technology transfer has generally been conceived of as a means to address a central injustice associated with climate change—that activities

¹⁹¹World Trade Organization (2014a, b).

¹⁹²World Trade Organization, Climate Change and the WTO Intellectual Property (TRIPS) Agreement, https://www.wto.org/english/tratop_e/trips_e/cchange_e.htm Accessed 1 May 2018.

¹⁹³Rimmer (2016a).

¹⁹⁴Maskus, and Okediji (2014).

¹⁹⁵The International Council on Human Rights Policy (2016).

¹⁹⁶*Ibid.*, p. 126.

¹⁹⁷*Ibid.*, p. 126.

that have primarily benefited the people of the world's richest states will disproportionately affect those living in the world's poorest states.'¹⁹⁸ The Council maintains: 'Technology transfer has long been recognized as an indispensable element of a stable future and a global deal.'¹⁹⁹ The Council insists: 'It is more than that, however: it is also a principal means by which basic human rights standards might still be attainable for the world's most vulnerable people in a climate-constrained future.'²⁰⁰

The Paris Agreement 2015 alludes to questions about intellectual property and climate change—without ever addressing them directly. Instead, there is a discussion of technology development and technology transfer.

Clause 66 of the Decision deals with technology development and technology transfer—taking 'note of the interim report of the Technology Executive Committee on guidance on enhanced implementation of the results of technology needs assessments as referred to in document FCCC/SB/2015/INF.3.'²⁰¹

Clause 67 'decides to strengthen the Technology Mechanism and requests the Technology Executive Committee and the Climate Technology Centre and Network, in supporting the implementation of the Agreement, to undertake further work relating to, inter alia: (a) Technology research, development and demonstration; (b) The development and enhancement of endogenous capacities and technologies.'²⁰²

Clause 68 requests 'the Subsidiary Body for Scientific and Technological Advice to initiate, at its forty-fourth session (May 2016), the elaboration of the technology framework established under Article 10, paragraph 4, of the Agreement and to report on its findings to the Conference of the Parties, with a view to the Conference of the Parties making a recommendation on the framework to the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement for consideration and adoption at its first session, taking into consideration that the framework should facilitate, inter alia: (a) The undertaking and updating of technology needs assessments, as well as the enhanced implementation of their results, particularly technology action plans and project ideas, through the preparation of bankable projects; (b) The provision of enhanced financial and technical support for the implementation of the results of the technology needs assessments; (c) The assessment of technologies that are ready for transfer; (d) The enhancement of enabling environments for and the addressing of barriers to the development and transfer of socially and environmentally sound technologies.'²⁰³

Clause 69 'decides that the Technology Executive Committee and the Climate Technology Centre and Network shall report to the Conference of the Parties

¹⁹⁸Ibid., p. 126.

¹⁹⁹Ibid., p. 126.

²⁰⁰Ibid., p. 126.

²⁰¹The Paris Agreement 2015.

²⁰²Ibid.

²⁰³Ibid.

serving as the meeting of the Parties to the Paris Agreement, through the subsidiary bodies, on their activities to support the implementation of the Agreement'.²⁰⁴ Clause 70 'also decides to undertake a periodic assessment of the effectiveness of and the adequacy of the support provided to the Technology Mechanism in supporting the implementation of the Agreement on matters relating to technology development and transfer'.²⁰⁵ Clause 71 'requests the Subsidiary Body for Implementation to initiate, at its forty-fourth session, the elaboration of the scope of and modalities for the periodic assessment referred to in paragraph 70 above, taking into account the review of the Climate Technology Centre and Network as referred to in decision 2/CP.17, annex VII, paragraph 20 and the modalities for the global stocktake referred to in Article 14 of the Agreement, for consideration and adoption by the Conference of the Parties at its twenty-fifth session (November 2019)'.²⁰⁶

Article 10 of the Paris Agreement 2015 addresses the topic of technology.²⁰⁷ Article 10.1 provides: 'Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions'.²⁰⁸ Article 10.2 states: 'Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognizing existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer'.²⁰⁹ Article 10.3 emphasizes: 'The Technology Mechanism established under the Convention shall serve this Agreement'.²¹⁰ Article 10.4 observes: 'A technology framework is hereby established to provide overarching guidance to the work of the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer in order to support the implementation of this Agreement, in pursuit of the long-term vision referred to in paragraph 1 of this Article'.²¹¹ Article 10.5 provides a longer articulation of the issue:

Accelerating, encouraging and enabling innovation is critical for an effective, long-term global response to climate change and promoting economic growth and sustainable development. Such effort shall be, as appropriate, supported, including by the Technology Mechanism and, through financial means, by the Financial Mechanism of the Convention, for collaborative approaches to research and development, and facilitating access to technology, in particular for early stages of the technology cycle, to developing country Parties.²¹²

²⁰⁴Ibid.

²⁰⁵Ibid.

²⁰⁶Ibid.

²⁰⁷Ibid.

²⁰⁸Ibid.

²⁰⁹Ibid.

²¹⁰Ibid.

²¹¹Ibid.

²¹²Ibid.

Article 10.6 provides: ‘Support, including financial support, shall be provided to developing country Parties for the implementation of this Article, including for strengthening cooperative action on technology development and transfer at different stages of the technology cycle, with a view to achieving a balance between support for mitigation and adaptation.’²¹³ Article 10.6 notes: ‘The global stocktake referred to in Article 14 shall take into account available information on efforts related to support on technology development and transfer for developing country Parties.’²¹⁴

As part of an Oxford University Press commentary, Heleen de Coninck and Ambuj Sagar have provided a treatise-style analysis of the text on technology development and transfer in Article 10 of the Paris Agreement 2015.²¹⁵ The pair conclude that ‘the limited nature of the technology provisions is a reflection of a deeper undercurrent—the continuing lack of political will to support climate technology actions adequately and the lack of consensus on how to do it best.’²¹⁶ The pair observe that ‘the scale and urgency of the climate challenge, and the range of the activities needed to allow technology to help meet this challenge... suggest that much more will be needed both within and outside of the UNFCCC in the coming years’.²¹⁷ The commentators underestimate the extent to which there has been intellectual property conflicts over clean technologies. The literature does show that there has been significant conflicts over patents, trade secrets, and green technologies.

Sanford Gaines observes that ‘the question of how to speed the adoption of emissions-reducing technologies in developing countries while protection intellectual property rights continues to be one of the more controversial topics in the discussion of the post-2012 climate regime’.²¹⁸ He notes that ‘many developing country governments still claim publicly that the protection of intellectual property rights stands as a barrier to their sustainable energy development and is not in harmony with the common-but-differentiated-responsibilities principle.’²¹⁹ Gaines commented that: ‘Most developed countries, including the EU and the US, disagree with this assessment and have worked successfully to keep discussion of intellectual property rights off the negotiating agenda of conferences of the parties.’²²⁰ He wondered whether it would be possible to bridge the divide. Gaines hoped that there would be ‘new legal modalities’ and ‘new ways of constructing the meaning of the “common but differentiated responsibilities” of all members of the world

²¹³Ibid.

²¹⁴Ibid.

²¹⁵de Coninck and Sagar (2017).

²¹⁶Ibid., p. 276.

²¹⁷Ibid., p. 274.

²¹⁸Gaines (2016, pp. 33–53 at 49).

²¹⁹Ibid., p. 49.

²²⁰Ibid., p. 49.

community’.²²¹ In his view, ‘the Paris Agreement appears to be a major step in this direction.’²²²

Professor Joshua Sarnoff reflects upon the lack of substantive text on intellectual property and climate change.²²³ He noted: ‘Unless and until international agreements develop that further regulate the international patent system or unless alternative co-ordinated approaches arise more spontaneously, we will continue to witness patent and climate change policies develop as national laboratories of democracies.’²²⁴ Sarnoff anticipated: ‘We thus should expect the relationship of the patent system (or more generally the intellectual property system) and climate change to remain controversial in a wide variety of international negotiating fora.’²²⁵

Al Gore’s 2017 documentary *An Inconvenient Sequel* provides a further insight into the negotiations between the United States and India on technology transfer at the Paris Agreement 2015.²²⁶ As a go-between, the former Vice President of the United States sought to reconcile the United States and India, looking to find practical solutions for access to clean energy. In the documentary, Gore can be seen discussing access to solar power for India with the United States company, SolarCity, associated with Elon Musk. He noted that Elon Musk took a co-operative approach to intellectual property and technology transfer.

10 Conclusion

In the wake of the Paris Agreement 2015, there should be an effort to develop an intellectual property regime which supports global action in respect of climate action. There have been some further efforts at COP22 and COP23 to boost climate finance and technology transfer.²²⁷ There should be better harmonisation between the international frameworks for intellectual property and climate change—across the United Nations Framework Convention on Climate Change 1992, the World

²²¹Ibid., p. 50.

²²²Ibid., p. 50.

²²³Sarnoff (2016b, pp. 334–345).

²²⁴Ibid., p. 345.

²²⁵Ibid., p. 345.

²²⁶Gore, Cohen, Shenk, Actual Films and Participant Media, Paramount Pictures (2017), Gore (2017).

²²⁷Marrakech Climate Change Conference, COP 22, November 2016, http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567/php/view/decisions.php#; Marrakech Partnership for Global Climate Action 2016 http://unfccc.int/files/paris_agreement/application/pdf/marrakech_partnership_for_global_climate_action.pdf; Marrakech Action Proclamation for Our Climate and Sustainable Development 2016, http://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/marrakech_action_proclamation.pdf and Fiji Momentum for Implementation 2017, Decision 1/CP.23, 18 November 2017, <http://unfccc.int/resource/docs/2017/cop23/eng/l13.pdf>.

Intellectual Property Organization, and the World Trade Organization. Governments should take action to promote research and development and diffusion of clean technologies. Future Climate talks should resolve outstanding issues in respect of intellectual property, clean technologies, finance, and technology transfer. Business can play a key role in this endeavour. Tesla has highlighted the potential of open innovation. Civil society can push for fossil fuel divestment and renewable energy reinvestment. There is a need for an approach to be intellectual property and climate change to be informed by larger principles in respect of human rights and climate justice.²²⁸ As Dean Baker, Arjun Jayadev, and Joseph Stiglitz have observed, there is a need to recalibrate intellectual property and innovation laws to promote sustainable development, innovation, and climate justice.²²⁹

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²²⁸Rimmer (2015).

²²⁹Baker et al. (2017).

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Chapter 3

Transparency in Climate Finance After Paris: Towards a More Effective Climate Governance Framework



Felicity Deane and Evan Hamman

Abstract The Paris Agreement charts a new course for measuring, reporting, verification (MRV) of State obligations with the intensification of the emphasis on the criterion of transparency. This is, in part, responsive to modern debates in regards to environmental law generally and climate law in particular. Transparency is crucial to the success or failure of climate mitigation and adaption regimes because climate governance is intimately connected to the ideals of deliberative democracy, public participation, and the rule of law. The Paris Agreement thus presents a ground-breaking and important point in time for both developed and developing States. Aligned with this requirement is the desire to increase the amount and flow of ‘climate finance’ from developed to developing states. The associated need for transparency in funding flows has been raised in part through the accusations of misused or inadequate funds, ‘tied’ funding and double counting. Though there are new informational requirements placed on states in the Paris Agreement, they also present considerable practical challenges. The purpose of this chapter is to analyse the principle of transparency in climate finance and to chart the direction of the associated informational requirements in light of the measures agreed at Paris.

Keywords Climate finance • Transparency • Climate governance
Paris agreement • UNFCCC

1 Introduction

Developing states are some of the most vulnerable to the impacts of climate change.¹ Sea level rise, ocean acidification, changing weather patterns, increased cyclones and droughts and bushfires are causing unprecedented phenomenon

¹Mirza (2003).

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including displacement and migration.² Not only will this disrupt places of immense natural beauty and ecological significance (coral reefs, mangroves, forests, wetlands etc.) but it will impact cultural attributes and heritage of developing States peoples as they are forced to change or disregard traditional practices of cropping and fishing, and the physical boundaries of their homelands shift or disappear. This is already taking place, for instance in parts of the Pacific.³ A large part of the solution, if there is to be a solution, comes down to financial resources and the questions of how and where they should be spent. In the last few years, the world has arguably come to terms with this, and committed to funding to help developing States confront the immense challenges of climate change. Sources of finance and other related resources (technical expertise, equipment, education training etc.) have been pledged from both state and non-state actors. Often, however, these pledges have ‘strings attached’ such as co-finance, or other political or diplomatic ‘tit for tat’ favours.⁴ Nevertheless, the flow of finances is broadly consistent, at least in theory, with the principle of Common but Differentiated Responsibilities (CBDR) which encourages the transfer of resources, including adequate financial resources from the developed to developing states.⁵ Climate finance (defined below) can also be one of the means through which the CBDR is implemented and where those responsible absorb the financial burden of others who face the consequences of past action.⁶

The obligations associated with financial support (or climate finance) have come about through the recognition that not all countries were in an equal position to achieve their greenhouse gas (GHG) mitigation requirements. At the same time, however, climate action requires that all states contribute to global budgeted reductions. It is acceptable therefore that developed states provide funding to developing states either through one of the recognized funds or bilaterally.⁷ The climate finance requirements are therefore settled in recognition of the enormous challenge that climate change represents coupled with the equity and justice desired by this vital international regime. It follows that climate finance must be mobilized within a robust and accountable framework underpinned by real and long term emissions reductions goals.

Although discussions around climate finance had been maturing since about 2008, the Paris Agreement, negotiated in December 2015, represents something of

²See, for example, CAB International (2016) Cab Direct. <https://www.cabdirect.org/cabdirect/FullTextPDF/2017/20173207688.pdf>. On the topic of climate migration, see also, Mayer (2016).

³These problems have been foreseen for some time. See, Brookfield (1989, pp. 1–17).

⁴See the discussion of ‘coercion’ and ‘conditionality’ in Stewart et al. (2009, Ch. 20–21).

⁵See Dellink et al. (2009).

⁶This is consistent with the notion of climate justice too. See Zadek (2011).

⁷Zahar (2017).

a turning point for both climate finance and transparency. The Paris Agreement emphasizes the need for increased and ‘consistent’ financial flows from developed to developing states. Article 2 of the Paris Agreement, for instance, requires that: ‘finance flows [be] consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.’ Article 6.8 of the Agreement further suggests that finance can and should be used to promote both ‘mitigation and adaptation’ programs; to enhance ‘public and private sector participation;’ and to ‘enable opportunities for coordination across instruments and relevant institutional arrangements’. Importantly, article 9.3 of the Agreement asks developed countries to increase their financial support: ‘beyond [all] previous efforts’ and article 9.5 of the Agreement requires states to report ‘biennially’ on their ‘projected levels of public financial resources.’

The aim of this chapter is not to map the adequacy of the amount of climate finance flowing from developed to developing states (thought that is a worthy topic for debate). Nor for that matter does this chapter seek to align the need for climate finance with the other components of the principle of CBDR (such as technology sharing, transfer of know-how and so forth). Rather, the purpose of this chapter is to highlight the need for one aspect of governance to permeate all levels of the flow of funds from developed to developing states: the principle of ‘transparency’. Transparency is vital to effective climate governance, environmental governance,⁸ and indeed any form of governance.⁹ Transparency builds confidence in a governance system and provides the means for third parties, the public, the media, and epistemic communities (university institutions, research networks, scientific bodies etc.), to have faith in the operational wheels of governance. From an economic point of view, transparency also has a role in reducing inefficiencies in a system. As Forstater and Rank write:

[Transparency] helps to reduce the high transaction costs, inefficiencies and fragmentation associated with multiple tracking systems covering overlapping actors, objectives, activities and financing streams.¹⁰

Though the topic of transparency has traditionally been seen as something of a subservient consideration to ‘accountability’,¹¹ or alongside other principles of ‘good governance’ such as ‘proportionality’ and ‘consistency’,¹² it is also a useful indicator of evaluating governance in its own right. Whilst it may not tell us conclusively that the climate governance system is working well, it does assist in honing in on the proper design and flow of information within that system—a crucial precursor to making the system more accountable. Indeed, the evaluation of

⁸See, Gupta (2010, pp. 1–9).

⁹See Kosack and Fung (2014, pp. 65–87).

¹⁰Forstater and Rank (2012, iv).

¹¹See, for example, Bianchi and Peters (2013, p. 10).

¹²See, Weatherill (2007, p. 33).

other aspects of governance (e.g. the resources allocated to address the problem and the quality of those resources) necessitates accurate and reliable information including, but not limited to: how and when decisions are made; by whom; and against what criteria. For these reasons and others, transparency in climate finance is a worthy topic of academic debate. After Paris, it is indeed also a topical one.

The methodological approach in this chapter adopts what Smits and others might refer to as a ‘traditional approach’ to legal inquiry: one that encapsulates largely normative arguments about ‘what the law is’ and then drawing on both primary and second material to construct an principled and rational argument about how the system ‘ought to be’ designed.¹³ This chapter is thus based upon not only analysing existing transparency arrangements associated with climate finance, but it also includes suggestions for improving the implementation of transparency following the agreement signed in Paris. To guide and inform the views in this chapter, we draw from the broader environmental governance literature which argues, as noted above, that transparency is inherently linked to accountability and legitimacy within a system.¹⁴ In addition to an analysis of the text of the Paris Agreement itself, the climate governance literature is drawn on to incrementally construct a persuasive case for how the system might be improved and effectively implemented. Recent discussions by state parties within the UNFCCC,¹⁵ as well as policy briefs from several key non-state actors¹⁶ are also referred to.

In terms of structure, there are three parts to the chapter. Part 2 provides a discussion and definition of ‘climate finance’ situating it within the broader climate governance literature. Here we give an overview of what climate finance is under the UNFCCC framework, why it is needed, and how it is currently distributed. In this part, we highlight the variety of climate finance (and related) terms used under the UNFCCC framework and in the literature as well as pointing out an important distinction between state and non-state financial support for climate initiatives. Part 3 of the chapter explores the meaning of transparency. Here we discuss the general literature on transparency and also cover the Measuring, Reporting, and Verifying (MRV) requirements under the UNFCCC. The MRV requirements are inherently linked to transparency in climate governance including the provision and allocation of climate finance. In Part 4 of the chapter we discuss climate finance and transparency after Paris, specifically separating the law (or substantive aspects) from the procedural aspects associated with finance mobilisation. In part 4.3 we make

¹³Smits (2012).

¹⁴See, Biermann et al. (2010, pp. 277–98).

¹⁵See for example, United Nations (2017) Round-table discussion on the process to identify information to be provided under Article 9, paragraph 5, of the Paris Agreement, UN Doc FCCC/CP/2017/INF.2. Available at: <http://unfccc.int/resource/docs/2017/cop23/eng/inf02.pdf>.

¹⁶See for example, Transparency International (2014). Also see, Stockholm Environment Institute (2016) and Espange (2016).

specific note of article 9.5 of the Paris Agreement which requires developed countries to ‘biennially communicate indicative quantitative and qualitative information about financial arrangements including their ‘projected levels of public financial resources.’ Our discussion highlights that although the Paris Agreement has [finally] emphasized the issue of transparency in the provision of climate finance, the implementation of article 9.5 needs to be given further thought. The recent roundtable discussions at the Conference of the Parties in Bonn, Germany (COP23) represent a positive step forward in this regard.¹⁷

2 Climate Governance and Climate Finance

2.1 *The Language and Study of Climate Governance*

Given the complexity and interconnectedness of world environmental problems, the discipline and language of ‘climate governance’ has rightfully come into its own. Backstrand and Lövbrand, define climate governance as the multilateral negotiations between states under the UNFCCC framework,¹⁸ as well as ‘the deregulated governance modes involving sub-state and non-state actors in various partnerships and multi-sectoral networks’.¹⁹ This definition seems fitting as it encapsulates the broadest range of national and international actors—both state and non-state—that operate and exert influence in governance affairs. Recent scholarly outputs in the field of climate governance have focused on a range of issues including: the history of climate governance²⁰; ‘transnational’ climate governance,²¹ the UNFCCC as a ‘compliance regime’,²² the rise of transnational partnerships,²³ the practice of climate engineering,²⁴ the role of non-state actors²⁵ and strengthening the ‘regime complex’ of climate governance more generally.²⁶ Fewer papers, however, have debated the ‘principles’ of climate governance—at least in terms of the vernacular

¹⁷United Nations (2017) Round-table discussion on the process to identify information to be provided under Article 9, paragraph 5, of the Paris Agreement, UN Doc FCCC/CP/2017/INF.2. Available at: <http://unfccc.int/resource/docs/2017/cop23/eng/inf02.pdf>.

¹⁸United Nations Framework Convention on Climate Change 1992, Opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

¹⁹Backstrand and Lövbrand (2007, p. 123).

²⁰Gupta (2014).

²¹Andonova et al. (2009, pp. 52–73).

²²Mayer (2017).

²³Backstrand (2008, pp. 74–102).

²⁴See Keith (2013).

²⁵Nasiritousi et al. (2016, pp. 109–126).

²⁶See Abbott (2014, pp. 57–88) and see also, Okereke et al. (2009, pp. 58–78).

of ‘principles’—what they might be, and how they might be different or similar to more general ‘principles of international environmental law.’²⁷ Fewer still, it seems, have sought to tackle the principle of transparency in climate finance (within climate governance), with of course, again, several notable exceptions.²⁸

It is against this context that we consider the topic of transparency in climate finance to be a worthy one. It has distinct transnational application, considering the global nature of the financial support regime (contributors and recipients) and the wide variety of players involved in its collection and distribution including state, non-state and sub-state actors.²⁹ As but one aspect of climate governance, climate finance is also a complex and pluralistic space within itself. It lends itself to both theoretical and empirical analysis and gives scholars a place to critically evaluate or, at the very least, describe, the web of relationships and implications of financial matters in climate change affairs. There are links to theory of networked (or nodal) governance in all of this,³⁰ as well as systems thinking³¹ and actor-network theory.³² Any and all of these theoretical frameworks could be drawn on to more fully understand the actors and influences involved in climate governance, including teasing out the need for climate finance to be made more transparent (and what the factors might be to make it so).

2.2 *Defining Climate Finance*

Climate finance is a popular term that has been used at global, local and regional level since the 1990s. The phrase is used both within and outside of the UNFCCC regime as a means to achieve the target temperature increase of ‘well below two degrees.’³³ In addition to the mitigation of climate impacts, climate finance is also said to be at the ‘core of the world’s ability to *adapt* to climate change’ in addition to being ‘absolutely critical for developing country parties to protect themselves from the effects of climate change.’³⁴

²⁷For a thorough discussion of principles of international environmental law, see Sands et al. (2012).

²⁸See for example, Forstater and Rank (2012), Gupta and Mason (2016, pp. 82–90), Buchner et al. (2014), Bécault and Marx (2014); see also, Transparency International (2014).

²⁹For a discussion of the importance of sub-state (or sub-national) actors in climate governance, see, Setzer (2015, pp. 319–37).

³⁰For an overview of nodal governance, see Burris et al. (2005).

³¹See for example the discussion in Martin (2017, Ch. 4).

³²Latour and Welt (1996, pp. 369–81).

³³The Paris Agreement 2015. Available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf, article 2(1)(a).

³⁴See, Falzon et al. (2016, p. 6).

The term climate finance is used specifically by the UNFCCC framework in its communications with the general public.³⁵ It is commonly used in the literature,³⁶ in the popular media,³⁷ and by numerous state³⁸ and non-state sources.³⁹ As such, one might expect the international community to have a clear understanding of the parameters of what constitutes climate finance. Closer inspection of legal instruments (including the Paris Agreement), however, reveals there is no set definition of climate finance and, in fact, there are varying and quite contradictory phrases used. The UNFCCC website for example, has published a definition as follows:

Climate finance refers to local, national or transnational financing, which may be drawn from public, private and alternative sources of financing.⁴⁰

Despite having no firm legal basis, this definition has been adopted by other organizations within the United Nations structure, for example, the United Nations Environment Programme (UNEP)⁴¹ as well as state parties.⁴² An alternative definition of climate finance is provided by the NGO 'Climate Policy Initiative' as follows:

[Climate finance] refers to the financial resources paid to cover the costs of transitioning to a low-carbon global economy and to adapt to, or build resilience against, current and future climate change impacts.⁴³

Key elements of any definition should consider the source of funds (state or non-state) whether they are pledged or applied, and the purpose for which such funds are intended and spent. Without that, the use of vague terms and phrases presents challenges for pinning down exactly what climate finance means in a legal sense, and therefore in moving towards more effective implementation of obligations on states under the UNFCCC regime. In short, the problem with competing definitions is that 'they are [likely to be] understood in different ways by different stakeholders.'⁴⁴

³⁵United Nations Framework Convention on Climate Change (2014) FOCUS: Climate Finance. Available at: http://unfccc.int/focus/climate_finance/items/7001.php.

³⁶See for example, Bowen (2011, pp. 1020–1036), and Ballesteros et al. (2010, pp. 261–312).

³⁷See for example, Grobe (2017) Climate finance: Footing the bill for a global crisis. In DW. Available at: <http://www.dw.com/en/climate-finance-footing-the-bill-for-a-global-crisis/a-41393588>.

³⁸See for example, Office of the Spokesperson (2015).

³⁹See for example, Transparency International (2014). See also this report: Falconer and Stadelmann (2014) What is climate finance? Definitions to improve tracking and scale up climate finance, Climate Policy Initiative. Available at: <http://climatepolicyinitiative.org/wp-content/uploads/2014/07/Brief-on-Climate-Finance-Definitions.pdf>.

⁴⁰United Nations Framework Convention on Climate Change (2014) FOCUS: Climate Finance. Available at: http://unfccc.int/focus/climate_finance/items/7001.php.

⁴¹United Nations Environment Programme, About UN Environment. Available at: <https://www.unenvironment.org/about-un-environment>.

⁴²See Supreme Council for Environment, Kingdom of Bahrain (2017).

⁴³Falconer and Stadelmann (2014, p. 4).

⁴⁴Falconer and Stadelmann (2014, p. 4).

The term ‘climate finance,’ is used specifically in the Paris Agreement on no less than three occasions, though not once defined.⁴⁵ In the text of the same document, however, we find reference to ‘finance’ (articles 2.1 and 6.8) ‘financial resources’ (articles 9.1, 9.4, 9.5 and 9.9) ‘financial means’ (article 10.5) and ‘financial support’ (articles 10.6, 13.6, 13.9, and 13.10). Furthermore, the phrase ‘public financial resources’—presumably a sub-set of financial resources, if there also to be ‘private ones’—is referred to in subsequent decisions under the UNFCCC framework specifically when discussing the information required under article 9.5 of the Paris Agreement.⁴⁶ Similarly, the original text of the 1992 UNFCCC agreement refers, not to ‘climate finance’, but to ‘financial resources’ (articles 4.3, 4.7, 11.1, 11.5) and the phrase ‘financial support’ (article 12.7).

An alternative conceptualization, again, is the use of the term ‘funds’ or ‘funding’ which are used the text of the Paris Agreement (in the recitals and article 9.3) as well as under article 4.3 of the original UNFCCC agreement:

The implementation of these commitments shall take into account the need for adequacy and predictability in the *flow of funds* and the importance of appropriate burden sharing among the developed country Parties.

All this creates additional problems about the provision of information about financial support (i.e. the topic of transparency we are concerned about in this chapter) meaning it is open to discretionary accounts of how much is pledged (versus how much is actually ‘financed’), through which sources (public, private, intermediaries etc.) and what the purpose of the funds actually is. It is for this reason we separate the law and international obligations from the procedural mobilisation of funds in Part 3 of this chapter. This has been done with a view to clarify the importance of transparency in all aspects of climate finance decisions.

In this chapter, given our focus on the Paris Agreement, we are primarily concerned with the roles and responsibilities of state actors in respect of their financial arrangements. Non-state actors, such as corporations, individual philanthropists and non-government organizations (NGOs) are not parties to the UNFCCC and thus not covered by the obligations which states have agreed to around the provision of finance and the information that accompanies it (see for example article 9.5 of the Paris Agreement). That said, the ‘landscape of climate finance’, as Buchner and others refer to it, is very clearly a space inhabited by both state and non-state actors.⁴⁷ In fact, non-state actors play the predominant role in most climate finance initiatives (however it is defined). Estimates in 2011, for example, suggested that out of the approximately US\$97 billion pledged in funding for mitigation and

⁴⁵The Paris Agreement 2015. Available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf, article 9(3), 9(6), 11(1).

⁴⁶See for example, United Nations (2017) Round-table discussion on the process to identify information to be provided under Article 9, paragraph 5, of the Paris Agreement, UN Doc FCCC/CP/2017/INF.2. Available at: <http://unfccc.int/resource/docs/2017/cop23/eng/inf02.pdf>.

⁴⁷Buchner et al. (2011).

adaptation efforts, almost two-thirds (US \$55 billion) was sourced from the private sector.⁴⁸ In fact, as Bécault and Marx made clear in 2015:

[M]uch climate finance is channelled through a wide range of institutions that do not directly fall under the UNFCCC such as bilateral aid agencies and multilateral funds.⁴⁹

All of this gives rise to the notion that a more explicit definition of climate finance is needed under the UNFCCC regime, and one that acknowledges with the pluralistic realities of climate governance (defined above) and the financial contributions of both state and non-state actors. Such an all-encompassing definition might see climate finance as comprising any and all ‘funds that are designed and resourced to address the climate challenge’ including financial support for to address climate change impacts provided by state and non-state actors.⁵⁰ These are, however, discussions for another day. We merely raise the point here to acknowledge the broader and decentralized landscape in which finance is provided for climate initiatives both within and outside of the UNFCCC regime. In this chapter we therefore confine ourselves to a discussion of the mobilization of *public resources* and the obligations of donor and recipient states to report on those funding flows. The equally important issues of non-state transparency in climate governance arrangements are thus outside the scope of this short chapter.⁵¹

2.3 *The Evolution of Climate Finance Under the UNFCCC*

The topic of climate finance has received varying levels of attention and importance under the UNFCCC regime. Since 1992, when the UNFCCC framework was first established, there has been a relatively slow push towards the provision of financial ‘support’ as well as technology and expertise as part of broader equity sharing arrangements between the parties. As noted in the introduction, the wording of the UNFCCC framework reflected a clear intention of applying the principle of CBDR and transfer the know-how, technology and resources from developed to developing states. In other words, financial support and climate finance were coupled

⁴⁸Buchner et al. (2011, p. iii).

⁴⁹Bécault and Marx (2014, p. 2).

⁵⁰Zadek (2011, pp. 1058–1068).

⁵¹The issue of transparency and non-state actors more generally in climate governance, has taken on significant importance in recent years. As non-state actors are increasingly recognised as central players in regulation and governance, including at the global level, attention has shifted as to how accountable and transparent they really are. As writes: ‘the transparency framework is key to generating compliance with the Paris Agreement by driving accuracy, completeness, comparability and consistency of efforts by states. But again, the role of non-state actors in the hybrid architecture of the Paris Agreement is blurred. On the one hand, non-state actors are asked to cooperate with states to ensure best practice on monitoring emission reductions; on the other, non-state actors are themselves asked to reduce their emissions through voluntary commitments framed as complementary to state action and supportive of NDCs.’ See, Bäckstrand et al. (2017).

with technological transfer, human ingenuity and benefit sharing considerations. The original text of the UNFCCC, for example, imposed on developed states a requirement to:

Take all practicable steps to promote, *facilitate and finance*, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.⁵²

In 2001, the UNFCCC Kyoto Protocol established an ‘Adaptation Fund’ aimed at supporting ‘concrete adaptation projects in developing countries that are “particularly vulnerable” to climate change.’⁵³ The Adaptation Fund was to be financed by ‘proceeds from the clean development mechanism (CDM), project activities and other sources of funding.’⁵⁴ Though it wasn’t officially launched until 2008 (COP14 in Poland), by 2012, the Adaptation Fund had acquired some US \$86 million in revenue (largely through donations) plus an additional US \$168 million from the sale of certified emissions reductions.⁵⁵ In 2009 (COP15 in Copenhagen) developed states pledged a further US \$30 billion in ‘fast-start finance’ for the period 2010–2012.

At the 16th Conference of the Parties (COP16) in Cancun in 2010 the ‘larger landscape’ of climate finance began to receive more focused attention.⁵⁶ At COP16, a ‘US \$100 billion by 2020’ target was confirmed (suggested a year prior in Copenhagen) along with the establishment of a new ‘Green Climate Fund’ (GCF) to help fund and promote climate finance investment across the world.⁵⁷ The GCF is today said to be the largest ‘international climate fund helping developing countries respond to climate change.’⁵⁸ In 2016, it had a portfolio of ‘more than 40 projects, using US \$2.2 billion of its own money and US \$5 billion from development agencies and banks’.⁵⁹ In his last year of office, United States President Barack Obama pledged US \$3 billion towards the GCF, whilst current President Donald Trump has backed away from the arrangement arguing the GCF is merely a mechanism to ‘redistribute wealth’ from richer countries.⁶⁰ The US \$100 billion

⁵²United Nations (1992) United Nations Framework Convention on Climate Change, FCCC/INFORMAL/84 GE.05-62220 (E) 200705, article 4(5).

⁵³See, Transparency International (2014, p. 5).

⁵⁴United Nations Framework Convention on Climate Change (2014) Adaptation Fund. Available at: http://unfccc.int/cooperation_and_support/financial_mechanism/adaptation_fund/items/3659.php.

⁵⁵Australian Aid (2012, p. 1).

⁵⁶At COP16, the ‘Technology Mechanism’ and ‘Cancun Adaptation Framework’ were also established.

⁵⁷The headquarters of the GCF is in South Korea. Australia was elected to lead the GCF board in 2017.

⁵⁸Green Climate Fund (2017).

⁵⁹Popovich and Fountain (2017).

⁶⁰Sengupta et al. (2017).

pledge—about which just over half has already been financed—has been described as ‘very generic’ and essentially allows for a mix of public and private finance from either development banks or the GCF.⁶¹

The momentum for a more sustained focus on increased financial commitments continued up until COP21 in Paris 2015 (when the Paris Agreement was signed).⁶² Espagne reflects on that period:

Right before the beginning of COP21, in early September 2015, the CEPPI and France Stratégie decided to launch a discussion platform on the many strands of research and policy-oriented discussions that aimed at understanding the links between financial and climate issues. This platform hosted more than thirty written contributions from experts and citizens alike, covering nearly all fields of discussion relating to finance and climate issues.⁶³

The French Government’s organizing efforts, amongst other things, contributed to the topic of climate finance being formalized (though not defined) within the preamble and the text of the Paris Agreement itself. Under the Paris framework, the GCF has been given a central and important role in the distribution of funds from developed to developing countries. At the same time developed states have strongly urged to develop a ‘roadmap’ to achieve the goal of jointly providing USD \$100 billion annually by 2020, whilst also increasing adaptation finance.⁶⁴

3 Transparency, Finance and the UNFCCC

3.1 *Conceptualizing Transparency in Climate Finance*

As is the case for other principles of governance crafting a universal definition of transparency which fits the analysis being attempted in this chapter is complicated by the many stakeholders with an interest in its implementation.⁶⁵ The question of whether a framework, institution or mechanism ‘is truly transparent’ must be answered with the realities of the implementation of governance in mind. A simple definition of transparency might include: ‘the extent to which information is made publicly available within a given social system.’⁶⁶ This definition links the availability of information to the perspective of the ‘common person.’ Another definition of transparency is equally broad: ‘[Transparency is] the full flow of information within a [given] polity.’⁶⁷

⁶¹Espagne (2016, p. 9).

⁶²Espagne (2016).

⁶³Espagne (2016, p. 2).

⁶⁴Paris Agreement, Preamble [115].

⁶⁵Martin Lodge points out that these relationships are often characterized by different types of power imbalances. See generally, Lodge (2004) in Jordana and Levi-Faur (eds), pp. 124–44.

⁶⁶Moon et al. (2005). See also discussion in Curtin and Meijer (2006, p. 111).

⁶⁷Hollyer et al. (2014, p. 413).

There are, however, some concerns with broad definitions of transparency in these formats. First, in most cases, achieving transparency from the perspective of ‘the general public’ is a well-intended goal though beyond what is realistic or practical in most circumstances. Vastly differing levels of education, language ability, access to databases and registries (online or in hard copy) and other socio-cultural barriers prohibit such conceptions of being any practical (or evaluative) use. Similarly, the ‘full flow of information’ may or may not be necessary for a more accountable system of governance, and in fact, may overload the recipients with complicated loads of data which turn out to have little use. In our view, a more comprehensive definition of transparency, therefore, needs to canvas, firstly, *what* and *how* information is presented and, secondly, a realisation that not every member of the public will have a need for information and therefore a consideration of ‘who’ needs the information. In other words, as some commentators point out, merely ‘informing’ the public may or may not have the consequences desired by the system.⁶⁸

With a view to a more comprehensive and practical definition of transparency, therefore, and one which has greater relevance to our current chapter, we suggest it must necessitate the following factors:

1. Who has the obligation to disclose information (the ‘informer’)?
2. Who has a right to access the disclosed information (the ‘informee’)?

Additional considerations might also include: what information should be presented; how the information should be presented; the quality of the information disclosed; and the timeliness of the release of the information.

All this suggests there is a stark difference between being ‘transparent’ with information and being ‘effectively transparent.’ For the most part, our considerations align with Frederick Schauer’s earlier work on the ‘three dimensions of transparency’ which include: (1) consideration of who possesses the information; (2) consideration of which data or documents need to be disclosed; and (3) consideration of who is entitled to those documents or data.⁶⁹ Moreover, as noted above, much of the literature in this area suggests that the principles of transparency and accountability are inherently linked,⁷⁰ and, accordingly, any definition of transparency in the context of climate finance must be conceptualised in such a way as to (eventually) lead to a more accountable system of climate finance and governance. Indeed, the literature on transparency acknowledges the limitations of the more basic definitions of transparency and challenges the ‘transformative potential of transparency’ in achieving good governance in circumstances where it is poorly defined.⁷¹

⁶⁸Ben-Shahar and Schneider (2014).

⁶⁹Schauer (2011, p. 1346).

⁷⁰Fox (2007, p. 664). See also Transparency International (2014).

⁷¹See for example, Bianchi and Peters (2013, p. 10).

Building on the factors above, and Schauer's work, we are able to put forward a more refined definition of 'transparency in climate finance' that is specific to the issues we are grappling with in this chapter:

Transparency [in climate finance] involves the effective and efficient transmission of quality information, relating to the provision of climate finance, for the purpose of making the governance system more accountable.

3.2 *The MRV Requirements*

In the introductory paragraphs to this chapter we have noted that MRV requirements must be adhered to in all aspects of climate change governance. Climate finance is no exception to this, regardless of whether the project is associated with mitigation or adaptation goals. The following section provides a brief understanding of the origins and nature of these requirements, which are then used as a means to analyse the substantive law and the procedural mobilisation of funds in Part 4 of this chapter.

The UNFCCC establishes obligations for nation states to report their GHG emissions. This regime does not impose direct obligations on emitting industrial entities, but requires nation states to report aggregate data obtained through prescribed protocols. Individual sectors must therefore at the very least attempt to align with these protocols in order to report robust and verifiable emissions reductions. In this respect, any parties claiming to contribute genuine climate finance should adhere to similar high standards in terms of transparency associated with transactions. This is especially important where there is a joint party obligation, such as that associated with climate finance and the Paris Agreement.

The Kyoto Protocol to the UNFCCC encapsulates some important elements of transparency. For instance, article 3.3 requires that certain GHG emissions are reported in a 'transparent and verifiable manner'. Further, Article 10(e) requires that state parties 'facilitate at the national level public awareness of, and public access to information on, climate change'. Although the concept of transparency was not initially central to the UNFCCC framework,⁷² this has changed with the development of the UNFCCC measuring, reporting, verification (MRV) mechanism and accounting rules. At times this mechanism is expanded to include measuring, monitoring, reporting and verification (MMRV), for example, as Takacs has done below:

You can *measure* anything quantifiable (and if it's not inherently quantifiable, you can invent scales and gradients to make it so) ... [*t*]o *monitor* is to assess the changes in carbon or any other variable over time ... [*t*]o *report* is to go public with what you have measured and monitored and thus permit others to see what you are doing and how you are doing it ... [*t*]o *verify* is to ascertain independently that the information measured, monitored, and reported is accurate.⁷³

⁷²Hare et al. (2010, p. 602).

⁷³Takacs (2013, pp. 665–71).

MRV requirements predominately serve the purpose of overcoming mistrust in the governance of climate change mitigation. Some commentators suggest that the MRV requirements, which have been central in many climate change negotiations, can overcome the problems of North and South division and promote greater global cooperation.⁷⁴ Because the climate change challenge requires both technological and policy innovations, the MRV requirements theoretically benefit nation states by enhancing the clarity of shared information.

The international MRV requirements are currently under revision. From Bali (COP13, 2007) until Paris (COP21, 2015), there were different, but seemingly parallel, standards for developing and developed country parties in regards to transparency, national communications, and domestic mitigation.⁷⁵ Now, after the passage of the Paris Agreement, it appears the existing MRV protocols will be replaced by a new transparency framework.⁷⁶ Although its details will not be known until 2018, the substantive requirements for developing and developed country parties will be the same. Procedural differences may remain insofar as developed countries provide assistance to developing countries to ensure they are able to meet the new standards.⁷⁷ The purpose of the 'new' framework is to promote transparency in the communication and measurement of emissions and in other associated obligations, such as those associated with developing country parties. Indeed, the Paris Agreement indicates that transparency in mitigation policies may no longer be a matter of state sovereignty. As will become apparent through the discussion of the funds associated with finance mobilisation, the MRV requirements permeate all aspects of the international climate change agreements.

As alluded to above, transparency in financial decisions is not a subject easily covered in a few short paragraphs. Indeed, the arrangements for the mobilisation of funds, the governance of the entities associated with them, the decisions regarding approvals and the ongoing MRV protocols in relation to the projects funded are each subjects worthy of their own detailed analysis. Therefore, what we are seeking to do here is present analysis of the scope that this chapter can accommodate and identify the areas in need of more research and ongoing consideration. As such the following section in this chapter demonstrates some of the areas where transparency has been demonstrated and those where improvements must be forthcoming in order to ensure the best outcomes can be achieved through the climate finance commitments.

⁷⁴Takacs (2012, p. 523).

⁷⁵Rajamani (2011, pp. 136–46).

⁷⁶Draft decision -/CP.21, Adoption of the Paris Agreement, Report of the Conference of the Parties on its Twenty-First Session, held in Paris from 30 Nov. to 11 Dec. 2015, FCCC/CP/2015/L.9/Rev.1, 12 Dec 2015.

⁷⁷Draft decision -/CP.21, Adoption of the Paris Agreement, Report of the Conference of the Parties on its Twenty-First Session, held in Paris from 30 Nov. to 11 Dec. 2015, FCCC/CP/2015/L.9/Rev.1, 12 Dec 2015, art 13 [14].

Climate change is inherently global, and although some regions will feel its effects more than others,⁷⁸ potential solutions lie in the hands of the global society. Climate mitigation efforts are increasingly being facilitated by interactions among state, sub-state, and non-state actors that span jurisdictional boundaries and political systems. These relationships—forged as they often are against the backdrop of trade and geopolitical opportunities—are increasingly commonplace. The relationships and genuine pursuit of common goals are at the heart of addressing the global problem of climate change, as it is only through global cooperation that solutions can potentially be achieved. We suggest this is particularly important in regards to climate finance, which by its nature requires Parties come together to achieve outcomes that may not be immediately measureable.

4 Transparency After Paris

4.1 *A New Focus on Climate Finance and Transparency*

The explicit references to climate finance (and related terms) within the Paris Agreement (see articles 2, 9, 10 and 13) give a clear indication as to the importance of financial support in achieving the goals of the internationally agreed targets contained within it. Indeed, as we have mentioned earlier in this chapter, the provision of climate finance appears to be one of the most fundamental ways for achieving climate justice in the new regime and for ensuring the common but differentiated responsibility principle is maintained despite the requirement for extensive GHG emissions reductions globally. In addition to this, the climate finance provisions clearly indicate that the need to adapt to climate change is necessary on a broad scale, and therefore there is equal importance placed on the provision of finance with this outcome in mind.

As a general comment in regards to transparency, the Paris Agreement itself has ‘enhanced the transparency requirements’ for all parties. This is evidenced, for example by the establishment of the Capacity Building Initiative for Transparency (CBIT) created to build ‘institutional and technical’ capacity in climate governance. There are a number of initiatives associated with the CBIT designed to provide support to the developing country parties to the agreement. Many of these initiatives are connected with the financial mechanism of the Convention.⁷⁹ These initiatives, although interrelated are generally not associated with the transparency specifically of the climate finance projects, funds, or arrangements at a domestic

⁷⁸This discussion is taken up in the discourse around climate justice. There are number of emerging works on this topic. See Shue (2014).

⁷⁹UNFCCC (2017) Sixth review of the Financial Mechanism. Technical paper, Draft Standing Committee on Finance SCF/TP/2017/1. Available at: http://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/technical_paper_for_review_of_fm_11_sept_circulation.pdf.

level.⁸⁰ However, these arrangements will ensure that more transparent reporting is possible for developing country parties,⁸¹ in particular small island developing states and least developed country parties. In this respect, requiring transparent measurement, reporting and verification associated with climate finance projects should be considered an attainable goal over time, even for the countries facing challenges associated with their economic stage of development.

In terms of the needs associated with transparency in climate finance generally, we must consider this at both an international, national and regional level. We can also consider these requirements along the pathway of climate finance, from mobilisation of funds through to the verification of emissions reductions in the developing country where a project is initiated. In addition to this it is important to evaluate whether transparency is promoted in the law (being the international obligations) or only in the processes surrounding the law, which are of course more susceptible to changes over time. In this respect, we argue that there must be an alignment of the law and procedural requirements. Such as, between the funds governance, the reporting of the nation states in terms of meeting their obligations and of the MRV requirements of developing countries where the funds are being utilised to achieve emissions reductions.

4.2 A Separation Between Law and Procedure

The Paris Agreement requires that developed countries provide financial resources for both the mitigation and adaptation of climate change effects. In addition to this, other parties to the Agreement are requested to do so voluntarily.⁸² Within the mandate the parties are strongly encouraged to gradually increase their commitments in this respect and provide increased funding for adaptation projects, which indicates that the global community has accepted that many of the climate change predicted effects are indeed inevitable.⁸³ Having said this, in terms of the priorities of the international community, the primary focus of climate finance remains on mitigation for its widespread global benefits rather than the localised benefits associated with adaptation options.⁸⁴

When we separate the law and procedure associated with climate finance it is possible to get a better understanding of where transparency is strongly promoted and the instances where it is actually being practiced. In terms of the law itself,

⁸⁰See Falzon (2016).

⁸¹Department of Foreign Affairs and Trade (2017) Roadmap to US\$100 Billion. Available at: <http://dfat.gov.au/international-relations/themes/climate-change/Documents/climate-finance-roadmap-to-us100-billion.pdf>.

⁸²The Paris Agreement, Article 9.

⁸³The Paris Agreement, Preamble [115].

⁸⁴Zahar (2017, p. 102).

international obligations exist for developed countries to provide support to developing states through climate finance commitments. This is directly traceable to the Paris Agreement. The obligation is clearly stated in Article 9 of the Agreement, and on this matter there is little debate. However, the international binding obligations are underpinned not by strict standards or even strong targets, but rather countries are ‘strongly urged’ to meet particular targets and provide road maps in accordance with those targets, rather than specifying a strict collective goal associated with the Article 9 requirement. This of course says nothing of the transparency associated with the legal obligation itself, but it does provide an indication of how countries may perceive the procedural aspects of the substantive obligation.

In terms of the Paris Agreement and the procedural aspects of climate finance there are two entities concerned with the actions associated with the Financial Mechanism of the Convention.⁸⁵ These are the Green Climate Fund (GCF) and the Global Environment Facility (GEF). The GEF was established in 1992 immediately preceding the Rio Earth Summit,⁸⁶ whereas the GCF is relatively new and was established in 2010 by 194 of the UNFCCC state party participants.⁸⁷ These two entities play an important role in supporting the finance goals of the Paris Agreement. They both have similar governance procedures where some transparent practices have been clearly implemented.

The GEF and GCF are funds which both operate under a governing body. In addition to this the LDCF and SCCF are ‘managed by the GEF’ however both funds have their own Council which meets concurrently with the GEF Council.⁸⁸ The governing instruments for the funds both demonstrate, at least in theory, adherence to the principles of MRV.⁸⁹ For instance, the governing instrument for the Green Climate Fund funds clearly stipulate requirements for the monitoring and evaluation of the projects funded through this mechanism, in order to ensure projects achieve the outcomes associated with the funding guidelines.⁹⁰

The outcomes of the funding arrangements, the parties who must report, and the projects funded are a different matter to the internal arrangements of the funding bodies themselves. In this respect we argue that transparency is inherently

⁸⁵3.6 CBIT: the Capacity-Building Initiative for Transparency financial mechanism.

⁸⁶Global Environment Facility (2017) Funding. Available at: <https://www.thegef.org/about/funding>.

⁸⁷Green Climate Fund, About the fund. Available at: <http://www.greenclimate.fund/who-we-are/about-the-fund>.

⁸⁸UNFCCC (2017) Sixth review of the Financial Mechanism. Technical paper, Draft Standing Committee on Finance SCF/TP/2017/1. Available at: http://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/technical_paper_for_review_of_fm_11_sept_circulation.pdf.

⁸⁹UNFCCC (2012) Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011, FCCC/CP/2011/9/Add.1. Available at: <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf#page=4>.

⁹⁰UNFCCC (2012) Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011, FCCC/CP/2011/9/Add.1. Available at: <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf#page=4>, [57–62].

important to both. The ability to monitor the funding decisions, and the internal review processes, should be extended to the general public to ensure climate finance is being managed in a way that will achieve the best global outcomes. In terms of the procedures and internal governance of these entities, discussions of the bodies are provided to the public in most instances, other than for the closed executive sessions. The decision as to whether a session may be open or closed appears to be discretionary however, which begs the question as to whether these procedures are as externally transparent.

Further evidence of a lack of ‘external transparency’ (discussed above) can be demonstrated when one considers the administration and decision making processes that these funds employ. Indeed, the GCF notes that it is for the board to decide which of the records of the meetings will be made public, which of course means there can be an internal vetting process as a perceived barrier to transparency.⁹¹ Where external transparency is compromised it is difficult to evaluate the internal transparency also, although where governance and procedures are based on international standard practice this evaluation is made somewhat easier.

The International Organization for Standardization is currently in the process for developing a new standard for ‘greenhouse gas management and related activities’.⁹² ISO/DIS 14080 will provide the framework and principles for methodologies on climate actions, and will likely provide guidance on the MRV principles associated with this action. In terms of the goals of this standard, the Organization suggests that it will aid all organisations in meeting their Paris commitments, and in aligning with the ‘global climate action agenda’.⁹³ At this stage it is difficult to provide more analysis on the ISO standard and its likely impact on the procedural aspects of climate finance as the publication is not expected until 2018. However, it is possible to say that international standardisation associated with MRV and with methodologies is clearly essential to achieve transparency in terms of providing information that is consistent and meaningful.⁹⁴

Although it is difficult to evaluate all the aspects yet to be developed and finalised it seems that procedural aspects associated with climate finance and the entities charged with the task to mobilise funds as mandated under the Paris Agreement, are progressing quickly towards a higher standard of transparency. Indeed, the law itself contains the specific requirement for transparent procedures, and as such the funds are directed to the importance of valuable and meaningful

⁹¹Green Climate Fund, Rules of Procedure of the Board. Available at: http://www.greenclimate.fund/documents/20182/574763/GCF_policy_-_Rules_of_Procedure.pdf/9d55fae7-f4df-45fe-a3f3-754bc0d98e67, paragraph 36.

⁹²International Organization for Standardization, ISO/DIS 14080, Greenhouse gas management and related activities—Framework and principles for methodologies on climate actions. Available at: <https://www.iso.org/standard/67452.html>.

⁹³International Organization for Standardization, ISO/DIS 14080, Greenhouse gas management and related activities—Framework and principles for methodologies on climate actions. Available at: <https://www.iso.org/standard/67452.html>.

⁹⁴Takacs (2013, p. 668).

sharing of information.⁹⁵ The GEF for instance will launch a new information management platform to align with the release of the new transparency agenda associated with the Paris Agreement. This platform is intended to ‘enhance the availability, accuracy, quality and timeliness of data on GEF financing’. Each of these aspects are quite clearly very important for achieving meaningful transparency in the pursuit of the GEF objectives. However, until this is done there are suggestions that these entities could provide better access to information for the public through access to meetings and improved website capabilities.⁹⁶

4.3 Article 9.5 Requirements

Article 9 of the Paris Agreement specifically covers ‘financial resources’ for GHG reduction initiatives. There are two substantive obligations contained in Article 9. First, article 9.1 of the Agreement states:

Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.

Second, article 9.3 of the Agreement requires developed states, as part of a global effort:

to continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, noting the significant role of public funds, through a variety of actions, including supporting country-driven strategies, and taking into account the needs and priorities of developing country Parties. Such mobilization of climate finance should represent a progression beyond previous efforts.

In support of these two ‘substantive duties’, article 9.5 of the Paris Agreement (for the first time ever in the UNFCCC regime)⁹⁷ creates a procedural obligation for Developed States to ‘biennially communicate’ indicative quantitative and qualitative information about articles 9.1 and 9.3 including their ‘projected levels of public financial resources’ to be provided to developing states. This requirement differs slightly from the existing UNFCCC Guideline on Biennial Reporting whereby developed states are asked to provide a description of their ‘national approach’ for tracking the provision of financial, technological and capacity-building support to developing states (i.e. how they have implemented the principle of CBDR).’ Many states have done this, with respect to financial support, by using the ‘Rio Markers’ (method) developed by the Organisation for Economic Cooperation and

⁹⁵Transparency International (2014).

⁹⁶Ibid.

⁹⁷See Gastelumendi and Gnitke (2017, p. 247).

Development (OECD).⁹⁸ What distinguishes article 9.5 of the Paris Agreement from this requirement, however, is firstly that it decouples the requirement for financial support from technological and capacity building, and secondly, that article 9.5 specifically requests both quantitative and qualitative information about ‘projected levels of public financial resources.’ It is far more detailed, targeted and forward looking in terms of state-driven financial support.

All that said, as recent as the lead up to COP23 (November 2017) article 9.5 was already beginning to cause concerns for developed states. In May 2017, for example, a roundtable discussion on the technical requirements of article 9.5 was established. The aim of the roundtable was to provide an ‘opportunity for the Parties to engage in a technical discussion [in the lead up to COP23] on the information to be provided’ under the article.⁹⁹ For example, what types of information is quantitative? What forms are qualitative? And, what does projected mean? During the roundtable discussions, several key issues were raised which are likely to stand in the way of enhanced transparency around information from state supported climate finance. These included: constraints imposed by national budgetary cycles, a limited ability by states to predict precision future flows of finance, and a lack of detailed information on budgetary resources already held by states.¹⁰⁰ Fortunately, several of the participants of the roundtable underlined the importance of ‘transparency, comparability and clarity.’¹⁰¹ This means that the parties are at least cognisant of the requirement for delivering some form of enhanced transparency in funding flows under the article 9.5 requirement. Unfortunately, as it stands, the detail of article 9.5 was not elaborated upon at Bonn (COP23) in November 2017. Accordingly, the exact obligations and concerns around transparency and article 9.5 have been postponed until COP24 in December 2018 in Poland.

5 Conclusion

In this chapter we have argued that transparency is a critical part of effective climate governance. It is a particularly crucial aspect of climate finance, where countries aspire to provide US \$100 billion in pooled revenues in the coming years.¹⁰²

⁹⁸UNFCCC ‘Biennial Reports and National Communications: Review Challenges and Practice.’ Background Paper for the 3rd Lead Reviewers Meeting, 3 March 2016, Bonn Germany available online http://unfccc.int/files/national_reports/biennial_reports_and_iar/application/pdf/review_practice_guidance_2016_background_paper_rev_26_feb.pdf, p. 29.

⁹⁹United Nations (2017) Round-table discussion on the process to identify information to be provided under Article 9, paragraph 5, of the Paris Agreement, UN Doc FCCC/CP/2017/INF.2. Available at: <http://unfccc.int/resource/docs/2017/cop23/eng/inf02.pdf>, p. 3.

¹⁰⁰Ibid., p. 5.

¹⁰¹Ibid., p. 8.

¹⁰²The \$100 Billion goal (by 2020) was first established in 2010 at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties.

Where, how and when that money is spent needs to be documented in open, transparent and easily-understood ways. There is but only a small window of opportunity to spend these funds, before, as the IPCC has predicted, the repercussions of dangerous climate change become very real indeed.¹⁰³ As Buchner and others report: ‘transparency in the overall system [is needed] to get a consistent, comparable and accurate overview of climate finance flows, trends, directions and purposes.’¹⁰⁴ In the end, transparency is the gateway to better forms of climate governance. In its broadest possible form, it includes collecting disseminating useful information on how and why decisions are made, whether by governments or non-government actors, including who had influence into the decision-making process. This chapter has highlighted the importance of transparency to the collection and dissemination of climate finance from state actors.

Transparency in climate finance can be analysed in terms of the law, when we consider the binding obligations themselves. For instance, the inclusion of the requirement for transparency as contained within the Paris Agreement itself means that parties are obliged to follow procedures in accordance with transparent practices. However, given the broad scope of different definitions one might be justified in asking, what does it actually mean where those specific requirements are not identified? To this rather than providing a definite response, we must suggest that the global community must wait and see what eventuates from the CBIT agenda in the coming years to determine what the transparent standards are for climate change mitigation and how these must necessarily be employed for climate finance specifically and the resulting support provided to developing country parties. This is clearly a fruitful area for future research agendas.

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¹⁰³See, IPCC 5th assessment report. Available at: <https://www.ipcc.ch/report/ar5/>.

¹⁰⁴Buchner et al. (2011, p. 51).

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Chapter 4

The Paris Agreement: Development, the North-South Divide and Human Rights



Anna Huggins and Bridget Lewis

Abstract In December 2015, nations of the world joined together in Paris to negotiate a new legal instrument to address climate change. The debates which took place in the lead up to the adoption of the Paris Agreement reflected broader, ongoing tensions between developed and developing states within the international climate regime. They also demonstrated the divergence of opinion between states as to the relationship between climate change and human rights. While the human impacts of climate change are now well-understood, there is still debate as to what a human rights-based approach to climate change should look like. This chapter argues that these geopolitical dynamics and differing priorities will continue to shape the implementation of the Paris Agreement, as well as the specific debates over intellectual property, finance, technology transfer and innovation. The chapter therefore provides an important contextual backdrop for further analysis of these issues.

Keywords UNFCCC • Kyoto Protocol • Paris Agreement • Development North-South divide • Human rights • Common but differentiated responsibilities

1 Introduction

This chapter contextualises the specific debates over intellectual property, finance, technology transfer and innovation in the Paris Agreement with reference to broader dynamics shaped by the tensions between developing and developed states in the international climate change regime. These dynamics strongly influenced negotiations between states for the United Nations Framework Convention on Climate

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Change (UNFCCC),¹ and its Kyoto Protocol² and Paris Agreement,³ and informed the way the principle of common but differentiated responsibilities (CBDR) has been incorporated in each treaty.⁴

Tensions between developed and developing countries are also evident in the ongoing contestation about the desirability of, and options for practically embedding, a human rights-based approach to climate change. Developing states face a range of challenges in meeting their obligations under international human rights law, including ensuring adequate food, water, healthcare, housing and energy for their populations. Climate change threatens to exacerbate these problems or introduce new challenges, putting additional strain on already limited resources in developing countries, and requiring that they attempt to balance obligations under both the international climate and human rights legal regimes. As this chapter explains, a number of developing countries have been among the strongest advocates for human rights-based approaches to climate change, in order to bring attention to their plight and to put pressure on the global community to address the human impacts of climate change. The interconnections between climate change, development and human rights are vital to understanding the geopolitical dynamics of the Paris Agreement negotiations and ongoing implementation.

Despite the highly charged nature of debates about differential treatment and human rights in the negotiations for the Paris Agreement, the final text of this Agreement does not take a strong stance on these issues. The Paris Agreement reflects a more nuanced, proceduralised variant of the CBDR principle than the UNFCCC and Kyoto Protocol, which differentiated between central treaty obligations for developed and developing states.⁵ Further, the references to human rights in the Agreement are limited, and do not create binding obligations—although reference is made to the relevance of existing obligations under other international human rights treaties.⁶ *Prima facie*, this might suggest that these issues are peripheral to the core issues that concern states, or perhaps have been partly resolved through the negotiation process. However, as this chapter shows, the text of the Paris Agreement belies the significance that states attach to issues of differential treatment and the human rights implications of climate change. Through an examination of the history of these tensions in the international climate change regime, their continuing salience becomes clear. The future realisation of the regime's intellectual property and innovation goals will occur against a backdrop that is strongly shaped by issues of development, North-South tensions and human rights, underscoring the importance of a contextualised understanding of these issues.

¹UNFCCC.

²Kyoto Protocol.

³Paris Agreement.

⁴See further Sect. 3.

⁵Huggins and Karim (2016, pp. 427–8).

⁶Paris Agreement, Preamble, para 11; Bodansky (2016, p. 313).

2 The Divide Between Developed and Developing States

Before proceeding to unpack the ways in which divergent positions on differential treatment and human rights have influenced the UNFCCC, Kyoto Protocol and Paris Agreement, it is useful to provide some context on the divide between developed and developing states. For decades, debates about international collective action on climate change have been highly politicised along North-South fault lines. Yet it is acknowledged that terms such as ‘North’ and ‘South’ are imprecise, and there is no widely agreed metric for identifying states as ‘developed’ or ‘developing’. For the purposes of this chapter, reference to developed and developing states is informed by understandings of the legacies of the colonial encounter,⁷ which continue to be reflected in the material and political inequalities between states.⁸ Anghie posits that the idea of sovereignty, which underpins an international law system based on state consent, is ‘formed by its history, its origins in and engagement with the colonial encounter’.⁹ Hence, the legacies of colonialism are concealed by, yet persist in, the very structure of international law, which serves to reproduce imperial relations.¹⁰

The conquest of non-European people under colonialism depended upon the colonial powers establishing and maintaining political and economic superiority.¹¹ Colonial rule denied the legal personality of the governed and excluded them from the formative era of international law.¹² Earlier discourses around ‘the civilized’ and ‘the uncivilized’ came to be re-conceptualised in economic terms as differences between developed and developing countries.¹³ Despite the end of the colonial era, global economic inequalities persist and are vast.¹⁴ Therefore, when we use the descriptors ‘developing’ and ‘developed’ states in this chapter, we are referring to economic and political disparities that have roots in colonialism.

Despite the large number of contemporary international and domestic organisations that employ various indicators to create lists of developing, emerging, developed or advanced economies, there is no single definitive categorisation of countries. To provide one illustrative example, the following country classifications can be distilled from the Annex to the United Nations’ (UN) *World Economic*

⁷Anghie (2005).

⁸Rajamani (2006, pp. 2–3).

⁹Anghie (2005, p. 312).

¹⁰*Ibid.*

¹¹Rajamani (2006, p. 3).

¹²*Ibid.*

¹³Anghie (2005, pp. 203–4).

¹⁴The United Nations Development Program (UNDP) notes that, despite the number of extreme poor dropping by more than half between 1990 and 2015, there are still 800 million people living on less than \$1.25 per day: UNDP (2017).

Situation and Prospects 2017:¹⁵ (1) developed economies (n = 36); (2) economies in transition (n = 17); (3) developing economies (n = 54); (4) small island developing states (n = 38);¹⁶ and (5) least developed countries (n = 48).¹⁷ The limits of these types of classifications in the international climate change regime are acknowledged. For instance, what is meant by ‘developing’ states is not defined in the Paris Agreement, despite the fact that the principle of common but differentiated responsibilities is enshrined in Article 3(1) of the UNFCCC and remains a key principle shaping states’ obligations under the Paris Agreement.¹⁸

Moreover, the interests of states that are typically classified as developing can vary widely. The negotiating positions and capacities of vulnerable least developed countries and small island countries differ significantly from large developing economies like Brazil, Russia, India, China and South Africa,¹⁹ and from comparatively wealthy developing countries such as Kuwait, Saudi Arabia, Singapore and South Korea.²⁰ Maguire and Jiang claim that the lines between the developed and developing countries in the international climate regime have ‘become increasingly blurred, as nations have formed various blocs and alliances and several Southern countries have become major emitters’.²¹ Despite this, the discussion in this chapter proceeds on the basis that developing countries have varying degrees of political and economic disadvantage vis-à-vis their developed country counterparts, and such divisions have been a salient factor in negotiations under the international climate regime.

¹⁵United Nations Secretariat Department of Economic and Social Affairs (2017, pp. 151–158). The data in this Annex are based on information collected from diverse, reputable sources, including, inter alia, the Statistics Division and the Population Division of the Department of Economic and Social Affairs of the UN Secretariat, five UN regional commissions, the International Monetary Fund, the World Bank, and the Organisation for Economic Cooperation and Development: *ibid.* 151.

¹⁶If non-UN members and Associate members of the Regional Commissions are included, the number of small island developing states is 57.

¹⁷As there is often overlap between countries in the last three categories, if a country appears in the least developed country list, it is classified as such, if it does not appear in the least developed country list but does appear in the small island developing states list, it is classified with the latter, and the remainder of developing countries are categorised as ‘developing countries’.

¹⁸For discussion of the CBDR principle in the UNFCCC, Kyoto Protocol and Paris Agreement, see further Sects. 3 and 5.1.

¹⁹At Copenhagen, a new bloc comprising the large developing countries of Brazil, South Africa, India and China, known as BASIC, emerged as a powerful geopolitical force: Dubash and Rajamani (2010, p. 594).

²⁰Bodansky and Rajamani (2016), Pauwelyn (2013, pp. 29–41).

²¹Maguire and Jiang (2015, p. 236).

3 Differential Treatment in the UNFCCC and Kyoto Protocol

The different capacities and contributions to environmental harms of developed and developing countries are reflected in the principle of CBDR. This principle recognises that all states have common environmental responsibilities,²² yet the manner in which a state meets its responsibilities should vary in accordance with the economic, historical, social and ecological factors at play in each country.²³ CBDR has been highly influential in international environmental law since the Rio Earth Summit in 1992.²⁴ Principle 7 of the Rio Declaration provides that:

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.²⁵

In the international climate regime, tensions between developed and developing countries have been fuelled by the historical contributions of industrialised countries to global climate change, current variations between countries in terms of wealth and emissions generation, and the heightened vulnerability of the poorest populations within developing countries to adverse climate change impacts.²⁶ Against this backdrop, differential treatment for developing countries is enshrined in the central treaty obligations of the UNFCCC and the Kyoto Protocol, which is a unique manifestation of the CBDR principle in international environmental law.²⁷

Specifically, in the UNFCCC, only Annex I industrialised countries²⁸ have obligations to adopt and report on national policies and measures to mitigate climate change, with the aim of reducing overall greenhouse gas emissions to their 1990 levels.²⁹ In contrast, all parties, taking into account their common but differentiated responsibilities and national circumstances, are required to publish national emissions inventories, and to formulate, publish and regularly update national programmes containing mitigation measures.³⁰ Thus, under the UNFCCC, the primary

²²This is consistent with the principle of *pacta sunt servanda* enshrined in Art. 26 of the Vienna Convention.

²³Hunter et al. (2011, p. 464).

²⁴Rajamani argues that the influence of the CBDR principle in international environmental law reached its zenith in the decade between the Rio Earth Summit in 1992 and the World Summit on Sustainable Development in 2002: Rajamani (2012, p. 606).

²⁵Rio Declaration, principle 7.

²⁶Rajamani et al. (2012, pp. 1–2).

²⁷Ibid. 3.

²⁸That is, developed countries and countries in transition.

²⁹UNFCCC, art. 4(2)(a) and (b).

³⁰UNFCCC, art. 4(1)(a), (b).

burden for reducing greenhouse gas emissions falls upon Annex I parties, which have also been the primary historical beneficiaries of industrialisation.

Whilst the UNFCCC contains broad and vague commitments, the 1997 Kyoto Protocol is far more prescriptive. Like the UNFCCC, the Kyoto Protocol contains asymmetric requirements for developed and developing state parties. Under Article 3(1), Annex I states have legally-binding obligations to, individually or jointly, reduce greenhouse gas emissions by at least 5% below 1990 levels.³¹ States' reports on their national emissions are subject to review by expert teams, and non-compliance matters are dealt with by a Compliance Committee consisting of both a Facilitative Branch and an Enforcement Branch.³² Developing country parties have legally binding requirements to report on programmes and activities undertaken with respect to mitigation and adaptation measures.³³

The bifurcated responsibilities of Annex I and non-Annex I parties in the Kyoto Protocol did little to quell the tensions between developed and developing states, which again came to the fore when the United States (US) signed but failed to ratify the Kyoto Protocol. The US has consistently stated that it will not support an agreement that exempts developing countries from emission-reduction commitments. Indeed, large developing countries such as Brazil, China and India rank among the world's top ten contributors to cumulative global emissions.³⁴ As shall be shown in Part 5, in the negotiations for the successor agreement to the Kyoto Protocol, bifurcated approaches to differential treatment were replaced by a more nuanced variant of the CBDR principle in combination with a bottom-up architecture of 'self-differentiation' for developed and developing states.³⁵

4 The Emergence of Human Rights as a New Battleground for Debates Between Developed and Developing States

In addition to the ongoing contestation about the appropriate roles and responsibilities for Annex I and non-Annex I states under the Kyoto Protocol, in the early 2000s, the human rights implications of climate change emerged as a new battleground for debates between developed and developing countries. Developing states, and particularly small island developing states, argued that climate change impacts should be recognised as a human rights issue to bolster their arguments that high-emitting industrialised states needed to take stronger action on climate change. Although the UNFCCC and Kyoto Protocol do not explicitly refer to human rights,

³¹Kyoto Protocol, art. 3(1).

³²Decision 27/CMP.1, section II.

³³Kyoto Protocol, art. 10(f).

³⁴Rajamani et al. (2012, p. 4).

³⁵Brunnée and Streck (2013, p. 591), Rajamani (2015, p. 852).

most state parties to these treaties already have binding human rights obligations under international law. Most notably, a large majority of states parties to the climate agreements are also parties to the two major human rights covenants, the International Covenant on Civil and Political Rights (ICCPR)³⁶ and the International Covenant on Economic, Social and Cultural Rights (ICESCR).³⁷ These covenants impose obligations to respect, protect and fulfil a wide range of fundamental human rights and freedoms. A significant benefit of a human rights-based approach is that it brings climate change within the scope of existing legal obligations under international human rights law, creating the potential for legal claims or at least providing legal language to strengthen advocacy and scrutiny of state action. Even where legal claims are not possible, the moral weight of human rights principles can exercise a ‘compliance pull,’ encouraging states to take more effective action to address the negative impacts of climate change.³⁸ As a result, a number of vulnerable developing states have adopted the language of human rights in advocating for stronger international action on climate change.³⁹

It is useful to contextualise the following discussion of the divergent positions of developed and developing states on the desirability of a human rights-based approach by first elaborating on the human impacts of climate change. Climate change is already affecting environmental systems, natural resources and weather patterns, which threatens the enjoyment of a wide range of human rights.⁴⁰ This is confirmed by the most recent report of the Intergovernmental Panel on Climate Change (IPCC), the peak scientific body responsible for researching and analysing the causes and effects of climate change, which identifies that changes in global temperatures, sea-ice cover, sea levels and precipitation rates are already being observed.⁴¹ It is predicted that changes to the world’s climate will lead to decreases in soil fertility, loss of species, increased ocean acidity and salinity, and increasingly common and severe extreme weather events such as floods, droughts, cyclones and bushfires.⁴²

The potential implications of these changes on human lives include displacement, loss of livelihoods, food insecurity, spread of disease and unsafe living conditions.⁴³ Families, communities and even entire nations in the South Pacific are already being affected by rising sea levels, with salt-water incursions affecting the

³⁶ICCPR.

³⁷ICESCR.

³⁸Kiss and Shelton (2007, p. 238).

³⁹Boyle (2012, pp. 618–619), Limon (2009, p. 451), Parsons (2008–09, p. 22).

⁴⁰Much has been written on the relationship between human rights and climate change. See, e.g., Atapattu (2016), Bodansky (2010, pp. 511–25), Humphreys (2010), Lawrence (2015), McInerney-Lankford et al. (2011), Limon (2009, pp. 439–76), Knox (2009, pp. 477–98), Office of the High Commissioner for Human Rights (2009); Male Declaration on the Human Dimension of Global Climate Change.

⁴¹Pachauri and Meyer (2014, p. 2).

⁴²Ibid. 6–13.

⁴³Ibid. 13–15.

availability of arable land and potable water, and forcing some communities to relocate further inland or even to move to other islands or emigrate.⁴⁴ These communities also face decreasing fish stocks and other changes to natural resources on which they rely,⁴⁵ and face the risk of more frequent severe storms, which threaten housing and infrastructure.⁴⁶ Climate change also threatens agricultural production in other parts of the developing world, particularly in Africa where significant losses in crop production are predicted to occur.⁴⁷ Health impacts are anticipated as water- and mosquito-borne diseases move into new areas and heat-related health conditions become more common and widespread.⁴⁸

These impacts can all be understood in terms of their implications for human rights which are guaranteed under international law. Rights which are most obviously affected include the rights to health,⁴⁹ an adequate standard of living, including adequate food and housing,⁵⁰ safe and healthy working conditions,⁵¹ and even the right to life.⁵² There are also particular rights belonging to Indigenous peoples and minorities which will be affected by climate change, including the rights to self-determination and to make use of natural resources,⁵³ and the right to practice and pass on culture, religion and languages.⁵⁴

The measures that states take to mitigate or adapt to the effects of climate change can also have human rights implications.⁵⁵ Mitigation measures may involve switching to alternative sources of energy, utilising more efficient technologies or increasing carbon sequestration. Adaptation strategies can incorporate a wide range of activities and may be targeted at the particular needs of affected communities or individuals. These activities include changes to planning and development requirements, the construction of sea walls or other protective infrastructure, changes to agricultural crops and practices, incentives for farmers to switch from food cultivation to biofuel production, altered water storage mechanisms and relocation of vulnerable communities.⁵⁶ If individuals, families or communities are forced to move in order to make room for these new practices or to comply with relocation plans, the right to freedom of movement, including the right to choose a

⁴⁴Aisi (2007, pp. 65–66), Barnett (2005, p. 208), Field et al. (2014, pp. 13, 24).

⁴⁵Barnett (2005, p. 208).

⁴⁶Field et al. (2014, p. 24).

⁴⁷Schmidhuber and Tubiello (2007, p. 19704), Field et al. (2014, pp. 13, 21).

⁴⁸Field et al. (2014, p. 19).

⁴⁹ICESCR, art. 12.

⁵⁰ICCPR, art. 11(1).

⁵¹ICCPR, art. 7.

⁵²ICCPR, art. 6.

⁵³ICCPR and ICESCR, common art. 1.

⁵⁴ICCPR, art. 27; Triggs (2006, p. 824).

⁵⁵Pedersen (2011, pp. 403–23), Lewis (2016, pp. 39–52).

⁵⁶Field et al. (2014), section C.

place of residence, is at risk.⁵⁷ People who rely on their land for subsistence may have their rights to food and an adequate standard of living jeopardised if they are required to change the way they use their land.⁵⁸

It should be noted that climate change action, and in particular adaptation projects, also have the potential to contribute positively to development objectives. For example, programs to improve agricultural practices and increase yield are good for development, as well as allowing for adaptation to the impacts of climate change.⁵⁹ However, issues can arise where these benefits are not distributed equitably. Human rights law provides that states must respect, protect and fulfil human rights without distinction as to race, religion, age, sex, property or any other status.⁶⁰ Where adaptation projects offer potential advantages, human rights law requires that these must be delivered in a way which is free from discrimination.

In recognition of the intrinsic links between climate change and human rights, and the various ways climate change might negatively affect human rights, many have argued that the international community should adopt a human rights-based approach to climate change, in which human rights play a leading role in guiding states' responses.⁶¹ One of the key benefits of this approach is that it focuses on the people who will be most affected and who are most in need of support.⁶² It will also encourage consultation with affected communities when developing responses.

4.1 Developing and Developed State Perspectives on Human Rights

Drawing on this understanding, the extent to which human rights should be addressed in binding legal instruments under the UNFCCC framework emerged as a polarising issue for developing and developed state parties in the lead up to the Paris climate talks. The human rights implications of climate change and relevant human rights principles occupy an expanding place within the work of NGOs and human rights bodies, and increasingly have been adopted by representatives of particularly vulnerable nations. However, not all states have been so willing to support a human rights-based approach to climate change. Writing in 2011, McInerney-Lankford, Darrow and Rajamani argue that the lack of explicit engagement with human rights principles within the climate regime:

seems to reflect differences of views between States (and regional and other groupings of States) on the so-called value-added of human rights in the climate change context, the

⁵⁷ICCPR, art. 12; Human Rights Committee, *General Comment* 27, [7].

⁵⁸ICESCR, art. 11.

⁵⁹Hall and Weiss (2012, p. 323).

⁶⁰ICCPR, art. 2; ICESCR, art. 2; CEDAW; CERD.

⁶¹Knox (2009), Limon (2009, p. 450), Bodansky (2010, p. 524).

⁶²Caney (2009, p. 228), Cameron (2010, p. 708), Limon (2009, p. 451), Doelle (2004, p. 216).

comparative weight and focus to be given to human rights obligations within and beyond national borders, and perhaps also perceptions in various quarters that human rights might risk overloading an already fragile climate change agenda.⁶³

This difference of opinion can be observed in a number of discussions about climate change with human rights bodies⁶⁴ and UNFCCC negotiations. An analysis of these deliberations reveals key themes which help in understanding the context of specific debates around technology transfer, intellectual property and finance mechanisms under the Paris Agreement.

First, there is a lack of consensus among states about what a human rights-based approach to climate change entails, and this contributes significantly to states' attitudes about the benefits and practicality of such an approach. Developed states have generally argued that human rights law is ill-equipped to deal with climate change.⁶⁵ However, they have also typically adopted a narrow understanding of what a human rights-based approach involves, one which is focussed on legal obligations and violations. For example, the US has argued against incorporating human rights principles into the climate change framework. This position can be seen to flow from the US's view that 'the central purpose of human rights law... is providing remedies for the victims of specific rights violations... This framework requires identifiable violations, and identifiable harms attributable to the violations'.⁶⁶

Developing states, on the other hand, generally appear to take a broader view of human rights, one which is about setting standards and providing a 'set of internationally agreed values around which common action can be negotiated and motivated'.⁶⁷ Limon argues that this approach provides a 'forward-looking means of encouraging the evolution of, and providing a qualitative contribution to, robust, effective, and sustainable policy responses at both the national and international level, across mitigation and adaptation'.⁶⁸ These differing views explain the disagreements between states about the role that human rights principles should play in the climate change framework.

A second theme that emerges is that states appear to be concerned that human rights principles and mechanisms should not interfere with the operations of the UNFCCC. As Limon describes it, a number of developed states feel that human rights 'should not be seen to be replacing or duplicating the UNFCCC process or challenging its primacy on climate change matters'.⁶⁹ A number of states have

⁶³McInerney-Lankford et al. (2011, p. 10).

⁶⁴For example, Human Rights Council Res 7/23; Office of the High Commissioner for Human Rights (2008), Office of the High Commissioner for Human Rights (2009), *Human Rights Council Panel Discussion* (2009).

⁶⁵OHCHR (2008, p. 7).

⁶⁶*Ibid.*

⁶⁷*Ibid.* See also Stephens (2010, p. 82), Pedersen (2010, p. 248), Bodansky (2010, p. 517), Caney (2009, p. 228).

⁶⁸Limon (2009, p. 458).

⁶⁹*Ibid.* 460.

argued that the complex, global and long-term nature of climate change makes it ill-suited for consideration as a human rights issue, and that responsibility for the problem ought to remain exclusively with the UNFCCC.⁷⁰ Concerns have also been raised that increasing integration of human rights principles into the climate framework might diminish states' willingness to commit to robust emission-reduction targets.⁷¹

A third insight which is evident from the discussions is an ostensible lack of trust between developed and developing states. In response to an apparent concern that aid money would not be used appropriately, some developed states have sought to introduce measures which would commit developing states to using the aid they receive to help the most vulnerable groups within their populations.⁷² Developed countries have also expressed concerns that formal recognition of the links between human rights and climate change might be used by developing countries 'as a political or legal weapon against them'.⁷³

Developing countries have also demonstrated mistrust towards industrialised nations. For example, developing countries may perceive that developed countries could use the negative human rights impacts of climate change, which are a result primarily of rapid industrialisation, to argue that development ought to be slowed.⁷⁴ The lack of trust between developed and developing states represents a significant barrier to achieving a greater implementation of human rights principles within the international climate change framework.

5 Differential Treatment and Human Rights in the Paris Agreement

It was against this backdrop of differing state capacities and positions that parties worked to negotiate the text of the Paris Agreement, a process which took several years and involved numerous iterations.⁷⁵ The first full draft of a negotiating text was adopted in Lima at the Conference of Parties in 2014.⁷⁶ This text then went through a series of further negotiations and amendments, most notably at meetings of state representatives held in Geneva in February 2015 and in Bonn in June and

⁷⁰See, for example, United States of America (2008, pp. 1, 4, 6), Australian Government Submission to the Office of the High Commissioner for Human Rights (2008, p. 4), United Kingdom (2008, p. 3), Limon (2009, p. 452), Knox (2009, p. 490).

⁷¹Limon (2009, p. 458).

⁷²Ibid. 460; United Kingdom (2008, p. 3).

⁷³Limon (2009, p. 461).

⁷⁴Ibid. 462.

⁷⁵For a detailed discussion of the key features of the Paris Agreement and its context, see Savaresi (2016, pp. 16–26), Bodansky (2010).

⁷⁶Decision 1/CP.20.

October 2015.⁷⁷ The contributions of developed and developing states at these meetings demonstrated the ongoing divide between the two groups in terms of how to allocate responsibility for reducing greenhouse gas emissions and how to share the burden of climate adaptation costs. This section begins by considering the extent to which the Paris Agreement reflects the principle of common but differentiated responsibilities, followed by an evaluation of efforts to have the relationship between climate change and human rights recognised in the Agreement.

5.1 *The Principle of CBDR in the Paris Agreement*

In the negotiations for a successor agreement to the Kyoto Protocol, it rapidly became clear that internationally prescribed mitigation commitments, compliance with which was backed by an Enforcement Branch, would not gain the support of key states. Yet differentiation continued to be '[p]erhaps the most divisive overarching issue in the Paris Agreement negotiations'.⁷⁸ As both developed and developing countries were concerned about the economic, regulatory and technical challenges of achieving deep emission reductions, a preference emerged for a new agreement under the UNFCCC that would have universal coverage and prioritise decentralised, bottom-up selection of national mitigation targets and actions, reinforced by rigorous reporting frameworks.⁷⁹ The Paris Agreement, which entered into force on 4 November 2016, reflects this paradigm shift.

How then does the Paris Agreement seek to accommodate the diverse interests and capacities of developed and developing states? The Agreement tailors differentiation to the key pillars of the regime: mitigation, adaptation, finance, technology, capacity-building and transparency. With respect to mitigation, the Paris Agreement's approach to differential treatment represents a significant departure from the Kyoto Protocol's model.⁸⁰ Whilst the Kyoto Protocol only imposed binding emission-reduction obligations on industrialised states, the Paris Agreement imposes a collective obligation on all state parties to hold 'the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels'.⁸¹ Instead of centrally-imposed targets which differentiate between developed and developing state parties, the Paris Agreement requires states to submit nationally-determined contributions (NDCs), which are subject to normative expectations of 'progression' and 'highest possible ambition'.⁸² As previously mentioned, this can be conceptualised as

⁷⁷Geneva negotiating text (2015a), Bonn consolidated text (2015b), Bonn draft negotiating text (2015).

⁷⁸Bodansky et al. (2017, p. 219).

⁷⁹Rajamani (2011, pp. 499–519), Huggins (2015, p. 121).

⁸⁰Rajamani (2015, p. 852).

⁸¹Paris Agreement, art. 2.

⁸²Paris Agreement, art. 4.

a type of bottom-up ‘self-differentiation’, as parties select their own mitigation targets.⁸³ States are not bound to achieve their NDCs per se, but they do have binding obligations to prepare, communicate and maintain NDCs, and pursue domestic mitigation measures.⁸⁴

A nuanced form of differential treatment is also evident with respect to adaptation. Adaptation is framed as a ‘global challenge faced by all with local, subnational, national, regional and international dimensions’.⁸⁵ Article 7(1) establishes a global goal of ‘enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change’, with each Party being obliged to plan for, and implement actions with respect to, adaptation.⁸⁶ The Agreement does, however, acknowledge that developing country parties that are particularly vulnerable to the adverse effects of climate change have ‘urgent and immediate needs’ in relation to adaptation.⁸⁷ Accordingly, the Agreement provides for ‘continuous and enhanced support’ for developing countries to develop and implement adaptation plans, and to prepare adaptation communications.⁸⁸ Thus, there is no substantive differentiation between developed and developing states’ adaptation obligations.⁸⁹

Article 9(1) of the Paris Agreement reinforces that developed countries have binding obligations to provide financial resources to assist developing country parties to meet their mitigation and adaptation commitments under the Agreement. Developed countries should also take the lead in mobilising and progressively increasing funds for climate finance.⁹⁰ In addition to all states’ obligations to report on their progress toward implementing and achieving their NDCs, developed states are required to report on the financial, technology transfer and capacity-building support they provide to developing country parties.⁹¹ However, in the absence of quantified and time-bound commitments for financial support, it will be difficult to hold individual developed states to account for these obligations.⁹²

To enhance trust between Parties, Article 13 of the Paris Agreement establishes a transparency framework for information on states’ action and support, which will be subject to technical expert review.⁹³ Differentiation between developed and developing countries is evident with respect to the implementation of this

⁸³Brunnée and Streck (2013, p. 591), Rajamani (2015, p. 852).

⁸⁴Paris Agreement, art. 4(2) and 4(3). Under art. 4(3), Parties are required to communicate their contributions every five years.

⁸⁵Paris Agreement, art. 7(2).

⁸⁶Paris Agreement, art. 7(9).

⁸⁷Paris Agreement, art. 7(2).

⁸⁸Paris Agreement, art. 7(13).

⁸⁹Huggins and Karim (2016, p. 439).

⁹⁰Paris Agreement, art. 9(3).

⁹¹Paris Agreement, art. 13(9).

⁹²Huggins and Karim (2016, pp. 441–442).

⁹³Paris Agreement, art. 13(1) and 13(11).

framework, which has ‘built-in flexibility’ to take into account parties’ different capacities.⁹⁴ Similarly, the Agreement’s compliance committee, established under Article 15, will be ‘expert-based and facilitative in nature’, and is required to ‘pay particular attention to the respective national capabilities and circumstances of Parties’.⁹⁵ Thus, in the Paris Agreement, differentiation between developed and developing states is evident with respect to a range of procedural requirements and obligations of conduct, rather than obligations of result.⁹⁶ Yet the tensions underpinning the ongoing debates about the appropriate roles and responsibilities of developed and developing countries persist, and will continue to remain a critical challenge during the operationalisation of the Paris Agreement.⁹⁷

Despite the fact that the drafting of the Paris Agreement accommodated the US position on key issues relating to differential treatment, in May 2017, the US announced its withdrawal from the Agreement. Again, the stated rationale for this withdrawal was the perceived unfairness of the US commitments vis-à-vis ‘the world’s leading polluters’, such as India and China. Such claims seem to misunderstand the nature of states’ self-differentiated commitments under the Paris Agreement, and overlook the US’s historical responsibility for 27% of the cumulative historic emissions, and 15% of cumulative current emissions.⁹⁸ Nonetheless, the US withdrawal from the Paris Agreement reinforces that issues of fairness between developed and developing countries remain highly contentious and divisive, and continue to strongly shape the evolution of the international climate regime.

5.2 *Recognition of Human Rights in the Paris Agreement*

As highlighted in Sect. 4.1, differing opinions and suspicions characterised state parties’ positions on human rights and climate change in the lead up to the Paris climate talks. In the Paris negotiations, the question of whether, and how, human rights ought to be integrated into the final Agreement continued to polarise developed and developing state parties. Ultimately, these polarised debates limited states’ ability to agree on incorporating additional human rights protections into the Paris Agreement.

In the negotiations, several developing states called for stronger language on human rights to be included in the Agreement. For example, submissions were made by Mexico, Chile, the Philippines, Costa Rica and several Pacific Island states for a stronger acknowledgement of the impact of climate change on the fulfilment

⁹⁴Paris Agreement, art. 13(1), 13(12), 13(14) and 13(15).

⁹⁵Paris Agreement, art. 15(1) and 15(2).

⁹⁶Voigt (2016, pp. 18–19), Huggins and Karim (2016, p. 448).

⁹⁷Ari and Sari (2017).

⁹⁸Rajamani (2017).

of human rights and more explicit references to human rights obligations.⁹⁹ The text which emerged from the meeting in Geneva in February 2015 included a provision which sought to oblige states to respect human rights, indicating at least some level of support among most states for reference to human rights in the Agreement.¹⁰⁰

Further, at the close of the Geneva meeting, a group of 18 mostly developing states, led by Costa Rica, pledged to address the human rights implications of climate change more explicitly, including through facilitating the exchange of expertise around the best way to deliver action on climate change which is supportive of human rights.¹⁰¹ The Geneva Pledge, as it is known, also recognises that climate change will impact most acutely on disadvantaged and vulnerable groups and that this represents an injustice. The Pledge has since been adopted by a further 14 states, including several developed states.¹⁰²

Despite this progress at Geneva, proponents of a human rights-based approach to climate change, including many developing states, faced further challenges before the final text of the Paris Agreement was settled. The outcome of the meeting in Bonn in October 2015 still included a reference to human rights, this time as part of the objectives of the Agreement set out in Article 2.2. The negotiating text suggested the following language:

[This Agreement shall be implemented on the basis of equity and science, in [full] accordance with the principles of equity and common but differentiated responsibilities and respective capabilities[, in light of national circumstances] [the principles and provisions of the Convention], while ensuring the integrity and resilience of natural ecosystems, [the integrity of Mother Earth, protection of health, a just transition of the workforce and creation of decent work and quality jobs in accordance with nationally defined development priorities] and the respect, protection, promotion and fulfilment of human rights for all, including the right to health and sustainable development, [including the right of people under occupation] and to ensure gender equality and the full and equal participation of women, [and intergenerational equity].]¹⁰³

Wording such as this would have obliged states to guarantee the respect, protection and fulfilment of human rights in all actions taken to address climate change, and would have recognised the rights of particular vulnerable groups. Significantly, a failure to uphold human rights would have amounted to a violation

⁹⁹Savaresi and Hartmann (2015), IISD Reporting (2015), Deconstructing Paris (2015b).

¹⁰⁰Geneva negotiating text, art 12*bis*.

¹⁰¹Geneva Pledge. The initial signatories to the Geneva Pledge were Chile, Costa Rica, France, Guatemala, Ireland, Kiribati, Maldives, Marshall Islands, Micronesia, Mexico, Palau, Panama, Peru, Uganda, Uruguay, Samoa and Sweden.

¹⁰²The subsequent signatories to the Geneva Pledge are Andorra, Algeria, Belgium, Cote d'Ivoire, Fiji, Finland, Germany Italy, Luxembourg, Morocco, Netherlands, Philippines, Romania, Slovenia, Switzerland, and the United Kingdom.

¹⁰³Bonn draft negotiating text, art. 2.2. The passages in square brackets were presented as alternative wording for state parties to consider.

of the Paris Agreement, with the potential to trigger the compliance mechanisms found elsewhere in the Agreement.¹⁰⁴

However, a number of states, primarily developed states, resisted this proposal. Countries including Norway, the United States, Saudi Arabia, China and Australia reportedly argued strongly that the inclusion of human rights language within the operative parts of the Agreement would create a risk of potential legal liability for states that failed to take appropriate action on climate change.¹⁰⁵ There were some reports from Bonn that the developed states that opposed the inclusion of human rights language did so as an act of retaliation towards developing states who were calling for a robust loss and damage mechanism to be included in the Agreement.¹⁰⁶ Ultimately, the final text of Article 2.2 adopted at Paris includes no reference to human rights, and consequently human rights are not directly mentioned anywhere in the operative provisions of the Agreement.

There is a singular reference to human rights in the Preamble of the Paris Agreement, but even this language was weakened throughout the negotiation process. Paragraph 11 of the Preamble reads:

Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.¹⁰⁷

The draft of the Preamble which emerged from the second Bonn meeting and variations which were circulated up until December had referred to the need for states to ‘promote, protect and respect’ human rights.¹⁰⁸ However, the final text uses different language, stating that ‘Parties should...respect, promote and consider their respective human rights obligations’.¹⁰⁹ Given that the duty to protect human rights is generally understood to impose a positive duty on states to prevent interference with human rights, its omission from the final text is significant, and what remains in the Preamble is a much weaker obligation.¹¹⁰ As Bodansky notes, the wording of the paragraph also limits the focus to the human rights dimensions of mitigation and adaptation, and does not address the impact of climate change itself.¹¹¹ Further, as the

¹⁰⁴Paris Agreement, art. 15. Article 15 establishes an expert committee to facilitate implementation of and promote compliance. The committee is to operate in a transparent, non-adversarial and non-punitive manner.

¹⁰⁵Human Rights Watch (2015), *Deconstructing Paris* (2015a, b), Rowling (2015).

¹⁰⁶Vidal and Vaughan (2015).

¹⁰⁷Paris Agreement, Preamble, para. 11.

¹⁰⁸Draft Text on COP21 agenda item 4(b), Durban Platform for Enhanced Action (decision 1/CP.17), Proposal by the President, Preamble.

¹⁰⁹Paris Agreement, Preamble, para. 11.

¹¹⁰Atapattu (2016, p. 46).

¹¹¹Bodansky (2016, p. 313).

reference to human rights is found only in the Preamble, it lacks the same binding quality of provisions in the operative part of the Agreement.¹¹²

By referring to states' 'respective obligations on human rights' the Preamble avoids any connotation that it might be creating new duties for states.¹¹³ This approach appeased those states, mostly developed countries, which resisted the idea that climate change should be construed as a human rights violation, and were concerned that more explicit references to human rights might expose them to legal liability for such violations. However, in adopting this approach, the Preamble affirms the fact that states are already bound by international human rights law. This means that, despite the lack of more explicit recognition in the operative parts of the Paris Agreement, countries are obliged under other international laws to address the human rights implications of climate change.

6 Conclusion

Opportunities for climate innovation after the Paris Agreement occur against a backdrop of highly charged debates about the extent to which roles and responsibilities for climate action should be determined by levels of development. This chapter has argued that in order to understand the specific issues relating to intellectual property, finance, technology transfer and innovation under the Paris Agreement, it is necessary to have an appreciation of the broader political dynamics that have shaped the negotiations in the international climate regime, and which will continue to animate the implementation of the Agreement. These contextual factors include the ongoing tensions between developed and developing states, which have resulted in divergent manifestations of the CBDR principle in the UNFCCC, the Kyoto Protocol and the Paris Agreement. In addition, part of this context relates to the human rights implications of climate change, which are also influenced by development imperatives. The human rights dimensions of climate change include both the impact of the changing climate on the enjoyment of human rights, as well as the human rights protections which apply to climate change mitigation and adaptation actions taken by states. While the references to human rights in the Paris Agreement are limited, the Preamble does acknowledge that states already have obligations under other international instruments to respect, promote and protect human rights. As such, as the effects of climate change on human lives become more apparent, the duties which states have under international human rights law will become increasingly relevant.

Issues of development, differential treatment and human rights remain contested, despite their lack of prominence in the final text of the Paris Agreement. Debates about these issues will continue to shape the implementation of the Agreement,

¹¹²Mayer (2016, p. 113).

¹¹³Savaresi (2016, p. 25).

including in relation to intellectual property, finance, technology transfer and innovation. An appreciation of the interconnections between levels of development, North-South politics and human rights is critical to understanding the practical opportunities for, and obstacles to, climate innovation after the Paris Agreement.

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Chapter 5

Climate Change and Human Rights: Intellectual Property Challenges and Opportunities



Alexandra Phelan

Abstract Mitigating and adapting to the effects of climate change will require innovation and the development of new technologies. Intellectual property laws have a key part to play in the global transfer of climate technologies. However, failures to properly use flexibilities in intellectual property regimes or comply with technology transfer obligations under international climate change agreements calls for a human rights based analysis of climate technology transfer. Climate change is an unprecedented challenge and requires unprecedented strategies. Given the substantial impact of climate change on all of humanity and the ethical imperative to act, a complete rethink of traditional intellectual property approaches is warranted. This chapter proposes a series of intellectual property law policy options, through a human rights framework, aimed at promoting access to technologies to reduce the human suffering caused by climate change.

Keywords Intellectual property • Human rights • Climate Change
Technology transfer • International law • Environmental law

1 Introduction

1.1 *Global Warming: A Planet in Crisis*

Multiple independently produced datasets demonstrate that the Earth's surface temperature has been successively warming.¹ From 1880 to 2012, global average land and ocean surface temperatures have increased by 0.85 °C.² For the third consecutive year, a global annual temperature record high was recorded in 2016,

¹IPCC (2013, p. 5).

²Ibid., p. 161.

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with an average global land and ocean surface temperature 0.94 °C above the 20th Century average.³ Under all emissions scenarios assessed by the Intergovernmental Panel on Climate Change (IPCC), the average global surface temperature will likely increase by 0.3 to 0.7 °C (above 1986–2005 levels) over the next 20 years (2016 to 2035).⁴ By the end of the 21st Century, it is likely that global surface temperature change will exceed 1.5 °C from 1850 to 1900 levels in most emissions reduction scenarios.⁵ If no measures are taken to constrain emissions from current rates, surface warming is likely to exceed 2 °C (high confidence).⁶ Modelling published in 2017 has concluded that by 2100, global temperatures are most likely to have increased between 2.0 and 4.9 °C.⁷ The consequences of an increase of even 2 °C is significant, resulting in longer and more frequent heatwaves, rising sea levels from increasing ocean heat as well as glacial and polar ice sheets melting, global shifts in rainfall patterns resulting in both flooding and drought, and increasing the severity and frequency of extreme weather events.⁸

It is with almost complete certainty that current climate change is induced by human activities producing greenhouse gas emissions.⁹ Immediate and substantial efforts must be made to reduce global greenhouse gas emissions to mitigate the effects of climate change. Adopted in 2015, State Parties to the Paris Agreement under the United Nations Framework Convention on Climate Change (Paris Agreement) committed to keep global average temperature increases from pre-industrial levels well below 2 °C, and to pursuing efforts to limit this to 1.5 °C.¹⁰ While the adoption of long-term temperature goals Paris Agreement was a significant step forward in international climate politics, keeping global mean surface temperatures at an increase of 1 °C (under the IPCC's most aggressive emissions reductions scenarios),¹¹ will require climate change adaptation technologies. Achieving the Paris Agreement's goals will require significant mitigation strategies, including the use of existing technologies.¹² The practical reality of climate change requires humanity take immediate steps to mitigate and adapt to the substantial effects of climate change. Furthermore, given the distorted impacts of

³NOAA National Centers for Environmental Information (2016), State of the Climate: Global Climate Report for Annual 2016.

⁴IPCC (2014a, p. 58).

⁵Ibid., p. 60: 'Relative to 1850–1900, global surface temperature change for the end of the 21st century (2081–2100) is projected to likely exceed 1.5 °C for RCP4.5, RCP6.0 and RCP8.5 (high confidence). Warming is likely to exceed 2 °C for RCP6.0 and RCP8.5 (high confidence), more likely than not to exceed 2 °C for RCP4.5 (medium confidence), but unlikely to exceed 2 °C for RCP2.6 (medium confidence)'.

⁶Ibid.

⁷Rafferty et al. (2017).

⁸IPCC (2013, p. 7).

⁹Ibid.: 7, 15; Climate Council of Australia (2015).

¹⁰Adoption of the Paris Agreement, FCCC/CP/2015/10/Add.1 (UNFCCC 2015).

¹¹IPCC (2014a).

¹²Schleussner et al. (2016).

climate change on the world's most vulnerable populations, there is a significant equity and human rights imperative to prevent the human suffering and violations of human dignity climate change will cause.

1.2 Climate Change as a Profound Challenge to Human Rights

Climate change poses profound consequences for human rights globally. From the individual to the population level, climate change will increasingly have negative impacts on all aspects of human life, including health, food, water, and housing. On a systemic level, climate change undermines self-determination, non-discrimination, and the enjoyment of a safe environment. Existing socio-political inequalities further exacerbate its impact, with the world's most vulnerable population groups disproportionately affected by the consequences of climate change. Climate change increases human suffering and decreases human dignity. These consequences are already being experienced around the globe.¹³ With greater awareness of the way in which climate change presents a direct challenge to these basic human rights, comes the need for new and innovative approaches to solving the climate crisis.

1.3 Human Rights Approaches: A New Strategy for Solving the Climate Crisis

A human rights based approach to climate change can provide substantial benefit to the political discourse for action on climate change. Firstly, potential or existing examples of climate change induced human rights violations are powerful advocacy tools for government action; particularly for marginalized or minority population groups that are disproportionately affected by changes in climate. Secondly, the extensive field of international human rights law is a source of tangible legal obligations on states which may be used by individuals to compel government action, either through litigation itself or simply a state's desire to avoid litigation.

Whether as an advocacy tool or as a cause of action against states, a human rights based approach provides a framework through which other laws, policies, and assumptions can be tested. As noted by Mary Robinson, former President of Ireland, former UN High Commissioner for Human Rights, and President of the Mary Robinson Foundation for Climate Justice:

¹³For example, see: United States Environmental Protection Agency (2016).

Our shared human rights framework provides a basis for impoverished communities to claim protection of these rights. We must not lose sight of existing human rights principles in the tug and push of international climate change negotiations. A human rights lens reminds us there are reasons beyond economics and enlightened self-interest for states to act on climate change. Because climate change presents a new and unprecedented threat to the human rights of millions, international human rights law and institutions must evolve to protect the rights of these peoples.¹⁴

Mitigating and adapting to the effects of climate change will require innovation and the development of new technologies. Intellectual property laws have a key part to play in the global transfer of climate technologies. However, failures to properly utilize flexibilities in intellectual property regimes or comply with technology transfer obligations under international climate change agreements calls for a human rights based analysis of climate technology transfer. Climate change is an unprecedented challenge and requires unprecedented strategies. Given the substantial impact of climate change on all of humanity and the ethical imperative to act, a review of traditional intellectual property approaches is warranted. This chapter examines a series of intellectual property law policy options, through a human rights framework, aimed at promoting access to technologies to reduce the human suffering caused by climate change.

2 Climate Change and Human Rights

In recent years, the broader legal and political dialogue has expanded to include greater focus on the justice and human rights dimensions of climate change. The most recent report from Working Group 2 of the IPCC noted the profound and disproportionate impact climate change will have on the world's most vulnerable populations, exacerbating existing socio-economic injustices.¹⁵

Traditionally, the realm of human rights law deals with the duties that states owe to individuals within their own territory. While there is some capacity for groups to claim rights,¹⁶ international human rights treaties are typically structured around the obligations of a duty-bearer State to protect the rights of individuals within the territory of the state. As a global concern with global contributors, climate change poses unique challenges for the traditional human rights regime. It may not be possible to determine whether a state has failed in its duty to respect, protect and fulfil the rights of individuals within its territory, nor may it be possible to use existing accountability mechanisms under international human rights treaties to

¹⁴Robinson (2008).

¹⁵IPCC (2014b, pp. 6, 20).

¹⁶Such as the "peoples' rights" contained within the Organization of African Unity (OAU), African Charter on Human and Peoples' Rights ("Banjul Charter"), 27 June 1981, CAB/LEG/67/3 rev. 5, 21 I.L.M. 58 (1982), available at: <http://www.refworld.org/docid/3ae6b3630.html> (accessed 1 December 2017).

hold third-party states to account for violations.¹⁷ In addition, climate change litigation often encounters difficulties with questions of justiciability and standing given the global nature of climate change. Despite this, the potential for human rights based, climate change litigation—whether through courts or non-judicial treaty bodies—has been highlighted by Olivier De Schutter, the United Nations Special Rapporteur on the Right to Food, stating that there is:

huge scope for human rights courts and non-judicial human rights bodies to treat climate change as the immediate threat to human rights that it is. Such bodies could therefore take government policy to task when it is too short-sighted, too unambitious, or too narrowly focused on its own constituents at the expense of those elsewhere. Fossil fuel mining, deforestation, the disturbance of carbon sinks, and the degradation of the oceans are developments that can be blocked on human rights grounds. Human rights bodies can, and must, increasingly play this reactive role at the local level, in order to ward off the multitude of developments that simultaneously violate human rights and aggravate climate change.¹⁸

There has been a significant increase in climate change related litigation against governments to compel action to address climate change.¹⁹ As of March 2017, nearly 900 climate change cases have been filed globally, with nearly three quarters of cases in the United States.²⁰ In a number of cases, the impact of climate change on States' human rights obligations under international or regional treaties has either formed part of the basis of the case or is referenced by plaintiffs when seeking to hold governments to account.²¹ However, the vast majority of climate change related litigation have been based on other causes of action, including other legal obligations on governments under national law, government liability for property damage, and the public trust doctrine, which holds that one of the most essential purposes of government is the protection of crucial natural resources for the survival and welfare of citizens. However, the field of climate change litigation based on enumerated, international and domestic human rights law obligations is yet to fully develop. Despite this, international and domestic human rights law obligations have legally distinct causes of action. In particular, a human rights based approach to climate change can empower advocacy. Climate change policy and climate activism has traditionally been the realm of physical scientists and environmentalists.

¹⁷See, for example Sheila Watt-Cloutier, with the support of the Inuit Circumpolar Conference on behalf of all Inuit of the Arctic Regions of the United States and Canada, Petition to the Inter-American Commission on Human Rights Seeking Relief from Violations Resulting from Global Warming Caused by Acts and Omissions of the United States (2005).

¹⁸De Schutter (2012).

¹⁹United Nations Environmental Program and Sabin Center for Climate Change Law at Columbia University (2017).

²⁰Ibid., 10–11.

²¹Ibid., 31. See, for example: *Gbemre v. Shell Petroleum Development Company of Nigeria Ltd* FHC/B/CS/53/05 regarding human rights protected under the African Charter on Human and Peoples' Rights and the Nigerian constitution; *Greenpeace Southeast Asia et al.* 2015— (Commission on Human Rights of the Philippines, 2015) regarding human rights protected under the Philippine Constitution and international human rights instruments; and *Leghari v Pakistan* (2015) W.P. No 25501/2015 regarding human rights protected under the Pakistan constitution.

A human rights based approach provides an advocacy tool that demonstrates the human-experience of climate change. It reveals the suffering and inequalities that climate change exacerbates, and frames action on climate change as a matter of justice and ethics.

Human rights are indivisible and interdependent. The violation of one human right invariably violates other rights. A human rights based approach to climate change should therefore be part of a broader multi-sectoral and holistic policy-making framework for climate change mitigation and adaptation strategies. With this in mind, this chapter will briefly survey four specifically identified human rights demonstrably affected by climate change: the Right to Life, the Right to Health, the Rights to Water and Sanitation, and the Right to Food. Each of these rights, even when presented in their least contentious and conservative formulations, demonstrate the significant extent to which anthropogenic climate change violates human rights.²²

2.1 *The Right to Life*

The United Nations Human Rights Committee describes the right to life as ‘the supreme right’.²³ The right to life is enshrined in numerous international and regional human rights treaties, including the International Covenant on Civil and Political Rights (ICCPR) (art 6),²⁴ the Convention on the Rights of the Child (art 6),²⁵ Charter of Fundamental Rights of the European Union (art 2),²⁶ African Charter on Human and Peoples’ Rights (art 4),²⁷ and the American Convention on Human Rights (art

²²This minimalist rights-specific strategy for demonstrating anthropogenic climate change violations of human rights was posited in Caney (2010, pp. 69–90: 75). Caney’s approach specifically examined three human rights, the human right to life, the human right to health, and the human right to subsistence.

²³UN Human Rights Committee (HRC), CCPR General Comment No. 6: Article 6 (Right to Life), 30 April 1982, [1].

²⁴UN General Assembly, International Covenant on Civil and Political Rights, 16 December 1966, United Nations, Treaty Series, vol. 999, p. 171, available at: <http://www.refworld.org/docid/3ae6b3aa0.html> (accessed 1 December 2017) (hereafter “ICCPR”).

²⁵UN General Assembly, Convention on the Rights of the Child, 20 November 1989, UN Treaty Series 1577, p. 3, available at: <http://www.refworld.org/docid/3ae6b38f0.html> (accessed 1 December 2017) (hereafter “CRC”).

²⁶European Union, Charter of Fundamental Rights of the European Union, 26 October 2012, 2012/C 326/02, available at: <http://www.refworld.org/docid/3ae6b3b70.html> (accessed 1 December 2017).

²⁷Organization of African Unity (OAU), African Charter on Human and Peoples’ Rights (“Banjul Charter”), 27 June 1981, CAB/LEG/67/3 rev. 5, 21 I.L.M. 58 (1982), available at: <http://www.refworld.org/docid/3ae6b3630.html> (accessed 1 December 2017) (hereafter “African Charter”).

4).²⁸ As one of the most universally accepted international human rights treaties, the ICCPR provides that the right to life is inherent to every human being, shall be protected by law, and no-person may be arbitrarily deprived of their life.²⁹ The right to life therefore includes not only an obligation on states not to kill individuals, but to take positive steps to protect individuals' lives. Climate change directly threatens the realization of the right to life. Numerous observed and projected impacts of climate change pose direct and indirect threats to human life. With high confidence, the IPCC predicts an increase in deaths from heat waves, fires, storms, floods, and droughts, as well as increases in food and water-borne and vector-borne diseases.³⁰ For example, the IPCC has attributed the 2003 Western European heat wave—which caused nearly 15,000 excess deaths in France over 3 weeks in August 2003—to anthropogenic climate change.³¹ As an example of increased fires as a result of climate induced long-term drought and record high temperatures, the IPCC notes the 2009 Victorian 'Black Saturday' bushfires, which lead to 173 deaths from burns and injury.³² The Office of the High Commissioner for Human Rights (OHCHR) has concluded that these observed and predicted impacts of climate change will therefore affect the realization of the right to life.³³ The OHCHR also notes that '[e]qually, climate change will affect the right to life through an increase in hunger and malnutrition and related disorders' as well as disproportionately impacting the enjoyment of the right to life in developing countries.³⁴

2.2 *The Right to Health*

In all cultures, health is revered as having intrinsic value, reflected in rituals and expressions demonstrating its universally special importance.³⁵ This value is reflected in the identification of health as a human right. In 1946, the preamble of the Constitution of the World Health Organization recognized generally the 'enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition'. While arguably vague and preambular, two years later, the right to health was expressly included in the Universal Declaration of

²⁸Organization of American States (OAS), American Convention on Human Rights, "Pact of San Jose", Costa Rica, 22 November 1969, available at: <http://www.refworld.org/docid/3ae6b36510.html> (accessed 1 December 2017).

²⁹ICCPR, art 6(1).

³⁰IPCC (2014b, p. 19).

³¹Ibid., p. 720.

³²Ibid., p. 718, 1400.

³³United Nations Office of the High Commissioner for Human Rights, Report on the Relationship Between Climate Change and Human Rights UN Doc A/HRC/10/61 (15 January 2009): [22–23].

³⁴Ibid.

³⁵Yamin (2008), citing Mann et al. (1994).

Human Rights.³⁶ Since then, the right to health has been included in numerous binding international and regional agreements,³⁷ and two-thirds of national constitutions.³⁸ Perhaps the most prominent legal source for the right to health is art 12 of the International Covenant on Economic, Social, and Cultural Rights (ICESCR).³⁹ Under art 12, states recognize ‘the right of everyone to the enjoyment of the highest attainable standard of physical and mental health’. States must take steps to the maximum of their available resources to progressively achieve the full realization the right to health,⁴⁰ but must immediately guarantee that all rights under ICESCR are exercised without discrimination of any kind.⁴¹ In addition to ICESCR, the right to health is expressly protected under the Convention on the Rights of the Child,⁴² the Convention on the Elimination of all Forms of Racial Discrimination,⁴³ Convention on the Elimination of Discrimination Against Women,⁴⁴ and the Convention on the Rights of Persons with Disabilities.⁴⁵ Given the special importance of health for fulfilling human life and potential, the CESCR notes that the right to health is ‘indispensable for the exercise of other human rights’.⁴⁶ To realize the right to health, state parties must ensure that the requirements for health in all its forms are available, accessible (physically, economically, as information, and without discrimination), socially and culturally acceptable, and of good quality.⁴⁷

³⁶UN General Assembly, Universal Declaration of Human Rights, 10 December 1948, 217 A (III), available at: <http://www.refworld.org/docid/3ae6b3712c.html> (accessed 1 December 2017): art 25 (1).

³⁷International agreements with express protections for the right to health include the Convention on the Rights of the Child art 24, the Convention on the Elimination of all.

³⁸Kinney and Clark (2004, p. 291).

³⁹UN General Assembly, International Covenant on Economic, Social and Cultural Rights, 16 December 1966, United Nations, Treaty Series, vol. 993, p. 3, (hereafter “ICESCR”) available at: <http://www.refworld.org/docid/3ae6b36c0.html> (accessed 1 December 2017).

⁴⁰ICESCR: art 2(1).

⁴¹ICESCR: art 2(2).

⁴²CRC: art 6.

⁴³UN General Assembly, International Convention on the Elimination of All Forms of Racial Discrimination, 21 December 1965, United Nations, Treaty Series, vol. 660, p. 195, available at: <http://www.refworld.org/docid/3ae6b3940.html> (accessed 1 December 2017) (hereafter “CERD”), art 5(1).

⁴⁴UN General Assembly, Convention on the Elimination of All Forms of Discrimination Against Women, 18 December 1979, UNTS 1249, p. 13, available at: <http://www.refworld.org/docid/3ae6b3970.html>. (accessed 1 December 2017) (hereafter “CEDAW”), art 11.

⁴⁵UN General Assembly, Convention on the Rights of Persons with Disabilities: resolution adopted by the General Assembly, 24 January 2007, A/RES/61/106, available at: <http://www.refworld.org/docid/45f973632.html> (accessed 1 December 2017) (hereafter “CRPD”), art 25.

⁴⁶UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12 of the Covenant), 11 August 2000, E/C.12/2000/4, available at: <http://www.refworld.org/docid/4538838d0.html> (accessed 1 December 2017), [1].

⁴⁷*Ibid.*: [12].

The impact of climate change on human health, directly and indirectly, is significant and will disproportionately impact children, young people, and the elderly.⁴⁸ Given the breadth of impacts climate change will have on health, the IPCC identifies direct and indirect climate impacts on health. Directly, global warming increases the frequency of severe weather events, resulting in a greater number of people suffering ill-health, disability, and death from heat waves (heat exhaustion and heat stroke), floods (injuries and drowning), storms (injuries), drought, and fire.⁴⁹ Indirectly, climate change will also have a profound impact on health mediated through both ecosystems and human institutions. Increasing temperatures and changes in rainfall patterns will change the habitable regions for mosquitoes, shifting the incidence of malaria and dengue fever.⁵⁰ Food and water borne illness are predicted to increase, with temperature increases and increased rainfall.⁵¹ In particular, the IPCC predicts that diarrhoeal diseases, which disproportionately affect children in the developing world, will increase.⁵² Respiratory and cardiovascular morbidity, caused by air pollution such as ground-level ozone, fine particulate matter, and smoke-particulate from fires,⁵³ is predicted to increase.⁵⁴ Additional projections estimate that climate change will further impact physical and mental health as mediated through human institutions, such as through increased conflict,⁵⁵ occupational hazards,⁵⁶ and poor nutrition.⁵⁷ As each of these impacts on human health demonstrate, climate change clearly results in a vast range of threats to minimum standards of realizing the right to health.

2.3 *The Rights to Water and Sanitation*

Water is fundamental to human life. The absence of potable water directly leads to human suffering through disease, illness, and death. The human rights to water and sanitation are well-established and were universally recognized by the United Nations General Assembly in 2010.⁵⁸ The rights to water and sanitation mean that

⁴⁸IPCC (2014b, p. 717).

⁴⁹Ibid., p. 720.

⁵⁰Ibid., pp. 722–725.

⁵¹Ibid., pp. 726–727.

⁵²Ibid.

⁵³Ibid., pp. 727–729.

⁵⁴Ibid., pp. 727–730.

⁵⁵Ibid., pp. 732–733.

⁵⁶Ibid., pp. 731–732.

⁵⁷Ibid., pp. 730–731.

⁵⁸United Nations General Assembly, Resolution 64/292: The human right to water and sanitation, A/RES/64/292, (28 July 2010), available at: <http://www.un.org/es/comun/docs/?symbol=A/RES/64/292&lang=E> (accessed: 1 December 2017).

every person, without discrimination, has the right to water and sanitation that is safe, socially and culturally acceptable, physically accessible, affordable, and is provided without discrimination.⁵⁹

While not expressly included in either of the most comprehensive human rights treaties—the ICCPR and the ICESCR—the inherent connection of clean water with the realization of express ICCPR and ICESCR rights has resulted in implied rights to water and sanitation under these treaties. For example, the right to life (art 6, ICCPR) may be violated where states fail to ensure access to clean water and sanitation, conceptually demonstrated in 2014 when the Mumbai High Court held that despite not being expressly referred to, the right to water is an ‘integral part’ of the right to life under Art 21 of the Indian Constitution.⁶⁰ The right to an adequate standard of living (art 11, ICESCR) and the right to health (art 12, ICESCR) are recognized as impliedly including the rights to water and sanitation by the Committee on Economic, Social and Cultural rights (CESCR) in General Comment 15.⁶¹ In addition to deriving the right to water from the ICCPR and ICESCR, the rights to water and sanitation are express obligations on ratifying states under the Convention on the Rights of the Child,⁶² the Convention on the Elimination of Discrimination Against Women,⁶³ and the Convention on the Rights of Persons with Disabilities.⁶⁴

Climate change severely threatens the realization of the rights to water and sanitation. Climate change has profound effects on hydrological systems, affecting both the quantity and quality of water and the security of sanitation facilities.⁶⁵ Predicted consequences of climate change including run-off from melting snow and ice, changes in precipitation, drought, flooding, and water and sanitation infrastructure break-down from extreme weather events may all contribute to inadequate access to clean water.⁶⁶ For example, the ‘very likely’ change of increased rainfall events and frequency is expected to have adverse impacts on the quality of both surface and groundwater and result in contamination of the water supply, as well as an increased risk of communicable diseases from flood waters.⁶⁷ Conversely, likely increases in the incidence of droughts will directly impact the availability of clean

⁵⁹de Albuquerque (2012).

⁶⁰*Pani Haq Samiti & Ors v Brihan Mumbai Municipal Corporation & Ors* Bombay High Court, PIL-10-2012 (15 December 2014), at [11], available at: http://www.msihyd.org/pdf/pani_haq_samiti_hc_orders_on_water_to_all.pdf (accessed: 1 December 2017).

⁶¹UN Committee on Economic, Social and Cultural Rights, General Comment No. 15: The Right to Water (Arts. 11 and 12 of the Covenant), 20 January 2003, E/C.12/2002/11, available at: <http://www.refworld.org/docid/4538838d11.html> (accessed 1 December 2017).

⁶²CRC, art 24.

⁶³CEDAW, art 14(2)(h).

⁶⁴CRPD, art 28(2)(a).

⁶⁵IPCC (2014b), above n10: 4.

⁶⁶Ibid.: 13; IPCC (2008, p. 47).

⁶⁷IPCC (2008, pp. 41, 43).

water.⁶⁸ It is evident that there are significant adverse impacts that climate change will have on realizing the rights to water and sanitation.

2.4 *The Right to Food*

The fourth and final specific human right subject to particular climate change analysis is the right to food. The right to adequate food is most authoritatively articulated under art 11 of ICESCR, which affirms ‘the right of everyone to an adequate standard of living for himself and his family [sic], including adequate food’,⁶⁹ and ‘the fundamental right of everyone to be free from hunger’.⁷⁰ States are therefore obligated to not act so as to deprive individuals from food, but also a positive obligation to act to ensure access to adequate food. The CESCR’s General Comment 12 on the right to food notes that violations of the right to food can be caused by both the direct actions of states, but also through third parties inadequately regulated by the state.⁷¹

The UN Special Rapporteur on the Right to Food, Olivier De Schutter, has stated that ‘climate change threatens the ability of entire regions to feed themselves’.⁷² In addition to extremes including drought, storms and flooding, higher average temperatures and changes in rainfall patterns negatively impact the quality and quantity of food crops grown, including major food crops wheat, rice, and maize.⁷³ The effect of this on the realization of the right to food is substantial: with 2.5 °C warming, there will be an estimated 45 to 55 million extra people at risk of hunger by 2080, and with 3 °C warming, 65 to 75 million people at risk of hunger.⁷⁴ The majority of these people will be in poor, highly vulnerable developing countries, however developed countries are not immune. In Australia, for example, a warming of 4 °C will completely disable entire food production regions.⁷⁵ The destruction of entire food production regions, crop failures, and food shortages all contribute to global and regional food insecurity, amounting to violations of the right to adequate food.

⁶⁸Ibid.: 41–42.

⁶⁹ICESCR, art 11(1).

⁷⁰ICESCR, art 11(2).

⁷¹UN Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 12: The Right to Adequate Food (Art. 11 of the Covenant), 12 May 1999, available at: <http://www.refworld.org/docid/4538838c11.html> (accessed 1 December 2017).

⁷²De Schutter.

⁷³IPCC (2014b): pp. 14, 17–18, 485–533).

⁷⁴Hare (2006, p. 179).

⁷⁵Ibid.

3 Climate Change and Intellectual Property

The development and successful transfer of environmentally sound technologies (ESTs)—particularly from developed to developing nations—is an essential requirement of effective climate change mitigation and adaptation. Since the adoption of the United Nations Framework Convention on Climate Change (UNFCCC), subsequent international climate change agreements have expressly included obligations on developed countries to facilitate technology transfer to developing countries, including the Paris Agreement. Despite this commitment, successful examples of large-scale EST technology transfer are lacking. It has been posited that the reason for this stagnation is due to the restrictive operation of international and domestic intellectual property regimes.⁷⁶ This part first defines technology transfer and obligations under international climate law. It then proceeds to examine the role of intellectual property in impeding technology transfer, followed by a human rights based analysis of proposed solutions, including direct and indirect human rights to technology transfer.

3.1 *Defining Technology Transfer*

Technology transfer is the process by which technology is disseminated, and subsequently adopted. Under the international climate law agreements, this is typically deemed to occur in the direction of developed to developing countries. The technology transfer process may include many types of technologies, typically categorised as being ‘hard’ or ‘soft’ (and even somewhere in between). Hard technologies tend to refer to patented technologies,⁷⁷ for example, climate change mitigation equipment or products that reduce or manage greenhouse gas emissions (like solar panelling), or adaptation technologies (such as irrigation systems or drought-resistant plants).⁷⁸ Soft technologies refer to broader know-how and experience, such as training, capacity building, and information,⁷⁹ which in the adaptation setting could include crop rotation patterns or insurance schemes.⁸⁰ The IPCC defines climate change related technology transfer as encompassing both hard and soft technologies.⁸¹ Given that climate change related technology transfer is seen as flowing largely from developed to developing countries, it inherently requires the transfer of both hard and soft technologies, as developing countries

⁷⁶See, for example: South Centre (2009), Third World Network (2008), Littleton (2008), Hutchison (2006) and Abbott (2009).

⁷⁷Hutchison (2006, p. 520).

⁷⁸UNFCCC Secretariat (2004, p. 9).

⁷⁹Hutchison (2006, p. 520), Adam (2009, p. 10).

⁸⁰UNFCCC Secretariat (2004, p. 9).

⁸¹Intergovernmental Panel on Climate Change (2000, 3).

who lack the transferred hard technologies, are unlikely to possess the associated know-how and soft technologies required for implementation.⁸² Much of the debate about technology transfer focuses however on hard technologies as, unlike soft technologies, they can be protected under intellectual property rights mechanisms, in particular, patents. There is a wide range of potential stakeholders involved in the technology transfer process, including governments, the private sector, research and education institutions such as universities, non-governmental organisations, and financial institutions.⁸³ This broad cross-section begins to demonstrate the difficulties that may be faced in the development of international laws that enable climate change technology transfer.

3.2 *Technology Transfer Obligations Under UNFCCC*

In 1988, the World Meteorological Organization and the United Nations Environment Program formed the IPCC; a scientific and policy hybrid charged with analysing and evaluating the available information on the science, impacts and economics of climate change, and to develop mitigation, and later adaptation, strategies.⁸⁴ The IPCC's initial responsibilities included producing Assessment Reports at regular intervals setting out the current state of climate change knowledge. In 1990, the IPCC produced its First Assessment Report, concluding that the Earth was warming, however it was not clear to what degree the greenhouse effect, and therefore the increased concentration of greenhouse gases caused by human activities, was contributing to the observed increases in temperature.⁸⁵ The findings of the First Assessment Report had a significant impact,⁸⁶ and ultimately resulted in the United Nations Framework Convention on Climate Change (UNFCCC).⁸⁷

The ultimate aim of the UNFCCC, and any other related legal instruments that the Conference of Parties adopt,⁸⁸ is to stabilise atmospheric greenhouse gas concentrations at such a level as to prevent dangerous interference with the climate system.⁸⁹ Even in its infancy, the UNFCCC acknowledged the essential role of technology transfer in addressing climate change. The UNFCCC requires developed countries to take all practicable steps to promote, facilitate and finance the

⁸²Hutchison (2006, p. 520).

⁸³Intergovernmental Panel on Climate Change (2000).

⁸⁴Ibid.: v; Adam (2009, p. 3).

⁸⁵IPCC (1990).

⁸⁶Weart (2003, p. 146).

⁸⁷Ibid.

⁸⁸United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 20 July 2005), available at: http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (accessed 1 December 2017) (hereafter "UNFCCC"): art 2.

⁸⁹Ibid.; IPCC (2000), above n75: 5, 3.

transfer of environmentally sound technologies and know-how to other UNFCCC parties, particularly developing country parties.⁹⁰ The UNFCCC attempts to use the technology transfer obligation to offset developed countries' disproportionate contribution to historical and—at the time of the Convention, contemporary—global emissions.⁹¹ Given the importance of economic development to alleviating poverty and reducing the human impacts of climate change, developing countries' desire to have the same development opportunities as wealthier countries cannot be dismissed. This is expressly recognized in the UNFCCC, which states that economic and social development, as well as poverty eradication, are the first and overriding priorities of developing country parties. The obligation on developed countries to engage in technology transfer of ESTs to developing countries to assist sustainable, low-emissions development therefore seeks to resolve this dynamic while promoting global transfer of climate change adaptation and mitigation technologies.

Since 1995, the Conference of Parties has developed various mechanisms for defining and facilitating the technology transfer obligation. In 2000, the IPCC produced a special report 'Methodological and Technological Issues in Technology Transfer' recognizing that for the transfer of ESTs to occur, governments must take greater efforts to break down barriers to technology transfer.⁹² The following year, the Marrakesh Accords included the Framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention (Marrakesh Framework).⁹³ The Marrakesh Framework defined what constituted an environment conducive to public and private sector technology transfer; that is, an 'enabling environment'.⁹⁴ Government actions that create an enabling environment include: fair trade policies, regulatory frameworks and the removal of technical, legal and administrative barriers to technology transfer.⁹⁵ Such actions specifically include the protection (not the dilution) of intellectual property rights,⁹⁶ categorising such rights as being conducive to the expansion of commercial and public technology transfer to developing countries.

In 2007, developing countries at the Bali Conference of Parties argued that developed countries had failed in delivering effective, measurable and verifiable transfer of ESTs, and as a result, developing countries refused to agree to post-Kyoto Protocol emissions reduction targets.⁹⁷ The Bali Action Plan sought to address developing countries' concerns by calling for enhanced actions on

⁹⁰UNFCCC: art 4.5.

⁹¹As reflected in the text of *Ibid.*: preamble.

⁹²*Ibid.*: 5.

⁹³The Marrakesh Accords: Development and Transfer of Technologies, 4/CP.7, FCCC/CP/2001/13/Add.1.

⁹⁴*Ibid.*: Annex, para 12.

⁹⁵*Ibid.*: Annex, para 12.

⁹⁶*Ibid.*: Annex, para 14.

⁹⁷Shabalala (2008, 4).

technology development and transfer, including boosting the technology transfer to developing countries, and removal of barriers to technology transfer,⁹⁸ to improve access to environmentally sound climate-related technologies.⁹⁹ In 2009, the Conference of Parties in Denmark agreed to the Copenhagen Accord, taking a more substantive approach to technology transfer, seeing it as an essential method of mitigating and adapting to climate change. In order to achieve this, the Copenhagen Accord established the Copenhagen Green Climate Fund, a financing mechanism for UNFCCC projects, policies and activities in developing countries related to mitigation including technology development and transfer.¹⁰⁰ However the primary relevant advancement was the establishment of the Technology Mechanism, tasked with accelerating technology development and transfer for adaptation and mitigation actions.¹⁰¹

Cancun built upon the Technology Mechanism established under the Copenhagen Accord, formulating the composition and operating structure of the Technology Mechanism to include two pillars, a Technology Executive Committee (TEC) and a Climate Technology Centre and Network (CTCN).¹⁰² The Cancun Agreements charged the TEC with providing policy and technical analysis of issues relating to the development and transfer of technologies, while facilitating technology transfer between governments, non-government organisations, academia, the private sector and other relevant stakeholders along with support from the CTCN.¹⁰³ While Cancun appeared to be a step in the direction of a clear strategic approach to technology transfer and climate change, successful dissemination and adoption of ESTs still lagged. The following year's climate talks in Durban failed to make any significant advances, but reinforced the work previously undertaken in Copenhagen and Cancun in the operations of the CTCN and, in particular, the procedures of the TEC.¹⁰⁴ While there now existed a formal body responsible for proposing policies and methods to encourage and facilitate technology transfer, developing countries and non-governmental organisations began pressing the TEC

⁹⁸UNFCCC, Report of the Conference of the Parties on its thirteenth session, held in Bali from 3 to 5 December 2007, FCCC/CP/2007/6/Add.1 (entered into force 17 December 2007), available at: <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf> (accessed 1 December 2017) (hereafter "Bali Action Plan"): art 1(d)(i).

⁹⁹Adam (2009, p. 2); Bali Action Plan: art 1(d).

¹⁰⁰UNFCCC, Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009, available at: <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf> (accessed 1 December 2017): art 10.

¹⁰¹Ibid.: art 11.

¹⁰²UNFCCC, Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010 FCCC/CP/2010/7/Add.1, available at: <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2> (accessed 1 December 2017): art 117.

¹⁰³Ibid.: arts 121 and 123.

¹⁰⁴UNFCCC, Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011, FCCC/CP/2011/9/Add.1 (1), available at: <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf> (accessed 1 December 2017).

to provide guidance on intellectual property rights and technology transfer.¹⁰⁵ As a result, the TEC requested that the 2012 Doha negotiations provide greater clarity as to the TEC's role in matters relating to intellectual property.¹⁰⁶ While the Doha round saw the United Nations Environmental Program elected to host the Climate Technology Centre and Network, there was no resolution on the disagreements on intellectual property and technology transfer. This silence continued at the nineteenth and twentieth Conferences of Parties in Warsaw, Poland and Lima, Peru respectively. Neither of the public reports of these two meetings expressly mention intellectual property.¹⁰⁷

3.3 *The Paris Agreement*

The simplicity of the text of the Paris Agreement masks the fierce negotiations on intellectual property and technology transfer during the COP21 meeting. The final text of the Paris Agreement does not expressly address intellectual property matters, however it contains a number of provisions relevant to technology development, transfer, and financing. Under art 9 of the Paris Agreement, developed country Parties agree to provide financial resources to assist developing countries in mitigation and adaptation efforts through the UNFCCC Financing Mechanism. Under art 10, Parties commit to strengthening 'cooperative action' on both technology development and technology transfer, utilizing the Technology Mechanism and Financing Mechanism. The Paris Agreement further establishes a technology framework to guide the Technology Mechanism's efforts for technology development and transfer. To track and establish accountability, art 14 of the Paris Agreement establishes a global stocktake ever five years to assess progress on technology development and transfer to developing countries.

At COP 22 in Marrakech, eight countries and the European Union pledged over US\$23 million to the Technology Mechanism's CTCN to significantly increase its capacity to provide assistance and give effect to the Paris Agreement commitments.¹⁰⁸

¹⁰⁵International Centre for Trade and Sustainable Development (2012).

¹⁰⁶Rimmer (2012).

¹⁰⁷See: UNFCCC, Report of the Conference of the Parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013, FCCC/CP/2013/10/Add.3 (31 January 2014), Available at: <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf> (accessed 1 December 2017) and UNFCCC, Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014, FCCC/CP/2014/10/Add.3 (2 February 2015), Available at: <http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf> (accessed 1 December 2017).

¹⁰⁸CTCN, Countries Pledge Millions for Technology Transfer to Implement Paris Agreement (16 November 2016), available at: <https://www.ctc-n.org/news/countries-pledge-millions-technology-transfer-implement-paris-agreement> (accessed: 1 December 2017).

As of 1 December 2017, the CTCN has completed 26 requests for technical assistance.¹⁰⁹ Despite these efforts, the status of intellectual property in technology transfer under the UNFCCC remains unchanged. As a result, for a number of developing countries and civil society, the efficiency and scale of technology transfer risks being hampered by insufficient flexibilities within international intellectual property law regimes.¹¹⁰

3.4 *The International Intellectual Property Law Regime*

The main source of international intellectual property law is found in the Agreement on Trade Related Aspects of Intellectual Property (TRIPS).¹¹¹ TRIPS forms part of the broader World Trade Organization (WTO) suite of trade agreements, providing developing countries with access to developed country markets in exchange for compliance with minimum standards of intellectual property protections.¹¹² Under TRIPS, WTO members must provide patent holders with a twenty-year monopoly.¹¹³ In addition, patents granted by members are subject to a series of particular standards including, *inter alia*, non-preferential treatment of domestic over foreign inventors,¹¹⁴ non-discrimination as to the field of technology of the proposed invention,¹¹⁵ and exclusivity of the patent rights for making, using, selling or importing the protected technology.¹¹⁶ Technology transfer and the aims of TRIPS are closely aligned. Not only operating to protect intellectual property rights, TRIPS expressly requires that the protection and enforcement of intellectual property rights ‘should contribute to the promotion of technological innovation and to the transfer and dissemination of technology’.¹¹⁷ Furthermore, such contribution should be ‘to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations’.¹¹⁸ The text of TRIPS itself therefore includes a balancing of intellectual property rights so to facilitate technology transfer, *and* the need to take into account broader policy considerations. This is supported by

¹⁰⁹CTCN, Technical Assistance Dashboard, available at: <http://ctc-n.org/dashboard> (accessed: 1 December 2017).

¹¹⁰Khor (2014).

¹¹¹Agreement on Trade-Related Aspects of Intellectual Property Rights, opened for signature 1869 UNTS 299 (entered into force 15 April 1994) (hereafter “TRIPS”).

¹¹²Adam (2009, p. 7).

¹¹³TRIPS: art 33.

¹¹⁴Ibid.: art 3.

¹¹⁵Ibid.: art 27.1.

¹¹⁶Ibid.: art 28.

¹¹⁷Ibid.: art 7.

¹¹⁸Ibid.

TRIPS' interpretative provisions which provide that WTO members may implement domestic laws and policies to 'protect public health' and to 'promote the public interest in sectors of vital importance to their socio-economic and technological development' providing that these measures are consistent with TRIPS.¹¹⁹ WTO members may also 'exclude from patentability inventions...necessary... to avoid serious prejudice to the environment'.¹²⁰ There is debate over whether this subject matter exclusion would allow for flexibilities in treating ESTs differently to other patentable subject matter,¹²¹ however this provision could provide a legitimate basis for policy decisions to exclude ESTs to prevent or address climate change induced human rights violations.¹²²

TRIPS also includes a specific provision for balancing intellectual property rights and the facilitation of technology transfer between developed and developing countries. Under art 66.2, developed country members must provide incentives to enterprises and institutions in their country with the express purpose of promoting and encouraging technology transfer to least-developing countries.¹²³ However, this article gives developed countries large discretion when interpreting how to comply with this otherwise strictly worded obligation.¹²⁴ Until recently, countries took little action under this provision,¹²⁵ even less so within the specific realm of the transfer of environmentally sound technologies. At the request of least-developed countries, the Council for TRIPS (the governing body for the implementation of the TRIPS Agreement) adopted decision IP/C/28, 'Implementation of article 66.2 of the TRIPS Agreement' in 2003 in an attempt to improve compliance with this article. Since then, developed countries have submitted reports on technology transfer to the least developing countries every three years.¹²⁶

In contrast, many developed and middle-income countries, in particular the United States, reject calls for relaxing intellectual property protections for ESTs and rather push for stronger protections.¹²⁷ Stronger evidence also exists for intellectual property protections and inward foreign domestic investment in middle-income and large developing countries.¹²⁸ However, the assumption that strong intellectual property regimes are essential to the research and development of ESTs in developed countries, is receiving more challenge in light of the sharing economy and

¹¹⁹Ibid.: art 8.

¹²⁰Ibid.: art 27(2).

¹²¹For an analysis of the debate on this point as well as the TRIPS Agreement and climate change, see Rimmer (2011, pp. 83–119).

¹²²Ibid.: 91.

¹²³Ibid.: art 66.2.

¹²⁴Adam (2009, p. 13); Hutchison (2006, p. 524).

¹²⁵Hutchison (2006, p. 524).

¹²⁶World Trade Organization, Database of Reports on Implementation of article 66.2 of the TRIPS Agreement. Available at: <http://goo.gl/w01cW>.

¹²⁷Rimmer (2011, p. 117).

¹²⁸Maskus (2003, p. 7).

open source movements. Arguably, ‘the benefits of an intellectual property system tend at best to be long term and tenuous while in the short-term, intellectual property protection increases the cost of development, especially since in the globalized economy the patents awarded and resulting payment for the use of these technologies go primarily to foreign multinational corporations’.¹²⁹

While TRIPS is at its core a trade and intellectual property protection instrument, the provisions for a balance between intellectual property rights and socio-economic goals demonstrates the competing interests and perspectives of developed and developing countries. While there are a number of ‘flexibilities’ within the TRIPS text, the reality is developing countries are yet to receive substantive technology transfer benefits under the international intellectual property regime. Rather than attempting to define the scope of TRIPS flexibilities, human rights frameworks may shift the debate out of the trade sphere and inform alternative strategies for policy change and developments. In doing so, it is possible that the normative assumptions that underpin intellectual property will be challenged by the distributive justice human rights require. However, a range of options exist—from patent pools to impact based funds—that try to bring human rights and intellectual property together, and can be applied to the transfer of ESTs for climate change mitigation and adaptation.

4 A Human Rights Approach to Technology Transfer and Intellectual Property

4.1 ESTs for Human Rights

Technological development inherently seeks to advance and improve current practice by increasing efficiencies and beneficial outcomes. A human rights based approach to the development of ESTs makes the alleviation and prevention of human suffering the goal and priority of technological advances.

As the harmful effects of climate change increase, technologies that mitigate further escalation—or improve adaptability to—climate harms become even more important. Such technologies may have a global impact or targeted impact. Global impact technologies may involve mitigation ESTs, including emissions reduction technologies or renewable energy technologies like solar, wind, hydro or artificial photosynthesis processes. In this arena, technological developments may include improving efficiencies or the scalability and ease of replicability of technologies. More interventionist global impact technologies may involve geoengineering strategies such as atmospheric carbon dioxide removal or the management of solar radiation.

¹²⁹Chapman (2009, p. 29).

Targeted impact technologies may involve adaptation measures for specific climate concerns. The right to life and right to health for example could be ensured through vaccines, diagnostics or antibiotics for emerging or reemerging diseases such as dengue, malaria, and tick-borne encephalitis, or through more efficient and affordable air conditioning, building technologies, and insulation reducing heat stress. Respecting, protecting and fulfilling the right to adequate food may involve ensuring equitable and affordable access to drought tolerant, insect resistant or improved nutrition crops. Water treatment, capture, or desalination processes as well as sea-walls or other physical-barrier technologies may be critical in guaranteeing the right to water.

Human rights frameworks have already begun to hold states to account when denying access to ESTs amount to violations of human rights. In 2008, the CESCR noted its deep concern with the extreme hardship experienced by farmers in India exacerbated by increasing farming costs as result of the introduction of genetically modified seeds owned by multinational corporations.¹³⁰ The CESCR noted that India's regulation of seeds under a proposed Seeds Bill 2004 risked violating the right to food by limiting farmers to using seeds that have been formally registered and expanding intellectual property protections over seeds for up to 30 years.¹³¹ With no mechanism to regulate seed supply or price, or a compulsory licensing regime or similar safeguard, states risk violating the right to food with overly-expansive intellectual property regulation. As the case study of India's seeds demonstrates, the intertwining of human rights issues with accessing environmentally sound technologies is complex and multifaceted.

4.2 *A Human Right to Technology Transfer?*

International law contains an express, specifically identifiable human right to technology transfer itself: the right to enjoy the benefits from scientific progress and its applications (REBSPA). The REBSPA has remained a relatively unexamined human right, described as 'so obscure and its interpretation so neglected that the overwhelming majority of human rights advocates, governments, and international human rights bodies appear to be oblivious to its existence'.¹³² The right however is not a creation of recent academic discourse or human rights theory,¹³³ but rather has been enumerated in two main international human rights instruments, under art 27 of the UDHR and art 15(1)(b) of ICESCR. The description of REBSPA as 'so

¹³⁰CESCR, Consideration of reports submitted by States parties under articles 16 and 17 of the Covenant on Economic, Social and Cultural Rights: concluding observations of the Committee on Economic, Social and Cultural Rights: India, 8 August 2008, E/C.12/IND/CO/5, available at: <http://www.refworld.org/docid/48bbdac42.html> (accessed 1 December 2017): 6.

¹³¹Helfer and Austin (2011, pp. 419–420).

¹³²Chapman (2009, p. 1).

¹³³Compared with, for example, the Right to Development.

obscure and its implementation so neglected'¹³⁴ in comparison to other ICESCR and UDHR human rights is attributable perhaps to its content: scientific progress and its applications.

Unlike other ICESCR rights, CESCR has not prepared a General Comment on the content, scope and application of the REBSPA.¹³⁵ However, in 2009, the sunlight began to penetrate the canopy cover and illuminate REBSPA, with UNESCO hosting the first international expert discussion on the right in Venice, culminating in the Venice Statement on the Right to Enjoy the Benefits of Scientific Progress and its Applications (Venice Statement).¹³⁶ The Venice Statement recognised not only the continued neglect of REBSPA, but also the increasing relevance of science as a substantive human right in of itself. Importantly, the Venice Statement is the first international document to examine the normative content of REBSPA,¹³⁷ defined to include¹³⁸ the enjoyment of the applications of the benefits of science in a non-discriminatory way, including by way of technology transfer.¹³⁹ In addition, the statement noted that REBSPA 'may create tensions with the intellectual property regime, which is a temporary monopoly with a valuable social function that should be managed in accordance with common responsibility to prevent the unacceptable prioritization of profit for some over benefit for all'.¹⁴⁰ The Venice Statement urges states to 'apply human rights-based approaches to their policies and activities in the field of science and technology...to ensure that science and technology policy [for example, intellectual property laws] serve human needs in addition to economic prosperity'.¹⁴¹ Therefore, the right to benefit from scientific progress and its applications 'cannot be reduced to the right to *wait* to benefit from any trickle-down effects that may result from the aggregate increase in societal welfare flowing from the technological progress that intellectual property encourages'.¹⁴² Developing the scope of REBSPA within the climate context, and promoting its existence, may provide a specific human right which can underpin direct human rights justifications for equitable global access to technologies that mitigate and adapt to the effects of climate change.

¹³⁴Chapman (2009).

¹³⁵Interestingly, the UN CESCR has released General Comment 17, which covers article 15(1)(c), the right to intellectual property protections arising from a scientific, literary or artistic production. General Comment 17 recognises the possibility for a future General Comment on the REBSPA, and advises that each sub-article of article 15 is interrelated, being "mutually reinforcing and reciprocally limitative".

¹³⁶UNESCO, 'Venice Statement on the Right to Enjoy the Benefits of Scientific Progress and its Applications' (2009).

¹³⁷*Ibid.*

¹³⁸*Ibid.*: art 13.

¹³⁹*Ibid.*: art 13(b).

¹⁴⁰*Ibid.*: 10.

¹⁴¹*Ibid.*: art 24.

¹⁴²Helfer and Austin (2011, p. 237).

In addition to REBSPA and specifically identifiable rights, the binding UNFCCC obligation for states to take steps to realize technology transfer under art 4.5 UNFCCC, may also be construed as having a parallel human rights based obligation. Under art 2(1) of ICESCR, states have a duty to provide international assistance and cooperation to fulfill economic, social and cultural rights. Within the context of climate change, art 2(1) of ICESCR may therefore add a powerful rights-based component to the technology transfer obligations on developed states under the UNFCCC where the realization of economic, social and cultural human rights affected by climate change—such as the right to health, the right to water, and the right to food—require access to technologies in developed countries.

4.3 Addressing Intellectual Property Impediments

The tension between human rights, the transfer of climate change technologies, and intellectual property is not a new tension. Over the past thirty years, similar debates have played out with regard to the right to life, right to health, and access to medicines debates. Some of the lessons learnt from these debates are relevant to a human rights based approach to accessing climate change technologies and intellectual property. Here, four proposed solutions are examined: a Doha-Style Declaration, Compulsory Licensing, Patent Pools, and Impact Funds. These are not an exhaustive list of possible policy approaches, however they provide important lessons for the advantages and limitations of continuing to work within an intellectual property regime framework for climate technology transfer.

4.3.1 A Doha-Style Declaration for TRIPS, Climate Change, and Technology Transfer

In the years following the implementation of TRIPS, developing countries raised their concerns over the impact of TRIPS and its pharmaceutical patent provisions on access to essential medicines.¹⁴³ In particular, developing nations sought to clarify the interpretation of existing flexibilities in TRIPS in a manner consistent with global public health issues, in particular, HIV/AIDS.¹⁴⁴ The result of this lobbying by developing countries and civil society was the adoption of the Declaration on the TRIPS Agreement and Public Health (Doha Declaration) in late 2001.¹⁴⁵ This declaration reaffirmed the right of WTO members to interpret and use the existing flexibilities under TRIPS to support broader socio-economic and policy

¹⁴³Chapman (2002, p. 881).

¹⁴⁴Ibid., p. 881.

¹⁴⁵Declaration on the TRIPS Agreement and Public Health, WT/MIN(01)/DEC/2, 14 November 2001, Doha Declaration (20 November 2001).

concerns, such as access to medicines,¹⁴⁶ the granting of compulsory licences at member discretion,¹⁴⁷ and the sovereign right to determine when doing so is necessary (such as by giving members the power to define what constitutes a public health emergency).¹⁴⁸ The Doha Declaration is remarkable in that it was the first clearly articulated statement from the WTO on how the internal development and socio-economic needs of a country allow interpretive flexibility of international legal intellectual property protections. In that particular instance, the public health good of allowing the transfer of technologies, such as through compulsory licensing of pharmaceuticals in matters of serious public health concern like malaria and HIV/AIDS, was deemed sufficient to outweigh the international trade obligations contained in the TRIPS Agreement.

As the site of the pivotal intellectual property and public health negotiations that resulted in the Doha Declaration eleven years previously, the 2012 UNFCCC COP in Doha was an appropriate forum for discussions on climate change and intellectual property. In fact, the similarities with the 2001 Doha Declaration negotiations were striking. The non-governmental organisation, the Climate Action Network called for the development of a Declaration on Intellectual Property and Climate Change in order to facilitate the 'rapid and efficient uptake of technologies to address mitigation and adaptation'.¹⁴⁹ The Philippines took a leading position on the need for such a text, with a particular concern with respect to climate related emergencies, stating that the TEC should consider issues 'related to intellectual property rights as they arise in the development and transfer of technologies'.¹⁵⁰ South Africa supported this approach but went further as to state that the Doha climate talks should address 'questions of equitable access to sustainable development, intellectual property rights and unilateral trade measures',¹⁵¹ while the 'Progressive Latin Americans', led by Venezuela, proposed a draft text on a broad variety of measures relating to intellectual property and climate change.¹⁵² India attempted to provide a compromise, recognising developed countries' concerns with a dilution of intellectual property rights, and called for a fund to be established enabling access to intellectual property protected clean technologies.

Even though the instigating request to clarify intellectual property rights and climate change came from the TEC, this push by developing countries for a new intellectual property and climate change regime was rejected by developed countries. This rejection came from the similar position developed countries had

¹⁴⁶*Ibid.*: art 4.

¹⁴⁷*Ibid.*: art 5(b).

¹⁴⁸*Ibid.*: art 5(c).

¹⁴⁹Rimmer (2012).

¹⁵⁰*Ibid.*; Submission from the Philippines to the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Fifteenth, two, 3(d), FCCC/AWGLCA/2012/CRP.6 (28 November 2012).

¹⁵¹Africa: Molewa Delivers South Africa's Position at Cop18, allAfrica (6 December 2012), available at: <http://allafrica.com/stories/201212070382.html>.

¹⁵²Rimmer (2012).

previously taken, echoing the pro-intellectual property argument that strong enforcement is necessary to encourage investment and development in clean technologies.¹⁵³ The United States and the European Union were resolute Doha should remain silent on providing a specific position on intellectual property and climate change, and rather, rely on alternative, more broad forums, like the World Intellectual Property Organization and the WTO, to address the climate change and intellectual property.¹⁵⁴ The draft text of the Doha negotiations sought to address developing countries' concerns, albeit indirectly, by providing that the TEC should be 'examining effective mechanisms that promote access to affordable environmentally sound technologies, reward innovators and increase the dynamic of global innovation'. However, by the time the final texts of the Doha climate talks were complete, this sentence was removed, leaving the position of intellectual property and technology transfer murky.¹⁵⁵ Developing countries and non-governmental organisations seem resolute that a Doha Declaration style statement on climate change and technology transfer is the only way forward. However, it is arguable whether, even with such a declaration, the current flexibilities under TRIPS are sufficient to address concerns about the possible barrier that such rights may impose on the transfer of ESTs.

4.3.2 Compulsory Licensing

Compulsory licensing is a means by which governments can bypass patent owners' permission to use, produce, or sell a patented product. TRIPS contains express protections against arbitrary compulsory licences, requiring governments or third parties to first attempt to obtain a voluntarily given licence from the patent holder.¹⁵⁶ However, in 'other circumstances of extreme emergency', governments are not required to abide by this requirement.¹⁵⁷ The Doha Declaration took this provision further, interpreting art 31 to mean that it is in the absolute discretion of a country to decide for itself what constitutes a circumstance of extreme urgency. Following a decision of the WTO in 2003,¹⁵⁸ and in conjunction with the 2017 entry into force of a protocol to amend TRIPS, any WTO member may export generic pharmaceutical products made under an importing country's compulsory licence for domestic use. Arguably, a similar interpretation could be extended to other applications of art 31 of TRIPS.¹⁵⁹ The International Centre for Trade and

¹⁵³Ibid.

¹⁵⁴Ibid.

¹⁵⁵Ibid.

¹⁵⁶TRIPS: art 31.

¹⁵⁷Ibid.: art 31(b).

¹⁵⁸WTO, Implementation of Paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health, WT/L/540, (30 August 2003).

¹⁵⁹Adam (2009, p. 9).

Sustainable Development has proposed that compulsory licensing be utilised for the transfer of environmentally sound technologies, arguing that:

[c]limate mitigation or adaptation could provide valid ground for compulsory licensing, and could even be considered to be included in general references to ‘public interest’ in most patent laws. Some countries also foresee compulsory licences in cases in which the invention is not exploited in the country, or is insufficiently exploited. Such a measure could restrain the anti-competitive practices feared as potentially impeding the transfer of climate-related technologies to developing countries.¹⁶⁰

The International Centre for Trade and Sustainable Development concludes that ‘compulsory licences could thus prove an effective tool to ensure rapid access to critical climate-related technologies in developing countries’.¹⁶¹ The Third World Network has supported this position, arguing that ‘compulsory licensing is an option that developing countries can seriously consider for those patented climate-friendly technologies for which they have need, which are expensive, and in cases where negotiations with the patent holder are unable to result in a sufficiently affordable price either for the original product or for a license for an intended generic product’.¹⁶² However some scholars have argued that there are limitations in using art 31 of TRIPS, with climate change not being deemed a significant enough emergency causing a threat to human life.¹⁶³ This position however is no longer legitimate, given the growing body of science into the seriousness of climate change’s impact on human life. Other scholars have raised concerns with the use of compulsory licenses in respect of clean technologies, given the number of different solutions that will be required to address climate change,¹⁶⁴ and the absence of know-how and other soft technologies in the compulsory transfer process.¹⁶⁵ While these criticisms may be valid, they do not necessarily undermine the potential of compulsory licensing to act as one solution to address developing countries concerns. Furthermore, until a more appropriate solution, or solutions, is devised, a flawed model is likely to be better than no action at all.

4.3.3 Patent Pools

Patent pools are by no means a new strategy to addressing the balance between intellectual property rights and the wider public good. Typically, patent pools are used in the commercial sphere as risk mitigation strategies whereby patent holders cross-license their patents for a particular technology in order to save time, money, and in certain cases, move products to market as soon as possible. Patent pooling

¹⁶⁰International Centre for Trade and Sustainable Development (2008, p. 6).

¹⁶¹Ibid., p. 6.

¹⁶²Khor (2012, p. 15).

¹⁶³Macmillan (2001, 31–32) as cited in Rimmer (2011, p. 99).

¹⁶⁴Rosenzweig (2009) as cited in Rimmer (2011, p. 100).

¹⁶⁵Maskus (2009, p. 23) as cited in Rimmer (2011, pp. 99–100).

has become a successful method of balancing intellectual property rights with broader international social-economic issues. Funded by UNITAID, the Medicines Patent Pool was established in July 2010 to serve as a voluntary licensing service to patent holders and interested manufacturers for HIV/AIDS medicines. The Medicines Patent Pool operates by allowing ‘for more affordable and adapted’ generic versions of patented drugs to be developed and distributed prior to the expiration of a patent’s 20 year protection term. Under the patent pool model, originator patent holders are invited to voluntarily submit their patents to the Medicines Patent Pool by granting a license to the Medicines Patent Pool on specified public-health terms. These typically include the limitation that supply is to developing nations only, or in a particularly adapted formulation. The Medicines Patent Pool therefore acts as a central repository from which generic companies can apply for sub-licenses from the pool. Sub-licences are granted for the development, production and sale of medicines in permitted countries, and with regard to the Medicines Patent Pool’s priorities, such as fixed-dose combination drugs, climate-adapted formulations and medicines formulated for children. This pooling results in one of the Medicines Patent Pool’s key advantages for complex diseases like HIV/AIDS: the ability to cross-combine licenses allowing for a blending of technologies, such as advantageous drug delivery through fixed-dose combination pills (reducing multiple drugs into a single dose), medicines developed for children, and more environmentally suitable medicines (by including patented technologies as heat-resistance). Similar benefits could be seen equally for ESTs, where a cross-pollination of sub-licences has the capacity to produce a wider variety of geographical and circumstance-modified technologies.¹⁶⁶

In preparation for the Paris Agreement, an ad hoc working group was established to examine the elements of a draft negotiating text to form the basis of negotiations at the 2015 Paris COP21. Within these drafts, elements of a proposed negotiating text included options to address barriers to technology transfer ‘caused by intellectual property rights’, including use of the Financing Mechanism, the Green Climate Fund, licensing on humanitarian groups, and patent pools.¹⁶⁷ The draft proposed to other options to address intellectual property under the Paris Agreement including a statement by Parties recognizing the importance of intellectual property rights in creating an enabling environment for innovation in ESTs, as well as an option that the Paris Agreement should not address intellectual property rights.¹⁶⁸ The final option was the ultimate outcome of the Paris negotiations.

The limitations of the Medicines Patent Pool have been the focus of civil society criticisms, and would likely be similar to criticisms lobbied to any climate change technology patent pool by developing countries or non-governmental organisations.

¹⁶⁶For a detailed discussion on the utility of patent pools for cross-pollination in climate change technologies, see: Reichman et al. (2008).

¹⁶⁷UNFCCC Conference of Parties, Lima Call for Climate Action, Decision 1/CP.20 FCCC/CP/2014/10/Add.1, 25.

¹⁶⁸*Ibid.*

Such criticisms include the fact that patent holders effectively dictate the geographical scope and application of their patents in the pool; limiting access to technologies on commercially driven decisions on the capacity for market reward.¹⁶⁹ This is a valid criticism of the Medicines Patent Pool, however with growth and expansion, it is possible that patent pools have the ability to overcome these limitations. Importantly, the Medicines Patent Pool model appears to have been welcomed by the international intellectual property community,¹⁷⁰ and is an important first step in attempting to balance both investment and innovation benefits of intellectual property protections and access to technologies.¹⁷¹

4.3.4 Climate Impact Fund

Modelled on the proposed Health Impact Fund,¹⁷² a Climate Impact Fund may facilitate investment and innovation in ESTs. Companies developing ESTs may continue to exercise their patent rights, maximising their profits in developed markets, and, if they wish, engaging in licensing regimes, such as patent pooling. The impact fund establishes a ‘second track’ that provides an additional option for companies developing ESTs to register their technology with the fund and sell its product at close to cost price.

While most funding models operate as a ‘push’ to research technologies (by providing subsidies and funding into targeted research), a Climate Impact Fund could serve as a ‘pull’ model; rewarding companies that register their ESTs on the basis of the success of their technology.¹⁷³ ‘Success’ may be defined in many ways, such as emissions reduced against a baseline level, or referenced against other industry standards such as the health measurement standard Quality-Adjusted Life Years (QALYs). The success of the technology then forms the proportionate share that the company will receive from the fund each year for a set period, after which the EST would be open to the general market.

An impact fund model is unique to other existing models in that it formulates a structure in which both the ultimate social and environmental aim and intellectual property rights can coexist. In addition, an impact fund is geographically open, and does not undermine existing regimes (such as through compulsory licensing). Most importantly however, impact funds aim to spur and promote innovation and development in neglected areas. While compulsory licensing and the patent pool

¹⁶⁹New (2011).

¹⁷⁰Hoen et al. (2011).

¹⁷¹Broader than patent pools, patent commons have been suggested to address the technology transfer of ESTs—for example, the World Business Council for Sustainable Development’s “Eco Patent Commons”. Under a patent commons, participants pledge their patented technologies and agree not to assert patent rights against uses of the technology for humanitarian or other public interest grounds. See: Rimmer (2011, p. 318).

¹⁷²Grootendorst et al. (2011, p. 183), Hollis and Pogge (2008).

¹⁷³Ibid., p. 1.

model improve developing nations' access to technologies, the impact fund model creates an incentive structure that rewards companies for investment in technologies that will have the most impact. This is particularly significant for environmentally sound technologies targeted to emissions intensive products and processes that are mainly, or even solely, present in low-income markets due to their cost (such as brown coal power plants, mining, and construction materials such as concrete). This model is perhaps the most innovative, and ultimately the largest-scale model, but appears to address the concerns raised by existing models, such as compulsory licensing, and even very recent ones, such as patent pooling. Fundamentally though, each of these models seek to actively address the central issue of the transfer of environmentally sound technologies to developing countries, with their success to be judged not in dollars, or contracts, or patents, or pilots, but in tangible examples of successful transfers and emissions reduced.

4.3.5 A Multi-pronged Approach, Recognizing Multiple Perspectives

Resolving the potential impact intellectual property may have on access to technologies, climate change and human rights will not solely depend on one model. The scale of the challenge that climate change poses means that a multi-pronged, multi-strategy approach is crucial. Each of the strategies discussed in this chapter essentially accept the legitimacy of using flexibilities in intellectual property laws to carve out issues of human rights, equity, and justice. There is still a significant disjunction between countries' perceptions on the positive and negative impacts of climate change and the development and distribution of ESTs. There are also matters of intergenerational equity and distributive justice, which 'do not typically inform intellectual property's analytical frameworks'.¹⁷⁴ While this is fundamentally a political question, further research or evidence on the impacts of intellectual property on technology transfer will assist in informing the political processes.

5 Conclusions

A human rights based climate technology framework promotes the transfer of climate technologies to alleviate suffering from climate change's impact on the realization of human rights. The elements of such a framework are extensive, however the following ten recommendations contain the main components for domestic, regional, and international policy development.

1. Increasing commitments to capacity development and technology transfer, including active support of the UNFCCC's Technology Mechanism and Climate Technology Centre and Network.

¹⁷⁴Helfer and Austin (2011), above n121: 237.

2. Prioritizing the transfer of technologies that promote or protect human rights impacted by climate change, particularly in vulnerable population groups.
3. Prioritizing technology transfer policies that seek to alleviate the root causes of barriers to realizing human rights affected by climate change.
4. Identify and develop traditional knowledge for climate strategies.
5. Support national, regional, and international environmental litigation that seeks to reduce the impacts of climate change upon human rights.
6. Support national, regional, and international administrative mechanisms and National Human Rights Institutions in efforts to develop policies, laws, and innovations that seek to reduce the impacts of climate change upon human rights.
7. Support efforts to clarify flexibilities within intellectual property regimes in a manner that prioritizes human rights.
8. Establish, finance, and lead innovative mechanisms for technology transfer, using existing initiatives such as the Financing Mechanism or Green Climate Fund to explore the use of patent pools or impact funds.
9. Incorporate UNFCCC technology transfer obligations into international and regional aid efforts.
10. Recognize that even historically innovative solutions to technology transfer may not be radical enough to address the profound challenge of climate change.

While these steps will reinforce the opportunities for developing technologies that may assist in mitigating and responding to climate change, the central challenge of addressing climate change will not be solved by technology. It is political. As Mary Robinson notes, ‘[u]ltimately, achieving sustainability and a low-carbon economy will not only depend on technological innovation, but will require far-ranging social and political innovation. Let us not forget that technology does not have the ability to eliminate poverty, respect human rights, stop climate change and build a sustainable society—people do’.¹⁷⁵

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¹⁷⁵Robinson (2010), pp. xvii–xx.

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Part II

Patent Law

Chapter 6

Intergenerational Justice: A Framework for Addressing Intellectual Property Rights and Climate Change



Heather Ann Forrest and Peter Lawrence

Abstract Is there a conflict between intergenerational justice and the current global system of intellectual property (IP) rights to the extent that it acts as a hindrance to climate change mitigation and adaptation efforts? Addressing the potential for conflict between the intellectual property system and intergenerational justice depends on the role played by intellectual property in technology development and diffusion. It also depends on what role property rights have within a theory of intergenerational justice. We argue for a theory of intergenerational justice based on core human rights to life, subsistence and health and a notion of equality. A right to property (which includes intellectual property) is best seen as a vehicle for securing these core rights. We argue that both intergenerational and international justice are crucial in making more explicit the normative elements embedded in public policy-related arguments made in relation to intellectual property and climate change.

Keywords Climate change · Intergenerational justice · Justice
Intellectual property rights · IPR

1 Introduction

At first blush, one may wonder what contribution normative theory can make to what seems to be such a technical/political issue as the role of intellectual property rights (IPRs) in the global climate change regime. There are two answers to this. Firstly, as eloquently put by Joe Bowersox,

... normative theory... can be a powerful diagnostic tool for evaluating public policy; it can act as an altimeter, if you will, that checks the thinness of the theoretical air surrounding a particular policy mountain or molehill, telling us whether there is enough oxygen present to

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support political life. Sometimes theory may even suggest that we try an alternative, less precipitous policy pass by which to cross to the other side.¹

Conceptions about justice—can provide a valuable framework in terms of ensuring that policy prescriptions are well directed, particularly given that economic policy discourse can bury ethical assumptions. This broader picture, can provide a valuable point of reference in the highly technical debates relating to intellectual property rights and climate change. A second reason for turning to normative theory is the reality that environmental treaties will not be agreed to without at least overlapping conceptions of fairness.² This provides a practical motivation for interrogating more deeply justice discourses involved in the climate change negotiations. To the extent that the current global climate regime is inadequate, shared understandings of justice are a crucial precondition for reforming and making more effective the current climate change regime.

Climate change gives rise to challenging issues of justice—both intragenerational, international and intergenerational. While it is important to remember that serious climate impacts are predicted to occur within the lifespan of people alive today, the most serious impacts will be felt by unborn generations, who played no role in creating this situation.

Intergenerational justice must be considered in conjunction with intragenerational justice. Large developing countries such as India have an understandable imperative to rapidly develop economically quickly and provide access to energy to the poor. However, if such energy is provided by fossil fuels, it would seem well-nigh impossible to stay within the Paris Agreement's goal of '[h]olding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels.'³ As argued by Henry Shue, the future poor will be most impacted by unmitigated climate change, and we must find a way of meeting the energy needs of the poor now without sacrificing the interests of the future poor.⁴

The situation of India and other developing countries also raises what could be seen as the first major challenge of applying a theory of intergenerational justice to the problem of intellectual property rights in the climate change context. That is, how to balance intergenerational and intragenerational justice demands. Put differently, who bears responsibility for technology development and transfer and IPRs reform where necessary to meet the challenge of climate change? Does responsibility fall entirely on the shoulders of developed countries or is this a shared responsibility?

¹Bowersox (2002, p. 247).

²See Albin (2001).

³Paris Agreement to the United Nations Framework Convention on Climate Change (adopted 22 April 2016, entered into force 4 November 2016) http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf (Paris Agreement).

⁴Shue (2014, p. 315).

Intergenerational justice is important here because it provides a powerful rationale for the rapid roll-out now and further development of low carbon technologies which is arguably the key to any successful strategy likely to meet both inter and intra-generational justice demands. While the rationale for IPRs has been the incentive they provide to innovation, IPRs—particularly patents—have also come to be seen as constituting barriers to the development and diffusion of climate change-related technologies. To the extent that the global system of IPR acts as a barrier to such technology development and transfer, it should be reformed to ensure that it facilitates rather than hinders this process.

A second key challenge in applying intergenerational justice in relation to this field, is the question of whether the current generation bears a *particular* responsibility to take strong action in response of climate change—distinct from—and greater than—the responsibility of previous generations, given its position of having the last chance to take strong mitigation action to avoid a significant risk of catastrophic climate change.⁵ This is in a context where scientists maintain that global GHG emissions must start to go down within the next few years at the latest and then decline further toward zero emissions by 2050.⁶ This creates dissonance with intergenerational justice theories which have relied on a notion of each generation being under an equal burden in terms of obligations towards the future. In this chapter we argue that this notion of “last chance responsibility” has a number of important implications in terms of policy positions related to the debate surrounding intellectual property rights and climate change.

These two key challenges are addressed in this chapter, which is structured as follows. Section 2 sets out a theory of intergenerational justice. Section 2.1 examines the question of whether this theory places a particular responsibility on industrialised countries for reforming the global IPR system in light of the climate change challenge. Section 3 turns to examine the global IPR system in light of this intergenerational justice framework, setting out (in 3.1) a short overview of the global intellectual property rights framework and how it functions. An analysis is made in terms of how the current system is biased in favour of the interests of the North vis-à-vis the South, and also biased in favour of current vis-à-vis future generations. Section 3.2 discusses how intellectual property rights relate to climate change mitigation efforts. Section 4 outlines how the intellectual property rights issue has been dealt with in the global climate regime. This chapter does not pretend to provide an authoritative answer in relation to the controversy as to whether intellectual property rights serves as a barrier or facilitator to action on climate change, but aims to show how an intergenerational justice framework can provide a fresh and sharper perspective in analysing this debate which makes explicit key normative assumptions. Section 5 draws conclusions.

⁵Shue (2015).

⁶UNEP (2016, p. 9).

2 Intergenerational Justice

There is no single theory of intergenerational justice. Applying justice principles in relation to unborn generations throws up particular challenges. Thus theories based on reciprocity face what seemed to be an insurmountable hurdle, given future generations' inability to reciprocate in relation to current generations.⁷ Furthermore, Rawlsian and other theories premised on continual progress and/or each generation having the same obligations seem ill suited to the current context where we are facing an environmental catastrophe.

Lawrence (2014) has argued for a theory built on the work of Simon Caney and Henry Shue, which, in summary, involves the following elements:

These are as follows:

P1 *Equality principle*: All persons born now and in the future are entitled to certain core human rights (to life, health and subsistence).⁸

P2 *Harm avoidance principle*: Contemporaries have an ethical obligation to avoid harm, including to the interests and core human rights of future generations including their right to a healthy environment.⁹

P3 *Responsibility for harm principle*: A person who caused harm to the interests of others-and no one else-is responsible for clearing up this harm and/or compensation proportionate to their share of the damage.

P4 *Capacity to pay*: Among a number of parties, all of whom are bound to contribute to some common endeavour.¹⁰

P5 *Effectiveness principle*: In order to meet the requirements of P1, P2, P3 and P4 i.e. to avoid harm to the core human rights of future generations, governments should negotiate an effective global climate regime. As mentioned above, "Effectiveness" has been agreed by the international community in the 1.5 °C/ 2 °C Paris Agreement objective.

These ethical principles rest on widely shared values. The notion of all persons being equally entitled to core human rights is found in the near universal support for the Universal Declaration on Human Rights (UDHR) and the major human rights

⁷Lawrence (2014, pp. 48–50).

⁸Lawrence (2014, p. 76) which builds on Simon Caney's work. Note some authors extend these core rights to also include the right to a healthy environment, see e.g. Hayward (2005), and Vanderheiden (2008), who argues for a right to a stable climate system, p. 241.

⁹For a similar harm avoidance principle see Vanderheiden (2008, p. 137), and Lawrence (2014, pp. 29–66).

¹⁰Lawrence (2014, p. 86) relying on Shue (1999, p. 531).

treaties.¹¹ These treaties and the UDHR enjoy near consensus support from the international community. Since 2006 even China accepts the universality of human rights while placing emphasis on ‘survival rights of subsistence’—socio-economic rights—over civil and political rights.¹²

While the right to property is included as a human right in major human rights treaties, here we follow the logic of Henry Shue who argues that property is not a core human right but rather a vehicle for securing the more basic human rights to subsistence and life.¹³ The fact that one could enjoy a right to life and subsistence in a social system which did not contain private property rights underscores this point.

Climate change threatens a number of well-established human rights, such as the rights to life, health and subsistence.¹⁴ Unmitigated climate change threatens the rights of persons *alive today*. Thus, if one imagines a person born today, that person in 2050 will be 32 years old. A 50 year old politician will in 2050 be 82 years old. Thus climate change will seriously impact current generations within their lifetime, with increased mortality from extreme weather events and tropical diseases.¹⁵ But the most severe impacts will be felt by unborn generations and these future generations will face risks of irreversible harm to the global ecological system and climate. The recently released IPCC 5th Assessment Report highlights some of these risks including the likelihood of meltdown of the Greenland ice sheet.¹⁶

It is important to recognise that human rights alone cannot provide a coherent theory of intergenerational justice. The potential conflict between the interests and rights of persons alive today and in the future can only be resolved by application of a distributive justice principle, whether this be a principle of equality, subsistence or priority to the poor, for example.¹⁷ Distributive justice principles with the greatest chance of being implemented should rest on values already widely supported in the global system. Thus for example, the notion of equality, which is already embedded in the Universal Declaration of Human Rights in terms of each person being equally

¹¹Donnelly (2007, p. 281). Note that we do not wish to imply that a broader range of human rights can also be the basis of a more comprehensive theory of intergenerational justice. It is however, sufficient to base a strong ethical obligation towards future generations on the more limited list of human rights contained in the theory described here.

¹²Sceats and Breslin (2012, p. 8).

¹³Shue (1980, pp. 24, 125).

¹⁴Caney (2009b, p. 167). Some argue that future unborn persons cannot possess human rights at all. Even if this were to be true, as a minimum, persons upon being born possess human rights, and we therefore have a corresponding ethical obligation to ensure that such rights are not infringed, Vanderheiden (2008, p. 129).

¹⁵IPCC (2014). Intergovernmental Panel on Climate Change (IPCC) (2014), Fifth Assessment Report, Climate Change 2014: Working Group II: Impacts, Adaption and Vulnerability, Summary for Policymakers (2014) http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf accessed 7 May 2014.

¹⁶IPCC, 5th Assessment Report, The Physical Basis, Summary for Policymakers, http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf accessed 7 October 2013.

¹⁷Caney (2009a, p. 163).

entitled to human rights can be extended into the future within a theory of inter-generational justice. Similarly the notion of justice and subsistence, involving the idea that the poor should not be allowed to fall below a certain threshold required for human dignity, is well reflected in the 2015 UN millennium goals.¹⁸

2.1 *Who is Responsible for Technology Development and IPRs Reform?*

If one accepts the theory of intergenerational justice sketched above, what does this tell us in terms of who bears *ethical responsibility* for the development and diffusion of technology necessary to address mitigation and climate adaptation, and linked to this who bears responsibility for ensuring that the IPR system is reformed so as to not provide a barrier with regard to technology development and transfer?

The principles outlined above are expressed in a manner relating to ethical responsibility of individuals. Translated to the global level in terms of responsibility of governments, the responsibility for harm principle and the notion of proportionate responsibility for harm, together with the capacity to pay principle both point towards industrialised countries being *primarily* responsible for making available the technologies necessary for climate change mitigation. This acknowledges the role of industrialised countries in being primarily responsible for causing the problem and in relation to the benefits which developed countries have enjoyed in industrialisation and in relation to which it would be unfair to deprive developing countries.

Making industrialised countries *entirely* responsible in this regard would be problematic for a number of reasons. Firstly, the share of global cumulative greenhouse gas emissions has shifted towards developing countries.¹⁹ Secondly, the nature of technology development and transfer is not linear in the sense that technology and associated IPRs can simply be transferred to developing countries. Forsyth and others have pointed out that the successful transfer of low carbon technology in Clean Development Mechanism (CDM) projects in Asia for example, has been linked very much to domestic factors, including how much projects mesh with local priorities and values.²⁰ Thus, it makes more sense to consider technology development and transfer as a *shared and proportionate* responsibility—with the amount of responsibility

¹⁸UN Millennium Development Goals www.org/millenniumgoals/poverty.shtml.

¹⁹Technical Summary. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change—Total Anthropogenic CO₂ Emissions from Fossil Fuel Combustion, Flaring, Cement, as well as Forestry and Other Land Use (FOLU) by Region between 1750 and 2010 (p. 43) reveals that developing countries' cumulative emissions had (in 2010) already overtaken developed countries' cumulative emissions. https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_technical-summary.pdf.

²⁰Forsyth (2005, pp. 165–176).

proportionate to capacity to pay and historic emissions. This in no way implies that industrialised countries should be let off the hook in terms of the necessity to fund the Green Climate Fund and other international funding mechanisms which must play an essential role in the rapid development and diffusion of low carbon technology. The notion of proportionate responsibility, acknowledges that take up of low carbon technology depends on regulation in both industrialised and developing countries, in terms of placing a price on carbon, which is essential in terms of avoiding the ‘valley of technological death’ which can occur if there is no ‘market pull’ to ensure commercialisation of low carbon technologies.²¹

The notion of shared and proportionate responsibility is crucial as a mechanism for balancing the potentially conflicting interests of future and current generations. Importantly, this conflict can be substantially avoided if we take intergenerational justice seriously and governments are pushed to rapidly develop and transfer the required technologies.

2.2 A Special Responsibility on the Shoulders of Current Generations?

Given the potential for catastrophic harm occurring to future generations (and even to young persons alive now, within their lifespan), intergenerational justice requires strong and decisive action to mitigate climate change. The most important consequence of the theory of intergenerational justice sketched above is in terms of urgency. Some theories of intergenerational justice emphasise that each generation should have an equal burden. This does not make sense in relation to the current crisis—carefully distributing the mitigation burden in an equal manner over a number of generations would fail the test of avoiding avoidable harm implicit in the harm avoidance principle described above.

If one accepts that the current generation—particularly the wealthy who enjoy luxury emissions—have a particular responsibility—distinct from other generations—to do all it can to mitigate greenhouse gas emissions, what implications would this have for the debate on climate change and IPRs? We would argue that ethical responsibility requires that IPRs should bend to meet this emergency. Thus, to the extent that IPRs do indeed constitute a barrier to technology development and transfer, intergenerational justice considerations would point to the need to modify—and provide a framework for modifying—the rules to take into account the current crisis.

It is outside the scope of this chapter to set out precise details in terms of IP reform or compulsory licensing or other options. What is important is ensuring an effective response so as to avoid harm to future generations, while also addressing intragenerational justice imperatives. So the emphasis needs to be encouraging and

²¹Philibert C (2004) International Energy Technology Collaboration and Climate Change Mitigation, OECD paper com/ENV/EPOC/IEA/SLT.

rewarding technology development and diffusion as a vehicle to meeting the requirement of rapid mitigation of greenhouse gas emissions. It may be that—at least to some extent—this objective can be met by mechanisms within the existing global IPRs system, such as compulsory licensing in relation to patents, patent pooling and funding of IPRs transfer. However, to the extent that more thoroughgoing reform is required, as argued by e.g. Rimmer,²² the effectiveness principle integral to intergenerational justice requires the IP regime to be reformed to ensure an effective response in terms of reduction of emissions. To provide the context for this to occur, we now turn to an analysis of the intellectual property regime and how it relates to climate change-related technologies.

3 The Global Intellectual Property Rights System

3.1 *Intellectual Property Rights—Problem or Solution to Climate Change Mitigation?*

Contemporary intellectual property law draws from a longstanding reliance on the moral imperative or necessity of rewarding those who create.²³ Intellectual property rights, the argument goes, encourage innovation and investment, and thereby improve society. Conversely, without intellectual property rights, creators and innovators are not sufficiently incentivised to create, and society suffers.

Environment advocates have good reason to question these foundational notions. Do intellectual property rights encourage innovation and investment in technologies vital for climate change mitigation? Without intellectual property rights, would climate change mitigation efforts suffer? Or would such efforts perhaps be better served without intellectual property rights?²⁴ Environment advocates appropriately join those in other sectors asking these questions,²⁵ for if intellectual property rights are intended to be a key driver of new and innovative solutions to society's problems, and data suggests increased use being made of the intellectual property system, where are the promised advances in climate change mitigation?

The economic growth thesis that is supported and enabled by intellectual property rights argues 'that institutions set a country upon the path to rags or riches. Property rights, especially private property rights, are generally the heroes of the story.'²⁶

²²Rimmer (2011).

²³Beckerman-Rodau (1994, p. 603).

²⁴Dutfield and Suthersanen (2008, p. 6) ('even if one accepts the economic and strategic importance of knowledge, it is not necessarily to be concluded that the more intellectual property you have and the stronger the rights are better, or even that intellectual property is necessary at all. One may more safely conclude that intellectual property policy-making is a high stakes exercise and is consequently an inherently political activity.').

²⁵See, e.g., Rimmer (2011), Blakeney (2013, p. 433).

²⁶Drahos (2011, p. 31).

This thesis ‘raises the possibility that IPRs might have a key role to play in helping the world to avoid catastrophic climate change. But there is another possibility. Extractive IPRs might impede us from innovating to save ourselves from the coming storms.’²⁷

Various explanations have been offered for this conundrum. Some say the intellectual property system (within which patent law in particular) will not facilitate climate change mitigation: ‘the patent institution will do little to drive the big science that is needed, especially in the energy sector, to avoid the worst climate change scenarios.’²⁸ Others say that the intellectual property system (and again, patent law in particular) is not capable of facilitating climate change mitigation: as is described in more detail below, the international intellectual property framework merely reinforces the North-South divide, hindering rather than encouraging technology development and transfer to marginalised economies.²⁹ At their heart, both complaints charge patent law—and by implication, all intellectual property law—with failure to deliver on its key promise. We question more specifically whether intellectual property rights might be impeding innovation today in the field of climate change mitigation, favouring instead technologies more lucrative in the immediate term while assuming that future generations will be sufficiently incentivised to innovate in less certain, less lucrative climate change technology when the urgency is more apparent.

To address these concerns, one must first appreciate the nature of intellectual property rights and their intended function and purpose. A clear understanding of the scope of protected subject matter and the rationales for affording them legal recognition through private property rights is required if the concerns of climate change policy-makers are to be reasonably responded to. It is all too easy and predictable to blame intellectual property rights, as has regularly been done in the past.³⁰ Expressing the view that the intellectual property system is broken³¹ takes us only so far; proposing a solution without clearly identifying the problem risks wasting resources on a solution needing a problem at best, or a completely unsuitable ‘solution’ at worst. In short, before proposing to resolve the problem, we must frame the problem.

Framing the so-called problem of the so-called failure of intellectual property rights involves looking at these issues from a new (and unashamedly provocative) perspective. Framed in this way, we question whether the core problem is *not* that the intellectual property system is failing to deliver on its key promise, but rather posit that it may be over-delivering on that promise. To the extent that the

²⁷Draho (2011, p. 33).

²⁸Draho (2011, p. 45).

²⁹Richardson and Gaisford (2017).

³⁰See, e.g., Intellectual Property: The cost of ideas, *The Economist*, 11 Nov 2004; Inside Views: The Downfall of Invention—A Broken Patent System, Intellectual Property Watch, 18 Aug 2016; Mossoff and Sichelman (2016).

³¹See, e.g., Jaffe and Lerner (2006), Bessen and Meurer (2008), Greenhalgh and Rogers (2010).

intellectual property system incentivises innovation in the most immediately lucrative and easily commercialised fields (such as ‘lifestyle drugs’³² for such wealth-related conditions as diabetes, obesity and impotence) and not in longer-term solutions to problems not yet fully appreciated or conceptualised or valued (such as climate change mitigation technology), then perhaps it is not new (or no) intellectual property laws that we need, but a lens for evaluating and reforming existing laws. In analysing this issue, intergenerational justice leads us to focus on the time element in relation to the existing intellectual property law framework; to the extent that the urgency aspect of climate change mitigation is not taken into account, this must change. The imperative of rapid dissemination and uptake of low carbon technologies means that the time element in existing institutions and rules becomes crucial.

3.2 *Role and Rationale of Intellectual Property Rights Applied to Climate Change Mitigation*

3.2.1 **The Intellectual Property Rights Framework and How It Functions**

(i) *Intellectual property: more than just patents*

Understanding the linkages between climate change mitigation and intellectual property rights requires as a starting point an understanding of what falls within (and without) the scope of intellectual property rights. A plain meaning interpretation equates intellectual property with products of the mind that are legally recognised through the conferral of private property rights which give the rights holder certain ‘freedom... over their creations.’³³ Put another way, ‘[i]ntellectual property is often the propertization of what we call “talent.”’³⁴ Such simplified definitions highlight key characteristics of intellectual property, but they lead all too easily to the unwarranted assumption that all intangibles that derive value from their contribution to human culture, information or entertainment fall within its basket.

Formal definitions make clear that intellectual property is not a refuge for all creative or potentially profit-generating expression or innovation,³⁵ but do so by requiring that protected subject matter fit within identified categories.³⁶

³²Collier (2013, p. 185).

³³Karky (2016, p. 213).

³⁴Hughes (1988, pp. 287, 291).

³⁵Forrest (2017, p. 170).

³⁶See, e.g., Drahos (2011, pp. 30–31) (“‘Intellectual Property’... is a generic term used to refer to independent statutory or non-statutory systems such as patents, copyright, trade marks and trade secrets.”).

Article 2(viii) of the Convention Establishing the World Intellectual Property Organization (the ‘WIPO Convention’),³⁷ for example, defines the term as including ‘the rights relating to:

- literary, artistic and scientific works,
 - performances of performing artists, phonograms, and broadcasts,
 - inventions in all fields of human endeavor,
 - scientific discoveries,
 - industrial designs,
 - trademarks, service marks, and commercial names and designations,
 - protection against unfair competition,
- and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields.’

While the WIPO Convention’s use of inclusive language clearly leaves room for future expansion, the TRIPS Agreement appears to be more prescriptive, defining ‘intellectual property’ as ‘all categories of intellectual property that are the subject of sections 1 through 7 of Part II’ of that agreement. Prescriptiveness has not borne out in practice, however, with subject matters not expressly articulated in Article 1 (2) having been deemed to fall within its scope.³⁸ Further, it is increasingly difficult in the current social and economic climate to argue that new subject matter falling within the general conception of intellectual property is not ‘trade-related’.³⁹

These definitions make clear that patents are notably but one of multiple categories of intellectual property right, and yet they tend to be explicitly targeted in framing the failings of the intellectual property system vis-à-vis climate change mitigation. Certainly innovations such as a method for ‘operating a wind turbine generator during an abnormal power grid event’,⁴⁰ a ‘concentrated solar power light tube illuminating apparatus’⁴¹ and a ‘gravity-powered electricity generator’,⁴² each the subject of current patent protection, are relevant to the overall efforts to mitigate climate change. A by-product of intellectual property rights’ absorption into the trade agenda and thus commercialisation, however, is the spawning of suites of rights around each creation. Working symbiotically, contemporary intellectual property laws and the economy have made it ‘economically more feasible... to invest in organized large-scale in-house research and development’⁴³ and build a

³⁷Convention Establishing the World Intellectual Property Organization (14 July 1967, entered into force 26 April 1970), 828 U.N.T.S. 3.

³⁸United States—Section 211 Omnibus Appropriations Act of 1998, 41 I.L.M. 654 (W.T.O. D.S. B. App. Body 2 Jan. 2002). (Interpreting ‘intellectual property’ to include not only the categories indicated in each title of each section of Part II of the TRIPS Agreement, but also categories of intellectual property subject to each section of Part II).

³⁹Gervais (2012).

⁴⁰WO/2017/202428.

⁴¹PCT/CN2017/085600.

⁴²WO/2017/197847.

⁴³Dutfield and Suthersanen (2008, p. 109).

portfolio of rights around each output of that research and development. Alongside each patent sits a host of corresponding trade marks, designs and copyright works in the form of manuals, guides, reports, drawings, sketches, videos, databases, photographs, and brand names.

The broad coverage of intellectual property must be borne in mind when considering the role of IPRs in the mitigation of climate change. ‘Intellectual property’ is not, in the context of climate change mitigation or indeed any other context, a homogenous thing, and the protection of the different categories of subject matter may be motivated by differing objectives. Differing scope and duration of protection across the various rights, and the increased incidence of protecting a single idea through a complex portfolio of intellectual property rights, complicates matters further. This is discussed in further detail below. Nor is intellectual property ‘a static conception’; rather, it ‘is in a state of constant evolution and reconsideration.’⁴⁴ In this evolutionary process, there is a clear trend in the expansion, rather than contraction, of the subject matter categories deemed to fall within the concept of intellectual property. While this expansion has been broadly consistent with the various attributes of intangibility, origin in the human mind and non-perishability attributed over time to intellectual property subject matter,⁴⁵ the likely impetus for expansion is not that conceptual consistency, but rather the potential for commercialisation—recouping the investment of resources in innovating. Herein lies the promised incentivised reward of the grant of a limited monopoly in the form of private property rights. This is of course manifestly reflected in the name of the most recent and all-encompassing international treaty on intellectual property rights, a fact that may be lost when its full name ‘Trade-Related Aspects of Intellectual Property Rights Agreement’ is reduced to the simpler and more often used acronym ‘TRIPS’.

The reliance on categories of subject matter, the fluidity of those categories, and the pace of contemporary human development make it impossible to draw up a conclusive list of all of the many touchpoints between intellectual property rights and climate change mitigation. The relevance of intellectual property rights to climate change mitigation is nevertheless clear, and dynamism of the concept assures that relationship into the future.

(ii) *The globalised intellectual property framework and its effects*

The ability of law and policy makers to adjust domestic intellectual property law to support national climate change negotiations is curtailed by the globalised approach taken since the late nineteenth century. True to the meaning of ‘globalisation’, the international intellectual property law framework ‘create[s] and consolidate[s] a unified world economy, a single ecological system and a complex and dynamic network of communications that covers the world.’⁴⁶ It does this by establishing a

⁴⁴Dutfield and Suthersanen (2008, p. 14).

⁴⁵See Beckerman-Rodau (2011).

⁴⁶Dutfield and Suthersanen (2008, p. 3). Note ‘ecological system’ here refers to the global context and not the environment.

baseline of minimum standards; all must meet the baseline protections, any may opt to exceed the baseline. Further, the minimum standards are, on the whole, articulated in general terms so that signatories may employ language that addresses national norms and priorities. Thus, ‘sovereign states still try to work as independent actors, where there is room for them to negotiate or legislate variations, and attempt to protect their own interests.’⁴⁷

In principle, this in-built flexibility provides some freedom to take national priorities into account within the agreed framework of ‘what intellectual property is all about’,⁴⁸ but in reality ‘developing countries implementing new multilateral or bilateral intellectual property agreements find their interpretative scope concerning rights, exceptions and limitations curtailed or limited’ by the interpretations of major trading partners the European Union and the United States, which ‘sometimes intervene and discourage’ countries from interpreting treaties in line with local conditions.⁴⁹ The benefits of harmonised registrability standards and protection scope so earnestly sought 150 years ago have been tainted by accusations of ‘the imposition of colonialist/imperialist ideals for the propertisation of the expression of human intellect on developing nations.’⁵⁰ Thus the TRIPS agreement is an essential part of a global trade and economic system which involves structural intra-generational injustice in terms of the interests of developing vis-à-vis developed countries.⁵¹

While the international intellectual property conventions make it fairly uncontroversial to offer more than the minimum standards baseline, the inverse is not true. Exemptions are envisaged but are subject to challenge.⁵² With the strategic absorption of intellectual property rights into the trade agenda in 1994, meeting the minimum standard framework became a condition of full participation in the global market. Developing countries of course tend to be seldom in the position of enforcer, and almost always in the position of violator, so are understandably bitter as to why they are being held to standards of intellectual property which industrialised countries only adopted late in their industrialisation process. The TRIPS Agreement is not, however, completely ignorant of the tensions inherent in imposing a single, unifying approach to intellectual property rights across a wide variety of economies, cultures and legal systems. Nor is the TRIPS Agreement ignorant of the inherent balancing that takes place in intellectual property rights between creators and users. It is even argued that ‘TRIPS has reinforced the public nature of intellectual property rights in a way that WIPO had never done before,

⁴⁷Perry (2016a, p. 7).

⁴⁸Hughes (1988, p. 293).

⁴⁹Dutfield and Suthersanen (2008, p. 4). See also Drahos (2011, p. 39) (posting that the ‘global command structure for patents means states have less freedom to use patent rules adaptively.’).

⁵⁰Perry (2016b, p. 1).

⁵¹Ciplet et al. (2015).

⁵²de Vuyst et al. (2003).

and indeed had been at pains to avoid doing.⁵³ Specifically, Article 7 of the TRIPS Agreement provides:

The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.

Article 8 separately provides:

1. Members may, in formulating or amending their laws and regulations, adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement.
2. Appropriate measures, provided that they are consistent with the provisions of this Agreement, may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology.

These articles notably have no equivalents in the WIPO conventions, lending support to the observation that the TRIPS Agreement has at last expressly acknowledged what was previously the elephant in the room obvious to all but called out by none, the ‘linkages between human rights and intellectual property rights, including public health, nutrition, environment, innovation and development.’⁵⁴ Two moderating factors distinguish them from the broader TRIPS agenda, however. First, they are framed in discretionary, rather than mandatory, language. Second, article 8 makes clear that taking social considerations into account cannot come at the expense of compliance.⁵⁵

On the other hand, a TRIPS Agreement without articles 7 and 8 would arguably be an entirely different animal. From these two articles several key principles can be extracted. First, there is express acknowledgement and effective codification of the notion that intellectual property rights recognition is an effort in balancing the (often conflicting) interests of creators and users. Second, there is express acknowledgement, where this was not achievable over the more than 100 years prior, of both the social and economic welfare impacts of intellectual property rights. Third, there is acknowledgement and furthering of the belief that a key function of intellectual property rights is incentivisation. None of these basic tenets is inherently incompatible with climate change mitigation.

While the existence of a globalised intellectual property system brings challenges and constraints, it is unquestionably the case that a balkanised approach of differing intellectual property norms (as to what is protectable, duration of protection, scope of protection, etc.) across jurisdictions would bring its own

⁵³Dutfield and Suthersanen (2008, p. 14).

⁵⁴Dutfield and Suthersanen (2008, p. 223).

⁵⁵Dutfield and Suthersanen, (2008, p. 34) (‘the proviso that such measures be consistent with the provisions of TRIPS appears to narrow their possible scope quite considerably.’).

challenges and constraints. The so-called problem with intellectual property rights is not, therefore, simply that the intellectual property laws of developed nations have been wrapped into trade agendas and imposed on developing nations with weaker relative negotiating authority. The problem, such as it is, is the philosophies and objectives underpinning the intellectual property laws of the developed nations that drive the international framework.

3.2.2 Why We Protect Intellectual Property, and How This Relates to Climate Change Mitigation

Questioning the need for and rationale of intellectual property protection is certainly not a new phenomenon. Intellectual property laws have survived (and arguably even thrived in spite of) innumerable attacks. In recent times, these attacks have been fended off largely by the sacred status accorded to economic growth. By linking intellectual property rights recognition and enforcement to economic growth, intellectual property rights inherit some of that sacred status. Enticing assertions such as ‘intellectual property fuels economic development and drives growth... and [i]ncreased intellectual property protection boost[s] multilateral/bilateral trade and investment’⁵⁶ are difficult for governments, with their weighty fiscal responsibilities, to ignore. Couched in patriotic terms, they are even harder to resist.⁵⁷

But in recent decades, the mantra of economic growth has been strongly challenged in terms of whether it is consistent with addressing global ecological threats such as climate change. In response to these challenges, the WTO Marrakesh Agreement has inserted into the preamble reference to ‘sustainable development’ in its listing of the objectives of the WTO. Moreover, this preamble language has been referred to in jurisprudence of the WTO in interpreting provisions of WTO agreements relevant to conflicts between environment and trade objectives.⁵⁸ Nevertheless, in general terms, this amendment to the WTO agreement has done little to modify the overarching ethos of the organisation’s focus on ever-expanding trade and economic development. The WTO and its members have done nothing to curb massive fossil fuel subsidies, and have failed to reform its current rules on subsidies, which has resulted in more than half a dozen successful challenges against countries introducing renewable energy schemes.⁵⁹

⁵⁶Karky (2016, p. 221).

⁵⁷(‘Nowadays, patents are said to be an institutional means for investors and research corporations to be rewarded, or alternatively, incentivised, for investing in research and development, for deterring the pirating of their inventions by competitors, and for harnessing a nation’s inventive spirit.’).

⁵⁸United States—Import Prohibition of Certain Sharp and Sharp Products (WT/DS 58/AB/R) 22 October 2001.

⁵⁹Asmelash (2015, p. 261).

Sweeping statements linking intellectual property with economic growth suggest a particular rationale for and intended role of intellectual property. Precise identification of this rationale/role is not simply philosophising or retrospective navel-gazing, but rather is necessary to give effect to interpretation doctrines that call for construing terms and provisions so as to give effect to the intentions of their drafters, at both the domestic⁶⁰ and international⁶¹ levels. There is a rich history in intellectual property jurisprudence, and this is gaining recognition and coherence as increasing importance is ascribed to intellectual property rights.⁶²

Caution is advised in seeking to identify a single, overarching philosophy of intellectual property, however, in light of the fluidity of the term ‘intellectual property’ noted earlier in this chapter. Today the TRIPS Agreement lumps together in a single conceptual basket all intellectual creations under the umbrella term ‘intellectual property’, but this was not always so. When the international legal intellectual property framework was first designed, a conceptual dichotomy split industrial and intellectual property and treated each differently. Industrial property captured the commercially driven intellectual creation, whilst intellectual property captured aesthetic creations. Hence falling within the scope of the Paris Convention for the Protection of Industrial Property⁶³ were patents, trade marks, unfair competition, while the Berne Convention for the Protection of Literary and Artistic Works⁶⁴ focused on copyright-protectable works. The lumping together of all of these creations by the World Trade Organization in the TRIPS Agreement under the single term ‘intellectual property’ blurs the differences in the inspirations and incentives for their creation. Some of the historical justifications ascribed to intellectual property fit more comfortably with one category of subject matter than others.⁶⁵

Vestiges of the old dichotomy of industrial and intellectual property remain nonetheless. In Australia, a seminal case considers the mould and plug used in developing racing yacht hulls and whether these are rightly the province of design law (which is industrial in nature) or copyright (which is aesthetic in nature). The High Court of Australia maintains that it is appropriate and even useful to

⁶⁰See, e.g., Pearce and Geddes (2014, pp. 37–8); Lonquist (2003, p. 18).

⁶¹Merrills (1969, p. 55).

⁶²Karky (2016, p. 213). (‘Intellectual property rights have never been more economically and politically important or controversial than they are today’).

⁶³Paris Convention for the Protection of Industrial Property (20 March 1883, last revised 14 Jul. 1967 and as amended 28 Sep. 1979), 828 U.N.T.S. 305.

⁶⁴Berne Convention for the Protection of Literary and Artistic Works (9 September 1886), 828 U.N.T.S. 221.

⁶⁵Dutfield and Suthersanen (2008, pp. 53–4) (‘It is clear that Locke’s theory on property is most appropriate to the protection of investment-based intellectual property such as industrial property, inventions and sound recordings. Hegelian thought, discussed further below, lends itself more to the ethical and human rights considerations, and hence is useful for explaining, for example, why we have moral rights under copyright law.’).

distinguish the two environments, if only to avoid overlapping (and thus overly generous) protection:

With wallpaper, a tapestry, stained glass window, piece of jewellery or Tiffany artefact, there is considerable freedom of design choice relatively unconstrained by the function or utility of the article so produced. But, as the evidence disclosed, that was not the case with the design constraints upon a class of yacht such as the JS 9000.⁶⁶

These remarks inherently draw upon the presumption that the creators of the sorts of creations protected by copyright are driven to create, and unmotivated (or at least less motivated) by functionality and marketability.⁶⁷ By contrast, the designer of a racing yacht hull must, of necessity, bear these objective factors in mind:

The thread running through this discussion is the significance of functional constraints, extreme for a dental mechanic, less so for a glazier or blacksmith, and depending upon the nature of the particular design brief. A horseshoe is one task; the Tjou gates, screens and grilles for St Paul's Cathedral, Hampton Court and Chatsworth by the French Huguenot ironmaster were in a very different category.⁶⁸

Without ignoring these differences, all definitions of intellectual property, and indeed all categories of subject matter falling within those definitions, come together around the centrality of ideas as products of the human mind. Thus crafting a 'jurisprudence of intellectual property must be built from an understanding of the philosophical justifications for property rights to ideas.'⁶⁹

Identifying a universal rationale for or justification of intellectual property protection is difficult, if not impossible. 'The way patents have been justified in different countries', for example, 'has always depended to some extent at least on the level of industrial development [of the country in question]—and also to whom one speaks.'⁷⁰ Yet one nation's intellectual property jurisprudence serves as a reference point: because of the dominant role that the United States played in bringing the TRIPS Agreement to fruition, US creative and innovative industries' priorities, needs and demands lay just below the surface of the agreement.⁷¹ Thus it seems logical to conclude that understanding the US philosophy of intellectual property is key to understanding the intentions behind the current international intellectual property framework. That philosophy draws heavily from John Locke's labor theory, which is 'subject to slightly different interpretations. One interpretation is that society rewards labor with property purely on the instrumental grounds that we *must* provide rewards to get labor. In contrast, a normative interpretation of this labor theory says that labor *should* be rewarded.'⁷² Both versions presuppose

⁶⁶*Burge v Swarbrick* (2007) 232 CLR 336, para 75.

⁶⁷Dutfield and Suthersanen (2008).

⁶⁸*Burge v Swarbrick* (2007) 232 CLR 336, para 81.

⁶⁹Hughes (1988) at 288.

⁷⁰Dutfield and Suthersanen (2008, p. 110).

⁷¹See Field (2015, pp. 129, 137–154).

⁷²Hughes (1988, p. 296).

that labour is unpleasant, but the *must* version specifically ‘proposes that the unpleasantness of labor should be rewarded with property *because people must be motivated to perform labor*.’⁷³ Crucially, this theoretical underpinning emphasises recompense to individual creators, rather than duties to the broader society in terms of dissemination of ideas and inventions.

This idea that without incentive, the creative will not create is baked into the US Constitution, which ascribes to Congress the power ‘[t]o *promote the Progress of Science and useful Arts*, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries’.⁷⁴ Interpreting this clause, the Supreme Court famously noted:

The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors ... Sacrificial days devoted to such creative activities deserve rewards commensurate with the services rendered.⁷⁵

The US’s leading scholar in this field has gone so far as to declare: ‘In almost all of its decisions on patents, the Supreme Court has opined that property rights are needed to motivate idea-makers.’⁷⁶ If we assume that the TRIPS Agreement is motivated at least in part, if not considerably, by the intentions, philosophies and needs of the country that championed its drafting, we must conclude that incentive is a key rationale for and justification of intellectual property rights. The lack of ‘empirical evidence that strengthening patent law brought about a surge in innovation (as opposed to a surge in patenting)’ is, in this regard, troubling.⁷⁷ But if intellectual property rights do actually encourage innovation and investment in some fields or industries more than others, this is a sign that the system works, but not in the areas in which it is most needed.

In the field of medicine, data suggests that research and development expenditures are skewed to high-value pharmaceuticals.⁷⁸ This is so because of the belief that it is ‘[t]he possibility of attaining commercial benefits... [that] encourages innovation.’⁷⁹ Put simply, there is greater incentive to develop anti-obesity drugs than anti-malarials. Extrapolated to climate change mitigation technologies, innovation in that field reflects the relative benefits of investing in this, compared to other fields.

The integral role of intellectual property laws in the economic growth thesis mean that ‘much of creativity is dictated by market and societal needs and demands.’⁸⁰ Objective factors linked to market demand predominate in intellectual

⁷³Hughes (1988, p. 303).

⁷⁴(Article 1, § 8, cl 8) (emphasis added); Hughes (1988, pp. 303–4).

⁷⁵*Mazer v Stein*, 347 US 201 (1954).

⁷⁶Hughes (1988, p. 304).

⁷⁷Weatherall (2010, p. 8).

⁷⁸Bouchard et al. (2010, p. 174).

⁷⁹Dutfield and Suthersanen (2008, p. 110).

⁸⁰Dutfield and Suthersanen (2008, p. 18).

property law over the subjective ‘inherent and deep need or impulse to bring a work into realisation’.⁸¹ Seen in this way, intellectual property laws *are* necessary, and without them, the creative will simply choose to ignore the desire to create. The market is the ultimate motivator: ‘While necessity may be the mother of invention, the quest for new products and technologies must fiercely compete against the demands for current consumption.’⁸²

Steering intellectual property law to fulfil its rationale and role in the context of climate change mitigation requires adopting a fundamentally different philosophy to overcome such purely utilitarian, market-based realities. The threat of catastrophic climate change threatens society and its legal order, including the IPR system itself. A system premised on individual compensation for labour as an incentive for invention becomes problematic if the incentive structures involve locking up expertise which the climate change imperative demands to be rapidly disseminated. While retention of incentives remains vital in such an environment, these need to be structured to meet the demands of intergenerational justice.

Moreover, a close analysis is required to determine whether the various types of intellectual property sketched above make assumptions as to the ongoing value of private property rights into the medium- and long-term future, which come into question in a climate change threatened world. In addition, it is important to address the question of whether the current forms of intellectual property—including for example the length of patent protection—involve a bias in favour of the interests of current generations vis-à-vis future generations. Concerning the first issue, the threat of catastrophic climate change potentially makes the subject of some patents valueless in the long-term; for example, if the planet becomes too warm to feed a larger proportion of the world’s population, lifestyle medications addressing problems of overeating will become redundant. Concerning the second point, overly long patent protection meshes well with incentives premised on economic development and business as usual in terms of existing energy structures, but when economic development becomes threatened by catastrophic climate change, business as usual incentive structures must be rethought. There are a range of policy mechanisms—including subsidies and tax-rebates—which can be adopted to shift incentive structure in this direction.

4 Intellectual Property Rights in the Climate Change Regime

The conflict over intellectual property rights which found expression in the Paris Agreement climate change negotiations has a relatively long history as part of a broader issue of technology development and transfer. The United Nations

⁸¹Dutfield and Suthersanen (2008, p. 16).

⁸²Rosenberg (1985) S 1.07.

framework Convention on Climate Change 1992 placed a general obligation on developed countries to transfer technology to developing countries, with such transfer being conditional on developing countries taking mitigation action.⁸³ Similar provisions were included in the Kyoto Protocol.⁸⁴ The conditional element of these provisions was never tested given that neither instrument imposed mitigation commitments on developing countries. Nevertheless, these provisions reflected a strong justice or equity based position which developing countries have continued throughout the negotiations ever since.⁸⁵ The essence of this discourse is the developing countries' argument that developed countries caused the problem of climate change through their historic greenhouse gas (GHG) emissions since the Industrial Revolution, and therefore these countries have responsibility for addressing the issue. Linked to this is the argument that most of the technology essential for quickly reducing greenhouse gas emissions is possessed by the industrialised countries, and therefore it is only fair that if these countries wish to see developing countries reduce their emissions, then this technology should be transferred to developing countries.

Industrialised countries have strongly resisted this discourse, arguing that to the extent that climate-related technology is covered by intellectual property rights—particularly patents, then this is possessed largely by private companies, not governments. Moreover, industrialised countries argue that intellectual property rights should not be shared or transferred as they are essential incentives for research and development. Rather than removing or limiting IPRs, the US, for example, has argued that IPRs should be strengthened in all countries as this is essential for the development of climate change-related technologies. To date, the industrialised countries have succeeded in resisting the inclusion of any explicit provisions relating to IPRs in the global climate regime (UNFCCC and Kyoto Protocol and Paris Agreement).

Developing countries have tended to argue that IPRs are a barrier to technology transfer. Thus, the October 2014 the Like-Minded Developing Countries (LMDC) proposal under the Durban mandated negotiations leading to the Paris Agreement

⁸³Article 4.7 of the United Nations Framework Convention on Climate Change 1992 provides that: 'The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.'

⁸⁴Kyoto Protocol to the United Nations Framework Convention on Climate Change 1997, opened for signature 16 March 1998, 2303 U.N.T.S. 148 (entered into force 16 February 2005) ('Kyoto Protocol').

⁸⁵This ethical principle of leadership by the industrialised countries in mitigation is reflected as a general principle in article 3 of the United Nations Framework Convention on Climate Change 1992 which states that 'the developed countries should take the lead in reducing emissions....' See discussion of differential treatment in the chapter by Huggins and Lewis (section 3) in this volume.

called for developed country parties to ‘increase the provision of technology and finance and measures to address barriers to technology transfer including IP’.⁸⁶

In the Paris Agreement negotiations, there was a push by a number of developing countries to include specific mention of IPRs in the agreement with proposals including the establishment of an international mechanism on intellectual property rights to facilitate access to the deployment of clean technologies for developing countries. But these proposals were strongly resisted by developed countries and the final text of the agreement dealing with technology development transfer (article 10) makes no reference to IPRs. Thus the agreement papers over the ongoing conflict between developed countries who perceive IPRs as not being a barrier for the development transfer of low carbon technologies, and developing countries who tend to perceive the IP regime ‘as a manifestation of the technological hegemony of the developed world, and the unwillingness to discuss IPR issues as evidence that developed countries are not genuinely interested in sharing technology’.⁸⁷

5 Conclusion

Overcoming the ongoing North-South impasse in relation to technology transfer and IPRs will be essential to ensuring that the Paris Agreement 1.5 °C/2 °C objective is attained, which is in turn crucial for ensuring intergenerational justice. To the extent that IPRs constitute a barrier to the transfer of low carbon technologies⁸⁸ intergenerational justice dictates that IPRs be modified or removed to ensure rapid mitigation of GHG emissions. Achieving this objective requires building trust between developed and developing countries. Only with the building of such trust will we be able to move towards an understanding of *shared and proportional responsibility* for technology development, transfer of which IPRs form a valuable part.

Trust will need to be built by industrialised countries taking the lead in reducing GHG emissions rapidly. Trust will also be need to be built by wealthy countries contributing sufficiently to the Green Climate Fund and other international mechanisms essential for technology transfer. Building trust will also require urgent reform of the way incentives work within the IPR system to ensure that it acts as a positive incentive for the development and diffusion of low carbon technologies and not as a barrier.

⁸⁶LMDC Proposal (October 21 2014) Elements for a Draft Negotiating Text of accelerating the implementation of enhanced pre-2020 climate action www4.unfccc.int/submissions/Lists/OSPSubmissionUpload/39_99.

⁸⁷Klein et al. (2017).

⁸⁸See careful analysis in Rimmer (2011) and Abdel-Latif (2015, pp. 103–126).

This chapter has argued that intergenerational justice, interpreted in a manner sensitive to the equally important needs of intragenerational justice, provides a valuable framework for a reform agenda in this area.

A failure to build trust and take strong mitigation action will potentially have catastrophic impacts for future generations. In terms of IPRs this would entail that material which is potentially subject to IPRs may decline in value or be lost altogether.⁸⁹ This is true in relation to for example, biological material, and would apply with particular force in relation to catastrophic climate change. Even beyond this, catastrophic climate change would bring into question what relevance at all the IPRs system would have. Thus, various elements of the existing IPR system include assumptions which will not be sustainable in a world threatened by catastrophic climate change.

The foundational justification of the whole IPR system has involved an assumption of ever-growing wealth and progress—achieved through the provision of (limited) private monopoly rights designed to create an incentive for innovation benefiting an ever expanding the common pool of ideas. The threat of climate change challenges to its core these foundational assumptions.

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⁸⁹Thanks to Ben Boer for pointing this out.

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Chapter 7

Management of Intellectual Property in Australia's Clean Technology Sector: Challenges and Opportunities in an Uncertain Regulatory Environment



Kane Wishart

Abstract Australia's history of developing and managing the intellectual property rights of domestic innovations is—at best—mixed. The relative immaturity of Australia's public sector commercialisation infrastructure has, over recent decades, been the subject of both stinging academic commentary and not insubstantial juridical disbelief. That said, improvements have been observed, and increasingly private sector involvement in public sector innovation has allowed for a deepening refinement of domestic approaches to IP retention and ongoing management.

Keywords Climate change • Clean technology • Intellectual property
Cleantech • IP reform • Sustainable energy

1 Introduction

There are many challenges faced by small-to-medium enterprises in Australia seeking to establish themselves in the promising clean technology sector, far beyond the usual start-up challenges of funding, establishing supply-chains and engineering to scale. So-called 'clean tech' innovators in Australia must also grapple with a politically charged and often uncertain regulatory environment.

Intellectual property (IP) inhabits a strange and unique place in Australia's public policy landscape. There is bipartisan agreement that (properly calibrated) intellectual property policy plays a vital role in fostering innovation and driving growth in the economy. However, there is an equally bipartisan lack of appreciation for what IP is, how it operates within the economy, and how seemingly subtle

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changes to the nation's intellectual property laws and policy settings can have a profound impact on the economic destiny of innovative technologies.

Technology is undoubtedly the cause of anthropogenic global warming. However, given the alternatives, innovation in technology also represents the only viable solution. Throughout Western society (and increasingly now, the world), IP (and specifically, but not exclusively, the patent system) is the chief architecture through which innovative technology is generated, disseminated and shared, both within and between communities. Accordingly, any consideration of how society responds to climate change necessitates a broader consideration of IP laws and norms, including how both domestic and international pressures may inform how we understand, and how we implement, IP.

This chapter will briefly survey what constitutes 'best-practice' intellectual property management viewed through the lens of a hypothetical clean-tech start-up. This discussion will identify the key friction points wherein such start-ups can run into problems, thereby delaying (and sometimes preventing) innovations from ever making it to market. By examining the Australian innovation landscape, this chapter will consider how Australia's statutory and institutional settings may be helping (or hindering) a start-up facing such challenges. Finally, the chapter will conclude by examining some of the significant developments internationally (both in terms of multilateral agreements, domestic policy developments, and other mechanisms) that may inform how the Australian landscape will change moving forward, and the opportunities for better facilitating clean tech innovation both domestically and around the world.

2 Intellectual Property Management

Intellectual Property is a field of legal enquiry encompassing a variety of different sets of rights, each of which differ depending on the nature of the intellectual endeavour to be protected. Chiefly, the vehicle by which an inventor might best exploit an invention in the clean technology sector is a patent. While the balance of this chapter may passingly refer to other forms of intellectual property where appropriate, the focus of the following sections of this chapter will be on the management of patents specifically (although, many of the issues of IP management generally will be equally applicable to other forms of IP).

Similarly, clean technology may include a range of technologies used across a range of sectors: from developments in aquifer technology, innovations in 'bio-char'¹ or even smartphone apps to assist in monitoring and reducing individual

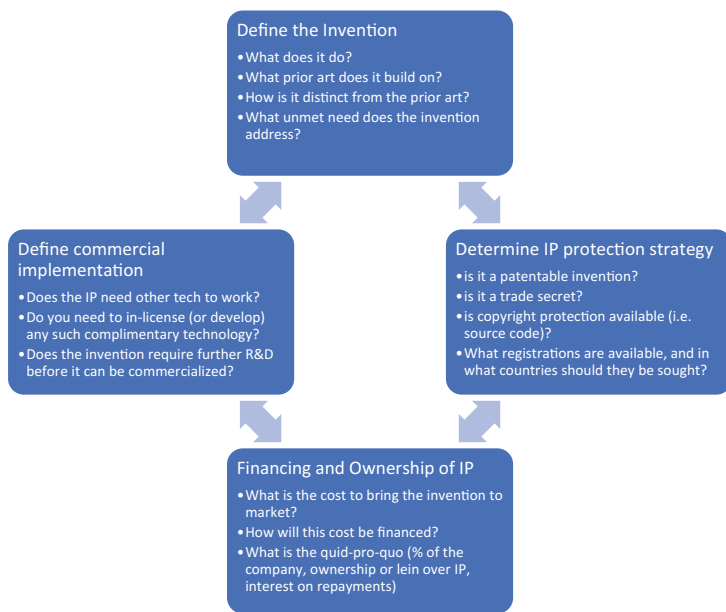
¹The NSW Department of Primary Industries defines biochar as: 'Biochars refer to the carbon-rich materials (charcoal) produced from the slow pyrolysis (heating in the absence of oxygen) of biomass.' (See: <http://www.dpi.nsw.gov.au/research/topics/biochar>). This technology remains a central pillar of the Australian Government's vision for reducing Australia's net carbon emissions.

carbon footprints. For the purposes of this chapter, to the extent that it is necessary to define 'clean technology', the phrase is used to refer to any innovation that helps to reduce—either directly or indirectly—the greenhouse gas intensity of human endeavour and activity.²

One of the central challenges for start-up entities is setting out a clear strategy for securing, defending, and (ultimately) commercialising their intellectual property. There are multiple points of friction in this process where a clean-technology start up can encounter problems, and in the usual course, the earlier that these issues are addressed, the better the prospects are for commercialising a given innovation. Indeed, one of the common mistakes a start-up makes is to wait until it is too late to sit down and draw up its internal intellectual property plan (often waiting until a problem is encountered that necessitates this kind of methodical deliberation), or alternatively, having gone through the process of developing an IP management plan, then failing to revisit, refine and constantly update that plan considering the growth or evolution of both the start-up and the innovation itself.

²Finding a standard definition for clean technology (sometimes 'green technology') is difficult. WIPO uses the term strictly to mean 'environmentally sound technologies as defined in Chapter 34 of Agenda 21 (The United Nations Program of Action from Rio, 1992)'. (See: <https://www3.wipo.int/wipogreen/en/about/faqs.html>). IP Australia prefers the more general cast of any 'environmentally-beneficial invention'. (See: <http://www.ipaustralia.gov.au/get-the-right-ip/patents/patent-application-process/expedited-examination-for-standard-patents/green-patents/>). The US Patent and Trademark Office defines green technology as encompassing any technology concerning 'environmental quality, energy conservation, development of renewable energy resources or greenhouse gas emission reduction' (See: <http://www.uspto.gov/patent/initiatives/green-technology-pilot-program-closed>). The definition preferred for this chapter is cast more broadly, to encompass not only products but also services, which may directly or indirectly contribute to a reduction in greenhouse gas intensity. For a useful taxonomy of what can fall within the scope of clean technology, see: <http://www.ecoconnect.org.uk/about-us/definition-of-cleantech/>.

3 Developing the IP Management Plan



The above chart sets out, in very general terms, the process of developing an IP management plan, or strategy, which encompasses several of these key ‘friction’ points from early in the commercialisation process. Notably, this process is iterative, and continuing: each step will necessarily inform refinement or reconsideration of each of the other adjacent steps. The best IP management plan is a living document; constantly revisited and refined throughout the course of a business life-cycle. Each of these steps are examined in more detail below.

3.1 *Define the Invention*

The first step is to define what it is that the inventor(s) developed. Is it a product in and of itself? Is it a ‘widget’ that can be used to enhance the functionality or efficiency of existing products? Is it a service rather than a tangible product, such as a structured energy efficiency audit for the home or a carbon-credit purchasing scheme? Is it a different method or approach that uses existing technology? Being able to clearly define what an invention is will impact what kind of protection an inventor may be able to secure, and is often overlooked as too ‘obvious’ a first step. Much heartache in the commercialisation process can be avoided if an

inventor takes the time to sit down and clearly and methodically define the invention.³

3.2 How to Best Protect the Invention

Defining the invention is only the first step. Once defined, the inventor must determine how to best protect it? Well-resourced inventors or start-ups may be well served at this point to seek recourse to a commercialisation officer, patent attorney, or IP specialist. However, but even a lay inventor without those kinds of resources available should take the time to research what might be available given the nature of their invention.

Determining what is available is only one part of the question, particularly given that, in many circumstances, there will be more than one kind of intellectual property protection available. More pointedly, the question becomes: what type of protection, of those available, will best suit the inventor(s) commercial objectives (a collateral question is of course, have the commercial objectives been defined)?

Often the commercial objectives for an invention are obvious: protect the invention, so it may be brought to the market exclusively, to maximise profits derived from the invention, such that any research and development costs are recouped, and the inventor may enjoy the fruits of her labours. While these same commercial realities are likely to dominate for most inventors in the clean technology space, it would not be completely surprising if some inventors approach the question of 'commercial objectives' from a more altruistic perspective.

Perhaps the most important question to ask, which will have a telling effect on how the commercial objectives are ultimately defined, and in turn, how the invention may best be protected, is this: how will it be financed? And in turn, who ultimately owns it?

3.3 Financing the Commercialisation of the Invention

Firstly: if an inventor is trying to raise capital to help manufacture the invention at scale and bring it to market, they will need to be able to demonstrate that they've secured that invention, or are taking steps to do so (which of course, feeds into the above question, of how best to secure that invention in the first place).

Certainly, there are examples within the clean technology space—energy efficient light bulbs, smart power meters—where the cost-per-unit of production is (relatively)

³See for example, McKeough and Stewart (1997): 'Failing to protect intellectual property has been acknowledged as one of the main mistakes firms make in their commercial efforts, even though it may seem expensive or unnecessary in the first steps of product development'.

manageable, even for a small-to-medium enterprise. But for most innovation in this space (e.g., the sort of clean technology innovation that operates at scale in the power generation and transmission sector, or the automotive sector, or the IT sector) manufacturing scale-up to industrial or commercially viable levels will demand a sizeable up-front investment in production facilities, in distribution networks, in upskilling and training, and often all with a relatively high cost-per-unit-of-production ratio.

The inventor, unless they outright assign their invention to an established entity, is going to need to attract investment, and investment demands proprietary certainty. Investors may be motivated by altruism more so in the clean technology space than others, but ultimately the capital available to a start-up will be maximised should the inventor be able to demonstrate that she has ‘secured’ her IP. This isn’t merely about monetising the invention, it’s about how predictable the commercialisation trajectory for bringing that invention to market is.

3.4 *Ownership of the Invention*

There is often an intrinsic assumption by inventors that they will have exclusive ownership over their invention. But this assumption can be dangerous. Most intellectual property is just that: property. Although a minority view, some theorists argue that IP is better understood as a form of economic regulation, rather than a bare property right.⁴ It can be traded, assigned, bought or sold, and its ownership a matter quite distinct from its creator. For an inventor whose invention was developed during her employment, it may be that an explicit clause in her contract renders any such invention the property of her employer.⁵

Another consideration is where there may be multiple inventors. The days of the backyard inventor toiling away in the workshop are, if not completely over, increasingly consigned to history. The modern innovation story is one of teams, sometimes sprawling and interchanging, working over prolonged periods of time to develop innovative technologies. It may not always be clear who were the key personnel at the point of ‘invention’, especially where people may have come into and left the relevant development team over time. An inventor should be cautious when assessing ownership as part of developing their IP management plan, and consider whether any collaborators may have a claim to inventorship of the given invention.⁶

⁴See especially: Lemley (2015).

⁵The question as to whether a university researcher’s invention was the property of that researcher or the university was the subject of detailed judicial consideration in the case of *University of Western Australia v Gray and others (No 20)* (2008) 246 ALR 603, wherein Justice French (as he then was) determined that, absent an explicit contractual right, the duty owed by the staff member was a duty to research, not a duty to invent.

⁶A similar dispute to the UWA v Gray case occurred in the United States, but involving multiple co-inventors seeking to commercialise their technology out of the universities’ technology incubator: see *The Curators of the University of Missouri v. Suppes, Sutterlin, Renewable*

The other consideration when it comes to questions of ownership is that of financing. An inventor should consider whether they may owe any obligations to anyone else, aside from their employer or any potential co-inventors. In some cases, seed capital or other funding streams may have been secured at earlier points in the life of a project, which involved contingent rights that crystalize upon development of a new product or method. Such rights may be simply to a guaranteed return-on-investment upon commercialisation of the invention, or they may be a part-claim to the invention, or in some cases, a bare-assignment of any inventions once protection has been secured.

3.5 Is Third-Party Technology or Resourcing Required for the Invention to ‘Work’

In many instances, an invention may appear to stand on its own as a discrete product or method, but in fact may rely on inputs in terms of both resources and existing technologies, to be produced, deployed, or outright function. Prior to determining an IP Management Plan, the inventor ought to ask herself whether there will be a need to license any such existing technologies (or, if resources permit, to outright buy the rights to any such technologies) for her product to work. This question may in of itself bear out some detailed investigation. It may be that the end-product is itself discrete, but that one or more components of a product require licensed products or components in *their* individual manufacture. It will be important for the inventor to define, clarify and fully characterise the production chain for an inventive product.

Another consideration may be where inputs appear to be available to use by virtue of pre-existing agreements (for example, at universities or other public-sector institutions) that allow for the exploitation of a technology or product for research purposes.

Eric Lane describes the practice of licencing green patents from universities and national laboratories as an avenue to ‘jump-start’ a new clean-tech business.⁷ Lane cites one example of an Ohio start-up, Xunlight 26 Solar, which licensed a thin-film manufacturing technology from the University of Toledo which provided a “foundation” block from which to develop its own proprietary solar panel technology. By identifying and licensing an existing patented technology early on the company’s life cycle, Xunlight 26 Solar was able to avoid ‘starting from scratch’,

Alternatives LLC, and Homeland Technologies LLC (2009) 2:09-cv-0412-SOW and The Curators of the University of Missouri v. Suppes, Sutterlin, Renewable Alternatives LLC, and Homeland Technologies LLC (2009) Case No. 09BA-CV0231; one of the defendant co-inventor’s opined in a newspaper editorial that poorly run university commercialisation bodies harm domestic innovation, contending that ‘technology has at least a reasonable change of commercialization when it is under the control of inventors who truly understand the technology’: see Suppes (2010).

⁷Lane (2011, Chapter 4, part II).

potentially saving years and significant resources in terms of its own research and development pathway.

Such examples are not mere exceptions. Indeed, a key issue in the clean technology sector is the interoperability of technologies in this space: for example, to rig a wind turbine doesn't require recourse to a single patented technology, but several. Often a clean tech start-up may find itself with part of a broader solution and will be eager to reach out to partner with other firms to bring that solution to market. It may be that an inventor cannot head out on the commercialisation pathway alone: a partnership or joint venture with another company may become necessary (and for those with limited financial backing, may come with additional benefits in terms of resourcing and scale).

3.6 What Is the Pathway to Market

Having turned their mind to defining the invention, determining the commercial objectives of the invention, considering what (if any) funding will be required and where to source it from, who owns the invention, whether any licenses or other arrangements need to be put in place in order to commercialise the invention, and how best to protect the subsisting intellectual property in their invention, an inventor may be forgiven for thinking they've done all they need to in developing their IP Management plan.

As shown in the above chart, IP management is an iterative, continuous process. Each input feeds into the next and back into the IP Management Plan. Importantly, an inventor should always consider what the future development pathway might be for that invention:

- What improvements might be possible to it in two, three, five years' time?
- Will it be important to separately protect those improvements and any IP that subsists in them ahead of time?
- How flexible will the product or service be considering any changing use in the marketplace?

It would be difficult to understate just how important this kind of prospective, and continuing, planning can be to the successful commercialisation and management of intellectual property, not just in the clean technology space, but generally. Indeed, given the funding volatility apparent in the Australian clean technology sector, it will become even more crucial that a given inventor or clean technology start up maintains a clear and adaptable sense of their IP management plan and strategy, to ensure that the commercialisation 'trajectory' can be sufficiently tweaked as and when circumstances change.

3.7 *Litigation: What Are the Risks?*

Part of a successful IP management plan will include an appraisal of the patent landscape in which the given venture will operate.

A patent, like other forms of IPR, can be described as a bundle of 'rights'. Often these rights are referred to as positive and negative rights. The positive rights relate to the 'property'-like nature of an IPR. A patent can be assigned or transferred, it can be used to create interests over, or to underwrite the value in your company (including for the purposes of public float or takeover), or it can be licensed or mortgaged to realise capital. The negative right is the right to enforce against third parties, which usually means, to litigate.

Accordingly, an IP management plan should take account of two things. The risks and potential consequences of a competitor or third party having a patent which they might seek to enforce against the inventor or the start-up, and conversely, whether it is necessary or desirous to 'clear the way' for the new clean technology by seeking to invalidate an existing patent, or (more simply) seek a license from the patentee. In either instance, it will be important to seek independent legal advice to be properly appraised of the risks. But a survey of the patent landscape in the first instance can provide at least some clarity within an IP management plan of the kinds of litigation risks a new clean technology venture may face.

Determining which patents represent an infringement risk requires a thorough understanding of the clean technology to be commercialised, including a forward-looking consideration of all of the ways in which that technology may be used. As noted above, a patentee has the exclusive right to exploit its patent. Any exploitation of the subject-matter of the patent by a third party may constitute an infringement. The Patents Act in Australia defines 'exploit' broadly, as including:

- (a) where the invention is a product - make, use, sell or otherwise dispose of the product, offer to make, sell, hire or otherwise dispose of it, use it or import it, or keep it for the purpose of doing any of those things; or
- (b) where the invention is a method or process - use the method or process or do any act mentioned in (a) in respect of a product resulting from such use.⁸

Being found by a court to have infringed a patent brings with it significant commercial risks. Most basically, a court may award damages (being pecuniary compensation for the patentee as redress for any loss suffered because of the infringement) or an account of profits (which involves determining the profits gained by the infringer by dint of the infringing acts, and having those profits paid to the patentee).⁹

⁸Schedule 1 of the *Patents Act* 1990 (Cth).

⁹Section 122(1) of the *Patents Act* 1990 (Cth).

Perhaps more troubling for a start-up or inventor seeking to commercialise a new clean technology is the scope for an injunction. An injunction is a court order requiring the infringer to cease carrying on the activity which constitutes an infringement of the patent. If the alleged infringing act is a necessary component of the technology being commercialised, such an order may be fatal to the venture in a way that mere pecuniary penalties are not.

The clean technology sector differs in important ways from other, heavily litigated sectors (such as the pharmaceutical sector) in that most innovation is incremental, building on or improving existing technologies. While this reduces the likelihood of a competitor having an existing patent which covers the whole or a substantial whole of a new clean technology, it increases the complexity of the inquiry that must be undertaken. Several of the components, or the parts which make up a new clean technology, may in fact be patent protected, while other parts or components may have long since passed into the public domain.

The earlier example of a wind turbine is again pertinent, with most turbines involving several components, many of which are protected and the subject of cross-licensing agreements. Litigation in the wind turbine space has been rife.¹⁰ General-Electric (GE) endured a long-spanning dispute with Mitsubishi with respect to various wind turbine components alleged to infringe GE's patents,¹¹ and GE has more broadly engaged aggressively in litigation both against its major competitors and individual inventors.¹²

Examples of entities vigorously enforcing a patent are not confined to dominant companies seeking to defend market share: examples abound of opportunistic litigation from smaller companies and commercialisation boutiques, as well as so-called 'non-practicing' entities,¹³ seeking to realise value from a patent not through direct exploitation, but via litigation and resultant damages/licensing royalties. GS CleanTech, a subsidiary of the commercialisation boutique GreenShift, has engaged in extensive litigation across multiple jurisdictions for its biofuel patent, directed towards recovering by-products of ethanol production.¹⁴

Aside from seeking legal advice as an adjunct to the development of an IP plan, an inventor or start up should be mindful of the range of options available if they identify a potentially problematic patent in the field in which the innovative technology will be introduced, or in circumstances where enforcement proceedings have been threatened. The simplest solution may be to do nothing. The patentee

¹⁰See Rimmer (2011, pp. 222–223).

¹¹See for example, *General Electric Co. v. Mitsubishi Heavy Industries, Ltd.* (2010) S.D. Tex. No. 2:09-cv-00229; *General Electric Co. v. Mitsubishi Heavy Industries, Ltd.* (2010) N.D. Tex., No. 3:2010-cv-00276; and *Mitsubishi Heavy Industries, Ltd. v. General Electric Co.* (2010) W.D. Ark., No. 5:10-cv-05087. The Parties arrived at a confidential settlement of the various lawsuits in 2013, which included various cross-licensing arrangements.

¹²See *General Electric Company v. Wilkins* (2014) Fed Cir. No. 2013-1170 (on appeal from E.D. Cal.); for detailed commentary on the dispute see Lane (2014).

¹³Also referred to more derisively as 'patent trolls' in some commentary.

¹⁴Discussed in Lane (2010); see also Rimmer (2011, p. 226).

may not be especially litigious, and of course, may not be aware of or consider the innovative technology to be infringing. Such a course of action not only introduces uncertainty, but it runs the risk of being held liable for infringement further down the track, potentially after significant resources have been committed to commercialising the technology.

Other options include approaching the patentee to either purchase the relevant IP or negotiate a license. While this may incur upfront or ongoing costs, it may involve the uncertainty and costs of future litigation. Another (not uncommon) course of action for larger companies is to simply acquire the patentee. In the pharmaceutical sector, some entities now appear to be expanding their IP portfolios by way of mergers and acquisitions just as much (if not more so) than by way of internal research and development.¹⁵ While the costs of such an acquisition are high, they provide the benefit of not only clearing the way for the new technology, but obtaining a patent which may provide additional protection to that technology (not to mention any additional patents or assets which may have been held by the acquired company). Settlements may also be on a purely commercial basis.

Beyond these commercial outcomes though, there is always the prospect of willingly proceeding to litigation. If legal advice is obtained which provides good prospects of either proving non-infringement of a patent, or alternatively, invalidating that patent, it may be that proceeding to trial is the best option available (particularly in circumstances where commercial approaches have been rebuffed or are only available on unfavourable terms).

3.8 IP Management—Key Principles

In short, successful management of intellectual property requires three things: clearly identifying the technology that the inventor(s) wish to protect and commercialise; adopting a strategy as to how best protect and commercialise that technology; and managing the resources and various legal rights necessary to successfully produce that technology and bring it to market.

Securing the innovation and having an IP management plan gives surety that if (or more usually when) copycat producers come along to borrow on the ingenuity of an invention and bring it to market themselves, the inventor will have enforceable legal rights to bring to bear. Even a company like Tesla, which is embracing open-access norms in respect of its patent portfolio, still takes steps to patent its inventions. No matter the commercial objectives of the inventor or start up, that control, that choice as to how the innovation ought best to make its way to the marketplace, ought to remain with the inventors. This isn't just a proprietary question, but also one of logistics and of resource allocation: if there has been a lesson of Australian innovation over the past decades, it is that the best person to be

¹⁵CNBC (2015).

working on the future trajectory of a given technology or invention is the person or team who developed it; not only are they likely to be more invested in the success of the product, but—when assisted by properly calibrated and expert financial, business and legal resources—none can match their first-hand knowledge of the product, how it works and critically, how it may evolve in future.

4 Commercialisation and Management of Intellectual Property in Australia

Australia's services sector and high-tech industries have long been touted as the future of the economy, particularly in recent years as Australia's manufacturing base continues to shrink. In the latter years of the Gillard government, the then-Minister Kim Carr promised a new era of innovation with the establishment of 'Industry Innovation Precincts', a conceptually exciting policy where industry-led national networks were designed to co-locate relevant industry and public-sector research capability, facilitated by purpose-specific infrastructure built to provide legal, financial and business-support to potential innovators.

These precincts were envisaged to bridge a long-recognised but rarely conquered divide between the innovative ideas being developed in the nation's universities and public-sector institutions, with a far less developed private sector capacity to invest in and nurture new start-ups and IP-based spin-outs through to market. In the 2014–15 budget, the incoming government announced that the idea, barely formed, was already dead, with the programme to close on 31 December 2014.

The Abbott Government appeared just as eager to embrace programmes upon which the 'innovation-friendly' imprimatur could be printed. In response to the 2015 inter-generational report (which tellingly, gave global warming only a cursory treatment),¹⁶ the former Treasurer Joe Hockey launched the “#ChallengeofChange” campaign, aimed at convincing Australians to work longer, and to embrace the structural changes occurring within the economy (principally, the transition out of commodities and manufacturing and into services).

Overpromising and underdelivering government policy has hardly been the only issue facing Australian innovators. Throughout the last two decades, the Australian innovation story has been one of extraordinary achievement and innovation by scientists and engineers—at universities around the country as well as at public institutions such as CSIRO—who succeed despite a frustrating lack of specialist knowledge and capacity both within university administrations and in the broader economy to help commercialise innovative ideas into fully realised, marketable services or products.

This gulf was brought into focus within the legal sphere by the case of *University of Western Australia v Gray (UWA)*, which ostensibly involved a dispute regarding

¹⁶Australia Government, Treasury (2015).

the terms of an academic's employment relationship.¹⁷ However, in doing so, the case gave rise to questions of what a role a university should play in the broader economy, and brought into stark contrast the problems facing innovators who have an otherwise patentable idea in getting that idea commercialised and brought to market.

The choice facing Australian policy makers was to either drive a reconceptualization of Australian universities as commercial entities, or to allow greater cooperation and collaboration with the private sector to take on that role on behalf of universities. As Justice French surmised in *UWA*:

UWA and other universities might well consider the alternative of deriving benefits from inventions produced by their staff by offering highly competent and experienced commercialisation services in exchange for a negotiated interest in the relevant intellectual property. That alternative offers many benefits in terms of incentives, harmony and certainty that are not available through the enforcement of legal rights...¹⁸

These questions go to the core of innovation policy and patent policy, and how the law may best serve the commercialisation objectives of Australia's innovation community. The *UWA* case was in many ways a warning that Australian universities were ill-equipped to handle large patent portfolios, commercialise those portfolios or act as public sector analogues of private sector 'tech incubators'.

The emphasis on encouraging innovation as a panacea for better economic growth is a consistent theme in the policy platforms of successive Australian governments. However, the tide may be gradually shifting. The Australian Productivity Commission undertook a wide-sweeping inquiry into Australia's Intellectual Property laws, releasing its recommendations in late 2016.¹⁹ The ambit of the Commission's inquiry includes an examination of other reports and committee findings that bear on IP, to determine if those recommendations should be implemented, and to examine Australia's approach to treaty-negotiations, to ensure that Australia's negotiating position reflects an appropriate balance between protecting rights holders and fostering growth, innovation and competition. After a period of consultation, the Turnbull government announced its response to the report in August 2017.²⁰

Encouragingly, the government confirmed its support for recommendations concerning balancing protections of IP with the dissemination of innovative ideas and technologies, including specific measures to promote collaboration, de-incentivize litigation, and enhance the capability of government departments to deploy resources and provide services to new and emerging technology sectors.²¹ However, perhaps most importantly for Australia's burgeoning clean-tech industry,

¹⁷See *University of Western Australia v Gray and others (No. 20)* (2008) 246 ALR 603.

¹⁸*Ibid*, at [14].

¹⁹Australian Government Productivity Commission (2016).

²⁰Commonwealth of Australia (2017).

²¹*Ibid*: see Commonwealth of Australia's response to Recommendation 2.1, and relatedly, Recommendation 15.1 and Recommendation 16.1.

the government supports a recommendation to incorporate an objects clause into the *Patents Act* 1990 (Cth).²² This would involve an express statutory statement that the purpose of the Act is to ‘enhance the wellbeing of Australians by promoting technological innovation and the transfer and dissemination of technology’. Given the specific challenges and drivers in the clean-tech industry, whose goal is to prevent and/or mitigate the effects of the global warming, the inclusion of an objects clause would be a welcome reform that would serve to better guide Courts in interpreting the act in any future controversies that may emerge in respect of clean-tech patents (which, judging by past controversies surrounding new and rapidly emerging technologies, such as in the pharmaceutical sector, are bound to arise). Disappointingly, the Turnbull Government noted, but did not accept, the Productivity Commission’s recommendation that the Australian Department of Foreign Affairs and Trade work with the interdepartmental IP Policy Group to develop policy guidance for IP provisions in international treaties.²³ One of the key critiques of several recent treaties has been the increasingly permissive IP requirements built into trade-related agreements: better cooperation across government to ensure that our international negotiating positions do not conflict with our domestic policy settings would be a welcome change. Equally, looking forward, the way the Australian Government seeks to domestically implement IP provisions in climate-related treaties will be critical in determining the future statutory and institutional landscape facing clean-tech start-ups in Australia.

The Turnbull government’s response to the Productivity Commission’s report is better characterized as cautious rather than genuinely reformist, however, when judged against the backdrop of previous governments, this more holistic and evidence-based approach to Australia’s IP arrangements is a welcome change, and brings with it the promise of further reform to come.

4.1 The Role of the Australian University and Public-Sector Commercialisation

Monotti and Ricketson, in their authoritative text on university commercialisation,²⁴ examined stated policies and objectives of universities and identified some traditional motifs: the university as a teaching institution; a research institution; and a community institution.²⁵ However, throughout the 1990s and early 2000s, another motif emerged: the theme of universities as an ‘enterprise’,²⁶ with ‘the language of academic tradition and collegiality...often replaced...by that of commerce and

²²Ibid: see response to Recommendation 7.1.

²³Ibid: see Recommendation 17.2, see also Recommendations 18.1 and 18.2.

²⁴Monotti and Ricketson (2003).

²⁵Ibid, p. 29 [2.26].

²⁶Ibid.

management'.²⁷ A study in 2000,²⁸ revealed that internal governance had largely moved 'away from collegial to managerial models...closer to those of large public enterprises or large commercial corporations'.²⁹ This corporatisation of university structures has not always lead to commercially focused decision-making or policies that facilitate day-to-day business thinking. This may very well be the missing link in bridging the gap between the antecedent role of universities as 'protectors of the intellectual commons',³⁰ and the emergence of the enterprise or 'entrepreneurial university'.³¹

The commercialisation landscape in Australia differs from its counterparts internationally. However, Australia has followed the global trend of an increasing interoperability between public sector and private industry research. A recent study in the United States published in *Health Affairs* found that over half of researchers in the life sciences maintained some form of financial ties to private industry.³² As the influx of private funding of university research has increased,³³ a concomitant flow of intellectual property rights has found its way out of the public sphere into private entities often part-owned by a variety of stakeholders, including (more often than successive governments may like to admit) foreign multinationals.

In the United States, universities are for the most part private enterprises that enjoy public funds on more of a project-specific basis than the historically government run tertiary sector in Australia. Even still the United States grappled with a situation similar to that of contemporary Australia, where research institutions had failed to commercialise a substantial number of inventions either through want of expertise or ill-defined incentives for undertaking the potentially costly process of commercialisation without guarantees of future dividends.³⁴ A nationally uniform policy was called for, and thus now all research institutions in the US that operate wholly or partly using public funds are subject to both the *Bayh-Dole Act*,³⁵ and the *Stevenson-Wydler Act*.³⁶

The US statutory regime allows for the transfer of exclusive control over publicly funded inventions to universities for the purpose of further development and commercialisation. The universities then retain control to license rights to an invention to third parties on terms as they see fit. However, one of the more interesting features of the US regime—reflecting the importance placed on public interests tied up in the IP system—is the idea of 'March-in' rights. These operate to

²⁷Ibid, 38 [2.32].

²⁸Marginson and Considine (2000, p. 1).

²⁹Monotti and Ricketson (2003), 39 [2.34].

³⁰Monotti and Ricketson (2003), 43 [2.43].

³¹See generally Clark (1998).

³²Zinner et al. (2009, pp. 1814, 1816).

³³Research Australia (2009, p. 16).

³⁴Christie et al. (2003, p. 12).

³⁵*Bayh-Dole Act* of 1980 35 USC § 200–212 (Cornell, 2009) ('Bayh-Dole').

³⁶*Stevenson-Wydler Technology Act* of 1980 15 USC § 3701 (2009) ('Stevenson-Wydler').

allow the government to license the invention to a third party, without the consent of the patent holder or original licensee, where it determines the invention is not being made available to the public on a reasonable basis. Under the Stevenson-Wylder provisions, this ownership can be conferred upon the employer inventor. Hence, concerns about anticompetitive practices such as patent squatting are alleviated to a degree, and publicly funded research organisations are encouraged to develop their own internal commercialisation expertise, so as to retain control of and hence the benefit of publicly funded inventions.³⁷

The resultant success of the US framework has been the basis for multiple calls for reform in the Australian context.

4.2 *National Laboratories*

The other side of Australia's innovation story is happening in institutions such as the CSIRO. Much touted for successful commercialisations such as Wi-Fi, CSIRO has successfully spun-out new ideas in a variety of industries, ranging from agricultural innovations to new medical devices. CSIRO set up an independent business development and commercialisation arm, not unlike the commercialisation bodies run by various university institutions, which manages both the process of commercialising nascent innovations into marketable products, as well as maintaining the sizeable royalty proceeds from those innovations, providing an independent pool of revenue to either invest in further research or (as is the case of late) return a dividend to the government. Royalty revenue from the licensing of CSIRO-derived IP peaked at A\$279 million in 2011–12 (largely on the back of CSIRO's wireless technology),³⁸ with revenues in excess of A\$600 million over the past years.

The CSIRO has already shown promising signs of being a key driver of innovation in Australia's clean tech sector, with significant spin-outs already having been achieved. In Newcastle, CSIRO has set up the National Solar Energy Centre, a key development projecting partnering with industry to investigate solar thermal technologies and their ability to scale-up to commercial power generation. Windlab systems is another CSIRO spin-out, which has projects on both sides of the Pacific aimed at mapping wind resources to optimise the placement and design of wind-farms.³⁹ The VAMCAT system—developed by CSIRO in Queensland and trialled in collaboration with China—is a catalytic turbine which captures fugitive methane emissions, oxidising the methane and converting it into additional energy.⁴⁰

³⁷Chew (1992, pp. 259, 261).

³⁸CSIRO (2013).

³⁹Bouchet (2009).

⁴⁰CSIRO (2012).

4.3 Public Private Partnerships

Since the late 1980s the phenomenon of public private partnerships (or 'PPPs') has matured, especially with respect to large scale infrastructure projects and other Australian Government procurement activities. As a result, there is an increasingly mature workforce of procurement managers, legal and commercial professionals, public sector workers and financiers who are familiar with and increasingly comfortable in working within the confines of PPPs.

PPPs have several advantages, but chiefly in circumstances where a project comes with a very large capital cost, with development timelines spanning multiple years. The appeal of bringing together the stability of government cash flows with sources private sector capital unconstrained as to budgetary or policy settings, coupled with the spreading of risk over multiple public and private sector participants and the lure of longer-term, safe, high-quality and stable revenue streams for private sector participants, has resulted in a steady upswing of PPPs as the vehicle of choice for large-scale infrastructure delivery.

Margaret Chon, one of the leading academics examining the intersection of intellectual property and PPPs, contends that governments and the public sector will often lack the sufficient resources to provide material support to, or indeed, distributional mechanisms for, new innovations.⁴¹ PPPs provide an opportunity to address these structural failures in the public sector and to ensure production and dissemination of public goods in key areas (such as, for example, clean technology).

In terms of IP management, PPP projects require a clear delineation between the 'Background IP' of each of the PPP participants (being the *pre-existing* IP that each participant owns and will be contributing to the activity of the PPP, including usually a clearly drafted cross-licensing instrument of everyone's Background IP to each other) and the 'Foreground IP', being the new IP generated in the course of the project (there can be many different instances of foreground IP generated in the course of the project) which will usually vest in only one of the participants, with potential royalty flows back to other participants as required.

PPPs are not necessarily simple instruments to form or carry on as a going concern. Margaret Chon describes in detail the difficulties in bringing together distinctly different actors who will often speak in different structural, cultural, and operational 'languages' or discourses. Chon notes that PPPs may not only consist of public and private actors, but also often differently motivated private actors.⁴² Setting up common frameworks and the communicative structures necessary for a PPP to succeed is often a continuing and challenging task: extending far beyond any initial heads of agreement or financing arrangement.

⁴¹Chon (2013, p. 261 at 262).

⁴²Ibid, at p. 283.

Despite such caution, the US experience⁴³ suggests that clean-technology PPPs may provide a ready-made alternative to traditional venture capital funding arrangements for commercialising public-sector IP, especially for the Australian clean technology space where traditional venture capital is often difficult to engage.⁴⁴

5 Survey of Alternative, Contemporary IP Management Models

In the main, this chapter has focused on traditional notions of IP management, and has presumed the pathway of commercialisation most often adopted by small-scale industry, disproportionately driven by public sector organisations. Under this framework a firm will (ideally) move through the process of developing an IP management plan as set out above, after which it can set about securing its IP (most often by way of a patent application to IP Australia), after which it will have the requisite property and security to ‘shop’ its innovation around to sources of capital or to partner-firms.

Once that capital or strategic partnership is secured, the start-up ought be positioned to consider manufacturing scale-up of production from prototype to finished product, all the while managing the various ancillary costs and development pathways that entails: skilling up the workforce to manufacture the product; skilling up the relevant sales force on how to deploy and use the product; securing relevant branding; trademarks; advertising; developing a marketing strategy; and partnering with associated technologies and brands to try and promote quick consumer take up and stable market share.

Increasingly, commentators are highlighting that the present policy settings and the lack of any critical mass of innovators in Australia make it difficult to successfully bring innovations to market under the above-described traditional model.⁴⁵ Absent significant funding from government or managing to attract interest from international investors willing to purchase the IP outright, the existing patent system may not provide sufficient incentive for small-scale operations to attract the right mix of investment and partnerships to commercialise an idea in the Australian market. In fact, many commentators argue that the IP maximalist

⁴³The United States has made PPPs a central pillar of its international response to climate change. In June 2015, President Obama launched ‘Climate Services for Resilient Development’, a PPP targeted at tackling climate change within the developing world. Including \$34million in seed funding from the US government, the PPP including partnerships with the American Red Cross, Asian Development Bank, Esri, Google, Inter-American Development Bank, the Skoll Global Threats Fund, and the U.K. Government. See: White House Office of the Press Secretary (2015).

⁴⁴For a practical insight into the approach of a non-profit actor to handling IP within PPPs structured with various private-sector actors, see: Brooke et al. (2007).

⁴⁵See for example, Mohannak and Matthews (2011); see also: OECD (2011).

position of the Australian government only serves to stifle innovation, as it concentrates IP rights into the hands of established interests who may seek to stifle research and development of potential competitors or otherwise seek to commercially exploit any reliance by Australian innovators on patented products, components or methods.⁴⁶

A 2013 study out of Washington University concludes that 'there is no empirical evidence that [patents] serve to increase innovation and productivity, unless productivity is identified with the number of patents awarded...while patents can have a partial equilibrium effect of improving incentives to invent, the general equilibrium effect on innovation can be negative'.⁴⁷ Interestingly, the study notes that while 'weak patent systems may mildly increase innovation with limited side effects, strong patent systems retard innovation with many negative side effects'.⁴⁸

While there is little to suggest that Australia or any other major developed economy will seek to abandon the patent system, there are several reform movements around the world gathering pace, ranging from purpose-specific instruments to broader treaty-like measures that will implicate the structure and function of Australia's domestic statutory and policy settings. Internationally, these alternative mechanisms are being not just entertained but deployed, with varying degrees of success.

5.1 *Patent Pools*

An increasingly common alternative to the traditional model of IP Management is the adoption of patent pool schemes. Patent pools have developed as a response to the complexity and difficulty of managing multi-party cross-licensing schemes for multiple patents. A patent pool is where a collection of patents (owned by separate, individual entities) is grouped together and made available for licensing as a block. Each individual owner will usually automatically hold a license to the group patent pool. The use of patent pools is particularly useful in industries seeking to impose a standard on a given product line.

An example of such a pool was that established to allow for the MPEG-2 standard of digital video.⁴⁹ MPEG-2 was a usual format for use in the production of DVDs and digital television. The establishment of the pool allowed for the format's ubiquity across the hardware and equipment produced by electronic and technology companies. The patent pool included patents from significant market leaders in the space, such as Sony, LG Electronics, and Samsung.⁵⁰

⁴⁶Rimmer (2011, p. 189).

⁴⁷Boldrin and Levine (2013, pp. 3–22).

⁴⁸Ibid.

⁴⁹MPEGLA (2009).

⁵⁰Nearly half of the patents included in this pool lapsed in 2012.

Patent pools are an effective way to avoid stultifying litigation and licensing disputes from bogging down industries that are patent-rich (sometimes referred to as ‘patent thickets’), provided that competitors can be persuaded to the merits of establishing a pool, and regulators can be persuaded that a pool once established wouldn’t amount to anti-competitive behaviour.

Patent pools have been advocated as a potential tool to overcome the potential for patent thickets in cleantech (such as wind turbines or solar technology), with one suggestion being that the United Nations Framework Convention on Climate Change (UNFCCC) and WIPO establish a fund for the purchase of key technology,⁵¹ and providing that technology as part of a patent pool to be licensed on nominal terms.⁵²

5.2 *Patent Fast-Tracks*

IP Australia in 2009 announced that it would give priority to environmentally friendly technologies in the patent application system.⁵³ This concept mirrors those that had been adopted at the time overseas, most notably in the United States Patent and Trademark Office.

The system ‘fast-tracks’ green patents to the front of the queue, such that the period between application and acceptance can be shortened as much as is possible. While typically, a patent application may take upwards of a year, this form of ‘expedited examination’ can see an application take as little as four to eight weeks.

A related program run through the United States Patent and Trademark Office is the ‘Patents for Humanity’ program.⁵⁴ Patents for Humanity was an awards competition aimed at identifying and rewarding innovators whose technologies helped to remedy global humanitarian challenges. Award recipients received ‘acceleration certificates’ which allowed for expedited proceedings with the USPTO.⁵⁵

IP Australia’s Green Patenting program is importantly, not a lowering of patentability thresholds, but a commitment as to timing. In the context of attracting investment, and providing certainty to those capital sources, this is obviously an advantageous set-up.

Unfortunately, there has been a lower-than-expected take-up of green patenting fast-track in Australia (except for an initial uptake of the program for various carbon-capture and storage technologies). There has been a slow ramp-up in recent

⁵¹It’s been separately suggested that the Green Climate Fund be used for such a purpose.

⁵²Reichman et al. (2008).

⁵³IP Australia (2013).

⁵⁴USPTO (2015).

⁵⁵The shortcomings of the Patents for Humanity scheme as a measure for incentivising proliferation of desired technologies is discussed in detail in Rimmer (2012).

years in terms of access to the green patent fast-track process, but this build up has developed from a very low-base. Prominent business commentators have lamented that Australia is 'falling behind' in terms of the current global innovation boom, laying the blame that the feet of Australian Government policy and the high costs of innovation domestically.⁵⁶ Suffice to say, the low take-up of IP Australia's Green Patenting scheme demonstrates that there are other pressure points in Australia's commercialisation landscape, other than the speed of patent application processing, that's leading to the apparent domestic innovation shortfall in this area. Notably, the relatively low take up of green patenting in Australia does buck the international trend. Contrastingly, environmental patent filings for the 40 countries investigated increased by nearly 100% between 2008 and 2011: unfortunately, this may indicate that the Australian experience is relatively atypical.⁵⁷

5.3 New and Emerging Approaches—Commons, Open-Source, Philanthropy

Other innovations include attempts at trialing open access and open innovation structures instead of the traditional commercialisation approach. In the patent sphere, this notion has found root in an expansive approach to the notion of patent pools, into a related but broader concept, the patent commons. The key difference between a patent commons and a patent pool is the lack of any royalty or license schema; the patents in a commons are genuinely open-access.

5.3.1 The Eco-Patent Commons

One of the leading examples is the establishment of the Eco-Patent Commons initiative, involving patents from companies such as Bosch, Dow, DuPont, Fuji-Xerox, IBM, Nokia, Sony and Sony, and administered in conjunction with the World Business Council for Sustainable Development. This commons has over 100 green patents, which are available to any user seeking to develop new clean technology innovations. The scheme has won praise not only for being a mechanism for incentivising innovation in sectors where inventors may be otherwise dissuaded by the volume of extant patents, but as an avenue by which multi-national companies and innovators can be brought together, enriching the networks of all participants and fostering the kind of linkages that help facilitate eventual commercialisation of innovative technology.⁵⁸

⁵⁶See Kohler (2014).

⁵⁷Cleantech Group, World Wildlife Fund (2014).

⁵⁸See discussion in Davies (2013 p. 108, at 110–118).

The establishment of the Eco-Patent Commons has been lauded⁵⁹ as an example of industry addressing the tension between “its contribution to the harm of the environment and its role in reducing the use of resources and pollution”.⁶⁰ However, a commons might not be a whole-answer, as providing patented innovations for free fails to recognise the cost of innovation, and accordingly the only industry actors who are likely to be able to contribute to a patent commons are those with sufficient scale that they can absorb the potential revenue thrown away by contributing their IP.⁶¹

5.3.2 Open-Access Automotive: Tesla Versus Toyota Versus Ford

While some companies have opted to contribute to patent commons, other companies have approached the notion of open-source approaches to patent portfolios more directly. The automotive industry has seen a spectacular explosion in the quality and popularity of low-emission vehicles, such as hybrid or electric cars.

The current vanguard of this movement is Tesla Motors, the venture launched by the enigmatic Elon Musk. In June 2014, Tesla Motors made the stunning move of declaring all its patents to be open source.⁶² In justifying the move, Musk made the persuasive case that Earth’s carbon crisis simply couldn’t wait for innovation to advance in the traditional, incremental manner, stating that:

[A]nnual new vehicle production is approaching 100 million per year and the global fleet is approximately 2 billion cars, it is impossible for Tesla to build electric cars fast enough to address the carbon crisis...Our true competition is not the small trickle of non-Tesla electric cars being produced, but rather the enormous flood of gasoline cars pouring out of the world’s factories every day.⁶³

Not to be left behind, Tesla’s competitors have followed suit. Toyota announced that it would allow royalty-free use of all 5680 fuel cell patents it held.⁶⁴ Taking the gloss of the announcement somewhat were the significant terms and conditions attached to the offer, and the fine-print that the patents relating to fuel-cell vehicles would only be royalty-free until 2020.

Joining Tesla and Toyota is now Ford, although the company’s embrace of open-source philosophies has been somewhat more tentative. Ford is offering over 650 electric vehicle patents for an undisclosed fee via an intermediary.⁶⁵

The competing approaches in the automotive industry are instructive in that they demonstrate the willingness of even established companies to depart from business-as-usual practices to remain ahead of the pack in the continuing innovation and development of clean technologies.

⁵⁹Boynton (2010–2011, p. 659).

⁶⁰Gollin (1991, p. 193).

⁶¹Boynton (2010–2011, p. 672).

⁶²Musk (2014).

⁶³Ibid.

⁶⁴See Cunningham (2015).

⁶⁵The Ford patents are available to license via the website <http://www.AutoHarvest.org>.

5.3.3 Philanthropic Ventures—The Bill and Melinda Gates Foundation

Philanthropic organisations and corporate philanthropy are increasingly playing a role in the global response to climate change. Google.org, the philanthropic arm of Google (now Alphabet Inc.), has spent the best part of the decade engaged in various initiatives to combat climate change, including the RE<C initiative, which sought to encourage renewable technology innovation with the end-goal of producing one gigawatt of renewable energy more cost-effectively than one gigawatt of coal.⁶⁶ The project was retired in 2013 when it published its findings and technical papers, citing that other firms were better positioned to take the vision forward.

One of the largest philanthropic foundations in the United States, the William and Flora Hewlett foundation, with net assets totaling over \$9 billion, has made considered and significant contributions over the past decades as well, including a five-year, \$100 million a year funding arrangement to the ClimateWorks Foundation⁶⁷ from 2008 to 2013.⁶⁸ The Foundation continues to provide grants to clean technology innovation in the power generation and transport sectors, as well as funding advocacy groups.⁶⁹

One of most significant global philanthropy organisations, the Bill and Melinda Gates Foundation, has become a target for climate-action advocates seeking a greater role from the humanitarian organisation in combatting climate change.⁷⁰ The fossil fuel divestment movement, which advocates for organisations and institutions to 'divest' themselves from carbon-intensive industries, has shed light on the reputed \$1.4 bn dollars which the Bill and Melinda Gates Foundation had invested in fossil fuel companies as of its 2013 tax filings.⁷¹ Despite some limited philanthropic input into the fight against climate change,⁷² the pressure remains on the world's most visible philanthropists to do more, and it remains to be seen if (or when) that pressure will eventually tell.

5.4 *Approach of Multi-lateral Institutions and Developing United Nations Frameworks*

The most significant global movement in response to climate change however, is undoubtedly within the United Nations Framework Convention on Climate Change,

⁶⁶Google.org (2015).

⁶⁷ClimateWorks is a clearinghouse for the coordination and support of regional climate foundations around the world.

⁶⁸Hewlett Foundation.

⁶⁹Hewlett Foundation.

⁷⁰GatesDivest.Org (2015a).

⁷¹GatesDivest.Org (2015b).

⁷²Bill and Melinda Gates Foundation (2008).

or UNFCCC.⁷³ The Conference of the Parties, or COP, is the supreme body of the framework. Its annual meetings have taken on a meta-significance in the eyes of the world, as attempts to hammer out an enduring and universal agreement between member states repeatedly comes into reach before receding again. From an Australian point of view, the most significant of these meetings was undoubtedly Copenhagen (or COP15), the failure of which some credit with eventually unseating the then Australian Prime Minister, Kevin Rudd,⁷⁴ and the eventual unwinding of the various abortive attempts in Australia to price carbon as a market externality. However, while receiving less domestic coverage than COP15, the efforts of the UNFCCC did not end there, and eventually a breakthrough global consensus was reached at COP21, in Paris.

The international agreement struck in Paris on 12 December 2015 was adopted by the Conference of the Parties in a text now referred to as the Paris Agreement.⁷⁵ The Paris Agreement includes several long-term goals (including temperature and adaptation goals), and critically, detail of what support mechanisms need to be instituted to help achieve these goals: traversing questions of technology development and transfer, finance, and internal capacity building (as countries meet the challenge of modernizing their economies without the historically-concomitant increase in carbon intensity).

5.4.1 The Technology Mechanism

In the realm of IP, a technology transfer mechanism has long been mooted as a necessary component of any global response to climate change.⁷⁶ This has not occurred in a vacuum: similar debates around access to medicines, the Convention on Biological Diversity, and in the broader trade and environmental space have involved questions as to how developed economies can best disseminate the advantages of innovative technology to emerging economies. That said, the debate takes on a distinct character in the global warming arena. States have an obvious interest in the wide-diffusion of clean technology beyond mere altruism: mitigating climate change will benefit the whole of the global community. The COP in Cancun first established a ‘Technology Mechanism’ to help countries develop and transfer clean-tech technologies, consisting of both a policy body (the Technology Executive Committee) to analyse innovative technology issues and provide recommendations, and an implementation body (the Climate Technology Centre and Network), to provide technical assistance directly to emerging economies and to facilitate collaboration internationally in delivering clean-tech technology to such countries. The Paris Agreement builds on this established Technology Mechanism by further establishing a technology framework to facilitate the assessment of technologies that are sufficiently mature to be transferred, and to promote the kind

⁷³See <http://unfccc.int/2860.php>.

⁷⁴Chubb (2014).

⁷⁵Adoption of the Paris Agreement, FCCC/CP/2015/10/Add.1 (UNFCCC, 2015).

⁷⁶The framework was set up following COP7, and expanded at COP 13: see http://unfccc.int/ttclear/templates/render cms_page?TTF_home.

of institutional architecture necessary for countries to internally develop clean technologies.⁷⁷

5.4.2 Financing

Like earlier COP discussions, the Paris Agreement contemplates the need to direct capital to emerging economies to facilitate both the purchase of innovative technologies and the physical implementation of relevant infrastructure and the implementation of those technologies. Reflecting calls in the literature for the establishment of a fund to assist in the purchase and diffusion of IP,⁷⁸ the Green Climate Fund (GCF) was established at COP16. At COP19 in Copenhagen, it was agreed that developed countries would raise up to 100 billion USD in climate-related financing. As of January 2018, some 43 state governments have pledged amounts to the GCF, with approximately 10.3 billion USD so far committed, and a total of 153 million USD announced but not yet signed.⁷⁹ The Paris Agreement still focuses on certain developed countries carrying the burden in mobilising funding to support emerging countries, but also recognizes that other Parties (including principally, China) may (and are already) playing an increasing role in providing financial support in the clean-tech space.⁸⁰ Further, the Paris Agreement provides that this 100 billion USD amount must be raised and delivered annually between 2020 and 2025, with a higher climate financing goal to be set for the period thereafter. The Paris Agreement consistently refers to 'climate-resilient development' as being the goal of such financing flows: again, echoing the challenge for countries to develop their economies and increase the well-being of their citizenry, without incurring what has been historically a concomitant cost in terms of carbon-intensity.

The ultimate disposition and function of the fund however, remains unclear. Commentators have variously argued for the fund to be used to establish a series of large-scale clean technology prizes,⁸¹ which it argued have the benefit of 'internalising' the negative externalities of the patent system, by directly incentivising innovation without the need for states' to cede a monopoly period to an inventor.⁸² Other suggestions promote the establishment of a large-scale patent pool or patent commons, with the GCF purchasing essential clean technology patents to add to the pool, to be licensed on either nominal terms or on an open-source basis to the developed world (for rapid dissemination and adoption) and to innovators around the world (for further experimental development and improvement). How the GCF evolves will be one of the more interesting elements to watch at future meetings of the COP.

⁷⁷Ibid.

⁷⁸Including by establishing a patent pool or commons, see Davies (2013).

⁷⁹Green Climate Fund (2018).

⁸⁰Article 9 of the Paris Agreement 2015.

⁸¹Rimmer (2011, p. 375).

⁸²Mandel (2005, pp. 64–69).

5.4.3 Future Developments

Of course, the hope of the UNFCCC is the establishment of a truly global carbon pricing mechanism. While this has not yet been fully realised, there are several such markets now established around the world. Several states now in the US are setting up their own emissions trading markets (with the Californian cap-and-trade system being the fourth largest in the world). The EU has now had a carbon price established for some time, despite some recent turbulence. 2014 saw the trialing of a provincial carbon market in Guangdong, China, and in late 2017, China's National Development and Reform Commission announced a national scheme would be implemented covering China's power and utilities sector, affecting up to 1700 companies in China.⁸³

Despite the relative lack of progress in Australian carbon pricing (and the significant domestic subsidies to fossil fuel energy production and the resources sector), international markets offer better prospects for a genuinely level playing field for new and emerging clean technologies to compete. The business case for clean-tech start-ups will continue to improve over time as the distortionary effects of carbon externalities are gradually priced around the world, together with the gradual reduction in other forms of both direct and indirect government subsidies for fossil-fuels, bringing cleaner power generation up to parity.

6 Conclusion

The world's energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable — environmentally, economically, socially. But that can — and must — be altered; there's still time to change the road we're on. It is not an exaggeration to claim that the future of human prosperity depends on how successfully we tackle the two central energy challenges facing us today: securing the supply of reliable and affordable energy; and effecting a rapid transformation to a low-carbon, efficient and environmentally benign system of energy supply. (International Energy Agency)⁸⁴

This chapter has attempted to illustrate some of the challenges facing Australian entrepreneurs in the clean-tech space, but as well as that, some of the reasons to be hopeful, with the clear-eyed view of the obstacles to be overcome in driving growth in the sector.

Sustained innovation and the development of an organic entrepreneurial culture isn't about the big disruptive success or the remarkable business careers of any handful of individuals. It's about the sum innovative potential of the thousands of grassroots entrepreneurs, researchers, engineers and scientists developing ideas. It is this workforce which needs the help of both government and private sector actors to realise their ideas in the global marketplace.

⁸³National Development and Reform Commission, The People's Republic of China (2017).

⁸⁴International Energy Agency (2008).

Australian innovation has an opportunity to help equip the world with the necessary technological and innovative processes required to decrease the carbon intensity of human endeavour, thereby increasing the wellbeing of citizens not just at home, but around the world. Australia's legislators, attorneys, investors and universities all have a role to play in helping to tend the ground in which such innovation may grow. Properly calibrated, reform to Australia's IP system will be a vital (and inevitable) component of the nation's broader response to the challenge of global warming.

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Chapter 8

Intellectual Property, Climate Change and Technology Transfer in South Asia



Kanchana Kariyawasam and Matthew Tsai

Abstract The impact of climate change has emerged as a major threat to the sustainable growth and economic development of South Asia. The use of clean technologies is crucial for countries in the region to address climate change and achieve a low-carbon economy. At one end of the spectrum, the development of clean technology requires extensive research and investment; a strong patent system and the promise of substantial financial revenues in return are of paramount importance. At the other end, stringent intellectual property rights (IPRs) increase the cost of technological acquisition, making it difficult for economically unstable developing countries to make use of the patented technology. The role of IPRs in the transfer of climate change technologies to developing countries has therefore emerged in recent years as a highly controversial issue. This book chapter presents a critical analysis of how IPRs affect diffusion of clean technology into countries in South Asia.

Keywords Intellectual property • Climate change • Technology transfer
Patent law • Low-carbon economy • Development • Sustainable development
South Asia • Technology transfer • Parallel importation • Patent pools
Patent clearinghouses

1 Introduction

The transfer of technology is a key pillar of the international framework for addressing global climate change.¹ The Greenhouse gas (GHG) emissions lead to a range of well-documented consequences, such as increases in average global

¹Sarnoff (2011, pp. 172–199).

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temperature, greater variation in temperatures across time, increased frequency and intensity of extreme weather-related events such as flooding, and a rise in global sea levels.² The level of GHG emissions and the extent of climate change, as well as the economic consequences and especially how well society responds, will depend on rapid development and widespread dissemination of a wide variety of new technologies to deal with climate change.³

Recent significant economic growth in several large developing economies has led to a policy focus on the role of technology transfer and technology development in countries that are not generally on the technology frontier in facilitating the use of clean technologies.⁴ This includes countries in South Asia, which is home to a quarter of the world's population and is at the same time one of the world's poorest regions. Essentially, South Asia is one of the most vulnerable regions to the effects of climate change.⁵ In particular, high economic growth has fuelled a growing and insatiable thirst for energy in South Asia.⁶ This has resulted in a rapid increase in GHG emissions in the region. India, for example, is now the sixth-largest emitter of GHGs in the world, even though per-capita emissions are much lower than those of Europe and North America.⁷ South Asia also has one of the highest concentrations of black carbon emissions globally.⁸ In 2015, for example, the largest increase in global carbon dioxide (CO₂) emissions, 5.3%, came from India, making it the world's fastest-growing major polluter.⁹ In addition, South Asia has the greatest number of solid-fuel users: household air pollution from incomplete combustion of these fuels leads to 1.7 million premature deaths annually.¹⁰

The rapid pollution growth in the region is expected to continue into the future. In one of its recent reports, the United Nations Framework Convention on Climate Change (UNFCCC) predicts that climate change impacts could reduce the South Asian economy by up to 9% every year, with the human and financial toll even higher if damage from floods, landslides, droughts and other extreme weather events is included.¹¹ The impact of climate change is likely to be particularly magnified in the region, given that many of its countries—including India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and the Maldives—depend to a large extent on the agricultural sector. Agriculture is one of South Asia's biggest employers, contributing about 18% of regional gross domestic product (GDP).¹² Approximately 60% of

²Intergovernmental Panel on Climate Change (2007), quoted in Helmers (2010, pp. 487, 488).

³Sarnoff (2011, pp. 301, 303).

⁴Hall and Helmers (2010).

⁵Sharma et al. (2014).

⁶The World Bank (2009).

⁷Sharma et al. (2014).

⁸United States Environmental Protection Agency.

⁹Earth Day Network (2016).

¹⁰Nature Energy (2016).

¹¹UNFCCC (2014).

¹²Walsh (2017).

India's population makes its living from agriculture.¹³ Climate change can also threaten biodiversity, food security, and the availability of water supplies.

Unless clean technologies are deployed, energy-related GHG emissions from Bangladesh, Bhutan, the Maldives, Nepal and Sri Lanka will increase from about 58 million tons of CO₂ equivalent in 2005 to about 245 million in 2030, largely due to rising energy consumption by the industrial and transport sectors.¹⁴ The introduction of large-and small-scale green technologies—including those involving solid waste or gas and more fuel-efficient technologies, as well as greener products such as solar cookers, electric or more efficient diesel vehicles, and biodiesel fishing vessels—could cut 27.9 million tons (20 percent) from 2020s projected energy-related annual emissions of 125.5 million tons of CO₂ equivalent.¹⁵ Despite the benefits yielded by the uptake of these technologies, climate change remains one of the major hurdles that South Asia will need to overcome in the coming decades, while still allowing its industrial and transport sectors to prosper. Technology transfer is therefore one of the most important driving factors in reducing GHG emissions and enhancing the region's economies.

An important but often controversial aspect of technology transfer relates to intellectual property rights (IPRs). In fact, most climate change technologies are created by developed countries, with industrialised countries aiming to recoup costs and generate profits while also securing prospects for future research in climate change technologies. IPRs are, therefore, of vital importance to developers of the technology in facilitating the technology transfer. However, the monopoly rights conferred by intellectual property ownership hinder diffusion of these technologies and undermine the capacity of developing countries to use, maintain and adapt the technologies to local conditions.¹⁶ These limitations mainly stem from the fact that developing countries in many cases lack the ability to access patented technologies, because a patent requires them to pay significant amounts in royalty or licence fees to the patent holder. IPRs undoubtedly increase the costs of acquiring climate-friendly technologies, restricting developing countries' ability to use climate change technologies.¹⁷

This chapter presents a critical analysis of how IPRs affect diffusion of green technology to countries in South Asia and examines the importance of using the national-level flexibility built into the World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) to promote the transfer of climate-related technologies to South Asian countries. The chapter then scrutinises why flexibility under the TRIPS Agreement is underused by countries in South Asia. In doing so, it will suggest that an effective regional mechanism is often one of the best ways to develop policy on climate change. Under a regional mechanism, countries in South Asia can ensure that they comply

¹³The World Bank (2013).

¹⁴Asian Development Bank (2013a).

¹⁵Asian Development Bank (2013b).

¹⁶Shashikant and Khor (2010).

¹⁷Falvey and Foster (2006, p. 19).

with a common set of regulations, with the aim of hastening the reduction of GHG emissions across the region.

2 Climate Change and Technology Transfer

Global warming and climate change are among the most pressing issues of our time. This is due ‘not only to its complex and pervasive nature but also its long-term impact on sustainable development’.¹⁸ Climate change has been caused by rising GHG emissions, including long-lived gases such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), as well as short-lived gases such as water vapour and ozone (O₃).¹⁹ Impacts of climate change include alteration of ecosystems, landslides, droughts, disruption of food production and water supply, damage to infrastructure and settlements, and negative effects on overall human wellbeing.²⁰

An essential component in addressing climate change is technology transfer, defined as ‘a process by which expertise or knowledge related to some aspect of technology is passed from one user to another for the purpose of economic gain’.²¹ This concept has the imperative of ensuring that the ideas, knowledge and skills associated with technology are disseminated throughout the world for commercialisation or further development, to benefit either the greater community or individuals.²² The Intergovernmental Panel on Climate Change (IPCC) describes technology transfer as ‘a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change among different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions’.²³

Technology transfer can include initiatives for processing waste, making available clean water, and generating power that does not produce significant greenhouse gases.²⁴ It can be transferred in a manner that is either ‘hard’ or ‘soft’. Hard technology transfer involves patented technologies.²⁵ Examples include climate change mitigation equipment, products that reduce or manage GHG emissions (such as solar panels) and adaptation technologies (such as irrigation systems or drought-resistant plants).²⁶ Soft technology transfer involves sharing expertise—for example, via training, consultation, capacity-building and information-sharing.

¹⁸United Nations Department of Economic and Social Affairs (2008).

¹⁹Hall and Helmers (2010).

²⁰Best Climate Practices (2015).

²¹Schnepp et al. (1990).

²²World Intellectual Property Organization (2011, p. 4), Universal Technical Resource Services Inc. (2016).

²³Intergovernmental Panel on Climate Change (2000).

²⁴Shugurova and Shugurov (2015, p. 133).

²⁵Hutchison (2006, pp. 517, 520).

²⁶UNFCCC Secretariat (2004).

Technology transfer mainly involves the distribution of climate change technology and other innovations addressing the environment or the sustainability of the planet's resources, from developed countries to developing countries.²⁷ This phenomenon is one of the cornerstones of international development.²⁸ It is the result of a prevailing trend called 'technological colonialism', whereby the developing world has a continual reliance on the developed world to deliver these technologies.²⁹ Facilitating technology transfer between nations, particularly to developing nations, has been recognised as essential to effectively tackle climate change.³⁰ For example, it is contended that the need for technology transfer to developing countries reflects a 'political reality':

developing nations are unlikely to accept any form of commitment to control [GHG] emissions without a reciprocal commitment by developed nations to assist in providing the technologies needed to help reduce these emissions and to facilitate economic development in a climate-conserving manner.³¹

3 Importance of Clean Technology Transfer to South Asia to Address Climate Change

Climate change has emerged as a serious challenge for countries around the world, but its effect is nowhere more pronounced than in developing countries in South Asia. This region is home to over one-fifth of the world's population and is arguably the most densely populated geographical region in the world.³² Given its low agricultural productivity, high population growth, natural resource degradation, poverty and food insecurity, the catastrophic consequences of water scarcity, island inundation, food shortages and energy shortages make South Asia one of the regions most vulnerable to the effects of climate change.³³ Climate change has therefore become a potential impediment to sustainable development and poverty reduction efforts in the region.³⁴

A manifestation of action at the international level has been the introduction of various multilateral environmental agreements obliging countries around the world to combat climate change.³⁵ This has spurred a range of mitigation technologies to

²⁷United Nations Environment Programme.

²⁸Shugurova and Shugurov (2015, p. 133).

²⁹Agenda 21: Programme of Action for Sustainable Development, UN GAOR, 46th sess, Agenda Item 21, UN Doc A/Conf.151/26 (14 June 1992); Shugurova and Shugurov (2015, p. 138).

³⁰Barton (2008, p. 2), Forsyth (2004, pp. 237, 239), Ockwell et al. (2008, p. 4104), Karakosta et al. (2010, p. 1547).

³¹Barton (2008, p. 2).

³²Sivakumar and Stefanski (2010, pp. 13, 14).

³³Ibid 13.

³⁴Azam (2011, pp. 485–486).

³⁵Van Hoorebeek and Onzivu (2010, p. 14).

address climate change problems, including renewable energy sources and low-carbon building materials.³⁶ Developing clean technology is necessary to stabilise and reduce GHGs. However, countries in South Asia must be empowered to respond to the harsh effects of climate change.³⁷ Many countries in South Asia are developing nations and lack the financial means to develop this technology. They are therefore left with no other option but to imitate or adopt the green technologies that have been invented in developed countries.³⁸ Given that the foreseeable growth in global emissions will predominantly arise in developing countries (such as those in South Asia), the transfer of climate change technology to countries in South Asia will be a major step towards overcoming global climate change.³⁹ Not only will this type of technology transfer allow South Asian countries to reduce their emissions, thereby facilitating harmonisation of environmental norms between developed and developing countries, but it will also contribute to sustainable economic development in the region.⁴⁰

Climate change, however, cannot be simply addressed through technology transfer from developed to developing countries. Different regions have individual needs and priorities, and a crucial criterion for successful technology transfer involves being able to use and adapt the transferred know-how.⁴¹ In this sense, technology transfer between developing countries is also needed. Cambodia, for example, has been slower to develop innovations in the energy sector to ensure energy security. Instead, it has had to rely on technology transfers from China to access low-carbon technology (such as that used to build hydropower dams) in an attempt to reduce energy poverty and mitigate the effects of climate change.⁴² From this perspective, the development and effective diffusion of green technology will largely determine both how and how well South Asian countries meet the core challenges of climate change adaptation and mitigation.⁴³

4 Addressing Technology Transfer Through International Agreements

Difficulties associated with transferring environmentally sound innovations to developing countries have been addressed to some degree by a number of international treaties and conventions. These regimes acknowledge that, in order for developing nations to fulfil their international obligations and commitments,

³⁶Ockwell, Sagar and de Coninck (2015, p. 405).

³⁷Hubler and Finus (2013, p. 479).

³⁸Schembri and Petit (2009).

³⁹Ghaleigh (2011, p. 221).

⁴⁰Schembri and Petit (2009).

⁴¹Karakosta (2016, pp. 503–504).

⁴²Urban et al. (2016).

⁴³Lybbert and Sumner (2012, p. 114).

technology transfer is necessary to enable their integration into the global economy.⁴⁴ They further emphasize that the agreements for technology transfer should occur on terms that are fair to any developing countries involved in the transactions.

The TRIPS Agreement prescribes the minimum international standards for the protection and enforcement of IPRs among member states. Prior to the formation of TRIPS, developing countries, including those in South Asia, had weak IPR laws. The introduction of TRIPS meant that they acceded to the demands of stronger IPR protections in exchange for greater access to core technologies created and innovated by developed countries.⁴⁵ TRIPS is therefore an important mechanism to promote the transfer and dissemination of climate change technology, striking a balance between developed and developing countries. With regard to the subject of climate-friendly technology transfer, the connection between the TRIPS Agreement and the measures for facilitating the diffusion of climate-friendly technologies in response to climate change are difficult to identify.⁴⁶ However, TRIPS provides its member states maximum flexibility to protect IPRs, in light of their local needs and interests, which can be used to advance transfer of climate-related technologies. For example, Article 7 of TRIPS highlights that ‘the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations’.⁴⁷ The effect of this provision is that it attempts to balance the interests of all stakeholders, including intellectual property owners, with the recipient nations’ public interest, thereby emphasising the need for transfer and dissemination of technology. In particular, Article 7 operates to facilitate equilibrium between the intellectual property system’s incentivising capacity and the negative effects of monopolistic rights.⁴⁸ In addition, Article 8.2 acknowledges members’ right to take action against anticompetitive or abusive IPR practices by rights holders. Article 8.2, on the other hand, creates a reciprocal obligation for developed nations to actively facilitate technology transfer, particularly to those nations needing help to generate a ‘sound and viable technological base’.⁴⁹ Both provisions acknowledge that intellectual property protection is inescapably aligned with other important national development objectives, and allow each state significant room to determine appropriate levels of intellectual property protection suitable for their own nations.⁵⁰

⁴⁴UNCTAD (2004, p. 3).

⁴⁵Hutchison (2006, p. 521).

⁴⁶Jiang (2014, pp. 173, 175).

⁴⁷Article 7 of the TRIPS Agreement.

⁴⁸Nordhaus (1969, p. 76), quoted in Slade (2016).

⁴⁹World Trade Organization, ‘Implementation of Article 66.2 of the TRIPS Agreement: Decision of the Council for TRIPS of 19 February 2003’, WTO Doc IP/C/28; World Trade Organization, ‘Implementation-Related Issues and Concerns: Decision of 14 November 2001’, WTO Doc WT/MIN(01)/17 at para 11.2, quoted in Slade (2016), see also Rimmer (2011, pp. 84–85).

⁵⁰Slade (2016).

Furthermore, Article 31(b) of the TRIPS Agreement recognises the balancing act between the need for the public to allow member states to make laws permitting access to inventions without authorisation in cases of ‘national emergency or other circumstances of extreme urgency or in cases of public non-commercial use’. This provision reaffirms that a member state has the right to access inventions subject to IPRs when it is deemed critical. It confirms that IPRs are not an absolute right. It is argued:

TRIPS is laid down as a set of minimum standards with plenty of flexibilities in the provisions to leave a substantial part of the legislation to the Members own discretion. This means that even though the exceptions and exclusions to patentability provided in the provisions cannot be used for overriding the patent rights completely they still provide Members with some interpretive opportunities and flexibilities to facilitate access to ESTs for all.⁵¹

The concept of technology transfer is also recognised by the UNFCCC, one of the key international forums for global efforts to address the challenges posed by climate change. The UNFCCC’s Article 4.3, for example, imposes a clear obligation on developed countries to provide financial resources for developing countries, to enable them to undertake emissions reduction activities under the convention and to help particularly vulnerable countries adapt to the adverse effects of climate change. In addition, Article 4.5 of the UNFCCC provides:

The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.

More importantly, Article 4.7 of the UNFCCC outlines the roles of developed and developing countries in technology transfer by stating that ‘the extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments related to financial resources and transfer of technology’.⁵² This provision exemplifies successful integration of the right to development in the institutional framework of climate change, clearly indicating a basis for making a direct demand for access to technology from those who possess technology.⁵³ The UNFCCC urges developed member states to support technology transfer to developing countries to address the adverse effects of climate change.

⁵¹Sørensen (2011), see also Cheyne (2010).

⁵²Article 4.7 of the UNFCCC.

⁵³Cazorla and Toman (2010, pp. 235, 236), Popp (2011, pp. 131–132).

Another important agreement addressing climate change is the Kyoto Protocol, which was adopted in Kyoto in 1997 and enforced from 16 December 2005.⁵⁴ It works alongside the UNFCCC and sets criteria that must be met by its parties, with the imperative of ameliorating carbon emissions.⁵⁵ One way technology transfer can be achieved is through the clean development mechanism (CDM) established under the Kyoto Protocol. The CDM allows firms in developed countries to meet their emissions reduction targets by financing projects to reduce emissions in developing countries.⁵⁶ The CDM aims primarily to achieve emissions reduction in a cost-effective manner. This benefits the providing firm because the marginal cost of reducing emissions is generally less expensive in developing countries than in their home country, and it benefits the world at large because, given the global nature of GHG emissions, a reduction in emissions in a developing country is as significant as a reduction in any developed country.

The Bali Action Plan moved the issue of technology transfer to centre stage by recognising that there is a 'crucial need to accelerate innovation in the development, deployment, adoption, diffusion and transfer of environmentally sound technologies among all Parties, and particularly from developed countries to developing countries, for both mitigation and adaptation'.⁵⁷ John Houghton, from the Centre for Strategic Economic Studies, Victoria University, stressed:

The Bali Action Plan included the commitment to help developing countries undertake nationally appropriate mitigation actions in the context of sustainable development without compromising growth, by transferring finance and technology from developed countries in a measurable, reportable and verifiable manner.⁵⁸

The most recent agreement on climate change was the Paris Agreement of 2015, which was signed by parties to the UNFCCC at the 21st Conference of Parties. The Paris Agreement brought together all countries with a common cause to address the effects of climate change, with the goals of restricting the increase of temperatures to 2 °C above pre-industrial levels at an absolute maximum, and facilitating action to further increase this limitation to 1.5 °C above pre-industrial levels. Decision 1/CP.1 of the Paris Agreement highlights the need for regional cooperation to address climate change impacts:

⁵⁴Kyoto Protocol to the United Nations Framework Convention on Climate Change, signed 11 December 1997, [2008] ATS 2 (entered into force 16 February 2005).

⁵⁵Kyoto Protocol to the United Nations Framework Convention on Climate Change, signed 11 December 1997, [2008] ATS 2 (entered into force 16 February 2005); and United Nations Framework Convention of Climate Change, signed 9 May 1992, [1994] ATS 2 (entered into force 21 March 1994).

⁵⁶Popp (2011, p. 142).

⁵⁷Bali Action Plan, Decisions 4/CP.13, 15 December 2007, quoted in Chuffart (2013).

⁵⁸Organisation for Economic Cooperation and Development (2009).

Climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions.⁵⁹

The long-term adaptation goal of the Paris Agreement is to address the effects of climate change through the collective actions of all countries through their common but differentiated responsibilities and perspectives.⁶⁰

As a general observation, it is clear that all international regimes discussed above have identified the need for the development and transfer of technology from developed countries to developing countries. However, there has been no agreed-upon level as to how this should be achieved, or to what extent. Hence, the implementation of most provisions may in practice be difficult. For example, Articles 7 and 8 of the TRIPS Agreement attempt to balance the interests of all stakeholders and intellectual property owners, as well as the public interest of recipient nations, emphasising the need for transfer and dissemination of technology. The extent to which this balance can be achieved in practice is unknown. Strictly speaking, for example, the extent to which developing countries make use of the flexibilities available under the TRIPS Agreement against providers of green technology has not yet been accurately determined (as will be discussed in more detail below). On the other hand, lack of enforcement measures has been a major factor inhibiting transference of technologies to developing countries through obligations imposed by international frameworks. It is therefore imperative to strengthen international commitments over the role of IPRs in the transfer of climate-friendly technologies from developed to developing countries, by taking an implementation-based approach to evidence that such transfers are indeed occurring.

5 Do IPRs Enhance or Impede Technology Transfer to South Asian Countries?

As discussed above, IPRs are an important but often controversial aspect of technology transfer. These rights play a major role in international negotiations, as providers often assess IPRs in their country of origin prior to transferring technology.⁶¹ How IPRs and technology transfer interact with one another is arguably specific to their context.⁶² Within the context of climate change technology, views are divided on whether IPRs obstruct or promote technology transfers.

IPRs are a necessary incentive for innovation and technology transfers, designed to benefit society by encouraging innovators to advance technology in return for a limited reward. Without IPRs, there can be no technology transferred in the first

⁵⁹Wijenayake (2016).

⁶⁰Article 2(b) of the Paris Agreement.

⁶¹Shujing (2012).

⁶²Maskus (2010).

place.⁶³ Developed countries (primarily located in ‘the North’) dominate ownership of climate change technology, royalties and licensing income and have been reluctant to transfer technology to developing countries (primarily located in ‘the South’) on the basis that they lack sufficient IPR regimes. This is because rights holders are only willing to transfer technology if they can safeguard against the risk of ‘losing control of information along the chain of transmissions’.⁶⁴

However, many developing countries in need of low-carbon technologies lack strong IPR systems that would otherwise facilitate technology transfer from developed countries.⁶⁵ As will be discussed in more detail below, countries with non-functional or weak IPR systems face serious difficulties in becoming resilient to climate change, and are hence more vulnerable to climate change.⁶⁶ The World Bank argued:

When enforcement of intellectual property rights (IPR) is perceived to be weak, foreign firms may not be willing to license their most sophisticated technologies, for fear that competitors will use it—which is the situation for wind equipment in China. Weak IPR enforcement also discourages foreign subsidiaries from increasing the scale of their R&D [research and development] activities and foreign venture capitalists from investing in promising domestic enterprises.⁶⁷

Further, Barton argues that IPRs do not act as a barrier to climate change technology transfers, as most of this technology is in the public domain.⁶⁸ As Barton states, IPRs play a different role in climate change and renewable energy industries compared with other industries such as biotechnology and pharmaceuticals. The basic approaches to climate change and renewable energy technology have long been off-patent and can be regarded as mature technologies.⁶⁹ Further evidence-based research is needed to corroborate this claim, but there is some merit to this view. Solar technology, for instance, is now several generations old, and what is usually patented are specific add-ons or improvements rather than the basic or original technology itself.⁷⁰ Cannady also observes that many developers of climate change technology have not protected their inventions in developing countries, either because of a lack of familiarity with the intellectual property processes, a view that the market in developing countries is peripheral, or a conscious decision to support climate change resilience.⁷¹

On the other hand, it is also contested that strong IPRs may in fact hamper technology transfers that have been an important source of learning and technical

⁶³Azam (2011, pp. 493–494).

⁶⁴Corvaglia (2014, p. 129).

⁶⁵Bazilian et al. (2008, p. 27), quoted in Burns (2012, p. 423).

⁶⁶Jolly (2012, p. 94).

⁶⁷World Bank (2010) at 309.

⁶⁸Barton (2007).

⁶⁹Ibid.

⁷⁰Cannady (2009, p. 2).

⁷¹Ibid.

change in developing countries.⁷² Bangladesh, for example, has long been regarded as one of the countries in the region most vulnerable to the effects of climate change.⁷³ Due to its socioeconomic incapacities, Bangladesh has an almost non-functional intellectual property system that provides no incentive or avenue for local researchers to explore technological advances, and no effective mechanism to disseminate technical knowledge for technology exchanges.⁷⁴ As a result, the country has had no alternative other than to rely on formal technology transfers and imitation by copying advanced technology to become better equipped for climate change resilience.⁷⁵ Hence, stronger IPRs could reduce the opportunity for countries such as Bangladesh to capitalise on imitated green or clean technologies to support their climate change resilience.⁷⁶ The World Intellectual Property Organization (WIPO) once argued that ‘it is likely that where most patents in the country are held by foreign inventors or corporations, local R&D can be stifled since the monopoly rights conferred by patents could restrict the research by local researchers’.⁷⁷ However, this phenomenon is highly dependent on the country’s market structure and economy.

From a theoretical perspective, it is true that the doctrines of substantive intellectual property law do not obstruct climate change technology transfers. Indeed, they do not discriminate against developing countries in particular. However, the problem is often practical and not theoretical.⁷⁸ The price for commercialisation can be prohibitively high,⁷⁹ and many developing countries in South Asia lack the capital to buy or license technology, or own no useful climate change technology that can be bartered.⁸⁰ Moreover, they have no great bargaining power to negotiate licences for these technologies.⁸¹ In its World Development Report 2010, the World Bank also weighed in on this issue:

There is no evidence that overly restrictive IPRs have been a big barrier to transferring renewable energy production capacity to middle-income countries, but there are fears that they could one day become so. Brazil, China, and India have joined the ranks of global industry leaders in photovoltaics, wind, and biofuels, often by acquiring licensed technologies. IPR issues may become more of a barrier to technology transfer as patenting activity accelerates...

In low-income countries weak IPRs do not appear to be a barrier to deploying sophisticated climate-smart technologies. But predictable and clearly defined IPRs can still stimulate technology transfer from abroad... On the whole however, the impact of IPRs on

⁷²Shujing (2012, p. 1402).

⁷³Roy et al. (2016).

⁷⁴Azam (2011, p. 499).

⁷⁵Ibid.

⁷⁶Shujing (2012, p. 1402).

⁷⁷World Intellectual Property Organization (2014).

⁷⁸Cannady (2009, p. 1).

⁷⁹Corvaglia (2014, p. 129).

⁸⁰Cannady (2009, p. 1).

⁸¹Ibid.

technology transfer may be over - stated in comparison with other costs such as management and training and barriers such as limited absorptive capacity.⁸²

In sum, the relationship between IPRs and technology transfer is far more complicated, and whether strong intellectual property protections would benefit countries in South Asia is inconclusive. Nevertheless, it is crucial for countries in South Asia to develop an effective, functioning national patent system that can attract foreign investments and technology transfer and at the same time promote domestic technological innovations, especially in small- to medium-sized business enterprises. On the other hand, it will be challenging to strike a complete balance in IPRs between the originating and recipient countries. Weatherall stated:

It makes no sense to expect that IP [intellectual property] law will give equal ‘rights’ to creators and users of IP, given that IP is a system built on exclusive rights. At risk of giving meaning to a meaningless phrase, however, I presume that what is intended, by references to ‘balanced’ IP rules, is that the rules recognise the legitimate interests of creators and innovators through the conferral of exclusive rights enabling exploitation of IP in the market, and protect other stakeholders in the IP system including through limits on rights, and through the recognition of *appropriate exceptions* where a user ought not be required either to seek permission, or pay for use, or either.⁸³

6 Importance of Using of Voluntary and Compulsory Licensing at National Levels to Promote Transfer of Climate-Related Technologies to South Asian Countries

Although the TRIPS Agreement has a fairly high and uniform level of protection, some TRIPS flexibilities allow member countries to limit the scope of patents, or to grant exceptions to promote public interests or anticompetitive practices.⁸⁴ For example, licensing—the process of leasing legally protected intellectual property—allows others to benefit from its use while allowing creator(s) to control the extent of use.⁸⁵ It acts as a safeguard against the risk of losing control of information along the chain of transmissions and has the potential to foster collaborative practices of mutual benefit.⁸⁶

One of the options introduced by TRIPS is the use of voluntary licences. This could be done with national law before the use of compulsory licensing. Under this system, countries needing access to climate change technologies could request a

⁸²The International Bank for Reconstruction and Development (2010, p. 310).

⁸³Weatherall (2016, p. 16).

⁸⁴Haugmark and Bach (2009, p. 15).

⁸⁵Srinivas (2011, pp. 147, 152–153).

⁸⁶Ibid.

voluntary licence on 'reasonable commercial terms' from the patent owner or licensee. The patent holder or licensee would charge a royalty or licence fee for granting the licence. However, it is necessary to understand that, even if a recipient country could pay for the royalty and licensing fees to access the technology, the patent holder may still refuse to license out the technology.⁸⁷ There has been evidence of patent abuse, where certain patent holders of climate change technology have refused to license their technology to firms in developing countries.⁸⁸ Indian firms, for example, were refused licences on patented technologies that substituted ozone-depleting substances.⁸⁹ In reality, in order for it to be functional, voluntary licensing requires the cooperation of the rights owner.

Compulsory (non-voluntary) licensing is a way of overcoming such hurdles. Under this system, applicants apply to the government to be granted a compulsory licence, especially when a patent holder refuses to license the use of a technology on terms that are fair, reasonable and non-discriminatory. Article 31 of the TRIPS Agreement regulates 'compulsory licensing'. It covers both compulsory licences granted to third parties for their own use and use by or on behalf of governments without the authorisation of the rights holder.⁹⁰ In line with Article 31 of the TRIPS Agreement, member states have the right to adopt such laws permitting the use of patented material without authorisation by the patent holder, through 'compulsory licensing', in the case of 'national emergency, other circumstances of extreme urgency, and in cases of public non-commercial use'.⁹¹ Some argue that compulsory licensing for emergencies should not be applied to long-term environmental problems such as climate change and should only be available for widespread epidemics where access to a particular drug is insufficient.⁹²

However, the Doha Declaration⁹³ has clarified that there are some flexibilities in Article 31 of TRIPS, under which member states may obtain compulsory licences⁹⁴ to offset the monopoly of patents, based on 'strong public needs'. Article 5 of the Doha Declaration, in particular, states that members have the right to grant compulsory licences and the freedom to determine the grounds upon which such

⁸⁷Hutchison (2006, p. 531).

⁸⁸South Centre (2009, p. 14).

⁸⁹*Ibid.*

⁹⁰Taubman et al (2012, p. 109).

⁹¹See Article 31 of the TRIPS Agreement.

⁹²Giovanetti (2009), quoted in Fair (2010, p. 32).

⁹³The Doha Declaration is not an alternative to the TRIPS Agreement; it is merely a ministerial interpretation of the agreement intended to clarify the uncertainties.

⁹⁴According to Article 31(b) of the TRIPS Agreement, compulsory licensing may only be permitted if, prior to such use, the proposed user has made efforts to obtain authorisation from the rights holder on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time. This requirement may be waived by a member in the case of national emergency or other circumstances of extreme urgency or in cases of public non-commercial use.

licences are granted.⁹⁵ It also declares that members have the right to determine what is to be considered a national or extreme emergency. Further, there is no definition in TRIPS specifying what a national emergency is. It can be argued that, even though Article 31 of TRIPS does not directly refer to the environment, it gives room for members to adopt the provision where it is deemed to be necessary.

On the other hand, the use of compulsory licenses within the TRIPS flexibilities has been exercised by many developed countries on the ‘grounds of public interest at large’. For example, the United States government has granted compulsory licences under the Clean Air Act 1970 to control air pollution, allowing industries greater access to air pollution control devices, and preventing companies from avoiding the use of superior inventions by claiming that they are not available.⁹⁶ This is an example demonstrating the flexibility and potential of the compulsory licensing system to address a multiplicity of public interests and concerns,⁹⁷ and of countries being willing to use it to tailor it to the needs of the public.

Regardless of its effect on technology transfer, compulsory licensing has not often been used by developing countries. This chapter argues that the option to use compulsory licensing and the national legislative provision for compulsory licensing are paramount for aiding developing countries. Given the TRIPS flexibility used by developed countries, countries in South Asia should incorporate effective provisions for compulsory licensing into their national IPR legislation, in order to access technology without limiting their right to use it. In fact, the region would highly benefit from compulsory licensing, as it would considerably reduce high start-up costs and allow the manufacture of significantly cheaper green technologies at an affordable price. For example, compulsory licensing is more useful for a country like India because it has the technical skills and physical capital to produce many advanced technologies, and to operate and maintain imported equipment.⁹⁸ Carlos Correa argues:

Developing countries should preserve the maximum possible freedom under international rules to design their compulsory licensing systems, according to their own interests and needs, including in such areas as the protection of health and *the environment, and the promotion of transfer of technology and local industrialization*.⁹⁹

Further, Khor argues:

Compulsory licensing is thus an option that developing countries can consider using for those patented climate friendly technologies for which they have need, which are expensive, and when negotiations with the patent holder are unable to result in a sufficiently affordable price...¹⁰⁰

⁹⁵Article 5 of the Doha Declaration.

⁹⁶Gormley (1993, pp. 131, 141–42), quoted in Yosick (2001, p. 1279).

⁹⁷Correa (1999, p. 24).

⁹⁸Ibid.

⁹⁹Sampath (2003, p. 25).

¹⁰⁰Khor (2014, pp. 1, 11).

7 Can Parallel Importation Be a Solution to Technology Transfer?

Another considered option is parallel importation. The central concept behind parallel importation is ‘exhaustion’—whether a patent holder parts with all of its rights (that is, exhausts its rights) when it sells its product.¹⁰¹ The principle of exhaustion states that once a patent holder, or any party authorised by the patent holder, has sold a patented product it cannot prohibit the subsequent resale of that product, because its rights with respect to that market have been exhausted by the act of selling the product.¹⁰² The rationale behind the doctrine is that the patent owner has received full economic benefit of the patent from the first sale, and, as a result, it should not be able to control the resale of products in which its patents are embedded.¹⁰³ The doctrine of exhaustion limits the patent holder’s exclusive right by restricting their exclusive control over the use of the patented technology. As Rothnie argued:

‘Parallel imports’ have two vital, distinguishing features. They are lawfully put on the market in the place of export, the foreign country. But, an owner of the intellectual property rights in the place of importation, the domestic country, opposes their importation (usually because the goods are sold in the two different countries at quite disparate prices) and, taking advantage of the lower price, some enterprising middleman buys stocks in the cheaper, foreign country and imports them into the dearer, domestic country. Hence, the imports may be described as being imported in ‘parallel’ to the authorised distribution network.¹⁰⁴

The three types of market give rise to the establishment of different doctrines of rights exhaustion: national exhaustion, regional exhaustion and international exhaustion. Under the concept of national exhaustion, patent holders’ IPRs end upon the first sale within a nation, but the rights holder can prevent importation of protected products from other countries.¹⁰⁵ Regional exhaustion permits parallel trade among members of a region but not outside the region. Under international exhaustion, the least restrictive on parallel importers, IPRs are exhausted once the product is placed by the IPR owner anywhere in the world; the rights holder cannot prevent its products from being imported from other countries. The countries have the freedom to choose their own exhaustion (parallel importation) regime; however, there is considerable debate over which exhaustion regime is best suited to developing countries. However, in principle, developing countries usually prefer international exhaustion that allows them to import lower-priced patented products from anywhere in the world.

In fact, the TRIPS Agreement facilitates parallel importation based on the doctrine of exhaustion of IPRs. For example, Article 6 of the TRIPS Agreement

¹⁰¹Rothnie (1993).

¹⁰²Declaration on the TRIPS Agreement and public health.

¹⁰³Owoeye (2015, pp. 359, 360), quoted in Humphries (2016, p. 266).

¹⁰⁴Rothnie (1993, p. 1).

¹⁰⁵Bonadio (2011).

specifies that countries have the discretion to implement their own policies and laws with respect to exhaustion of rights in which member states are free to permit parallel imports. That allows member countries the flexibility to incorporate the principles of exhaustion of rights into their domestic law, along with national, regional or international doctrines of exhaustion.¹⁰⁶

As noted previously, many countries in South Asia are economically unstable, have weak production/manufacturing capacity and rely heavily on exports. Hence, parallel importation may significantly benefit South Asian countries by providing access to clean technologies that would not otherwise find their way to the local communities at affordable rates.¹⁰⁷ Most developing countries consider parallel importation not only as an opportunity for economic growth but also as a tool to prevent possible anticompetitive behaviours of an exclusive distributor.¹⁰⁸ For example, because price differences for the same product exist across countries, parallel importation allows consumers to enjoy the benefits of reasonable prices. The Report on the Commission on Intellectual Property Rights (United Kingdom) states:

Developing countries should not eliminate potential sources of low cost imports, from other developing or developed countries. In order to be an effective pro-competitive measure in a scenario of full compliance with TRIPS, *parallel imports should be allowed whenever the patentee's rights have been exhausted in the foreign country*. Since TRIPS allows countries to design their own exhaustion of rights regimes (a point restated at Doha), developing countries should aim to facilitate parallel imports in their legislation.¹⁰⁹

8 Is the Use of Patent Pooling an Option for Developing Countries in South Asia?

In a more narrow sense, a patent pool can be described as an agreement between two or more patent owners to license one or more of their patents to one another, and to license them as a package to third parties who are willing to pay the royalties that are associated with the license.¹¹⁰ The benefit of patent pooling is that the recipient country/company can work with the provider country/company and have the ability to license climate change technology. They can then either actively distribute them to their home countries or pursue development plans for future introduction, provided the collaboration agreements and technology licenses are

¹⁰⁶The Doha Declaration has further reaffirmed that 'Member States are free to establish their own regime for such exhaustion without challenge'.

¹⁰⁷Duke (2014, p. 585).

¹⁰⁸Okojie (2016, p. 2).

¹⁰⁹Azam (2016).

¹¹⁰van Overwalle (2016, p. 9).

negotiated for useful technology transfers. This is because pool licences are generally devoid of instructions and know-how.

One of the advantages of patent pooling is that it ensures that access to environmental technologies is guaranteed, avoiding the need to deal with multiple patent dealers.¹¹¹ The World Bank identifies patent pooling as a strategy that has potential for developing nations, particularly ‘for neglected seeds for drought-prone, saline environments, or other green solutions for lower-income countries’.¹¹² Patent pooling can overcome IPR barriers and provide biotech companies with greater incentives to license their technologies to developing countries, with the ultimate goal of ‘facilitating the implementation of novel climate change mitigating approaches in the developing world where they are most needed’.¹¹³ Reichman et al. describe the potential utility of patent pools for green technologies as follows:

A standard mechanism for addressing certain types of patent thickets is technology pools. These pools function particularly well when multiple complementary patents owned by different parties cover a platform technology or standard. Once the patents are pooled, licenses to the pool can then be made available both to contributors of relevant patents and to outsiders ... As a conceptual matter, a package of innovations licensed under a nonexclusive license of this kind invites the world to make use of the package at will, while organizing the contributors to the package as de facto partners of all subsequent users, who labor under a contractually specified obligation to pay reasonable royalties for follow on applications. The more successful the package becomes, the more follow-on users it generates, and the greater are the ‘lottery effect’ royalties paid to those who contribute to the package.¹¹⁴

Although patent pools have been suggested as a way to enhance developing countries’ access to climate change technology, in order for patent pools to function, there must be a commitment by the members to remain in the pool. On the other hand, for the recipient country, there are natural concerns, such as cost and potential lack of control over technology, that should be considered when assessing proposals to establish patent pools. Viewing patent pooling as a means to equalise disparate bargaining power is perhaps too altruistic—indeed, any suggestion that patent pools can magically resolve access issues to clean technology is far-fetched. One of the reasons is that, even though the members remain in the pool, pool licences do not eliminate inequality in bargaining power among the pool members.¹¹⁵

¹¹¹Chuffar (2013).

¹¹²The World Bank (2012, p. 78).

¹¹³Van der Veen (2012) proposed that the United Nations’ Green Climate Fund (GCF), established by the United Nations Framework Convention on Climate Change, be augmented by the creation of a licence system and/or patent pool.

¹¹⁴Reichman et al. (2008, pp. 20–1).

¹¹⁵Cannady (2009).

9 Is the Use of Patent Clearinghouses Effective for South Asia?

A clearinghouse is a mechanism that helps match patent holders with those in need of the technology. There are many forms of clearinghouse models. A patent clearinghouse could allow South Asian countries to have fair access to climate change technology while ensuring a fair economic return to the patentees/developers.¹¹⁶ Normally administered by a third party, a clearinghouse works on behalf of both parties in such a way that technology is made available to all users, and users only pay for the technology they require.¹¹⁷ It acts like a middleman in the market for technology that facilitates exchanges between intellectual property owners and intellectual property users.¹¹⁸

The functions of a clearinghouse can range from an informational clearinghouse that merely facilitates access to information, to a royalty collection clearinghouse that facilitates standardised licensing fee collection and licensing compliance.¹¹⁹ The advantage of a patent clearinghouse for South Asian countries is that it would successfully address the current obstacles preventing green technology transfers to those countries. For example, it would minimise the transaction costs spent on negotiation, as it would aggregate information about the technology needs of both parties. Patent holders would transfer their climate change technology to the clearinghouse on agreed conditions for licensing, without further need to interact with any users.¹²⁰ By centralising information, a patent clearinghouse can reduce search and bargaining costs by maximising matches between patent holders and potential licensees.¹²¹ Furthermore, provided a third party administers the clearinghouse, opportunism through exorbitant licensing prices can be avoided by implementing standardised licensing practices and prices.¹²²

This would be especially beneficial to South Asian countries, which are particularly vulnerable to climate change and desperately require green technologies for climate change adaptation and resilience. However, any clearinghouse would need to bring together a critical mass of accessible climate change technology if it is to be an effective tool. It would require the developers of climate change technology to cooperate and provide the necessary information.¹²³

¹¹⁶Sheremeta and Gold (2013, p. 5).

¹¹⁷Baltzer (2011, p. 532).

¹¹⁸Aoki and Schiff (2007b).

¹¹⁹Aoki and Schiff (2007a).

¹²⁰van Zimmeren (2006, p. 41).

¹²¹Baltzer (2011, p. 532).

¹²²Ibid 532.

¹²³van Zimmeren (2006, p. 41).

10 Why Flexibilities Under TRIPS Is Underused by South Asian Countries

Although the flexibilities under the TRIPS Agreement allow South Asian countries considerable leeway to maximise the benefits and minimise the costs of adopting the international minimum standards, the flexibilities remain underused for a number of reasons, such as domestic considerations and pressures at bilateral and multilateral levels.

The flexibilities granted by TRIPS can be used only if they have been implemented domestically. However, different countries have different implementation strategies, and many developing countries—including those in South Asia—have not fully incorporated the TRIPS flexibilities into their laws. Failing to incorporate TRIPS flexibilities domestically has primarily been due to lack of technical expertise.¹²⁴ Most of the technical expertise held by developing countries relates to compliance with provisions relating to the patent holders' rights rather than to applying flexibilities to facilitate climate change technology transfers.¹²⁵ The lack of technical expertise to implement TRIPS flexibilities domestically has thus led to the countries' inability to access information on best practices, to curb the abuse of patent rights and to serve public interest purposes such as climate change mitigation.¹²⁶

The TRIPS flexibilities have also been underused by the interplay of domestic economic, political and social forces.¹²⁷ India's compulsory licensing practice, for example, has been market driven due to the numerous procedural and substantive obstacles between governmental and non-governmental agencies that have severely restricted the opportunity for respective national governments to be proactive.¹²⁸ As Serrano and Burri observed, the capacity to successfully implement intellectual property policies, such as compulsory licensing at a national level, was:

strongly affected by the need to achieve domestic consensus – particularly between the main ministries concerned: commerce and industry, foreign, finance, agriculture, rural development and communications, as well as information technology... each of these ministries had de facto veto power in the fields under its domain...¹²⁹

Bureaucratic divisions delayed the introduction of compulsory licensing, and it was ultimately epistemic communities such as legal scholars who played a central role in implementation. There is also political pressure from the private sector to prevent South Asian countries from using the flexibilities. Dominant multinational companies operating in local markets have vast resources, not just to lobby

¹²⁴Musungu et al. (2004, p. 24).

¹²⁵Ibid.

¹²⁶Ibid.

¹²⁷Serrano and Burri (2016, p. 6).

¹²⁸Ibid., p. 7.

¹²⁹Ibid., p. 9.

governments but also to engage in extensive marketing campaigns aimed at undermining the exercise of TRIPS flexibilities.¹³⁰

Compounding these domestic pressures are external pressures from developed countries, which cannot be underestimated: developed countries have mobilised their bargaining power and legal apparatus to enforce one-sided intellectual property protection provisions in trade agreements. The United States, for instance, entered into bilateral trade agreements with Vietnam and Cambodia, which required intellectual property compliance with TRIPS standards even when they were not members of the World Trade Organization (and therefore not obliged to comply with TRIPS).¹³¹ It is therefore unsurprising that bilateral pressures have also been exerted on South Asian countries to prevent use of TRIPS flexibilities. In the free trade agreement between the European Union and Vietnam, for instance, Vietnam is required to commit to a high level of intellectual property protection beyond the standards of TRIPS, including extending the scope of patentability, patent terms and data protection.¹³² Less relevant are the free trade agreements with the United States (only Singapore and South Korea have these agreements), but the United States has consistently curbed TRIPS flexibilities in its free trade agreements by extending the scope of patentability, patent terms, data protection and data exclusivity, imposing limits on patent revocation and compulsory licensing, and imposing blanket prohibitions on parallel importation.¹³³ Any South Asian country entering into a free trade agreement with the United States is likely to have their TRIPS flexibilities curtailed. Given that these agreements formally comply with Article 1(1) of TRIPS, developed countries have mobilised their bargaining power and legal apparatus to curb the flexibilities granted and to enforce stronger IPR protections beyond the scope of TRIPS. It requires a significant level of political and economic clout for developing countries to resist this pressure.¹³⁴ Unfortunately, this is something most developing countries in South Asia lack.

At the multilateral level, pressure has also been exerted through WIPO's Standing Committee on the Law of Patents and the efforts of developed countries to reach agreement on a Substantive Patent Law Treaty (SPLT).¹³⁵ It is argued that 'any form of deep harmonization through the SPLT that is likely to win the support of the developed countries seems certain to erode whatever flexibilities the developing countries still retain under the TRIPS Agreement.'¹³⁶ Developed countries demand higher protectionist standards, and:

¹³⁰Musungu et al. (2004, p. 30).

¹³¹See for example the Annex to the Trade and Investment Framework Agreement between the United States and Cambodia and the Annex to the Trade and Investment Framework Agreement between the United States and Vietnam.

¹³²Chapter 12 of the European Union – Vietnam Free Trade Agreement: Agreed text as of January 2016.

¹³³Serrano and Burri (2016, p. 5).

¹³⁴Musungu et al. (2004, p. 30).

¹³⁵World Intellectual Property Organization (2006).

¹³⁶Reichman and Cooper Dreyfuss (2007, p. 98).

there is a risk that virtually every pro precompetitive option still left open to developing countries under their domestic patent laws—from exceptions to patentability to limitations on exclusive rights and the possibility of imposing compulsory licenses – would shrink or disappear in the SPLT.¹³⁷

Deep harmonisation will likely require convergence on a single standard that will not suit developing countries in South Asia, given the disparity in technological sophistication and intellectual advances. Although negotiations on the SPLT were put on hold in 2006, proposals to revive the talks have periodically emerged.¹³⁸ Any successful implementation of the SPLT would be worrying, as it would likely exacerbate the underuse of TRIPS flexibilities.

It is clear that the flexibilities under TRIPS are not wide ranging and are constrained by procedural conditions and limitations which result in their underuse. As discussed, pressures exerted through other avenues like trade agreements and multilateral bodies curb the flexibilities granted in TRIPS. Developed countries can also mobilise their bargaining power and legal apparatus to enforce one-sided intellectual property protection provisions, which can include ‘the extension of the scope of patentability, limits on patent revocation, patent term extension, prohibition of parallel importation, limitations on compulsory licensing and extended data protection and data exclusivity.’¹³⁹ It is therefore unsurprising that South Asian countries have been wary of using these flexibilities.

11 Conclusion

This chapter has shown that technology transfer is critical to effectively tackling climate change for South Asian countries. It is accepted that an effective low-carbon green growth cannot be attained by one country alone; it requires considerable cooperation among countries in a region and beyond.¹⁴⁰ Hence, a regional regulatory framework is often one of the best ways to develop policy on climate change. In this way, the countries in South Asia can ensure that they comply with a common set of regulations, with the aim of accelerating the reduction of GHG emissions across the region.

The initiation of a regional task force would reinforce the regional states’ development of IPR standards through national legislation. For example, enhanced intellectual property protection at a regional level makes powerful trading partners and applies pressure to patent holders in the Western world to issue voluntary licences that are less time-consuming and cumbersome than compulsory

¹³⁷Ibid., p. 99.

¹³⁸See for instance World Intellectual Property Organization Standing Committee’s 2010 Report SCP/13.

¹³⁹Serrano and Burri (2016, p. 5).

¹⁴⁰Anbumozhi (2015).

licensing.¹⁴¹ In addition, harmonised regional intellectual property regulations will facilitate cross-border trade agreements, increase the certainty of technology transfer, and reduce contracting and regulatory compliance costs, allowing technology to be available across the region. This regional integration should require all its countries to adopt uniform regional intellectual property policy and law in their legal systems, with harmonised intellectual property norms and standards between the countries. In addition, an effective monitoring mechanism must also be placed at the regional level to ensure that regional members keep their promises and fulfil their obligations.

South Asian countries can also establish green technology funds. These funds could be used to provide both finance and technology support for countries in the region to implement their green policies and acquire licensing for technology that is not being provided by the patent holder at reasonable terms. The regional green technology funds can be used both externally and internally by strengthening financial stability and cooperation within the region.

There is currently no formal legal framework or mechanism in the region that can guide enforceable rights with respect to technology transfer. A regional mechanism would be practically feasible, given the fact that all the countries in the region have economies that are at a similar level of development and are among the most vulnerable to the effects of climate change. It is therefore crucial for countries in the South Asian region to develop an effective, functional regional mechanism that can attract foreign investment and technology transfer and at the same time promote domestic technological innovations. There is clearly a need for regional coordination, which would undoubtedly provide an excellent opportunity for South Asian countries to strengthen their negotiating powers and successfully negotiate contracts with technology providers.

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¹⁴¹Hopkins (2006).

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Chapter 9

Intellectual Ventures: Patent Law, Climate Change, and Geoengineering



Matthew Rimmer

Abstract This chapter considers the role of patent law in respect of geoengineering. Intellectual Ventures has developed a large portfolio of patents in this area. A number of other private and public entities have also filed patents in the field of geoengineering. In light of the recent precedents of the Supreme Court of the United States in respect of *Bilski*, *Prometheus*, *Myriad*, and *Alice*, it is worth exploring the question, Should patents on geoengineering be allowed? Defenders of geoengineering would maintain that such technology is legitimate, much like traditional forms of engineering. Critics, such as the ETC Group, have called for a ban on patents in respect of geoengineering. There have been fierce debates over the ethics of geoengineering. Philosophers and policy-makers such as Stephen Gardiner, Clive Hamilton, Bill McKibben, Al Gore, and Naomi Klein have argued over the merits over such technologies. It is useful to situate such a discussion in the context of previous debates over intellectual property and emerging technologies—such as biotechnology, nanotechnology, synthetic biology, and clean technologies. Moreover, this chapter explores the potential for patent thickets in respect of geoengineering. What will be the impact of such patents on research, clean technologies, the environment, the climate? There has also been much concern about the possibility of overzealous enforcement of patents in respect of geoengineering. As such, it is worthwhile considering what policy options for patent abuse will be useful or effective in this field. There is a larger international debate over the governance and regulation of geoengineering—particularly in light of the Paris Agreement 2015.

Keywords Intellectual property • Climate change • Geoengineering
Patent law • Patentable subject matter • Patent infringement • Patent exceptions
Patent law and ethics • Regulation

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1 Introduction

Geoengineering is a field of science, which involves the large scale manipulation and alteration of the planet's climate. An expert report by the Secretariat for the Convention on Biological Diversity defines climate-related geoengineering as 'a deliberate intervention in the planetary environment of a nature and scale intended to counteract anthropogenic climate change and its impacts.'¹ The report noted:

Geoengineering techniques include increasing the reflectivity of the Earth's surface or atmosphere, and removing greenhouse gases from the atmosphere; other approaches have also been proposed. This definition of geoengineering encompasses a wide spectrum of possible actions to counteract (or remedy) global warming and its associated consequences. The commonality of those actions is that they could produce global cooling, if applied at sufficient scale. Geoengineering can therefore be differentiated from actions that mitigate (reduce or prevent) anthropogenic greenhouse-gas emissions.²

The report distinguishes climate-related geoengineering from other activities such as Carbon capture and storage (CCS), and large-scale land management.³ In an overview of intellectual property and climate science, David Hunter observes that the area poses innovation challenges: 'Geoengineering solutions will require significant research and innovation to make them scalable and cost effective, but they may require fewer challenges for distribution and deployment because they are, almost by definition, large scale and require centralized, government-led initiatives.'⁴ There has been much public policy debate over the governance of geoengineering.

The topic of geoengineering has also raised theoretical and practical issues in respect of intellectual property law and policy. In 2010 Shobita Parthasarathy and her collaborators at the Gerard Ford School of Public Policy at the University of Michigan provided a snapshot of the geoengineering patent landscape.⁵ The group of researchers made a number of findings. First, the researchers highlighted different levels of activity between different types of geoengineering. Second, the researchers noted a rapid increase in patent applications covering geoengineering technologies. Third, the group identified that there were broad language in respect of patent claims, covering a wide array of future innovations. Fourth, there has been concern about the concentration of patent ownership in respect of the field of geoengineering. Fifth, there are issues with patents owned by non-practising entities. Sixth, there have been a number of geoengineering patents issued by major patent offices all around the world.

¹Convention on Biological Diversity Secretariat (2012, p. 8).

²Ibid.

³Ibid.

⁴Hunter (2016, pp. 11–32).

⁵Parthasarathy et al. (2010, p. 4).

There has been much controversy over the patenting of geoengineering. In light of the recent litigation in respect of patentable subject matter in the Supreme Court of the United States, it is worth exploring the question, Should patents on geoengineering be allowed? Defenders of geoengineering would maintain that such technology is legitimate, much like traditional forms of engineering. Some have defended a subfield of geoengineering—solar climate engineering.⁶ Yet solar geoengineering remains an unproven technology, still on the fringes of respectable science.⁷ A number of researchers have recommended procedural and substantive reforms in respect of patent law in order to address geoengineering.⁸ Critics, such as the ETC Group, have called for a ban on patents in respect of geoengineering. There has also been much concern about patent enforcement in respect of geoengineering. Intellectual Ventures has developed a large portfolio of patents in this area, to the delight of some, and the alarm of others. There has been a concern about the potential for patent thickets in respect of geoengineering. What will be the impact of such patents on research, clean technologies, the environment, and the climate?

There has been a burgeoning scholarly literature over policy settings in respect of intellectual property, trade, and clean technologies.⁹ The discipline of climate law certainly needs further work in this area.¹⁰ In this context, geoengineering has been a controversial area. As I flagged in a book in 2011, the patenting of geoengineering has been contentious—with some critics calling it ‘geopiracy’.¹¹ There have been fierce public policy debates over the ethics of geoengineering. Philosophers and policy-makers such as Stephen Gardiner, Clive Hamilton, Naomi Klein, Al Gore, and Anthony Giddens have argued over the merits over such technologies.

It is useful to situate such a discussion in the context of previous debates over intellectual property and emerging technologies—such as biotechnology, nanotechnology, synthetic biology, and clean technologies. Part 2 looks at patent litigation involving geoengineering. In particular, it focuses upon the enterprising and controversial company, Intellectual Ventures. Part 3 of this chapter considers the position of geoengineering in light of the debate over patentable subject matter. Part 4 considers options for patent law reform—in light of controversies over patent enforcement and emerging technologies. Part 5 focuses upon the international

⁶Reynolds et al. (2017); and see also Reynolds et al. (2018).

⁷‘It is appropriate that we spend money on solar geoengineering research,’ said Kevin Anderson, the deputy director of the Tyndall Centre for Climate Change Research. ‘But we also have to aim for 2C with climate mitigation and act as though geoengineering doesn’t work, because it probably won’t.’: Neslen (2017).

⁸Chavez (2015).

⁹See Lane (2011), Brown (2013), Menell and Tran (2014), Sarnoff (2016).

¹⁰Sindico (2016).

¹¹Rimmer (2011a, p. 400).

regulation of geoengineering in light of the Paris Agreement 2015.¹² The overall argument of this chapter is that patent law should not encourage research, development, and deployment of geoengineering technologies. Such incentives would be better targeted at truly clean technologies—such as solar power, wind power, and wave power.

2 Patent Litigation and Intellectual Ventures

There have been some initial efforts to map patents in respect of geoengineering and climate engineering. Oldham and colleagues have sought to chart the patent landscape in respect of geoengineering.¹³ The researchers ‘identified 143 patent families (first filings) linked to 910 family members worldwide originating from 12 countries and published in 39 countries between 1971 and 2013.’¹⁴ The researchers considered the top patent applicants in the field:

Levels of individual filings are low, with the clear leader being Global Research Technologies (co-founded by Klaus Lackner and Allen Wright of Columbia University), which was later renamed Kilimanjaro Energy. However, one of the most striking features of applicants is the presence of two intellectual-property-only companies Searete LLC and Invention Sci Fund. In the case of SRM, these companies have received a US patent grant for a ‘High altitude structure for expelling a fluid stream through an annular space’ (US8166710B2) that envisages uses to influence global warming or cooling. Both companies are reportedly subsidiaries of Intellectual Ventures Inc. (IV), an intellectual property company that acquires and licenses patents and patent applications and has developed in-house research capacity as Intellectual Ventures Lab. Intellectual-property-only companies have been associated in wider public discourse with the phenomenon of ‘patent trolls’, notably in the field of computer software patents. The presence of IP-only companies could suggest strategic positioning to capitalize on potential developments in climate engineering, particularly if broad patent grants have been awarded on fundamental aspects of emerging climate engineering technologies.¹⁵

The researchers identified a very small field of 244 inventors in the patent data for climate engineering. They observed: ‘Marking the edges of climate engineering as an issue, research domain or area of innovation is exceptionally challenging, given the profound scientific and definitional uncertainties’.¹⁶ Oldham and colleagues have argued that ‘the bibliometric monitoring of research and patenting

¹²Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

¹³Oldham et al. (2014), 20140065.

¹⁴Ibid.

¹⁵Ibid.

¹⁶Ibid.

activity could constitute an important part of the anticipatory governance of climate engineering.’¹⁷ Such research would suggest that geoengineering remains a rather boutique field in terms of patent filings. There has significant early controversy in respect of both public research and private commercial enterprises.

2.1 Public Research

There has been a lot of debate about public research funding in respect of geoengineering.

In the United Kingdom, a geoengineering experiment was cancelled due to a controversy over patent law and conflict of interest.¹⁸ The Stratospheric Particle Injection for Climate Engineering (SPICE) project involved a collaboration among several UK universities and Marshall Aerospace to investigate the possibility of spraying particles into the stratosphere to mitigate global warming. Matthew Watson, the principal investigator of SPICE and an Earth scientist at the University of Bristol, commented: ‘It is with some regret that today the SPICE team has announced we’ve decided to call off the outdoor “1 km testbed” experiment that was scheduled for later this year.’¹⁹ He noted in the absence of a regulatory framework, Watson said that the field trial would be ‘somewhat premature’.²⁰

There was a controversy over a patent application that was submitted by Peter Davidson, who runs the UK consulting firm Davidson Technology on the Isle of Man and was an adviser at the workshop that gave rise to the SPICE project, and Hugh Hunt, an engineer at the University of Cambridge, UK, who is one of the SPICE project investigators. The patent related to an ‘apparatus for transporting and dispersing solid particles into the Earth’s stratosphere’ by ‘balloon, dirigible or airship’ technology related to the SPICE field trial. Matthew Watson observed that the patent application presents ‘a potentially significant conflict of interest’.²¹ He observed: ‘The details of this application were only reported to the project team a year into the project and caused many members, including me, significant discomfort.’²² He commented: ‘Information regarding the patent application was immediately reported to the research councils, who have initiated an external investigation.’²³

¹⁷Ibid.

¹⁸Cressey (2012).

¹⁹Ibid.

²⁰Ibid.

²¹Ibid.

²²Ibid.

²³Ibid.

Davidson maintained that he told the main funder, the UK Engineering and Physical Sciences Research Council (EPSRC), about the pending patent. ‘The EPSRC was well aware I might have some IP [intellectual property] before the project was sanctioned.’²⁴ He insisted that it was ‘completely normal’ for engineering projects to seek to protect their intellectual property.²⁵ Davidson noted: ‘The issue here is that in climate science there is a mistrust of IP, and I understand that now.’²⁶ He commented: ‘We’re not expecting any revenue from any of the IP, but if there is any it will go into a trust fund supporting climate-change-related charities.’²⁷

Writing for the BBC, Richard Black observed that there were issues about disclosure of the patent application.²⁸ Matthew Watson commented: ‘The details of this application were only reported to the project team a year into the project lifetime and caused many members, including me, significant discomfort.’²⁹ He maintained that the patent application was intended for the public benefit, rather than private profit: ‘I’ve never taken the view that this is something anybody will make money on—it’s just saying ‘we thought of this’, so that if a company comes along and tries to patent it later, they can’t.’³⁰ Watson maintained: ‘Any postponement of the 1 km test would be a de facto cancellation as the experiment’s value, to elucidate balloon and tether dynamics, diminishes over the project lifetime.’³¹ He observed: ‘The Spice team sincerely hopes that this decision will facilitate rational, unrushed discussion on issues that include both governance and intellectual property but span broader issues surrounding solar radiation management (SRM).’³²

Erin Hale considered the larger issues surrounding the regulation of geoengineering for *The Guardian*.³³ John Shepherd, chair of the Royal Society’s geo-engineering group, commented:

This shows how commercial and financial interests can complicate the management of research on geoengineering, especially SRM technology, even if everyone agrees that it is safe. The project team have done the right thing, but this is an issue that needs to be explored in depth with stakeholders. It’s a shame that the balloon experiment won’t be done now, as it would be really interesting to know if this technology would work, and I am quite sceptical about it. However, it was always an optional extra to the rest of the project, which is scientifically much more important.³⁴

²⁴Ibid.

²⁵Ibid.

²⁶Ibid.

²⁷Ibid.

²⁸Black (2012).

²⁹Ibid.

³⁰Ibid.

³¹Ibid.

³²Ibid.

³³Hale (2012).

³⁴Ibid.

Peter Cox, a Professor of climate system dynamics at the University of Exeter, said in a statement: ‘It is regrettable that the field-trial aspect of Spice has now been cancelled, but it is vitally important that the remainder of the project, which is desk and lab based, should continue.’³⁵ The controversy certainly highly issues about the interaction between intellectual property and government regulation in respect of geoengineering.

2.2 Private Ventures

In his book, *Windfall: The Booming Business of Global Warming*, McKenzie Funk commented: ‘Advocates of geoengineering, or at least of geoengineering research, tend to fall into three categories: scientists deeply afraid of runaway climate change; free-market advocates deeply afraid of mandated carbon cut; and the capitalists, and the philanthrocapitalists who sustain them both.’³⁶ Funk particularly focuses upon the firm Intellectual Ventures; its investments in geoengineering; and the controversies over its intellectual property portfolio. Funk interviews both Nathan Myhrvold, the Chief Executive Office of Intellectual Ventures, and Casey Tegreene, the leading patent lawyer for Intellectual Ventures.

Intellectual Ventures is a private company founded by Nathan Myhrvold and Edward Jung of Microsoft, and later joined by Peter Detkin of Intel and Gregory Gorder of Perkins Coie. The company’s motto is ‘inventors have the power to change the world.’ Intellectual Ventures explains its business model thus:

IV has always been ahead of the intellectual property curve—in fact we set the trajectory for the market. We made the business choice to focus on invention, and invention only. That allowed us the freedom to build our expertise and knowledge and be pointed in our pursuits. But we’re no one trick pony. We know the IP market, from patent applications to portfolio licensing, inside and out.³⁷

Intellectual Ventures has purchased and developed a large portfolio of patents, cutting across a wide range of fields—including information technology, medicine, nanotechnology, nuclear energy, and agriculture.

In 2009, Intellectual Ventures explained its interest in the field of geoengineering.³⁸ The company sought to naturalise and normalise the technology. Intellectual Ventures stressed that geoengineering should be considered as a form of large-scale engineering:

‘Geoengineering’ describes how the earth’s systems can be influenced by engineering solutions. There are many historic examples of how humans have used technology to change geological systems. From using fire to drive game to building irrigation for

³⁵Ibid.

³⁶Funk (2014, p. 265).

³⁷Intellectual Ventures, <http://www.intellectualventures.com/about/>.

³⁸Intellectual Ventures, <http://intellectualventureslab.com/?p=338>.

agriculture, seeding clouds during droughts, reversing the Chicago River to building the Hoover dam, the term can encompass all sorts of ideas. Today, options discussed often include large-scale engineering of the environment in order to combat or counteract the adverse effects of human-induced changes in the atmosphere and climate.³⁹

In terms of patent law, Intellectual Ventures' emphasis upon engineering is notable, as it highlights its assumption that such subject matter can be protected. Mechanical inventions have long been considered to be subject matter, which are protected under patent law.

Intellectual Ventures explained that it was researching geoengineering, because of its interest in addressing climate change and global warming. The company stressed: 'Global warming is a very significant problem, but it won't be solved with old ideas and old technology alone'.⁴⁰ The company explained its approach in terms of innovation: 'We believe that the solution to this crisis will involve new ideas and new technologies.'⁴¹ The company makes the following pitch in respect of the potential benefits of geoengineering:

Realistically, geoengineering could offer us a way to buy time by preventing the worst effects of global warming while society gets its act together on a carbon-emission free energy infrastructure. We are continuing to work with experts in the climate sciences to further advance the technology. If we are effective in cutting emissions, and lucky in how much CO₂ the climate system can tolerate, then it may not be needed at all.⁴²

Intellectual Ventures downplays the potential risks associated with geoengineering. The company notes: 'Intellectual Ventures recognizes that the process of bringing new global warming ideas to the surface can be challenging and controversial.'⁴³ Intellectual Ventures emphasized: 'As an invention company, we believe research needs to be done now, rather than after the full complications of global warming are upon us.'⁴⁴ Intellectual Ventures discusses the topic thus: 'Geoengineering is only under consideration to combat the vastly more harmful effects that are predicted from severe climate change.'⁴⁵

Intellectual Ventures has made significant investments in respect of patent law and geoengineering. The company is coy about whether it plans to profit from its patents in respect of geoengineering. Intellectual Ventures observes:

Intellectual Ventures invents new technology as its main business, but we do not expect or intend that our climate technology inventions will make money. Rather, they are part of our work applying the brain power and creativity of our inventors to the serious problems confronting society. Other efforts like this include active programs in eliminating malaria,

³⁹Intellectual Ventures (2009).

⁴⁰Ibid.

⁴¹Ibid.

⁴²Ibid.

⁴³Ibid.

⁴⁴Ibid.

⁴⁵Ibid.

delivering vaccine to remote areas without refrigeration and purifying food and water to prevent illness in the developing world.⁴⁶

Intellectual Ventures maintains that its programme is a humanitarian one. The United States Patent and Trademark Office have provided special incentives and rewards for ‘patents for humanity’.⁴⁷

In his book *Windfall*, McKenzie Funk provides a vivid portrait of the research and development strategies of Intellectual Ventures.⁴⁸ The patent lawyer, Casey Tegreene explains that the company holds ‘invention sessions’—‘the process of sticking three to ten handpicked scientists, doctors, or engineers in a conference room for eight to sixteen hours and asking them to grapple with “big, interesting, well-stated problems.”’⁴⁹ Funk noted that such brainstorming strategies had been applied to the topic of geoengineering: ‘Three or four sessions a year had been dedicated to geoengineering—which had interested Myhrvold almost from the moment IV was founded, Tegreene said—and perhaps another ten a year touched at least tangentially on the topic.’⁵⁰ Funk observed:

The free-form sessions were typically held in the conference room I’d seen at the lab, where video cameras and mics recorded every word and transmitted the in utero inventions to Tegreene’s sixty-three person patent group, which included nearly two dozen attorneys, most of them with Ph.D.s of their own in aerospace engineering, computer science, biochemistry, or mathematics. The inventors, who were flown in for a day or two, were well fed – Indian food, Ezell’s Famous Chicken, cook-out barbecues in the early days – and they were paid modestly for their time. IV also gave them a stake in any resulting patents.⁵¹

Casey Tegreene commented: ‘But I wonder if they’d do it if they didn’t get any compensation at all. I think they would. The people who like to invent with us, they like to discuss interesting problems.’⁵²

However, the detractors of the company have accused Intellectual Ventures of being ‘a patent troll.’ In 2011, *This American Life* provided an expose of Intellectual Ventures.⁵³ The radio show noted that Intellectual Ventures had been subjected to fierce criticism:

There’s an influential blog in Silicon Valley called TechDirt that regularly refers to Intellectual Ventures as a patent troll. Another blog, IP Watchdog, called Intellectual Ventures “patent troll public enemy #1.” And the Wall Street Journal’s law blog had an article about Intellectual Ventures titled “Innovative Invention Company Or Giant Patent Troll?”

⁴⁶Ibid.

⁴⁷United States Patent and Trademark Office, Patents for Humanity, <https://www.uspto.gov/patent/initiatives/patents-humanity>

⁴⁸Funk (2014, p. 265).

⁴⁹Ibid., p. 261.

⁵⁰Ibid., p. 262.

⁵¹Ibid., p. 262.

⁵²Ibid., p. 262.

⁵³This American Life (2011).

The radio show contended that Intellectual Ventures used a corporate web of companies, and a hoard of patents, to pressure companies to either submit to patent licence fees or litigation.

For his part, Nathan Myhrvold denied the accusation: ‘Well, that’s a term that has been used by people to mean someone they don’t like, who has patents. I think you would find almost anyone who stands up for their patent rights has been called a patent troll.’⁵⁴

Others prefer the more neutral description of Intellectual Ventures as a ‘patent aggregator’.⁵⁵ Jacob Rooksby uses the term ‘patent aggregator’ in his study of the company and its relationship to the higher education sector.⁵⁶

Nonetheless, Intellectual Ventures suffered a significant setback in its patent litigation strategy in 2014.⁵⁷ In the case of *Intellectual Ventures 1 LLC v. Capital One Financial Corporation*, the United States District Court for the Eastern District of Virginia questioned the validity of Intellectual Ventures’ patents related to the ‘Advanced Internet Interface Providing User Display Access of Customized Webpages’ and the ‘Administration of Financial Accounts.’⁵⁸ Capital One contended that the two patents consisted of unpatentable subject matter. The court found against Intellectual Ventures LLC. Justice Trenga found that IV’s patents were simply abstract ideas: ‘nothing more than the mere manipulation or reorganization of data.’⁵⁹ The judge noted: ‘At most, the patents describe a more efficient system or method for performing tasks than could be done without a computer, i.e. monitoring expenditures according to preset limits (the 137 Patent) or determining what would appeal to a particular user from a particular website (the 382 Patent).’⁶⁰ The *Alice* decision has been applied by lower courts, and a significant number of software patents have been rejected.⁶¹

There were significant layoffs at the firm, Intellectual Ventures, in late 2014.⁶² The company has argued: ‘We are making operational changes that are consistent with this reduction and will enable us to maintain and expand our leadership in the market for invention.’⁶³ The company maintained: ‘Our assets—both people and intellectual property—are among the best in the industry.’⁶⁴

⁵⁴Ibid.

⁵⁵Hegarty (2012).

⁵⁶Rooksby (2016).

⁵⁷Mullin (2014).

⁵⁸*Intellectual Ventures 1 LLC. v. Capital One Financial Corporation* (2014), United States District Court for the Eastern District of Virginia, Civil Action No. 1:12-cv-00740 (AJT/TRJ). http://cdn.arstechnica.net/wp-content/uploads/2014/04/Trenga.MSJ_opinion.pdf.

⁵⁹Ibid.

⁶⁰Ibid.

⁶¹Lloyd (2014), Tran (2016), Decker (2016).

⁶²Vance (2014).

⁶³Ibid.

⁶⁴Ibid.

Despite such setbacks, Intellectual Ventures have continued to be active in patent litigation.⁶⁵ The company had some notable victories against Symantec in 2015,⁶⁶ and Motorola in 2015.⁶⁷ There have been larger questions about the future of software patents in the United States after some of the losses of Intellectual Ventures.⁶⁸

In 2017, Intellectual Ventures suffered another setback. The United States Court of Appeals for the Federal Circuit held that its patent for a method of identifying and characterizing errant electronic files were directed to abstract ideas and did not contain an inventive concept sufficient for a patent-eligible application.⁶⁹

In his book, *Earthmasters*, Clive Hamilton is suspicious of Intellectual Ventures' portfolio of intellectual property in respect of geoengineering. He comments:

Intellectual Ventures has patented several geoengineering concepts, including an ocean pump for bringing cold seawater to the surface. That patent lists [Ken] Caldeira, [Nathan] Myhrvold and [Bill] Gates as inventors along with Lowell Wood and Roderick Hyde, co-authors with Edward Teller of the seminal paper on sulphate aerosol spraying. Caldeira has said that if any funds come his way from these patents he will donate them to non-profit organizations.⁷⁰

Hamilton observes: 'The company defends its decision to privatize the intellectual property by arguing that a patent is the best way of communicating detailed technical ideas.'⁷¹ He questions the claims of Intellectual Ventures that patent ownership will enable them to be better stewards of the technology. Hamilton would prefer the public sector to be in charge of regulating geoengineering.⁷²

3 Patentable Subject Matter and Geoengineering

There has been much debate of late over the limits of patentable subject matter. In the European Union, there has been much controversy over patent law and emerging technologies—such as plants, animals, gene patents, and stem cell patents.⁷³

⁶⁵Intellectual Ventures, Legal Updates. <http://www.intellectualventures.com/news/legal-updates/> P10 Accessed 1 May 2018.

⁶⁶Intellectual Ventures (2015a).

⁶⁷Intellectual Ventures (2015b).

⁶⁸Roberts (2016), and *Intellectual Ventures I LLC v. Symantec Corp.* 838 F. 3d 1307 (2016).

⁶⁹*Intellectual Ventures I LLC v. Eric Indemnity Company* 2017 WL 5041460 (2017).

⁷⁰Hamilton (2013, p. 75).

⁷¹*Ibid.*, p. 75.

⁷²*Ibid.*

⁷³Ng (2010).

The majority of the Supreme Court of the United States took a broad approach to patentable subject matter in the *Diamond v. Chakrabarty* case.⁷⁴ However, there was a strong line of dissent, and ethical and moral objections raised by futurist Jeremy Rifkin. Charting the conflicts which have emerged after this precedent, Shobita Parthasarathy commented:

In the decades since, citizens have raised concerns similar to Rifkin's across a wide swathe of technologies, from pharmaceuticals to the large-scale technologies designed to mitigate climate change known as geoengineering. They question whether patents in these areas are indeed in the public interest, noting that the control over technologies that patents give to their owners can create market incentives where there should be none, drive development in morally and socially deleterious ways, and limit access to socially important innovation. Governments must, they argue, step into consider these issues and protect the public interest.⁷⁵

The Supreme Court of the United States has sought to rein in the expansive interpretation by patentability of lower courts in a series of cases dealing with medical information (*Prometheus*),⁷⁶ finance (*Bilski*),⁷⁷ gene patents (*Myriad*),⁷⁸ and software (*Alice*).⁷⁹ This has led to a reinvigoration of the debate over the boundaries of patentable subject matter.

The High Court of Australia has read down the scope of patentable subject matter in a dispute over gene patents relating to breast cancer and ovarian cancer.⁸⁰ However, this ruling was largely distinguished by the Federal Court of Australia in a patent dispute over the bovine genome.⁸¹ The Australian Patent Office has also distinguished the precedent in a patent dispute over codeine.⁸²

The Supreme Court of Canada has equivocated over the emergence of new technologies in respect of patent law. There is a tension between the ruling in relation to *Harvard College v. the Commissioner of Patents*,⁸³ and *Monsanto v. Schmeiser*.⁸⁴ There has been a lively debate over patent law, public order and morality in European patent law.⁸⁵

⁷⁴*Diamond v Chakrabarty* 447 U.S. 303 (1980); see Eisenberg (2005), Ginsburg and Dreyfuss (2005), Rimmer (2006), Rimmer (2008), Rimmer and McLennan (2012).

⁷⁵Parthasarathy (2017, p. 7).

⁷⁶*Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 132 S. Ct. 1289 (2012).

⁷⁷*Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

⁷⁸*Association for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107 (2013).

⁷⁹*Alice Corp. Pty. Ltd. v. CLS Bank International*, 134 S. Ct 2347 (2014).

⁸⁰*D'Arcy v. Myriad Genetics Inc.* (2015) HCA 35 (7 October 2015); and Rimmer (2016b), and Matthews and Zech (2016).

⁸¹*Meat & Livestock Australia Limited v. Cargill, Inc.* (2018) FCA 51.

⁸²*Sun Pharmaceutical Industries (Australia) Pty Ltd v Tasmanian Alkaloids Pty Ltd.* (2018) APO 7 (31 January 2018).

⁸³*Harvard College v. Canada (Commissioner of Patents)* (2002) 4 S.C.R. 45, 2002 SCC 76.

⁸⁴*Monsanto Canada Inc. v. Schmeiser* (2004) 1 S.C.R. 902, 2004 SCC 34.

⁸⁵Bently and Sherman (2014, p. 517).

In the context, there have been a number of ethical, moral, political, and environmental objections made in respect of patents relating to geoengineering. It is worth undertaking a brief literature review of this public policy debate—as it ultimately informs the position of Patent Offices and the courts in patent determinations in respect of geoengineering.

In his book *How to Cool the Planet*, Jeff Goodell provided an early portrait of scientists and geoengineering.⁸⁶ He is quite supportive of experimentation in this field, maintaining: ‘Trying to ban geoengineering right now is not a good idea—not just because it is likely to be ineffective but also because we simply don’t know enough about the real risks to set up a coherent and binding agreement’.⁸⁷ He maintains that ‘responsible scientists should be encouraged to experiment with various technologies so that their true risks can be discovered’.⁸⁸ Nonetheless, Goodell insists that ‘any geoengineering experiments need to be carried out with the highest degree of accountability and transparency, as well as an acknowledgment that there is a slippery slope from experimentation to deployment’.⁸⁹

In the 2010 work, *Hack the Planet*, Eli Kintisch explores the science of geoengineering, and the various questions, which arise in relation to the technology: ‘The advent of geoengineering takes the concept of the Anthropocene one step beyond the inadvertent impacts that humanity had already had on the climate’.⁹⁰ He wonders whether ‘it could be the deliberate control of the atmosphere that will redefine our species’ dominant role on Earth as the Anthropocene unfolds’.⁹¹ Kintisch comments: ‘One finds in the rhetoric about geoengineering—especially among fervent advocates of the idea—the misleading notion that one ought to find comfort in the notion of hacking the planet’.⁹² He suggests: ‘Succumbing to the illusion of control would mean replacing one burden—navigating the dangers of today’s climate crisis, and overhauling the world’s energy system—with the much more risky burden of revolutionizing our relationship with the sky itself’.⁹³ His book concludes: ‘Even if geoengineering helps us one day stave off the worst of the climate crisis, we’ll still be inside its walls’.⁹⁴

In *Climate Wars*, Gwynne Dyer considers the field of geoengineering.⁹⁵ He cites the views of the NASA scientist James Hansen on the topic who considers the possibilities of geoengineering: ‘Frankly, it makes more sense to reduce the forcing

⁸⁶Goodell (2010).

⁸⁷Ibid., p. 200.

⁸⁸Ibid., p. 200.

⁸⁹Ibid., p. 200.

⁹⁰Kintisch (2010, p. 17).

⁹¹Ibid., p. 17.

⁹²Ibid., p. 242.

⁹³Ibid., p. 243.

⁹⁴Ibid., p. 243.

⁹⁵Dyer (2010, p. 230).

that's causing the problem'.⁹⁶ Dyer advocates caution towards geoengineering, given the moral hazards: 'Prolonged reliance on geoengineering techniques to keep the global temperature stable while carbon dioxide concentrations continue to rise would probably have catastrophic effects on life in the oceans, which are already becoming distinctly more acidic, due to a higher level of dissolved carbon in the water.'⁹⁷

In his book, *Earthmasters: Playing God with the Climate*, Clive Hamilton discusses the rise in the patenting of climate engineering.⁹⁸ He comments that 'regulation moves more slowly than commerce and in recent years there has been a flurry of patents taken out over methods to engineer the climate.'⁹⁹ Clive Hamilton is shocked by the breadth of a number of the patent claims in respect of geoengineering. He observed that 'some of them are so broad that, if enforceable, they would place fertilization of the oceans in the hands of one man.'¹⁰⁰ Hamilton was alarmed by studies of patent thickets in respect of geoengineering: 'In 2010 Shobita Parthasarathy and co-authors noted a sharp increase in geoengineering patents in recent years and warned that, as in the case of biotechnology, the patents owned by private companies and individuals are on track to become the de facto form of governance of geoengineering'.¹⁰¹ Hamilton warned: 'We are approaching a situation in which international efforts to protect humanity from climate catastrophe could depend on whether or not one company wants to sell its intellectual property.'¹⁰²

Professor Gareth Davies from the VU University of Amsterdam has considered the issues raised by creating market incentives for the private industry to engage in geoengineering.¹⁰³ He noted: 'As people have already noticed with respect to climate change technologies, privatisation and dispersed ownership of geoengineering techniques may have unexpectedly obstructive consequences for policy.'¹⁰⁴ Davies comments: 'The tension between effectiveness and democracy is put centre-stage by the prospect of privatisation of geoengineering.'¹⁰⁵ He warns: 'Involvement of market mechanisms is likely to suppress wider issues for the sake of concrete progress towards more immediate goals.'¹⁰⁶ Davies comments that 'the fundamental question raised by private involvement is whether this contributes to good

⁹⁶Ibid., p. 230.

⁹⁷Ibid., p. 231.

⁹⁸Hamilton (2013).

⁹⁹Ibid., p. 75.

¹⁰⁰Ibid., p. 79.

¹⁰¹Ibid., pp. 79–80.

¹⁰²Ibid., p. 80.

¹⁰³Davies (2013).

¹⁰⁴Ibid.

¹⁰⁵Ibid.

¹⁰⁶Ibid.

management by creating fragmented and commercialised interests which stand in the way of achieving, or even fully articulating, the common good.¹⁰⁷

In his landmark book on climate change and philosophy, Stephen M. Gardiner considered the ethics of geoengineering.¹⁰⁸ He noted that ‘geoengineering is a relatively new and underexplored topic’ both in terms of the science and the ethics.¹⁰⁹ Gardiner is particularly interested in the justification that geoengineering is a ‘lesser evil’ required in order to ‘arm the future’:

At first glance, then, the arm the future argument appears to make a very strong, even overwhelming, case for geoengineering research, and also (under the stated circumstances) ultimate deployment. However, I will now argue that matters are not as straightforward as they initially seem. To begin with, we would do well to proceed with caution. In general, arguments from moral emergency are perennially popular in both private and public life, and for an obvious reason... Morality sometimes seems inconvenient to us (like truth, as Al Gore reminds us) – and in such cases we’d often like to have an exemption. Hence, we should be wary of arguments from emergency; clearly they are open to manipulation.¹¹⁰

Furthermore, Gardiner provides a critique of the ‘arm the future’ rationale provided for pursuing geoengineering, suggesting that it is less straightforward and decisive than it is usually taken to be. He suggests that issues—such as liability, compensation, political legitimacy, and lingering inertia—raise the ethical stakes in geoengineering policy.¹¹¹ The philosopher emphasizes the need for caution in interpreting these matters. Stephen Gardiner argues that policy-makers ‘should take seriously the risk that, far from being simply a welcome tool for climate action, geonengineering may become yet another manifestation of the underlying problem.’¹¹² He explains why some regard geoengineering as ‘ethically troubling’ and highlights the threat of interventions that discriminate against future generations.¹¹³

The sociologist Anthony Giddens is also sceptical about geoengineering, commenting that ‘none of the projects of this sort being mooted at the moment is more than a gleam in the eye of their potential inventors’.¹¹⁴

Some commentators have argued for bans or moratoria in respect of specific geoengineering technologies. Harvard University Professor, David Keith, has contended that the United States Federal Government could ban patents in the field of solar radiation.¹¹⁵ He observed: ‘This is technology that allows any country to affect the whole climate in gigantic ways, which has literally potential to lead to

¹⁰⁷Ibid.

¹⁰⁸Gardiner (2011).

¹⁰⁹Ibid., p. 341.

¹¹⁰Ibid., p. 354.

¹¹¹Ibid., p. 378.

¹¹²Gardiner (2017), and Gardiner and Thompson (2017).

¹¹³Ibid.

¹¹⁴Giddens (2009, p. 136).

¹¹⁵Mulkern and ClimateWire (2012).

wars'.¹¹⁶ Keith maintained: 'It has this sort of giant and frightening leverage.'¹¹⁷ He commented: 'We think it's very dangerous for these solar radiation technologies, it's dangerous to have it be privatized.'¹¹⁸ He maintained: 'The core technologies need to be public domain.'¹¹⁹

The environmentalist Bill McKibben has been scathing of geoengineering: 'We just have idea if they'll work and the early modelling shows they'd be disastrous.'¹²⁰ He makes three substantive criticisms of geoengineering. Firstly, he emphasizes no geoengineering 'solutions' address ocean acidification, a result of carbon emissions.¹²¹ Secondly, McKibben highlights that there are renewable energy solutions 'easily within our grasp'.¹²² Third, he observes that the 'psychological impulse behind it (geoengineering) is a dubious one'.¹²³ His book *Oil and Honey* expands upon his caveats and reservations about the use of geoengineering.¹²⁴

The Canadian writer Naomi Klein has also been suspicious of geoengineering.¹²⁵ She notes that the technology may be appealing to some: 'Geoengineering offers the tantalizing promise of a climate change fix that would allow us to continue our resource-exhausting way of life, indefinitely.'¹²⁶ Klein was concerned that there was a lack of informed consent for geoengineering:

The truth is that geoengineering is itself a rogue proposition. By definition, technologies that tamper with ocean and atmospheric chemistry affect everyone. Yet it is impossible to get anything like unanimous consent for these interventions. Nor could any such consent possibly be informed since we don't — and can't — know the full risks involved until these planet-altering technologies are actually deployed.¹²⁷

Klein noted: 'While the United Nations' climate negotiations proceed from the premise that countries must agree to a joint response to an inherently communal problem, geoengineering raises a very different prospect'.¹²⁸ She was concerned that particular countries or companies could engage in geoengineering without proper consent or authorisation from others: 'For well under a billion dollars, a "coalition of the willing," a single country or even a wealthy individual could decide to take the climate into its own hands.'¹²⁹

¹¹⁶Ibid.

¹¹⁷Ibid.

¹¹⁸Ibid.

¹¹⁹Ibid.

¹²⁰Hickman (2011).

¹²¹Forum for Climate Engineering Assessment (2013).

¹²²Ibid.

¹²³Ibid.

¹²⁴McKibben (2013).

¹²⁵Klein (2012).

¹²⁶Ibid.

¹²⁷Ibid.

¹²⁸Ibid.

¹²⁹Ibid.

In Chapter 8 of her 2014 book, *This Changes Everything*, Naomi Klein explores the field of geoengineering, with critical scepticism.¹³⁰ She observes that the narratives of geoengineers appeal to a deep-seated desire for techno-fixes of global problems: ‘The dogged faith in technology’s capacity to allow us to leapfrog out of crisis is born of earlier technological breakthroughs—splitting the atom or putting a man on the moon.’¹³¹ Klein observes that geoengineering fits into a hackneyed cultural narrative of salvation.¹³² Klein also explores geoengineering as a ‘shock doctrine’. In a section reminiscent of Marina Warner’s *Managing Monsters*,¹³³ she also examines geoengineering, in light of monstrous myth-making, looking at Mary Shelley’s *Frankenstein*.¹³⁴ Klein suggests a healthy scepticism towards geoengineering is well justified: ‘Having witnessed the recent spate of big failures, this generation of activists is unwilling to gamble with the precious and irreplaceable, certainly not based on the reassuring words of overconfident engineers.’¹³⁵

The subsequent documentary, *This Changes Everything*, is also highly critical of the push for geoengineering, seeing it as a form of magical thinking in the face of climate change.¹³⁶

In his 2013 book, *The Future*, Al Gore is sceptical of geoengineering. He warns of the psychological problem of ‘single-action bias’, an ingrained preference for single solutions, even for complex problems.¹³⁷ Gore suggests that ‘this common flaw in our way of thinking helps to explain the otherwise inexplicable support for a number of completely bizarre proposals that are collectively known as geoengineering.’¹³⁸ He fears that a number of geoengineering proposals involve reckless risks to the environment and humanity. Gore reflects that ‘our way of communicating about global challenges and debating reasonable solutions has been subjected to an unhealthy degree of distortion and control by wealthy corporate interests who are themselves desperate to prevent serious consideration of reducing global warming pollution.’¹³⁹ He warns: ‘If we continue to delay the launching of a serious multipronged global effort to reduce the emissions of heat-trapping greenhouse gas pollution, we will find ourselves pushed toward increasingly desperate measures to mitigate the growing impacts of global warming.’¹⁴⁰

¹³⁰Klein (2014).

¹³¹*Ibid.*, p. 280.

¹³²*Ibid.*, p. 289.

¹³³Warner (1994).

¹³⁴Wollstonecraft Shelley (1818).

¹³⁵Klein (2014, p. 290).

¹³⁶Lewis and Klein (2015).

¹³⁷Gore (2013).

¹³⁸*Ibid.*, p. 355.

¹³⁹*Ibid.*, p. 356.

¹⁴⁰*Ibid.*, p. 357.

In his 2013 book, *Overheated*, Andrew Guzman from the University of California Berkeley considers the ethics of geoengineering.¹⁴¹ He comments: ‘A geoengineering solution is like experimental surgery: there is a chance it will help, but it may do more harm than good, and it will certainly have major side effects, not all of which can be identified in advance.’¹⁴² Guzman maintains: ‘A better alternative is to find ways to reduce the Greenhouse Gases we are pumping into the atmosphere; this achieves the same result but without the enormous risks of geoengineering solutions.’¹⁴³ Guzman observes that, at the present moment, ‘these strategies do not offer a credible alternative to reducing emissions’.¹⁴⁴ Moreover, they are ‘too expensive and too risky’.¹⁴⁵ Moreover, ‘they carry the potential to make things even worse than they already are.’¹⁴⁶

In the 2014 book *Climate-Challenged Society*, John S. Dryzek, Richard B. Norgaard, and David Schlosberg summarize the technical and ethical issues associated with geoengineering.¹⁴⁷ The group comments that geoengineering is supported by a Promethean approach to emerging technologies: ‘Geoengineering sees the Anthropocene as presenting a technical problem, which can be solved through technological means.’¹⁴⁸ Dryzek, Norgaard, and Schlosberg observed: ‘Not much is known concerning whether or not the various technologies would work as predicted, and some remain distant dreams.’¹⁴⁹ The writers suggest

Geoengineering may also bring ‘unintended and unanticipated side effects that could have severe consequences’. We do not know who or what will turn out to be hurt. Geoengineering is an experiment on the global population and... some are better placed than others to cope with rapid and unpredictable environmental change of any sort.¹⁵⁰

The writers observed: ‘The lure of geoengineering frees us from responsibility for the behavior that creates the problem of climate change in the first place’.¹⁵¹ The writers note the linkage between the debate over geoengineering and the one of biotechnology: ‘Liao et al. suggest we think about engineering not the planet, but ourselves.’¹⁵² Dryzek, Norgaard, and Schlosberg commented upon such research in a startled fashion: ‘As wild as it may sound, negotiating the Anthropocene could then cover design of humans as well as the environments.’¹⁵³

¹⁴¹Guzman (2013).

¹⁴²Ibid., p. 221.

¹⁴³Ibid., p. 221.

¹⁴⁴Ibid., p. 221.

¹⁴⁵Ibid., p. 221.

¹⁴⁶Ibid., p. 221.

¹⁴⁷Dryzek et al. (2013).

¹⁴⁸Ibid., p. 122.

¹⁴⁹Ibid., p. 122.

¹⁵⁰Ibid., p. 122.

¹⁵¹Ibid., p. 122.

¹⁵²Ibid., p. 122.

¹⁵³Ibid., p. 123.

In their 2015 book on *Climate Change, Capitalism, and Corporations*, Christopher Wright and Daniel Nyberg consider the nature and significance of geoengineering in light of trends in capitalism.¹⁵⁴ They observe that business groups have sought to present ‘climate change as a space for new market opportunities.’¹⁵⁵ Wright and Nyberg noted: ‘Once considered an extreme measure, geoengineering is now enjoying a swift mobilisation of money and resources.’¹⁵⁶ The pair commented that ‘the turn to geoengineering is symptomatic of further marketization and management of the ecosystem’.¹⁵⁷

Climate litigation experts Jacqueline Peel and Hari Osofsky expect that there will be a greater liability focus on geoengineering in the future: ‘For example, if technological measures are employed to mitigate greenhouse gas emissions from coal power or to manage incoming solar radiation, litigation could be expected to engage with questions of liability if these measures fail or are inadequate and damage results’.¹⁵⁸ Michael Gerrard and Tracey Hester have also explored questions of regulation and liability for solar radiation management and carbon dioxide removal.¹⁵⁹

Given such public policy debate, it is likely that geoengineering will be an even more controversial field of technology in terms of patentable subject matter than earlier technological revolutions in information technology, biotechnology, medicine, and clean technology.

4 Patent Law Reform, Climate Change, and Geoengineering

There has been significant discussion amongst policy-makers about whether intellectual property could be better adapted to address the environment, biodiversity, and climate change.¹⁶⁰ There has been a particular interest in what has variously been described as ‘clean technologies’, ‘environmentally sound technologies’, and ‘green technologies.’ Intellectual property offices have developed fast-track mechanisms to expedite the examination of clean technologies. There has been a discussion about substantive policy options to facilitate access to clean technologies. Options have been mooted such as public sector licensing, patent pools, technology transfer, compulsory licensing, open innovation, and patent

¹⁵⁴Wright and Nyberg (2015).

¹⁵⁵*Ibid.*, p. 35.

¹⁵⁶*Ibid.*, p. 35.

¹⁵⁷*Ibid.*, p. 36.

¹⁵⁸Peel and Osofsky (2015, p. 339).

¹⁵⁹Gerrard and Hester (2018).

¹⁶⁰See Lane (2011), Rimmer (2011a), Brown (2013), Menell and Tran (2014), Sarnoff (2016).

subject matter dedications. There have often been international stalemates in respect of intellectual property, technology transfer, and climate change.

In this context, geoengineering poses problems in respect of classification. As I flagged in 2011, there has been much controversy over whether geoengineering should be treated or classified as a clean technology.¹⁶¹ There has been widespread criticism that the field of geoengineering has only speculative benefits at best, and extreme risks to the environment and public health at worst. As such, it may be better to treat geoengineering as a controversial field of technology, which deserves heightened scrutiny by intellectual property offices.

Some commentators wonder whether the patent regime is well-designed for new technologies, such as geoengineering. Shobita Parthasarathy and her collaborators at the Gerard Ford School of Public Policy at the University of Michigan have written a working paper on the need for a *sui generis* regime for the protection of geoengineering.¹⁶² The memo argues: 'If we act now, we have a window of opportunity to avoid the problems that arose in biotechnology and establish a patent system that will guide geoengineering technology toward the best interests of innovators and the public at large.'¹⁶³ Parthasarathy and her collaborators commented:

Particularly in loosely regulated areas of innovation, as the biotechnology comparison demonstrates, patents can become the *de facto* form of governance and control the future of a technological field. Because of the scope, potential risks and benefits, national security implications, public controversy, and need for coordination in geoengineering, it should be treated like atomic energy—a *sui generis* patent system is necessary. Our survey of the current geoengineering patent landscape demonstrates patents are broad, increasing in number, and concentrated in a small number of owners. Without some sort of *sui generis* patent system, it will be very difficult to control development and use of these technologies through traditional regulatory efforts alone.¹⁶⁴

The writers have a number of key recommendations. First, Parthasarathy and her colleagues argue that there is a need to stop issuing broad patents. Second, the group recommends the creation of an interagency geoengineering patent task force. Third, the group advised the need to add geoengineering to the existing sensitive application warning system with the Patent and Trademark Office, and require patent review by the Interagency Geoengineering Patent Task Force. Fourth, Parthasarathy and her companions call for the offer of other non-patent based innovation incentives—such as the use of prizes to encourage research.

A supporter of geoengineering technologies, Anthony Chavez has focused upon access to climate engineering inventions.¹⁶⁵ He has argued that the United States Patent and Trademark Office should establish a separate process for the

¹⁶¹Rimmer (2011a, p. 393).

¹⁶²Parthasarathy et al. (2010).

¹⁶³*Ibid.*

¹⁶⁴*Ibid.*, p. 12.

¹⁶⁵Chavez (2015).

consideration of geoengineering patents—including a process for expedited review. It is not clear, though to me, why a controversial technology should deserve a patent fast-track. Given the risks associated with geoengineering, a case could be made that the United States Patent and Trademark Office should be somewhat more conservative in terms of their examination of geoengineering patents. Furthermore, he has maintained that the United States Government should establish a patent pool, which would provide limited licenses for climate engineering innovations. In his view, such a strategy would address the potential problem of an anti-commons forming in respect of geoengineering patents.

A number of writers have advocated the use of patent flexibilities—such as patent pools—to ensure that essential technologies are accessible.¹⁶⁶ While such an approach may make sense for a useful, valuable technologies (such as pharmaceutical drugs and information technology and biotechnology and clean technologies),¹⁶⁷ it is not clear whether geoengineering technologies will have such public benefits. Indeed, if geoengineering technologies are risky or dangerous, the open dissemination of those technologies may compound such difficulties.

Jesse Reynolds, Jorge Contreras and Joshua Sarnoff have engaged in special pleading in respect of solar climate engineering under intellectual property law.¹⁶⁸ They contend: ‘Our approach generally assumes that [solar climate engineering] is worth additional research and consideration, and that if it appears sufficiently safe and effective, it should be developed responsibly.’¹⁶⁹ Reynolds, Contreras, and Sarnoff contend:

[Solar climate engineering] appears to offer substantial potential for averting the most dire consequences of global climate change. While the emerging [solar climate engineering] research community has not yet experienced significant disruption due to IP aggregation or litigation, the potential for such effects exists, particularly if the actual use of [solar climate engineering] technologies becomes more likely. The current, early state of R&D of [solar climate engineering] as well as the present absence of IP claims provide a unique opportunity to create norms and institutions to help assure that the R&D of these important - but risky and controversial - technologies proceed in a manner that supports the common good.¹⁷⁰

However, their lengthy treatise does not really properly establish a convincing, strong, persuasive case for why solar climate engineering may be particularly useful in an age of climate change (as compared to much more well-established clean technologies, such as solar, and wind power). There is also a tendency to downplay the risks associated with solar climate engineering—particularly if one applies the doctrine of the precautionary principle.

¹⁶⁶Reynolds et al. (2017).

¹⁶⁷See for instance Medicines Patent Pool <https://medicinespatentpool.org/> Accessed 1 May 2018.

¹⁶⁸Reynolds et al. (2017).

¹⁶⁹Ibid., p. 9.

¹⁷⁰Ibid., p. 110.

As such, the model of pushing for a research commons for solar climate engineering seems to be problematic—if there are significant risks associated with the technology.¹⁷¹

There has been a lot of concern about the rise of strategic patent litigation companies, particularly in the field of geoengineering. Professor Colleen Chien from Santa Clara University has done important empirical research on patent trolls.¹⁷² She has summarized this research in 2012. In 2013, Professor Colleen Chien updated her work, and provided the following summary:

- (Patent Assertion Entities) PAEs brought 62% of 2012 patent litigations
- In 2012, PAEs sued more non-tech companies than tech companies
- In 2012 PAE defendants comprised 59% of all patent lit defendants
- 55% of unique PAE defendants makes \$10 M or less
- ~ 16 publicly financed PAEs
- Some high impact PAE patents (9 out of 10) fit the ‘buy and sue’ pattern.¹⁷³

In light of such controversy, and empirical evidence, there has been much action to address the problem by the United States Congress and the United States President.

In 2013, President Barack Obama and the White House have announced the introduction of a package of reforms to address the issue of ‘patent trolls’.¹⁷⁴ Particularly at the urging of information technology companies, President Barack Obama has promised to take executive and legislative action to discourage strategic litigation by patent owners.¹⁷⁵ The White House commented:

Innovators continue to face challenges from Patent Assertion Entities (PAEs), companies that, in the President’s words ‘don’t actually produce anything themselves,’ and instead develop a business model ‘to essentially leverage and hijack somebody else’s idea and see if they can extort some money out of them.’ These entities are commonly known as ‘patent trolls.’ Likewise, the so-called ‘Smartphone Patent Wars’ have ballooned in recent years and today, several major companies spend more on patent litigation and defensive acquisition than on research and development.¹⁷⁶

The White House emphasized: ‘Stopping this drain on the American economy will require swift legislative action, and we are encouraged by the attention the issue is receiving in recent weeks.’¹⁷⁷ The Obama Administration stressed: ‘We stand ready to work with Congress on these issues crucial to our economy, American jobs, and innovation’.¹⁷⁸ The White House commented: ‘While no single

¹⁷¹Connolly (2017).

¹⁷²Chien (2012).

¹⁷³Chien (2013).

¹⁷⁴Quinn (2013).

¹⁷⁵The White House (2014).

¹⁷⁶Ibid.

¹⁷⁷Ibid.

¹⁷⁸Ibid.

law or policy can address all these issues, much can and should be done to increase clarity and level the playing field for innovators.¹⁷⁹ The Obama Administration has promised a range of executive actions, and legislative recommendations to combat patent trolls.

The seven legislative recommendations include requiring patent holders and applicants to disclose who owns and controls the patent; changing how fees are awarded to the prevailing parties in patent litigation; and providing consumers with better protections against being sued for patent infringement. The International Trade Commission's standard for issuing injunctions in patent cases will also be changed to make it harder for patent trolls to threaten and extort businesses. At the ITC, the risk of products being banned from the U.S. market is great. While Congress has held hearings on the issue, there has not been recent legislation. Under executive orders, the White House is making the 'real party of interest' the new default, requiring patent applicants and owners to regularly update ownership information when they are involved in proceedings before the Patent and Trademark Office. The White House says the United States Patent and Trademark Office will begin rulemaking on the issue. Furthermore, the United States Patent and Trademark Office will issue education materials to help consumers and retailers who are increasingly targeted by patent firms with letters threatening litigation.

The executive actions include firstly 'Making "Real Party-in-Interest" the New Default'. The Obama Administration hoped that this would stop Patent trolls from using shell companies to hide their activities and enable their abusive litigation and extraction of settlements. Second, the Obama administration promise to engage in Tightening Functional Claiming. Third, the Obama administration was concerned 'Patent trolls are increasingly targeting Main Street retailers, consumers and other end-users of products containing patented technology—for instance, for using point-of-sale software or a particular business method'. It wanted to empower downstream users. Fourth, the Obama administration wanted to expand 'Dedicated Outreach and Study'. Finally, the Obama administration hoped to strengthen the enforcement process of Exclusion Orders.

In response, Intellectual Ventures has been lobbying the White House and the United States Congress on matters of intellectual property.¹⁸⁰ Russell Merbeth was appointed to lobby on patent reform, intellectual property rights, taxation of patent royalties and corporate tax reform. He explained his approach to provide active lobbying on patent law reform: 'Part of the idea is to have a consistent presence here in Washington to educate members of Congress and the administration'.¹⁸¹

Merbeth maintained that Intellectual Ventures was not a patent troll. He maintained that the company did not bring litigation against small companies, start-ups or consumers over vague or overly broad patents. He commented: 'If Congress

¹⁷⁹Ibid.

¹⁸⁰Ho (2013).

¹⁸¹Ibid.

wants to enact something to reform that without needlessly undermining the value of patents at large, we're in support of that.'¹⁸² Merbeth insisted that Intellectual Ventures was targeted against Big Business: 'When we do wind up suing a company for infringement, these are large multinational corporations with hundreds of millions if not billions in annual revenue, distinguishing [Intellectual Ventures] from some of the companies and behavior that people are complaining about.'¹⁸³

In May 2014, legislative efforts in respect of patent law reform stalled in the United States Congress. Senator Patrick Leahy, the Chairman of the Senate Judiciary Committee, postponed the consideration of the legislative bill. He alleged: 'Unfortunately, there has been no agreement on how to combat the scourge of patent trolls on our economy without burdening the companies and universities who rely on the patent system every day to protect their inventions'.¹⁸⁴ Leahy commented: 'We have heard repeated concerns that the House-passed bill went beyond the scope of addressing patent trolls, and would have severe unintended consequences on legitimate patent holders who employ thousands of Americans.'¹⁸⁵ He decided: 'Because there is not sufficient support behind any comprehensive deal, I am taking the patent bill off the Senate Judiciary Committee agenda.'¹⁸⁶ Leahy recommended: 'If the stakeholders are able to reach a more targeted agreement that focuses on the problem of patent trolls, there will be a path for passage this year and I will bring it immediately to the Committee.'¹⁸⁷ He nonetheless admitted: 'We can all agree that patent trolls abuse the current patent system.'¹⁸⁸

Adi Kadmar, Daniel Nazer, and Vera Raneri of the Electronic Frontier Foundation despaired of the collapse of the process.¹⁸⁹ The commentators observed: 'The Senate's failure is especially galling given that the House overwhelmingly passed the Innovation Act in December'.¹⁹⁰ The Electronic Frontier Foundation denied that there would be severe unintended consequences on legitimate patent holders. The civil society group commented: 'Leahy effectively deferred a problem—a serious problem he readily admits exists—in order to please the pharmaceutical, biotech, and university lobbies that are hardly the victims of patent trolls anyway.'¹⁹¹

The Consumer Electronics Association was also disappointed by the postponement of the Senate Judiciary Committee's markup of the Patent Transparency

¹⁸²Ibid.

¹⁸³Ibid.

¹⁸⁴Leahy (2014).

¹⁸⁵Ibid.

¹⁸⁶Ibid.

¹⁸⁷Ibid.

¹⁸⁸Ibid.

¹⁸⁹Kadmar et al. (2014).

¹⁹⁰Ibid.

¹⁹¹Ibid.

and Improvements Act.¹⁹² President and Chief Executive Officer, Gary Shapiro, commented on the decision: ‘The removal of comprehensive patent litigation reform legislation from the Senate Judiciary Committee’s agenda makes this a day of celebration for patent trolls’.¹⁹³ The Association observed: ‘Patent abuse costs jobs, harms innovation and hurts our economy.’¹⁹⁴ The Association concluded: ‘The sole winners are patent trolls and trial lawyers.’¹⁹⁵

In 2016, the Director of the United States Patent and Trademark Office, Michelle Lee, considered the countervailing forces at play in patent law reform in the United States:

When our Founding Fathers provided for intellectual property protection in the Constitution itself, they foresaw the need for balance. Exclusive protection of an invention for a limited period of time to encourage the spread of scientific knowledge to “promote the progress of science and the useful arts.” It’s that balance that we’re working with Congress and stakeholders to achieve in patent litigation reform.¹⁹⁶

Lee noted that ‘This administration supports legislation designed to (1) curtail abusive patent litigation tactics, while also and importantly, (2) preserving the ability of holders of legitimate patent rights to enforce when needed’. She observed that ‘while Congress considers legislative reform, and while the Courts continue to develop the case law on patent issues through rulings, the USPTO is not standing still.’¹⁹⁷ Lee maintained: ‘Improving the quality of the patents we issue and providing a faster and lower cost alternative to district court litigation to test the validity of a patent.’¹⁹⁸ There remain concerns, though, about the operation of the patent regime, with the Government Accountability Office observing that the incentive structure in place for employees at the United States Patent and Trademark Office undermines the quality of patents granted.¹⁹⁹

Moreover, as Mark Lemley has noted, the patent system has shown a surprising resilience in the face of administrative rule changes and legislative reforms.²⁰⁰

It is hard to know the approach of the new Trump Administration to patent law, policy, and administration.

¹⁹²Consumer Electronics Association (2014).

¹⁹³*Ibid.*

¹⁹⁴*Ibid.*

¹⁹⁵*Ibid.*

¹⁹⁶Lee (2016).

¹⁹⁷*Ibid.*

¹⁹⁸*Ibid.*

¹⁹⁹The Washington Post (2016), United States Government Accountability Office (2016).

²⁰⁰Lemley (2016).

5 International Law and the Global Governance of Geoengineering

There has also been a great deal of debate over the international regulation of geoengineering—particularly in the context of the United Nations Framework Convention on Climate Change 1992;²⁰¹ the Convention on Biological Diversity 1992;²⁰² and most recently, the Paris Agreement 2015. More generally, there has been a discussion about intellectual property and climate change in international institutions such as the World Intellectual Property Organization,²⁰³ and the World Trade Organization and the TRIPS Agreement 1994.²⁰⁴

Albert Lin argues that geoengineering should not be banned.²⁰⁵ Rather, he maintains that there needs to be an effective research governance regime for geoengineering. Lin suggests: ‘Geoengineering research governance also must analyze and address systemic concerns of lock-in, moral hazard, and increased risk of conflict, for these concerns lie at the heart of the unease that geoengineering field research engenders.’²⁰⁶ He maintains: ‘To gain the public’s trust, governance must be independent, transparent, participatory, and accountable.’²⁰⁷ It is not clear, though, how intellectual property figures in this regulatory regime.

In his book *Earthmasters*, Clive Hamilton observed that there are a range of international fora, which could consider the geopolitics of geoengineering.²⁰⁸ He commented that ‘one or more existing international treaties or organizations could be co-opted or extended to encompass regulation of climate engineering.’²⁰⁹ Hamilton noted, though, that the jurisdiction was fragmented: ‘While a number of existing treaties have a bearing on geoengineering, none of them has the scope or capacity to provide a comprehensive regulatory regime, which is not surprising given the novelty and diversity of geoengineering methods.’²¹⁰ Hamilton surveyed the messy terrain in this area of international law:

²⁰¹United Nations Framework Convention on Climate Change 1992, Opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

²⁰²Convention on Biological Diversity, opened for signature 5 June 1992, (1993) ATS 32 (entered into force 29 December 1993).

²⁰³Rimmer (2011a, b, 2014), and David and Halbert (2014).

²⁰⁴Marrakesh Agreement Establishing the World Trade Organization, opened for signature 15 April 1994, 1867 UNTS 3, annex 1C (Agreement on Trade-Related Aspects of Intellectual Property Rights) (entered into force 1 January 1995). See also: Rimmer (2016a).

²⁰⁵Lin (2016).

²⁰⁶Ibid., p. 2575.

²⁰⁷Ibid., p. 2576.

²⁰⁸Hamilton (2013, p. 149).

²⁰⁹Ibid., p. 149.

²¹⁰Ibid., p. 149.

A 2012 study commissioned by the Convention on Biological Diversity assessed the state of the regulatory environment and noted that, in addition to the Convention itself, a number of international treaties have a bearing. They include the Law of the Sea, the London Convention and London Protocol on ocean dumping, the Montreal Protocol on ozone protection, Space law, and the Convention on Long Range Transboundary Air Pollution. The ENMOD Convention – whose full name is the Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques – is also salient. Following their use in the Vietnam War, any deployment of weather modification methods for hostile purposes is outlawed.²¹¹

Hamilton is concerned that there are gaps in existing international law in regulating climate engineering. He maintained that ‘a new treaty or international organization with the mandate of governing one or more category of geoengineering could be developed.’²¹² Hamilton laments: ‘Reflecting the early stage of the debates, the diversity of technologies, and the existing complexity of international law, there are no proposals for a comprehensive treaty governing geoengineering research.’²¹³

In a submission to the House of Commons in 2010, the ETC Group warned that ‘patent offices are already being inundated with applications on geoengineering.’²¹⁴ The ETC Group maintained that ‘monopoly control of any deployed global geoengineering scheme would be unacceptable.’²¹⁵ The ETC Group argued that the ‘issuance of patents [do not] make sense if indeed geoengineering is being developed as an emergency response measures.’²¹⁶

The ETC Group has engaged in larger work on patent law and geoengineering—raising concerns about geopiracy.²¹⁷ The Canadian organisation lamented: ‘As if restructuring the climate isn’t controversial enough, a handful of geoengineers are privatizing the means to do so by claiming patent rights over geoengineering techniques.’²¹⁸ The ETC Group noted that there were divisions in international negotiations over the policy settings in respect of intellectual property and climate change: ‘The politics of patents has always been a divisive issue when it surfaces in different international fora’.²¹⁹ The ETC Group has argued that ‘the challenge of addressing climate change highlights the need for the sound and timely evaluation of new technologies.’²²⁰

²¹¹Ibid., p. 149.

²¹²Ibid., p. 150.

²¹³Ibid., p. 150.

²¹⁴House of Commons (2009–2010).

²¹⁵Ibid.

²¹⁶Ibid.

²¹⁷ETC Group (2010).

²¹⁸Ibid.

²¹⁹Ibid.

²²⁰Ibid.

The ETC Group has engaged in larger work on patent law and geoengineering—raising concerns about geopyracy.²²¹ The organisation has highlighted the conflicts within the United Nations Framework Convention on Climate Change 1992:

As if restructuring the climate isn't controversial enough, a handful of geoengineers are privatizing the means to do so by claiming patent rights over geoengineering techniques. The politics of patents has always been a divisive issue when it surfaces in different international fora. Climate negotiations are no exception.²²²

The ETC Group maintained: 'With regard to climate-related technologies, restricting the diffusion of technologies by way of a twenty-year monopoly is clearly counterproductive to enabling urgent action'.²²³ The organisation was concerned: 'As with other high-tech industries, the profits to be made from licensing patented geoengineering technologies becomes a driver for governments to support geoengineering development, research and diffusion—regardless of ethics, safety or efficacy'.²²⁴ The ETC Group worried about the larger governance issues: 'If geoengineering techniques move toward actual deployment, the existence of patents held by individuals and private companies could mean that decisions over the climate commons will be effectively handed over to the private sector'.²²⁵

There has been significant debate about climate-related geoengineering and biodiversity in the context of the Convention on Biological Diversity 1992. In 2008, there was a resolution placing a moratorium on all ocean fertilisation experiments.

In 2010, the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity 1992 adopted decision X/33. Paragraph 8 (w) and (x) deals with climate-related geo-engineering and its impacts on the achievement of the objectives of the Convention on Biological Diversity 1992.²²⁶ The clause invites 'Parties and other Governments, according to national circumstances and priorities, as well as relevant organizations and processes, to consider the guidance below on ways to conserve, sustainably use and restore biodiversity and ecosystem services while contributing to climate change mitigation and adaptation.' Clause (w) asks parties to '(w) Ensure, in line and consistent with decision IX/16 C, on ocean fertilization and biodiversity and climate change, in the absence of science based, global, transparent and effective control and regulatory mechanisms for geo-engineering, and in accordance with the precautionary approach and Article 14 of the Convention, that no climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts, with the exception of small scale scientific research studies that would be conducted

²²¹Ibid.

²²²Ibid.

²²³Ibid.

²²⁴Ibid.

²²⁵Ibid.

²²⁶Climate-Related Geoengineering and Biodiversity, <http://www.cbd.int/climate/geoengineering/>.

in a controlled setting in accordance with Article 3 of the Convention, and only if they are justified by the need to gather specific scientific data and are subject to a thorough prior assessment of the potential impacts on the environment.’²²⁷ Clause (x) asks parties to ‘Make sure that ocean fertilization activities are addressed in accordance with decision IX/16 C, acknowledging the work of the London Convention/London Protocol.’

The Conference of the Parties also requested the Secretariat to ‘compile and synthesize available scientific information, and views and experiences of indigenous and local communities and other stakeholders, on the possible impacts of geo-engineering techniques on biodiversity and associated social, economic and cultural considerations, and options on definitions and understandings of climate-related geo-engineering relevant to the Convention on Biological Diversity.’²²⁸ The Conference of the Parties also requested the Secretariat to do the following: ‘Taking into account the possible need for science based global, transparent and effective control and regulatory mechanisms, subject to the availability of financial resources, undertake a study on gaps in such existing mechanisms for climate-related geo-engineering relevant to the Convention on Biological Diversity, bearing in mind that such mechanisms may not be best placed under the Convention on Biological Diversity.’²²⁹

A footnote observed:

Without prejudice to future deliberations on the definition of geo-engineering activities, understanding that any technologies that deliberately reduce solar insolation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity (excluding carbon capture and storage from fossil fuels when it captures carbon dioxide before it is released into the atmosphere) should be considered as forms of geo-engineering which are relevant to the Convention on Biological Diversity until a more precise definition can be developed. It is noted that solar insolation is defined as a measure of solar radiation energy received on a given surface area in a given hour and that carbon sequestration is defined as the process of increasing the carbon content of a reservoir/pool other than the atmosphere.²³⁰

Surveying the debate, Clive Hamilton considered the geopolitics of geoengineering.²³¹ He surveyed the responses of nation states to the issue at the Conference of the Parties for the Convention on Biological Diversity 1992.

In 2012, the Secretariat published a report entitled *Geoengineering in Relation to the Convention on Biological Diversity: Technical and Regulatory Matters* (2012)—no. 66 in the CBD Technical Series.²³²

²²⁷Ibid.

²²⁸Ibid.

²²⁹Ibid.

²³⁰Ibid.

²³¹Hamilton (2013).

²³²Convention on Biological Diversity Secretariat (2012).

In his book *Climate Change and International Trade*, Rafael Leal-Arcas considers trade-related aspects of geoengineering.²³³ He observes that ‘geoengineering gives rise to challenges such as dealing with risks of action versus inaction when faced with ambiguous scientific knowledge, the complexity of designing regulatory approaches, the need for cooperation amongst nations versus the costs of developing such arrangements, and their sometimes limited effectiveness.’²³⁴ Leal-Arcas considers a range of possible international forums to supervise geoengineering—including the UNFCCC, the Kyoto Protocol, the World Intellectual Property Organization, the World Trade Organization, and the G20. He contends: ‘A comprehensive global governance regime, therefore, ought not to limit itself only to providing definitive decision-making mechanisms; rather it should also articulate comprehensive regulatory frameworks, including clear rules, for the commercial use of geoengineering techniques and their trade aspects.’²³⁵

In its book *Earth Grab*, the ETC Group argued that there was a need to develop an international mechanism for the evaluation of new technologies.²³⁶ The ETC Group commented:

The challenge of addressing climate change highlights the critical need for the sound and timely evaluation of new technologies. What is required is an international participatory and transparent process that supports societal understanding, encourages scientific discovery and diversity, facilitates equitable benefit-sharing from new technologies and results in a legally binding treaty: an International Convention for the Evaluation of New Technologies. Such an instrument could also ensure the conservation of useful, conventional or culturally distinct technologies and promote technological diversification and decentralization.²³⁷

The ETC Group emphasized that there was a need to consider a number of principles—such as the strict application of the precautionary principle; no unilateralism; ensuring environmental integrity; a full consideration of social, cultural, and environmental impacts; an open and transparent process with full civil society participation; and respect for international human rights and environmental law. The ETC Group argued that ‘the establishment of a generalized, non-crisis approach to technology diffusion will also be a relief.’²³⁸ The ETC Group observed: ‘A transparent and participatory process with both early listening and technology conservation/diversification potential will encourage civil society.’²³⁹

There has been significant debate over the implications of the Paris Agreement 2015 for the practices of geoengineering. Professor John Shepherd from the United Kingdom Royal Society argued against geoengineering being presented as an

²³³Leal-Arcas (2013).

²³⁴Ibid., pp. 430–431.

²³⁵Ibid., p. 454.

²³⁶ETC Group (2011, p. 44).

²³⁷Ibid., p. 44.

²³⁸Ibid., p. 44.

²³⁹Ibid., p. 44.

alternative to cuts in greenhouse gases during the Paris negotiations.²⁴⁰ Nonetheless, they maintained that, ‘while geoengineering can never be a satisfactory ‘solution’ to climate change, it might in time prove to be a useful complement to mitigation and adaptation efforts, especially for addressing the risks that arise from the greenhouse gases that we’ve already emitted.’²⁴¹ Shepherd maintained: ‘I also hope that the challenges thrown up by the Paris Agreement will help to open up discussions on the scientific and ethical issues around geoengineering research and governance.’²⁴²

Somewhat more reluctantly, Professor Dan Farber from Berkeley Law School wonders whether ‘geoengineering begins to look necessary as a practical matter if we are going to hit such ambitious goals.’²⁴³ He noted: ‘Although it involves risks, the risks are less severe if we make a strong an effort as possible to cut emissions first, so that geoengineering doesn’t need to carry so much of the weight of emissions reductions.’²⁴⁴

Professor Michael Gerrard and Tracey Hester have focused on the legal aspects of climate engineering—in terms of the role of government regulation; the provision for liability and compensation; and the prospects of international governance.²⁴⁵

In his book, *Atmosphere of Hope*, Tim Flannery—a councillor on the Australian Climate Council—considers the respective merits of different forms of geoengineering but ultimately reflected: ‘Without a protocol to regulate interventions, there is no prospect of humanity agreeing to deploy any of the options discussed, even if they are urgently needed.’²⁴⁶

Given the lack of a clear international framework governing geoengineering, it seems hasty to press ahead with the research, development, and deployment of such technologies.

6 Conclusion

In the wake of the controversies over patenting life, the topic of geoengineering raises larger questions about intellectual property, ethics, risk, and climate change. There has an intense debate amongst philosophers, ethicists, and policy-makers over whether geoengineering is a clean technology or a moral hazard. John Vidal commented:

²⁴⁰Shepherd (2016).

²⁴¹Ibid.

²⁴²Ibid.

²⁴³Farber (2015). See also Farber and Peeters (2016).

²⁴⁴Ibid.

²⁴⁵Gerrard and Hester (2018).

²⁴⁶Flannery (2015, p. 150).

Climate change has been caused by ignorance and stupidity and cannot be solved by endorsing more of the same with geo-engineering. The only answer is reducing greenhouse emissions. Fast.²⁴⁷

As such, it should be expected that there will be significant debate over the desirability of granting patents in respect of the field of geoengineering. In particular, there will be a complex calculus of the relative benefits and costs of such untested technology. There will also be greater concerns over government regulation, scientific uncertainty, and the precautionary principle. There have been significant controversies over patent applications by both public researchers, and private entities, such as Intellectual Ventures. There has been a dialogue over whether patent applications in this field are ‘patents for humanity’ or mechanisms for private exploitation and control. There has been a great deal of debate about patent law reform, particularly to deal with patent trolls in the United States. There are larger, unresolved questions about the international regulation of patent law and geoengineering. Overall, it is questionable whether the patent regime should encouraging research, development, and deployment of geoengineering technologies. Given the threat posed by runaway climate change, it is imperative that there is a transition to a clean energy economy, which places a priority upon renewable energy.

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²⁴⁷Vidal (2016).

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Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques (The ENMOD Convention) May 18, 1977, 31 IST 333, 1108 UNTS 152, entered into force Oct. 5, 1977

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Part III
Trademark Law and Related Rights

Chapter 10

Trademark Goodwill and Green Global Value Networks



Margaret Chon

Abstract This Chapter focuses on the role of trademark goodwill in signaling environmental sustainability standards. In this view of trademark goodwill, brands potentially provide highly public platforms for interaction by firms and their customers to further various public and private policies. Brand value could play a far more significant role than it currently does to convey sustainability efforts and impacts to consumers, and thereby potentially create market-differentiation mechanisms for brand owners and increase supply chain sustainability—not to mention contribute to more meaningful choices for consumers participating in now ubiquitous global value networks. The Chapter concludes by proposing a new function of trademark goodwill, to augment and incorporate additional communicative nuance to its widely accepted signaling functions. This would expand the signal now primarily associating the trademark with its manufacturing origin and reputation to include the deeper, underlying standards and processes that the firm's goods and services embody. In short, trademark goodwill performs a critical public, communicative function and therefore is a key public good within a regulatory governance framework for cross-border trade of environmentally sustainable goods and services.

Keywords Trademark • Green global value networks • Goodwill
Environmental sustainability • Standards • Communication • Eco-Labels
Branding • Advertising • Certification trademarks

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1 Introduction

This Chapter focuses on how the goodwill associated with trademarks and certification marks¹ could better reflect the environmental impacts or sustainability (hereinafter sustainability standards or sustainability information)² of products or services offered in global markets. Brands associated with products and services provide a highly public platform for interaction by firms and their customers. Viewing goodwill as a critical information platform—rather than merely as brand value—highlights its market-differentiation mechanisms for mark owners, which can in turn increase the attractiveness of their products and services to environmentally conscientious consumers. At the same time, such efforts can also improve their firms' efficiency and sustainability. Indeed, emerging scholarship indicates that increasing the traceability of a firm's component sources yields 'important benefits to companies that have been overlooked ... [such as] enhanc[ing] a company's reputation among such stakeholders as consumers, investors, and NGOs. Moreover, in the process of complying with ... laws and conducting due diligence, companies can find possible inefficiencies within their supply chain and thereby improve their supply chain management so as to effectively reduce costs.'³

Viewing goodwill as an information platform therefore can potentially contribute to more meaningful choices both for global firms as well as for environmentally conscious consumers participating in now ubiquitous global value networks. In tandem, a recent decided shift is already visible towards relying on labeling to provide more informational transparency about a product's ingredients, by taking advantage of mobile and embedded data technologies.⁴ Thus powerful brands that dominate our transnational landscapes could be more fully developed to enable firms to provide such sustainability information to their consumers.

Trademark goodwill is co-created by trademark owners and the consumers of their products and services. Commonly defined as all possible sources of consumer patronage,⁵ trademark goodwill is increasingly impacted by networked digital technologies including social media. These technologies affect the highly dynamic process of trademark goodwill formation by shortening the distance between value adding or subtracting stakeholders in cross-border supply chains—or governance of what this Chapter will frequently refer to as global value networks (GVNs). The

¹The term 'trademark' in this Chapter is shorthand for all marks (trade marks, service marks, certification marks and collective marks) unless otherwise noted. 'Goodwill is an intangible asset that provides added value to a trademark's worth. A mark is a symbol of the owner's goodwill in the business and the goods or services associated with the mark.' International Trademark Association Fact Sheets.

²The term 'sustainability standard' in this Chapter refers primarily to environmental sustainability, recognizing that this term may overlap with other regulatory regimes involving sustainability criteria such as fair wages.

³Sarfaty (2015).

⁴Martin (2016).

⁵Calboli (2005, pp. 771, 804, n. 179).

term *value* in GVN denotes both economic and non-economic value relevant to trademark and their associated brands; in addition to direct monetization, it includes key informational attention that builds brand awareness and recognition within a market. The term *network* is intended to underscore the non-linear quality of multiple relationships among relevant actors.⁶ For example, actors in a value network focused on the provision of organic commodity food items may be organized differently in relation to each other than actors in a network focused on the provision of sustainably harvested wood or apparel.⁷ This is not only because the industry structures differ, but also because the process of creating brand significance may differ across industries. For these reasons, the term ‘value network’ is more descriptively accurate than ‘supply chain’ because it emphasizes the creation of key attentional and informational value created by multiple stakeholders (including consumers) rather than simply the manufacturing components of a good or service.

The scholarly literature on governance of GVN often pivots on collective consumer approval of or discontent with corporate social practices, ultimately impacting the reputation and hence value of the firms’ brands.⁸ It revolves around a central (albeit largely untested) assumption⁹ that consumers will reward or punish brands depending upon their social responsibility performance. The consumer is presumably expected to act upon relevant information to make more informed purchasing decisions. If enough consumers make purchasing decisions in favor of firms that disclose clean or green GVN (and against firms that do not), then a market signal is supposed to be delivered.

In these accounts, relevant sustainability information may be gathered via collective consumer efforts such as consumer class action lawsuits (with attendant civil discovery), the research activities of socially responsible investment (hereinafter SRI) funds or investigations by consumer advocacy non-governmental organizations (hereinafter NGOs). But while law and policymakers increasingly note the role that brands play in socially responsible undertakings by firms, a typical individual consumer currently has very little access to information in a meaningful form—even when disclosure is mandated by law. And outside the context of complying with mandatory disclosure laws, trademark owners have largely ignored the problem of providing market-differentiating mechanisms to provide that information.

This Chapter builds upon and adds to a series of works on the relation of trademark law to ethical consumption.¹⁰

Against this background, this Chapter has several goals: to connect the law and policy of trademark law with prevailing practices in business law and practice, in particular, governance of GVN; to show how trademark goodwill can function as a

⁶Meidinger.

⁷Blair et al. (2008, pp. 11–12, 14).

⁸Bartley et al. (2016).

⁹Scattered empirical or experimental work is emerging on this question. See, e.g., Sarfaty (2015).

¹⁰See e.g., Chon (2009), Chon (2014), Chon 2015a, b, Chon and Fujiye (2016), Chon (2017).

robust information platform between these two largely distinct areas of law, as well as between consumers and trademark owners; and to suggest the multiple ways that both consumers and businesses could benefit in various ways by such an expansion of trademark goodwill. The chapter first sets forth the case for viewing trademark goodwill as part of an overall system of transnational non-state rule-making. It summarizes current regulatory governance tools relevant to increasing the visibility of sustainability standards, including monitoring of GVN's as well as publicly mandated disclosures. Many of these recent initiatives depend upon informed consumers to send market signals back to trademark owners, via consumer purchasing choices. From this perspective, brands serve as information platforms around which various stakeholders participate to create value. While these voluntary mechanisms purport to complement or even substitute for public regulatory oversight of environmental and labor conditions, many observers question their effectiveness under current conditions of information asymmetry.

In this regard, this Chapter then revisits the concept of trademark goodwill and recasts it in light of governance objectives within global markets. It summarizes emerging suggestions about the role of brands in governance of GVN's, from both consumer and business perspectives. The Chapter concludes by proposing a new function of trademark goodwill, to augment and incorporate additional communicative nuance to its widely accepted signaling functions. This would expand the signal now primarily associating the trademark with its manufacturing origin and reputation to include the deeper, underlying standards and processes that the firm's goods and services embody. Such a shift in our conceptualization of trademark goodwill would redound the benefit of trademark owners by meaningful market-differentiating and efficiency-enhancing tools. And it would also benefit of consumers, including but not limited to environmentally conscientious consumers, by providing more specific information critical to their consumption behaviors and choices.

2 Brands as Information Platforms in Regulatory Governance

What's in a name? According to the World Intellectual Property Organization (WIPO), much more than what is currently being measured. A recent WIPO publication states:

Consider the definition of brand—an *intangible asset that depends on an association made by consumers*—and its more precise form, an asset that reflects *customers' implicit valuation of the revenue stream that accrues to a firm from its brand name(s)*. Now consider that investments in brand are usually measured as promotion expenditures, and that brand equity measured using standard growth accounting techniques reflects the cumulated value of those investments. A disconnect is then obvious: *all customer-facing aspects of a firm's*

*performance have an impact on brand equity valuation (product quality, product cost, after-sale service, etc.), not just its investments in brand.*¹¹

As this excerpt suggests, trademark goodwill is simultaneously important and incompletely appraised. Brands possess ‘global communicative power’¹² and yet possess weak signaling functions with respect to a firm’s performance, including important sustainability measures. This impaired sustainability signaling is true of both the standard accounting methods described above, as well as standard concepts of goodwill in trademark law and policy. Standard accounting methods view goodwill as a direct function of advertising expenditures by the firm, thus missing the extraordinary value contributed by consumer activities and attention. Similarly, standard legal theories view goodwill as a quasi-property rights appendage to marks themselves, the value of which is allocated solely to the mark owner. The consumer’s role, if any, is defined primarily by the law’s focus on the prevention of consumer confusion as the core of the traditional trademark infringement test.

As part of an overall branding strategy, trademarks have been described as having three primary functions, all of which could and do contribute to regulatory governance in the global market: ‘[a]n origin function—they indicate who is the producer of the product or the service; [a] quality [or reputation] function—they are a guarantee of consistent quality; and [a]n advertising function—they help in marketing products and bringing new products to the market.’¹³ These three basic functions of trademarks ‘become brands when they are able to convey something positive about the product to the consumer. *The essence of a great brand lies in its capacity to foster the sales of a product by creating an emotional link with its consumers.*’¹⁴ In addition to the widely shared understanding of these core signaling functions, trademarks also reflect any standards embedded in a good or service. These largely invisible standards, described sometimes as ‘credence’ attributes (or process characteristics)¹⁵ cannot be experienced directly by consumers, yet they are often key to fully informed consumer choices in the market. These signals are less commonly recognized, and could be viewed as part of the ‘trust function’ of trademarks.¹⁶ For some consumers, this information is pertinent to ethical consumption, such as avoiding goods made with negative environmental impact. Thus, a trademark’s trust functions include its communication of relevant guarantees of sustainability standards, along with sourceability, traceability, and other sustainability efforts.

¹¹Corrado and Hao (2014, p. 5).

¹²Kysar (2005), see also Kysar (2010).

¹³International Trade Centre (2003, p. 14).

¹⁴Ibid. (original emphasis).

¹⁵Nelson (1970) (distinguishing between search goods and experience goods with the examples of a dress, which can be tried on immediately, as opposed to a can of tuna fish, which has to be opened in order for the fish to be evaluated).

¹⁶Chon (2014, p. 945) (citing Katz 2010, p. 1563).

Brands are a central tool in regulatory governance accounts, which depend heavily upon both the underlying robustness of sustainability standards¹⁷ and the communication of these objective (rather than subjective) standards to the consumer.¹⁸ Eberlein and colleagues comment: ‘Regulatory governance refers to systematic efforts to regulate business conduct that involve a significant degree of non-state authority in the performance of regulatory functions across national borders.’¹⁹ Because ‘regulation’ is often associated with state action and binding legal rules, however, ... ‘regulatory governance’... encompass[es] non-state action and ‘soft’ norms.²⁰

According to one longtime observer/participant, brands have

become the point of leverage for a rapidly increasing number of NGO efforts to change corporate practices through ‘market campaigns’ ... which [are] a set of strategies designed to influence business and consumer purchases by informing buyers of some characteristics of the supply chain that might make them avoid a particular product. [A market campaign] is a direct attack on the brand of a company, or a product line, based on information about the company’s practices, and it is designed to push some of the company’s production or supply-chain activities toward more socially and environmentally responsible practices. It seeks to do that by reducing both sales of those products and the shareholder value embodied in the brand.²¹

Observers of these kinds of market-based regulatory governance approaches concede that the:

[u]ltimate impacts of conscientious consumption and production projects are often hard to discern, but this much is clear: taken together, these activities amount to a vast new set of standard-setting projects for the global economy. Promoted by a mix of NGOs, companies, and trade associations, they seek to use global production networks – or ‘global value chains’—rather than the national state to promote rules about fairness, justice and sustainability ... ‘Lead firms’ in these global value chains – that is, large retailers and brands from Apple to IKEA to Zara—have the power to set styles, prices, and delivery schedules for their supplies, so, advocates argue, they should also be able to influence the conditions of workers, communities, and the environment.²²

¹⁷Conroy (2007).

¹⁸World Intellectual Property Organization (2013, p. 7). (‘Overall, [several] interrelated trends stand out ... companies work to create and deliver a “brand experience” for the consumer. Companies increasingly have to manage not only product quality, but also their reputation as good global citizens, paying attention to how socially and environmentally responsible they are perceived to be ... [yet] branding is no longer the purview of companies alone. Increasingly, individuals, civil society organizations, as well as governmental and intergovernmental organizations are adopting an active approach to branding. ... However, the reputation mechanism only works if consumers are confident that they will purchase what they intend to purchase.’).

¹⁹Eberlein et al. (2013, pp. 1–21) at 3, and Wood et al. (2015, pp. 333–369).

²⁰Eberlein et al. (2013). These scholars, many of whom are deeply rooted with environmental studies and environmental law, proffer the TGBI framework as an analytical approach to the various interactions within this governance domain.

²¹Conroy (2007, pp. 9–10).

²²Bartley et al. (2016, p. 8), see also Dauvergne and Lister (2011, pp. 36–45) (‘... many of the most prominent cases of private regulatory governance involve very large lead firms with more or less captive suppliers’. Big brands have typically used this governance power to squeeze suppliers

The trajectory from consumer boycotts to labels embodying voluntary global standards relies entirely on consumer recognition of globally famous or well-known,²³ and hence powerfully expressive, brands. With their globally recognizable brands, many multinational corporations

through their expansive operations, ... offer one of the few direct relationships—and perhaps the only such relationship that is common across diverse cross sections of international societies—that individuals have with the larger economic, political, and cultural currents that are dramatically reshaping the planet. As such, ... their iconography offer[s] unparalleled global communicative power...²⁴

This undeniable ‘unparalleled’ power of brands in global markets is also their proverbial Achilles heel; recognizable brands are also more vulnerable to market campaigns spurred by social movements, and other forms of negative valuation by consumers.

3 Brand Citizenship

While a trademark is a legal term of art,²⁵ a brand is something much more amorphous. As Jessica Kiser writes: ‘[t]o illustrate the difference between the role of a trademark and that of a brand, consider that a trademark can be said to answer the question “Who made this product?” A brand answers the more existential questions of “Who is this product?” or “Who am I if I buy this product?”’²⁶ Intergovernmental organizations such as WIPO recognize that obtaining trademark rights is a critical legal step in the overall (non-legal) process of branding, which aims to ‘creat[e] and nurtur[e] an enterprise image linked primarily to the name of the proprietor, of the business or of its products.’²⁷ This linkage to a business can

present a powerful image of quality, exclusivity, youth, fun, luxury, adventure, glamour or other reputedly desirable lifestyle attributes, not necessarily associated with specific products but capable of presenting a strong marketing message in itself. This ability to

to cut costs. This helps to keep retail prices low. But it can also push suppliers to cut corners (i.e., reducing environmental and social standards) to meet low-cost demands. Recognizing the drawbacks of this in terms of increased risk, brand companies are increasingly adopting corporate sustainability programs as a means to establish rules, oversight, and closer relationships with their suppliers: to work with them directly to keep production costs down through eco-efficiencies while also helping to ensure high-quality, reliable output.’) (citations omitted).

²³TRIPS Agreement Chap. 16; Paris Convention Chap. 6 bis; Lanham Act section 1125(c)(2).

²⁴Kysar (2010, p. 43).

²⁵Cf. World Intellectual Property Organization (2013, p. 22) (‘[E]conomic research [has] clarified the distinction between a trademark as a legal instrument and a brand as a business tool. Legal scholars have similarly described trademarks as the legal anchor for the use of the commercial functions of brands.’).

²⁶Kiser (2017).

²⁷World Intellectual Property Organization (2013, p. 14).

convey ‘images and feelings’ gives reputed marks ‘an inherent economic value which is independent of and separate from that of the goods or services for which it is registered ... [and] which deserves protection.’²⁸

The social construction of brand identity, meaning and value is a complex process magnified immensely by social media. Compared to the one-to-many approach of the analog and print-based advertising and marketing models, digital networks allow disintermediated voices of consumers to contribute to the discourse around a brand’s meaning. In this way, brands are information intermediaries, and resemble what has been described in other contexts as a ‘two-sided platform.’²⁹ Thus the work of both consumers and producers contribute to the value of a brand,³⁰ although typically it is only the latter’s advertising efforts that are recognized.

Commenting upon the expansion of traditional trademark theory by the Court of Justice of the European Union to cover brand value, Dev Gangjee observes that:

the brand is generated in the minds of consumers, corporate control over its content has always been brittle. Brand image is negotiated, context-sensitive and constantly reproduced. As the symbolic, social and cultural aspects of consumption have come to be better understood, the consumer’s investment of time, creativity and effort into this process of negotiation is better appreciated. *Today ‘co-creation of value is emerging as the new frontier and leading edge in marketing thought.’*³¹

Graeme Austin has also recently argued that goodwill is not territorially specific because consumers are mobile and the value of brands travels with the consumer.³² If these observations are accurate, then the brand itself is a type of mobile platform around which these meanings converge.³³ The participation by consumers in these activities that create meaning and value could be termed ‘brand citizenship’—a term that also recognizes this global context in which trademark law operates. As I have explored in detail elsewhere,³⁴ brand citizenship also frames a broader

²⁸Gangjee (2013, pp. 16–17) (quoting *Mülhens v OHIM – Spa Monopole* (T-93/06) [2008] ECR II-93; [2008] ETMR 69 at [26]).

²⁹Rysman (2009, p. 126) (‘whether the seller is paid based on the success of the platform with the buying side. Strikingly, one-sided and two-sided selling strategies exist side-by-side at Amazon.com. For some products, like certain new books, Amazon (basically) buys at a wholesale price and sells for a retail price, which is a one-sided model. But for many other products, Amazon provides a web portal for a producer that sets the retail price that a consumer would see. As this distinction often depends on the decisions of the intermediary rather than on purely technological features of the market, it may be better to use the term “two-sided strategies” rather than “two-sided markets.”’); see also Jane Winn, *The Secession of the Successful* (on file with author).

³⁰Gangjee (2013, pp. 32–33).

³¹*Ibid.* (emphasis added).

³²Austin (2016).

³³Chon (2014), (quoting Arvidsson (2006, pp. 7–8)) (‘the brand works as a kind of platform that anticipates certain kinds of actions and attachments ... Brands are a form of immaterial capital; a form of ‘crystallized knowledge’ ...’); see also Arvidsson (2005, pp. 235, 238–239).

³⁴Chon (2014).

participation by various stakeholders in a cross-border community of regulatory governance, albeit one that congregates around the fluid, pluralistic, and open-ended construction of the value of a mark and its associated social spectacle—its brand. In short, the *brand*, which is not a legal term of art in any sense, drives and shapes much of the regulatory environment that intellectual property specialists tend to see solely through the prism of the *mark*.³⁵

By contrast, traditional trademark theory posits what Gangjee has called a one-way flow of information.³⁶ In this once dominant but now disappearing communication and marketing approach, the trademark supposedly plays a unilateral signaling function to largely passive consumers. Within this classic model, consumers indicate their relationship to the trademark through either exit or loyalty—by either switching to another product or sticking with what’s tried and true to their expectations from prior purchases. Drawing on a concept of ‘informational capital,’ Gangjee further coins the term ‘digital capitalism ... which is centred on immaterial, informational production rather than industrial production.’³⁷ And building upon these priors, I have offered a related concept of ‘cognitive capitalism.’³⁸

All of these related expressions stem from the observation that the *attentional value* of brands (that is, the attention they receive in cultural, economic, political, and social realms, magnified by networked digital technologies) is co-created by various stakeholders as they exchange meanings with each other. As the media landscape fractures, advertisers not only provide the familiar one way appeals to consumers, but also increasingly create original content that is hard to distinguish from non-marketing content. Advertising executives on the cusp of this trend ‘are put[ting] forth the idea that ads are the products of symbiotic relationships.’³⁹ Consumers pro-actively participate in the creation of content and its meanings, as Annette Kur has pointed out with the example of a recent marketing campaign involving Nutella.⁴⁰ Whether appreciative or critical, consumers spin off their own reviews of products through a plethora of social media tools.⁴¹

³⁵Chon (2014).

³⁶Gangjee (2013, p. 15). He further states that ‘within this tradition: it is often assumed that the brand owner exerts considerable control over the brand. From this perspective, successful brand management becomes a matter of finding the brand’s true and timeless essence and carrying out brand-building activities that will translate the identity into a corresponding brand image. Such thinking tracks the dominant approach to marketing in economics, which held sway until the late 1980s.’ Ibid. at 10.

³⁷Gangjee (2013, p. 33) (citing to preface of Arvidsson (2006, pp. 7–8)).

³⁸These concepts are related to but not identical to ‘informational capitalism.’ Pessach (2016) (defining it as ‘the use of data, information and content—as means of production and circulation—for profit motivated goals and wealth accumulation.’).

³⁹Ember (2016).

⁴⁰Kur (2016). See also Chon (2014, pp. 935–968) (describing a Coke marketing campaign).

⁴¹Goldman (2015).

4 The Regulatory Governance Ideal: Brand Citizenship Within Cognitive Capitalism

The emergence of this dense digital sociality in lieu of the largely analog media environment has changed the interactions between firm, consumer and brands, and potentially accelerates the social learning process. Instead of comprising a one-to-many signal from firm to customer, communications over brand identity are increasingly pluralistic and decentralized. Moreover, consumers (whether individually or collectively) have a meaningful voice vis-à-vis the brand identity. This voice can be expressed in the form of Facebook ‘likes,’ Twitter campaigns, user reviews on Yelp! or on TripAdvisor, and so on. Thus a firm’s commitment to the norm of consistent provision of a particular credence attribute, e.g., sustainably produced products, can be easily amplified not only through its own marketing but also through the power of digital networks. Goodwill or value can be added to (and subtracted from) a brand by consumers and other stakeholders. These increasingly prevalent communicative activities are a source of brand value in their own right within the cognitive capitalism frame, where attention is captured and consolidated into the container of trademark goodwill.⁴² Consumers signal to other consumers by consuming branded products, then connecting to their social media platforms to approve or disapprove of them. B2B signaling via brands is clearly for purposes of market differentiation and competition. Firms signal to consumers via brands in their targeted marketing efforts. Consumers signal to firms through consumer boycotts, and increasingly through their own individual assessments of products and services—again through the information platforms provided through digital technologies. And increasingly producers such as farm and factory workers are involved in these multidirectional conversations as a type of brand citizenship.

Viewed this way, the value of the brand as a business asset is no longer exclusively related to a trademark owner’s efforts such as marketing expenditures. Rather, trademark goodwill is a major feature of the global public square and is therefore more clearly than ever a type of public good, with temporary and partial possession by all who contribute to its meaning. No stakeholder with access to technology can be excluded and all brands potentially benefit (or are harmed) from the fluid and dynamic communicative power of brand citizenship linked with cognitive capitalism.

Ideally, the concepts of brand citizenship and cognitive capitalism have the potential to connect the global regulatory governance of GVN to the formation of trademark goodwill or brand value. Brand citizenship gives consumers a stakeholder role in demanding, assessing and enforcing product quality beyond the traditional method of repeat purchases due to customer loyalty. Brand owners would receive signals regarding consumer demands and desires, and then change or improve the underlying GVN, including their sustainability-related decisions.

⁴²It is analogous to what is called user-generated content in the copyright context. Gervais (2009), and Lee (2008).

Consumers, in turn, could receive information regarding salient aspects of firm decisions and policies, and could also potentially engage in brand-relevant conversations with other participants in these GVN. In reality, however, this possible multi-directional communication model rests on many assumptions about information flow and symmetry. These assumptions are explored in the next section.

5 The Regulatory Governance Reality: Missing Puzzle Pieces

Market-driven regulatory governance mechanisms has been described as the ‘puzzle of rules’—by which the contradictions of neoliberal markets are incompletely addressed through market-based rule-making projects, ‘from standardization of accounting procedures to the rules for fairness and sustainability’ of consumer projects.⁴³ These projects are typically based upon voluntary private codes or standards, combined with self-monitoring, and ‘seek to bypass nation-states and regulate through supply chains. Potentially, they are creating new forms of authority and regulation that do not rely directly on the nation-state system.’⁴⁴ Despite this proliferation of rules by these ‘new global rulers’,⁴⁵ key pieces of the puzzle of rules are missing. For example, it is not been demonstrated that consumers actually have access to the information they need to make ethical choices; indeed firms may resist making transparent their sustainability practices.⁴⁶ Moreover, there are unresolved questions of what consumers understand when they do get information, whether disclosure of information impacts consumer purchasing patterns, whether individual changes in consumption then add to up to an aggregate shift in market demand, and whether that aggregate demand will in turn impact corporate behavior. For purposes of this Chapter, the big missing piece is how trademark law interfaces with these consumer perceptions and ultimately through the brand’s value or trademark goodwill.

Ideally, regulatory governance promotes transnational policy outcomes through private ordering and contractual relations between and among firms in GVNs. The involvement of consumers via social media adds additional layers to this narrative of market-based governance, by leveraging digital technologies to potentially connect the end consumer to the proverbial last mile of a GVN. It is unclear, however, how much consumers understand from the standards that are embedded in certification marks or disclosures provided in labels. Some scholars assert that mandatory disclosures or ‘notice’ to consumers are often misunderstood or

⁴³Bartley et al. (2016, p. 29).

⁴⁴Pennington (2013).

⁴⁵Büthe and Mattli (2011, pp. 21–22).

⁴⁶Meidinger at 24 (reporting hesitancy among managers about making public their supply chain activities).

ignored,⁴⁷ and are therefore skeptical of notice as a form of regulatory governance. Others suggest that even if consumers are conscious and (furthermore conscientious), they may still prioritize price or other characteristics over ethical choices.⁴⁸ Studies on consumer behavior have revealed inconsistency between consumer's stated preferences and their actual behavior.⁴⁹ Much of the regulatory governance literature focuses on market campaigns or consumer boycotts as the primary market signal of discontent. This over-reliance on boycotts (or consumer class action lawsuits) belies the idea that individual consumers' actions in the aggregate may create a strong market signal. And even organized boycotts and other forms of collective consumer 'voice' may not ultimately have impact on a firm's behavior or bottom line.⁵⁰ Thus a potentially huge disconnect exists, therefore, between the ideal of brand citizenship and the reality.

Furthermore, even if the consumer is involved more in this informational interchange, which will purportedly result in more sustainable consumption choices, these approaches depend upon the provision of key information that the brand value does not currently signal. Trademark goodwill is currently a flat and not very deep interface for the kinds of signals that regulatory governance proponents regularly ascribe to it. To the extent that the consumer would like to receive information about the sustainability standards of a product or service, for example, a great deal more research on the part of the consumer is required than simply looking at a mark or label. It is challenge for all but the most sophisticated and well-organized consumer groups—such as NGOs dedicated to this process—to decode the differences among the competing standards, much less articulate them to the public. Thus one huge missing piece of the regulatory governance puzzle is the lack of harmonization of sustainability standards embedded in the production processes. And this widespread inability to discern the substance of invisible product attributes is true of widely recognized and harmonized public standards, such as the USDA organic certification, even with public administrative rule-making procedures in place.⁵¹ Thus the current governance dialogue is rife with missing pieces.

⁴⁷Ben-Shahar and Schneider (2014, pp. 185–90).

⁴⁸Weldon (2015), Sarfaty (2015), and Chilton and Sarfaty (2016).

⁴⁹See e.g., Chon and Fujiye (2016) (discussing consumer behavior with regard to healthy foods).

⁵⁰Weldon (2015) ('I conclude that the evidence is inconsistent, at best, about the effect of disclosures on consumer behavior. The evidence is clear, however, about the lack of consumer enforcement of the social contract through boycott or other sustained action.').

⁵¹PCC Natural Markets (2015) (describing a lawsuit against the US Department of Agriculture 'over a rule changing the "Sunset" provision restricting synthetics in organic foods; [t]he lawsuit contends USDA made the rule change illegally, without following the required process').

6 Trademark Goodwill in an Age of Out-Sourcing

As the previous sections demonstrate, many obstacles exist to meaningful governance dialogue between trademark owners and consumers even though there is huge potential to facilitate this dialogue through pervasive information and communications technologies. And at the same time, the expanded role of trademark goodwill within this regulatory governance framework has not been much explored to date. This section reviews how the extensive literature on trademark goodwill has developed almost completely separately from the regulatory governance literature, and the consequences of this disconnect.

Trademark scholarship often refers to goodwill as all possible sources of a customer's patronage.⁵² Historically, the concept of goodwill has moved from a narrow focus on the injury to a mark (and therefore by implication to one's business reputation and only incidentally to its goodwill) to the much broader conception injury to the trademark goodwill itself as a source of injury. Whatever their positions on whether this is a positive development, all observers agree that goodwill has expanded beyond its origins, which were limited to positive associations emanating from the brand itself ('such as its reliability, high quality, and the like')⁵³ to what could be called second generation goodwill, which includes positive associations with the firm that sells the brand.⁵⁴ And the third generation of the concept of goodwill, ascendant today, includes anti-dilution protection and merchandise licensing activities, based upon associations with the trademark itself, independent of the source or firm.⁵⁵

Despite any concerns over this expansion, the public policy rationale for protection of trademark goodwill has proved to be malleable enough to fit the felt needs of trademark owners in expanding global markets, particularly responding to innovations in technology and marketing.⁵⁶ The object lesson for purposes of this Chapter is that trademark goodwill can and has adapted quite rapidly over time, in response to changing business models and social conditions.

⁵²See Calboli (2005) (citing to *Newark Morning Ledger Co. v. United States*, 507 U.S. 546, 555–56 (1993)) 'Although the definition of goodwill has taken different forms over the years, the shorthand description of goodwill as 'the expectancy of continued patronage,' provides a useful label with which to identify the total of all the imponderable qualities that attract customers to the business.' Calboli canvases many historical definitions of goodwill, many of which refer to "consumer patronage." See also Bone (2006, pp. 547, 569) (referring to sources of consumer patronage).

⁵³Bone (2006, p. 551).

⁵⁴See also Black (2014).

⁵⁵Bone (2006, pp. 551–552). As both Bone and Irene Calboli have documented, this most recent incarnation of trademark goodwill, beginning in the 1980s, marks a decisive shift in favor of viewing goodwill as a property right rather than a tort injury to one's business reputation.

⁵⁶For an overall critique of intellectual property law's role in promoting status distinctions, see Beebe (2010). In defense of this expansion, see Chronopoulos (2014), and Dilbary (2007).

Many challenges exist to moving trademark law in the direction of incorporating GVN governance activities, such as certification of sustainability standards, now undertaken by trademark owners. One is ideological: trademark law has its own version of the copyright's 'romantic author.'⁵⁷ Trademark law developed under a prototypical small, local family-owned business or guild, very different from the current landscape dominated by multinational corporations with long supply chains. Thus the current legal framework and emphasis arguably over-emphasizes first-party certification, that is, the guaranteeing of quality control via a small firm (or even more distantly, a guild)⁵⁸ that also owns the mark and sources all the components. It also disregards the reality that most manufacturing is no longer local in nature. Under this traditional paradigm, this small firm markets a particular brand of good or service, signaling source of origin directly to consumers via trademarks. This emphasis on first-party certification assumes that a firm will act in its own self-interest and maximize quality assurance of its product or services, in order to attract repeat customers. With some locally based firms, this may still be a relevant paradigm: 'If it has a logo, then it's ok,' as one observer affiliated with a small fair trade chocolate firm puts it.⁵⁹ Arguably, however, it is difficult for many if not most trademark owners, particularly those with many tiers of suppliers and/or many products, to be absolutely certain of their sourcing.⁶⁰

With the expansion of cross-border markets and concomitant out-sourcing along value chains,⁶¹ the roles played by second-party certifiers—that is, voluntary industry associations or buyer firms in a GVN—have not been rigorously evaluated. Nor has much attention paid to the role of third party certifiers (independent third-party, nongovernmental standard-setting, inspection, assurance, and certification services).⁶² Because of this omission in the trademark literature, and its importance to the regulatory governance literature, this Chapter delves more deeply into third party certification.

⁵⁷Woodmansee and Jaszi (1994).

⁵⁸Schechter (1925, pp. 79–80).

⁵⁹Chon (2015a, b).

⁶⁰Sarfaty (2015, p. 431) ('Global supply chains frequently include multiple layers of suppliers, which may be difficult to trace and therefore regulate. Since companies often rely on first-tier suppliers to identify and audit those in the second-tier, who in turn identify and audit the next tier and so on, comprehensive monitoring by the company may not be possible. Usually, companies can locate first-tier suppliers, but those suppliers in the lower tiers are not so visible.').

⁶¹Gereffi and Fernandez-Stark (2011), Gereffi et al. (2005) (proposing theoretical underpinnings of global value chains based on different economic considerations).

⁶²Conroy (2007, pp. 14–15).

7 Certification and Sustainability Standards

Third party certification occurs through independent third-party, nongovernmental standard-setting, inspection, assurance, and certification services. These presumably provide quality assurance to brand owners through adherence to voluntary standards. Well-known certifications involving sustainability standards include organic certification and LEED certification. The LEED mark, for example, is registered in the U.S. by the U.S. Green Building Council and its certification statement provides: ‘The certification mark, as intended to be used by authorized persons, is intended to certify that an individual or organization has met the educational, experience... and ethical standards adopted by the US Green Building Council.’⁶³ These underlying standards themselves are not apparent from the certification mark itself, but are a required part of the application for registration in the USPTO.⁶⁴ Certification marks may be recognized not only by statute, but also at common law in jurisdictions like the USA.⁶⁵

Despite their potential to increase relevant information regarding sustainability standards, certification marks are riven with problematic characteristics, which require some consideration here. An enormous weakness of certification marks, for example is that the certification process, which purports to require adherence to objective standards, is vulnerable to the capacity and integrity of the self-auditing activities of the trademark owner or of third party certifying bodies. A second issue affecting certification marks is that they may proliferate so that multiple and competing marks may exist with regard to a single certification, resulting in consumer confusion about their differences. For instance, conflicting certifying schemes exist for organic agriculture. A variety of other organic standards operate in the U.S. market, some of which are more rigorous than the USDA standards (and some of which are far less). Similarly, multiple standard-setting organizations are involved in the sustainability certification of coffee—some of these include environmental measures and others do not.⁶⁶

The flip side of this problem information overload is information famine. From a consumer perspective, it is challenging to find out what organic standards are, because even the sustainability standards underlying the widely recognized USDA organic certification are subject to change without consumer knowledge.⁶⁷ Thus

⁶³US Green Building Council LEED Certified USGBC, Registration No. 77, 199, 331.

⁶⁴USPTO: ‘A copy of the relevant certification standards must be submitted when the mark owner claims use of the mark. The certification standards need not have been created by the mark owner, and may instead be standards established by another party, such as those promulgated by a government agency or developed by a private research organization.’

⁶⁵Hughes (2006, p. 310) (discussing common-law rights in regional certification marks).

⁶⁶Chon (2009).

⁶⁷PCC Natural Markets (2015) (describing a lawsuit against the US Department of Agriculture ‘over a rule changing the “Sunset” provision restricting synthetics in organic foods; [t]he lawsuit contends USDA made the rule change illegally, without following the required process’).

consumers are faced with an information famine created by the failure to fully understand the meaning of these marks, while paradoxically they are also faced with an information feast in the form of too many standards with not enough bandwidth to assess them.

In addition, certification marks carry substantial administrative costs. Implementation requires a separate certifying body, which can be a government, industry association or NGO (whether for profit or not-for-profit). In some sectors, this certifying body may be feasible to establish because the infrastructure and resources may be relatively easy to amass; in others, particularly less developed and/or rural areas, these resources may impose a significant cost on government agencies or producers.⁶⁸ Finally, certification marks require marketing in addition to a trademark, so that consumers can recognize them and make purchasing decisions based upon them. Beyond these general issues, some countries do not have certification laws and this lack of uniformity poses another obstacle to cross-border enforcement of standards through certifications.⁶⁹ Despite the drawbacks associated with certification marks, they are the sole form of trademark law that addresses credence attributes, that is, qualities of a good that are not immediately discernible to a consumer. Thus, they could be deployed more intentionally to promote information about products that can lead to better health.

8 Greenwashing in Governance Dialogue

Those concerned with organic labelling have also noted its potential for over-predicting whether a particular food item, such as wild-caught salmon, can truly be completely organic.⁷⁰ However, the bulk of concern centres around misleading claims associated with consumer confusion about what the term 'organic' really signifies.⁷¹ One commentator argues that consumer misunderstanding of the USDA's regulations gives organic farmers an incentive to refrain from publicly

⁶⁸Cramer et al. (2014).

⁶⁹Heavner and Justus (2009).

⁷⁰Hass (2010, p. 602) (claiming that the organic label is not appropriate for wild-caught fish and will fall short of consumer expectations because there is no way to determine a wild-caught fish's diet throughout its lifespan, and 100% organic feed is not fed to fish with an organic label).

⁷¹Fiser (2007).

complaining about the regulations or about agricultural practices that contaminate organic food.⁷²

‘Greenwashing’ practices such as this lead consumers to believe something is more environmentally sustainable or healthier than it actually is.⁷³ While no quick and easy method exists for consumers to differentiate among these different standards, the issue of this kind of market manipulation could be addressed not only by more rigorous testing and enforcement, but also by greater reliance on information intermediaries to sift through and evaluate marketing claims. In the U.S., this is typically done by national non-profit organizations such as the Environmental Working Group.⁷⁴ These NGOs engage with the challenge of providing analysis where needed by evaluating and making judgements about the plethora of market information, such as the meaning of organic certifications and labels, and thus can assist busy consumers in deciding what to purchase.

In addition to the activities of NGOs and public agencies in enforcing standards, this Chapter claims that consumers could play an expanded role in certification and verification strategies. Brands as information platforms could convey legitimate sustainability efforts in GVN, and possibly differentiate them from greenwashing. This of course assumes that trademark goodwill could develop the capacity to convey relevant information in a global regulatory governance structure. In particular, how would consumers—individual and institutional—signal their ‘patronage’ around sustainability standards? And how would trademark owners respond to these consumer signals? Currently, these communicative activities are incipient but discernable. An array of social media branding mechanisms actively embraces the consumer’s role in co-creating brand identity. The websites associated with brands usually display the now familiar icons allowing their consumers to connect to the brands via social media venues such as Facebook, Twitter, Pinterest, etc. While these on-line activities might currently be sporadic dialogues rather than deeply embedded practices, they have great potential to further connect consumers and trademark owners in governance conversations via the brand. The communication take place under the stick of negative publicity as well as the carrot of building

⁷²Friedland (2005). (‘The regulations allow organic farmers whose crops have been contaminated by pesticides ... to nonetheless sell those crops as organic. Organic farmers who refused to knowingly sell contaminated crops, or who paid for expensive testing of their crops to ensure that they did not do so, would be at a competitive disadvantage to organic farmers who merely complied with the ... regulations’ requirements. Moreover, because consumers do not understand that the regulations allow contaminated crops to be sold as organic, and because this lack of understanding increases demand for organic food, organic farmers also have an incentive to maintain consumers’ misperceptions about organic food.’); see also Kruse (2006, pp. 516–17) (describing challenge by University of Wisconsin to organic certified dairy produced by factory farms).

⁷³Northern (2011, p. 105) (greenwashing occurs when ‘disinformation [is] disseminated by an organization so as to present an environmentally responsible public image’), Hetu and Kramer (2011).

⁷⁴The Environmental Working Group, <https://www.ewg.org/> Accessed 1 April 2018.

goodwill. Pervasive information technologies provide almost limitless mechanisms and pathways of interactions around a brand as an information platform or interface.

9 Connecting Trademark Goodwill to Sustainability Governance

Arguing that current conditions for effective regulatory governance fall short, some observers have begun to suggest changes to system design features, in order to encourage the effectiveness of sustainable trade.⁷⁵ This final section canvases suggestions relevant to trademark law. Consistent with the concept of the brand as a platform for informational interchange, it first evaluates the consumer-facing side of a brand, and then evaluates its business-facing side.

CSR principles are informed by the UNGPs, particularly Guiding Principle 21, which is ‘not only about knowing, it is also about showing.’⁷⁶ Building upon this and other human rights principles applicable to transnational corporations, some have recently proposed a stakeholders’ right to receive independent information ‘so that they can monitor whether a business has been involved in certain human rights violations.’⁷⁷ From the consumer perspective, trademark goodwill can provide a partial communicative role for the provision of this information. While the trademark cannot and does not disclose the dynamism of sustainability standards, it can and does perform the signaling functions of business origin, which consumers might be able to trust at face value, especially if a firm has an established reputation and a fair amount of transparency with regard to its sourcing practices.

New technologies allow consumers to access more information about the mark via what I have elsewhere called ‘smart information.’ In earlier work, I proposed a hybrid mark called a *tracermark*, which would have some characteristics of a trademark and some of a certification mark.⁷⁸ The current informational market failure might be remedied through the more aggressive use of technology, and it appears that some markets are in fact moving in this direction. For example, similar to the tracermark proposal, others have proposed mechanisms

⁷⁵See e.g., Weldon (2015), Hugill et al. (2016).

⁷⁶Jagers (2017, pp. 314–15) (‘Guiding Principle 21 states: [i]n order to account for how they address their human rights impacts, business enterprises should be prepared to communicate this externally, particularly when concerns are raised by or on behalf of affected stakeholders. Business enterprises whose operations or operating contexts pose risks of severe human rights impacts should report formally on how they address them. In all instances, communications should: (a) Be of a form and frequency that reflects an enterprise’s human rights impacts and that are accessible to its intended audiences; (b) Provide information that is sufficient to evaluate the adequacy of an enterprise’s response to the particular human rights impact involved; (c) In turn not pose risks to affected stakeholders, personnel or to legitimate requirements of commercial confidentiality.’).

⁷⁷Ibid. (citing Melish and Meidinger 2011).

⁷⁸Chon (2015a, 2015b).

to present disclosures at the point of sale, rather than rely on consumers to seek out the information on corporate websites. These types of disclosures, referred to as ‘targeted transparency,’ mandate information at the time of decision-making in order to ‘nudge’ consumer behavior. Targeted disclosures may necessitate a rating system whereby the government or a third party converts disclosed information into a grade or label (e.g., a trafficking free label) that is presented to consumers at the time of purchasing. This information could also be available to consumers through apps, several of which already provide information on companies’ ethical practices. In fact, the G7 recently released a statement in support of responsible supply chains that calls for the development of ‘impartial tools [such as relevant apps] to help consumers and public procurers ... compare information on the validity and credibility of social and environmental product labels.’⁷⁹

Some sustainable supply chain managers express the goal of using their methodologies to change not only supplier behavior, but also consumer behavior. Thus these various suggestions for point of sale disclosure are technologically viable if underutilized options.

In addition to individual consumer choices, information intermediaries such as interested NGOs can act as representatives of consumer interests and provide some degree of access to otherwise invisible credence attributes. Some of these NGOs may have started as voluntary industry initiatives, or have ties to the for-profit sector. Other NGOs work independently of industries they monitor, as illustrated by a recent report from Oxfam about agricultural sourcing.⁸⁰ These and other efforts and proposals to increase transparency of information for consumers⁸¹ dovetail with changes on the business side, discussed in the next section.

At the same time that consumers demand and governments require more information about sustainability practices along GVN, the independent business case for expanding trademark goodwill about these efforts is increasing.⁸² The role of lead firms as sustainability disciplinarians over their suppliers has been aptly called ‘big brand governance.’⁸³ In these emerging efforts, business benefits to trademark owners from sustainability efforts have emerged:

as these companies compete to define and integrate environmental considerations into their core operations, products and supply chains, ultimately linking sustainability to their most

⁷⁹Chilton and Sarfaty (2016, p. 47).

⁸⁰Oxfam (2014).

⁸¹Dauvergne and Lister (2011, pp. 36–45) (‘Beyond direct commercial gains, brand companies are implementing environmental policies across their supply chains to achieve more intangible, indirect benefits, namely risk management and stronger brand reputation. This includes increasing supplier transparency and accountability about their practices, which the brand companies are using for identifying, assessing and limiting risks, as well as increasing consumer trust. From a Disney T-shirt to a Dole organic banana, consumers can now scan with their smart phone or go online to trace a product from the farmer to the retail shelf. Big brands are employing business tools like supply chain tracing, product life-cycle assessments, and supplier audits to reveal environmental “hotspots” and reduce exposure to questionable practices by poor-performing producers: from illegal sourcing to the use of hazardous chemicals. Addressing these risks is increasingly imperative, not just to guard brand reputation, but also to avoid regulatory penalties.’)

⁸²Dauvergne and Lister (2010, pp. 132–154).

⁸³Dauvergne and Lister (2011, pp. 36–45).

valuable asset: their brand ... [that is,] the value that consumers associate with it. ... [N]o doubt, some of it is still little more than greenwash. But, something is also different. Corporate sustainability goals reach further, include measurable targets, are audited by independent groups, and are integrated into the core business through increasingly standardized business tools, such as life-cycle assessment, supply chain tracing, eco-certification, and sustainability reporting. Business books are increasingly documenting the competitive value of these new tools.⁸⁴

As this quote suggests, greening of GVN's can in fact enhance internal efficiencies, improve corporate performance and promote innovation across these networks. In many cases, cooperation among competitors may result in industry-wide approaches, including harmonized standard-setting.⁸⁵ Many of these measures go 'beyond compliance' to capture what some have called policy innovation within the internal structure of corporations or industries.⁸⁶

As discussed above, the quality control communicated through trademark goodwill largely consists of both first and second party certification activities centered around a single business (if not manufacturing) source of origin. Implicit certifications also undergird the trademark owner's trust relationship to consumers, who then rely on the trademark to make repeated purchases of an environmentally sustainable product. Inter-brand competition, of course, can be fierce and can sharpen the market differentiation activities of particular firms vis-à-vis each other. Thus the 'costs to company reputations of failing to meet their [stated sustainability] goals are significant, and are increasing as competitors demonstrate corporate sustainability progress.'⁸⁷ This reputation cost affects both lead firms that play a largely first-party certification function over credence attributes as well as second-party certification firms that primarily engage in sourcing and verifying other suppliers. The inability to differentiate meaningfully among competitors with regard to meaningful sustainability efforts affects all business, including major trademark owners, and impedes innovation in business strategies toward sustainability. However, a powerful brand, especially for a lead firm, arguably plays a pivotal role in influencing the overall direction of a market for a given sustainably produced product or service, apart from any given firm's attempts to control its brand's meanings through its relationship to consumers.⁸⁸ This is a crucial component of the regulatory governance approach to sustainability on a global scale.

⁸⁴Ibid. at 3.

⁸⁵Meidinger (on file with author) at 14 ('Together for Sustainability[TfS], founded in 2011 by the chief procurement officers of six multinational chemical companies ... 'is to develop and implement a global audit program to assess and improve sustainability practices within the supply chains of the chemical industry.'').

⁸⁶Prakash (2000). See also Bamberger and Mulligan (2015).

⁸⁷Dauvergne and Lister (2011).

⁸⁸See e.g., Josh Simko's discussion of Making, powered by Nike (<http://nikemakers.com/#/>) (on file with author).

10 Conclusion

Brands function as omnipresent interfaces for interaction by producers and consumers around information. This interface depends, however, upon an iterative and reflexive information flow between brand owner and consumer—in which the consumer responds to certain information provided by the brand owner and in turn, the brand owner adjusts and adapts sourcing and quality control choices to capture greater market share. As information interfaces or platforms, brands could translate better the practices of internal firm GVN management to external audiences. By publicizing the firm's performance in this way, brands would be key tools in ensuring that rules operate as intended within a regulatory governance approach to sustainability standards. Ideally, this dynamic process of engaging with this and other facets of corporate social responsibility would be reflected in the brand value.

This Chapter explores the work that trademark goodwill—or brand value—could do to establish stronger signals regarding sustainability standards. The brand is a platform for or information exchanges, and relevant actors in this space range across transnational trademark owners (including big brand intrapreneurs)⁸⁹, trade officials, as well as consumer, environmental and labor activists. Ultimately, the governance space is at the intersection of global intellectual property, trade and sustainable development.⁹⁰ By examining two main actors in this regulatory governance arena—consumers and trademark owners—this Chapter claims that a much greater capacity can be developed for trademark goodwill to provide more nuanced signals about important sustainability characteristics in the goods and services we consume.

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⁸⁹Chon (2014), intrapreneurs are internal advocates within recognizable industry brands who are attempting to hold the brands accountable to rhetoric of the triple bottom line (people, planet, and profits) popularized in corporate social responsibility literature.

⁹⁰The UN has committed recently to seventeen post-2015 sustainable development goals (SDGs) related to the project of 'free[ing] the human race from the tyranny of poverty.' http://www.un.org/ga/search/view_doc.asp?symbol=A/69/L.85&Lang=E; see generally <http://www.un.org/sustainabledevelopment/>. These seventeen goals include to '[t]ake urgent action to combat climate change and its impacts.' www.un.org/sustainabledevelopment/climate-change-2/.

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Chapter 11

This Ain't Your Daddy's Greenwashing: An Assessment of the American Petroleum Institute's *Power Past Impossible* Campaign



Kim Sheehan

Abstract After the Obama administration signed the Paris Agreement to limit emissions, the American Petroleum Institute, a lobbying group for the petroleum industry, created a consumer advertising campaign to promote the different ways that the gas and oil industries benefit U.S. citizens. The advertising campaign debuted in the most-watched television program in United States—the Super Bowl—during a time when the U.S. public held strongly different opinions on U.S. Energy policy from the incoming Trump administration and Republican-dominated Congress. Generally, citizens favor investment in renewable energy while the government favors expansion of oil and gas drilling. The American Petroleum Institute campaign attempts to persuade U.S. citizens that the petroleum industry can help U.S. citizens to ‘power past impossible’ and live better lives. This chapter evaluates whether these ads can be considered greenwashing, defined as to the use of messages with environmentalism or green credentials to suggest that a company’s policies and products are environmentally friendly. The Power Past Impossible campaign provides evidence of greenwashing through both explicit communications (such as unsubstantiated claims that ‘gas comes cleaner’ and ‘oil runs cleaner’) and implicit communications (the use of green imagery). The ads also conflate the benefits of innovative products made with petroleum and the production of these products, providing a halo effect that can be misleading.

Keywords Greenwashing • Advertising • The Paris Agreement
Federal Trade Commission • Green Guides • Consumer Law • Marketing
Branding • Public Relations

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1 Introduction

‘This ain’t your Daddy’s oil’. These words, appearing on a television screen one after the other in block letters to the beat of a drum, introduced a multi-million dollar national advertising campaign from the American Petroleum Institute (API), a trade and lobbying group for oil and natural gas companies. The API’s campaign, known as *Power Past Impossible*, debuted during the 2017 Super Bowl in the United States and aired for much of the rest of that year. The advertising campaign highlights different ways that the gas and oil industries benefit U.S. citizens. The advertisements focus both on innovative technologies that utilize petroleum products (such as innovations from the automotive industry and space and sea exploration) as well as the use of petroleum by industries that many people may not associate with petroleum including makeup, art, and prosthetics. The campaign attempts to persuade U.S. citizens that the petroleum industry can help U.S. citizens ‘power past impossible’ to live better lives.

The campaign’s \$5 million introduction on the Super Bowl debuted fourteen months after almost every country in the world (except for Nicaragua and Syria¹) agreed to limit its carbon emissions. The Paris Agreement, signed in April of 2016 and effective as of November of 2016, was designed to keep the planet from warming by more than 1.5 degrees Celsius above pre-industrial levels and allows individual countries a wide degree of flexibility in setting and meeting country goals in reducing carbon emissions.² A draft report by 13 federal agencies in the United States and reported on in the *New York Times* suggested that if the Paris Agreement signing countries kept their promises to limit or cut fossil fuel, a key step toward keeping global warming at manageable levels will be reached.³ Many U.S. citizens applauded the Paris Agreement, which reflected the fact that U.S. citizens were increasingly in favor of alternative energy sources (such as wind, water and solar) as a way to combat climate change. It was also signed as increasing numbers of U.S. citizens were become more aware of the negative effects of hydraulic fracturing (the extraction of oil or gas through the process of injecting liquid into rocks deep beneath the earth’s surface to force open holes for access to fuel).

While it is not unheard of for lobbying groups to create and disseminate messages directly to citizens of the United States, the *Power Past Impossible* campaign is notable both for its placement in the most watched television program of the year in the United States and for the fact that most U.S. citizens have a highly negative view of the petroleum industry. The Super Bowl ad placement was just the start of the campaign which included additional: 30 and: 15 ads and a dedicated website.

¹Both countries have since signed onto the Paris Agreement 2015.

²Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

³Friedman (2017).

The campaign increased its media presence in June and July 2017, after U.S. President Donald Trump announced his intentions to withdraw from the Paris Agreement. A majority of US citizens did not agree with Trump's decision.⁴

This chapter will investigate the *Power Past Impossible* campaign in order to assess whether the campaigns' messages are legal given the FTC's Green Guides for environmental messaging or whether they could be considered greenwashing. Greenwashing can be defined as the use of environmentalism or green credentials to suggest that a company's policies and products are environmentally friendly. This examination helps to illuminate the role of lobbying groups on affecting public opinion in the current energy discourse in the United States.

2 The United States and the Paris Agreement

2.1 The Obama Administration

The Paris Agreement laid out a framework for countries to adopt clean energy and phase out fossil fuels. Every country joining the Paris Agreement submitted a climate-action plan laying out how it would achieve these goals. The Obama administration submitted the United States' plan in March 2015; this plan set the goal for the country to reduce greenhouse gas emissions by up to 26 to 28% by 2025. The decrease would be measured against the baseline emission level of 2005, when the United States emitted over 6000 million metric tons of carbon dioxide (CO₂).⁵

Most greenhouse gasses come from burning fossil fuels including oil, coal, and natural gas; greenhouse gasses also come from using fertilizers, raising livestock, and maintaining landfills. During the Obama administration, the United States had shown a reduction in carbon emissions, due to both the rise of affordable renewable energy sources (such as solar, wind and water) and the new abundance of natural gas in the United States from the increased use of hydraulic fracturing (commonly known as fracking). Fracking has made the U.S. less reliant on offshore sources for oil, and as a result has driven down petroleum prices. Electricity generated through fracking produces half of the carbon emissions of electricity generated through coal.⁶ At the same time, fracking can release another greenhouse gas, methane, which adds to current global warming issues. There are concerns with fracking and pollution of the natural environment.⁷

⁴Biesecker and Swanson (2017), Clement and Dennis (2017).

⁵Harrington (2017).

⁶Shukman (2017).

⁷Shukman (2017).

2.2 *The Trump Administration*

Throughout his presidential campaign, Presidential Candidate Trump promised to roll back regulations on coal production in order to increase coal-mining jobs on the path to achieving U.S. energy dominance. The Trump administration announced its decision to withdraw from the Paris Agreement in June 2017, arguing the agreement puts the United States in an unfair position economically.⁸ Trump's decision to withdraw from the Paris Agreement signaled that the coal industry in the United States, an industry that has been in decline for several years, was poised to make a comeback. However, the abundance of petroleum products derived from new fracking technologies, along with the environmental devastation that coal mining brings, made many people question the wisdom of Trump's support of coal mining.⁹

Withdrawing from the Paris Agreement also suggests that the United States is likely to do less about global warming than it otherwise might have done. For example, Larsen et al. (2017) suggested that the withdrawal meant that United States emissions would most likely fall 15–19% below 2005 levels by 2025, rather than the 26 to 28% that the Obama administration pledged. As a result, many state governments indicated that they would continue to pursue their own programs to reduce emissions from power plants and vehicles.¹⁰

The withdrawal decision was unpopular in both the international community and in the United States. The G-7 countries affirmed their support to the agreement, and the European Union and China issued a joint statement confirming their commitment to reaching their target goals. In the United States, many large corporations encouraged Trump to remain in the Paris Agreement, including major energy companies ExxonMobil, BP, Chevron, ConocoPhillips and Shell: it has been suggested that the Paris Agreements gives oil companies an impetus to sell more natural gas, which emits less carbon dioxide (CO₂) than burning coal in the production of electricity.¹¹ Cloud Peak Energy, a large coal company, also encouraged Trump to stay in the Paris Agreement, particularly because it would stimulate research on how to reduce and capture CO₂ emissions from coal plants, perhaps leading to the increase use of coal in the U.S.¹² A group of 13 states, representing about a third of the United State's gross domestic product, created the U.S. Climate Alliance to support actions to meet the emission goal reductions promised by the Obama administration—goals which some argue cannot be achieved without federal support.¹³

⁸Huitman (2017).

⁹Larsen et al. (2017).

¹⁰Larsen et al. (2017).

¹¹Hymas (2017).

¹²Hymas (2017).

¹³Huitman (2017).

3 The American Petroleum Institute

The American Petroleum Institute (API) is a U.S. trade association for the oil and natural gas industry. The API represents corporations involved in production, refinement and distribution of oil and natural. In 2012, the API described its mission as to influence public policy in support of a strong and viable oil and natural gas industry in the United States. In 2017, the mission was updated to including promoting safety across the industry on a global basis. Its work includes both lobbying and public outreach.

Trade associations such as the API defend business practices to local, state and national legislators. They also lobby against most types of government regulations that might limit their members' success. Between 2007 and 2012, 200 of the United State's most politically active corporations spent a combined \$5.8 billion on federal lobbying and campaign contributions, much of which is funneled through trade associations.¹⁴

The API's lobbying efforts involve attempting to limit any legislation that hinders either their members' ability to use land for gas and oil production or that might threaten economic interests. The API's agenda includes supporting massive increases in offshore drilling (including drilling in sensitive areas in Alaska,) fighting limits on federal regulations on fracking, and increasing tar sands extraction and transport. The API also opposes tank car safety rules for oil trains and the listing of the greater sage grouse on the endangered species list (as fracking and other drilling activities currently occur in its habitat).¹⁵

During the 2012 presidential election, the API spent about \$37 million to promote the use of fossil fuels in the United States and to criticize clean energy sources.¹⁶ With the *Power Past Impossible* campaign, API's budget for consumer advertising was far greater than their lobbying budget, perhaps reflecting the need to counteract growing concerns about the energy industry's impact on global climate change.

3.1 API's Advertising Campaigns

The API is no stranger to mass media campaigns, but has traditionally limited its activities to time periods surrounding important elections. In 2016, for example, the API created several different advertisements to air during the Republican and Democratic conventions. One ad airing in Philadelphia during the Democratic convention (held in that city) showed Philadelphians creating cheesesteaks; text over the images explained that Philadelphia has been 'home of the cheesesteak

¹⁴Allen (2015).

¹⁵Turnbull (2016).

¹⁶Williams (2016).

since 1930' and that 'thousands of cheesesteaks will power Philadelphia this week. Energy makes it possible.' The ad ended with the tagline 'A vote for energy is a vote for cheesesteaks' and included the website URL 'vote4energy.com'. The ad airing in Cleveland during the Republican convention used a voice over saying that 'like so many aspects of modern living, energy makes it possible' and included images of the city of Cleveland's airport and downtown area. The commercial continues with a voice over saying 'from food, to transportation, to participation in the democratic process, energy powers us forward. Now, cities across the country are benefiting from the United States' global energy leadership.' The ad ended with the website URL 'vote4energy.org'.

Both website URLs lead to the same website which is owned by the API, and introduces the content this way:

Energy is fundamental to our society. Our ability to responsibly produce, safely distribute, store and efficiently consume the energy we need to maintain our standard of living while lessening the impact on the environment is crucial to our shared goal of a better future for the next generation. We believe that our nation's best future will only be achieved through an all-of-the-above national energy strategy that recognizes the fundamental role of oil and natural gas.

The two ads airing during the political conventions have a similar goal: to create a perception in people's minds that the only energy sources that U.S. citizens should use are natural gas and oil. In fact, the ads suggest that this belief is necessary to participate in our democratic process—suggesting that one is not a good American if one does not 'vote for energy' (meaning oil and natural gas). Both ads directed viewers to an API website that was populated with content from API blogs. These two ads laid the framework for the *Power Past Impossible* Campaign.

In addition, the API has produced advertisements that advocate for natural gas pipelines; these ads have aired in states considering fracking bans. Two such ads focus on pipeline workers: workers state that pipelines are safe (since they are monitored by the EPA); pipelines create jobs (one ad states that as many as 800,000 jobs can be created through pipelines) and that pipeline jobs provide good incomes for families. One ad created specifically to air in Florida defines fracking as the 'safe exploration of clean natural gas that for Florida means lower energy prices and good paying new jobs.' The ad then says that 'special interests want to take that away, with new big government rules that would ban fracking and trample on private property rights that could even lead to higher prices for consumers. Call your legislator and tell them Florida needs more natural gas, not more government.'

3.2 The API's Power Past Impossible Campaign

The API's *Power Past Impossible* campaign kicked off during the 2017 Super Bowl, in February 2017. In an interesting twist on lobbying, the API's strategy was to communicate directly with consumers to encourage them to celebrate the

successes of gas and oil production in the United States (including the U.S.'s new leadership position in oil and natural gas production primarily due to hydraulic fracking). The campaign also wanted to share data that carbon emissions were at a 25-year low. It should be noted, though, that the petroleum industry is not wholly responsible for the decreased carbon emissions: these decreased emissions are due not only to the use of natural gas to power electrical plants but also to several economic recessions that decreased demand for power during the time period, along with increased fuel efficiencies in automobiles.¹⁷

The *Power Past Impossible* campaign began at a time when many U.S. citizens were much more in favor of alternative energy sources than traditional oil and gas. A Pew Center study conducted prior to the start of the campaign reported broad support for alternative sources: 89% of U.S. citizens polled for the study favored expansion of solar energy farms, and 83% supported expanding wind turbine farms.¹⁸ The study found that less than half of U.S. citizens supported expansion of other energy sources: only 41% supported the expansion of coal mining, 42% supported the expansion of hydraulic fracking, 43% supported the expansion of nuclear power, and 45% supported the expansion of offshore drilling.¹⁹ These opinions differed greatly from elected leaders in the Republican dominated Senate, and the *Power Past Impossible* campaign has been seen as an attempt to close the gap and bring public opinion more in line with the Republican agenda. Indeed, the API's president indicated that the goal of the campaign was to create 'energy awareness' and to open a broader conversation on how dependent our society is on oil and natural gas.²⁰

While such direct-to-consumer messages from lobbying groups are uncommon, they have been used strategically in the past. In 2012, the Corn Refiners Association, a lobbying group for the high fructose corn syrup industry, produced a series of ads with the goal of rebranding high fructose corn syrup as 'corn sugar'. The ads stated that 'whether it's corn sugar or cane sugar, your body can't tell the difference', a statement that many scientists have disproven: scientific studies focusing on consumption of high fructose corn syrup showed that consuming high amounts of fructose, as is typical in a Western diet, could damage the liver in the same way that alcohol does. Fructose is also metabolized into fat, not energy (like glucose).²¹

For the *Power Past Impossible* campaign, two thirty-second television ads (one focusing on oil and one on gas) were produced, along with two 15-second ads for oil only. The oil execution aired during the Super Bowl. The advertising trade magazine *Ad Age* (2017) described the ad, created by Omnicom's GSD&M, as 'fresher than Daddy's oil ..., with modern design and bright color.' The ads feature

¹⁷Loveless (2017).

¹⁸Funk and Kennedy (2016).

¹⁹Funk and Kennedy (2016).

²⁰Cama (2017).

²¹Mercola (2012).

a music soundtrack with a driving beat; the ads contain no voice-overs and visuals are interspersed with text during the spot. Both ads can be seen at the API website (<http://www.api.org/news-policy-and-issues/media/industry-advertisements>).

For the: 30 Oil spot, the text (with subsequent visuals) is as follows:

This ain't your Daddy's oil
 Oil gushes art (visuals: paints)
 Oil strikes a pose (visuals: models and lipsticks)
 Oil taps potential (visuals: archer with robotic arm)
 Oil pumps life (visuals: artificial heart)
 Oil runs cleaner (visuals: race car in a desert)
 Oil explores space (visuals: astronauts in space)
 Together we can power past impossible
 PowerPastImpossible.org
 American Petroleum Institute

For the: 30 Natural Gas ad, the text (with visuals) is as follows:

Natural Gas doesn't just cook dinner (visuals: hot air balloon)
 Natural gas fuels adrenaline (visuals: building a bicycle and mountain biker)
 Natural gas pipes in jobs (visuals: scientists in labs)
 Natural gas comes cleaner (visuals: farms and nature scenes)
 Natural gas condenses time (visuals: drone)
 Natural gas sparks invention (visuals: technology)
 Together we can power past impossible
 PowerPastImpossible.org
 American Petroleum Institute

Two: 15 ads for oil were also created. The first: 15 ad is as follows:

Oil pumps life (visuals: artificial heart, archer with prosthetic hand)
 Let the breakthroughs flow
 PowerPastImpossible.org
 American Petroleum Institute

The second: 15 ad is as follows:

This ain't your daddy's oil
 Oil strikes a pose (visuals: models and lipsticks)
 Oil pumps life (visuals: artificial heart)
 Oil runs cleaner (visuals: race car in a desert)
 PowerPastImpossible.org
 American Petroleum Institute

The press reaction to the campaign could be characterized as amused skepticism. The *USA Today's* Bill Loveless wrote that the oil ad 'still focuses too much on what oil's good for, which as we already know is just about everything except the future of the planet, and only very passingly on the assertion that 'Oil runs cleaner' (2017).²² Seth Stevenson, writing in *Slate*, described the oil ad as a brazen attempt from the American Petroleum Institute to recast oil as the 'slick fuel of the future, instead of the carbon-spewing sludge of the past. Text runs across the screen, making proclamations like 'oil gushes art' 'oil strikes a pose,' and 'oil taps into potential.' I kept waiting for more honest statements like 'oil starts wars' and 'oil is gradually ruining the planet'.²²

4 Greenwashing

In a narrow sense, greenwashing refers to the use of environmentalism or green credentials to suggest that a company's policies and products are environmentally friendly.²³ Greenwashing occurs when an entity (such as a brand or a firm) provides positive communication about environmental performance when in fact their environmental performance is poor.²⁴ Bradford suggests that greenwashed messages mislead consumers regarding either the environmental practices of the company or the environmental benefits of a product or service.²⁵ Others define greenwashing as the practice of making unwarranted or overblown claims of sustainability or environmental friendliness in an attempt to gain market share²⁶ or to present an environmentally responsible public.²⁷ Vos (2009) takes a different perspective and described three types of greenwashing: confusion, fronting and posturing. Confusion occurs when a firm selectively uses information to promote its green credentials that may not provide the full picture of a problem at hand.²⁸ Fronting occurs when a company presents experts as spokespersons to confirm the firm's environmental credibility (e.g. lawyers, compliance and ethics officers). Posturing occurs when the firm tries to persuade internal and external stakeholders of the firm's ethical commitment.²⁹

These definitions suggest that greenwashing can occur both at a product level (e.g. suggesting a product is greener than it really is in order to make a sale)³⁰ or at

²²Stevenson (2017).

²³Illia et al. (2013).

²⁴Delmas and Burbano (2011).

²⁵Bradford (2007).

²⁶Dahl (2010).

²⁷Furlow (2010).

²⁸Vos (2009).

²⁹Vos (2009).

³⁰Delmas and Burbano (2011).

a firm level (e.g. suggesting a firm is more environmentally friendly than it really is in order to elicit positive public opinion).³¹ Big Oil companies have often been criticized for greenwashing. Exxon, for example, ran ads in the *New York Times* addressing the scientific uncertainty of climate change, asking how scientists can predict future climate patterns when so many short-term weather forecasts are inaccurate. This is a form of selective disclosure as the message selects specific information that in this case confuses the relationship between weather and climate. This type of greenwashed message could be persuasive since it taps into a universal attitude—frustration with weather forecasts—and connects it to a lack of confidence about climate change.³² More recently, Exxon has been promoting their investments in various clean energy technologies, another type of selective disclosure as the actual percentage of its spending in these areas is quite low.³³ These Exxon ads could be seen as posturing as they try to persuade consumers that the company acts ethically.

Oil giant BP received criticism for their campaign repositioning BP as a ‘beyond petroleum’ energy company investing in alternative forms of energy. The fact that BP spent much more on this new positioning (over \$200 million) than it spent on, say, developing solar energy, suggests that BP was trying to focus the public’s attention on something with positive public opinions (alternative energy) while BP engaged in business as usual, a combination of both confusion and posturing.³⁴

The Federal Trade Commission (FTC) in the United States is responsible for sanctioning deceptive advertising, and have issued several versions of the ‘Green Guides’ that provide guidance on how companies should address environmental messaging so such messages are not deceptive. The FTC’s most recent update was in 2012. The Green Guides are not statutory law but are rather indicate how the FTC will apply section 5 of the FTC Act—the section addressing deceptive advertising—for green marketers and messages.³⁵ The FTC originally set forth four main principles in the Green Guides. These are:

1. Any qualifications or disclosures should be sufficiently clear, prominent, and understandable to prevent deception;
2. Environmental claims should clearly indicate to what they refer (e.g., a product, the product’s packaging, a service or portion of a component of the product, etc.);
3. Environmental claims should not be presented in a manner to overstate their environmental attribute or benefit, expressly or by implication; and
4. Comparative statements should be presented in a manner that makes the basis for the comparison sufficiently clear to avoid consumer deception.³⁶

³¹Lyon and Maxwell (2011).

³²Lorenz et al. (2008).

³³Crane (2016).

³⁴Lorenz et al. (2008).

³⁵Bradley (2011).

³⁶Bradley (2011, p. 2).

In the 2012 revision, the FTC explicitly indicated that unqualified general claims would no longer be permitted, and any general benefit claims must be accompanied by qualifications that are clear and prominent and limit the claim to a specific benefit.

4.1 *Is the API Greenwashing?*

Before the question of whether the API is greenwashing can be answered, it is first important to examine persuasive tactics in the message. A trade organization like the API wants to present a positive image of an entire industry to stakeholders, and to do so, will use both pragmatic and constitutive communication in its messages. Pragmatic communication are the elements of a message that persuade through education; pragmatic elements tend to be contained in the more direct and explicit language (and sometimes visuals) in a message. Constitutive communication works on a more implicit level to persuade by shaping perceptions of nature and relating those perceptions to the topic at hand. Constitutive communication for example can suggest if nature is safe/dangerous, or pristine/spoiled. The combination of both pragmatic and constitutive elements can create a message that is impactful and persuasive.

The :30 and :15 advertisements in the *Power Past Impossible* campaign contain pragmatic communication that is mostly straightforward although both ads contain an unqualified claim. The :30 and one of the :15 Oil ads state 'oil runs cleaner' followed by the sound of a car revving its engine and visuals of a race car in the desert. The desert image then dissolves into an image of an astronaut in space. The :30 Natural Gas ad shows several images of forests and farms before providing the text 'gas comes cleaner.'

These claims are unqualified since neither ad provides information on what oil and natural gas are being compared to: what oil runs cleaner THAN, and what gas comes cleaner THAN, remain unstated. Unqualified claims lead consumers to 'fill in the blanks' on their own and as a result may end up thinking that oil or gas is cleaner than renewable sources that produce significantly lower amounts of greenhouse gasses than coal, natural gas and oil. While it is widely recognized that gas and oil are cleaner (or perhaps it is better to say 'less dirty') than coal, the unqualified claims in both ads go against the FTC Green Guides and are potentially deceptive.

In fact, the FTC has cautioned against the use of the word 'clean' in communications related to energy. In comments on a draft proposal about environmental marketing guides for electricity, the FTC indicated that:

There is a wide variety of ways in which the term (clean) could be used, and a significant lack of experience with consumer research concerning interpretation of advertising using the term. These factors suggest that it is premature to state definitely and categorically that the term connotes a claim of general environmental benefit.³⁷

In the updated Green Guides, the FTC recommends that marketers not make broad, and unqualified like ‘green’ or ‘eco friendly’, and arguably the term clean is this type of word. The Green Guides also recommend that marketers should qualify general claims with specific environmental benefits, and such qualifications for any claim be clear, prominent, and specific.³⁸

The API, though, does not qualify the claims either during the ad or at the *Power Past Impossible* website which is referenced at the end of both ads. At this website, more information is provided about the text statements contained in both ads. While such information is not a replacement for the unqualified claims, the presence of the information perhaps suggests that the API realizes that additional information is needed to comprehend the claims. The ‘natural gas and oil come cleaner’ section provides this information:

Through investment and innovation, we keep raising production while helping improve air quality. As the U.S. EPA notes, air quality is improving even as the U.S. economy grows, U.S. citizens drive more miles and population and energy use increase. Due to the increased use of natural gas, U.S. emissions of carbon dioxide from power generation are near 30-year lows. From 2000 to 2014, the natural gas and oil industry invested \$89.9 billion in emission-reducing technologies—nearly as much as the rest of U.S.-based private industries combined. Engines run more efficiently, and since 1980, emissions of the six principal air pollutants have dropped by 63%. Ozone, particle pollution, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead are all down significantly with help from cleaner-burning fuels (powerpastimpossible.org)

This statement from the website links the term ‘clean’ to reduced emissions, but does not provide any additional information to substantiate the ‘runs cleaner’ and ‘comes cleaner’ claims as the statement does not provide a comparison to another type of energy source. Additionally, the website statement does not recognize that methane build-up from fracking may ultimately contribute to long-term for global warming.³⁹ Natural gas produces less CO₂ than coal but leaks in natural gas drilling and transport infrastructure increase methane in the atmosphere.⁴⁰

Thus, it can be argued that indeed the API is greenwashing with its pragmatic communication. The messages stating the ‘oil runs cleaner’ and ‘natural gas comes cleaner’ are comparative statements are not presented in a manner that makes the basis for the comparison sufficiently clear, opening the door to consumer deception.⁴¹ The statement provided on the website, which could be used to provide the qualification of the comparative statement, does not do so.

³⁷FTC (1999, p. 4).

³⁸FTC (2012).

³⁹Warren (2017).

⁴⁰Hymas (2017).

⁴¹Bradley (2011).

In addition to problematic pragmatic messaging, the ads provide constitutive content that could also mislead consumers. The Natural Gas ad includes many visuals set in the natural world (forests, oceans and farms); the inclusion of such visuals can serve to create a positive connection between the petroleum industries and the natural world in consumers' minds even without the API making any specific claim to that effect.

The images of a mountain biker in a beautiful forest and healthy plants in a greenhouse-type setting show nature in an intrinsically positive light as a place that is healthy in and of itself and healthy for us. It also demonstrates what Hansen would term as human power over nature: the biker uses the forest for his pleasure, the farmer has created a natural Eden that that he controls.⁴² What these images do not show is that nature is vulnerable or threatened.

These images are an example of the 'executional greenwashing' effect: the use of nature-evoking elements in advertisements that can artificially enhance a brand, firm or industry's ecological image and mislead consumers to think the advertisement's sponsor is greener than it is (especially among people with low knowledge of environmental issues).⁴³ While executional greenwashing is not covered specifically in the FTC Green Guides, it is a highly problematic tactic that can add to the accusations of greenwashing.

Another problematic aspect of the ads is the conflation of petroleum products as a raw material and petroleum products as an energy source in manufacturing. Oil is used in the creation of many of the technological innovations shown in the oil ad. The *Power Past Impossible* website provides more information on these innovations. For example, the archer with the prosthetic limb pictured in the Oil ad provided this commentary on the website:

I've worn a prosthesis all my life. Older versions had one grip pattern, but newer hands have smarter technology. There's been advancements in weight, speed, dexterity, grip and rotation that weren't possible before. I knew petroleum was used to fuel cars, but I didn't know it was used in the making of my arm.

Certainly these types of technological innovations are beneficial for our society, and it is likely that most people will believe that someone deprived of a limb should be able to have a prosthetic one, regardless of what it is made out of. By tapping into the audiences' empathy for the archer with the prosthetic arm, the API is counting on some type of 'halo effect' to pass from the product itself (the prosthetic arm) to the production of the product (using natural gas or oil to power the machinery that makes the prosthetics). What the ads do not mention, of course, is that alternative power could just as easily be used to power the industries that make the various innovations shown in the ads.

The ads are also noticeable for what they lack, and that is any reference to the hydraulic fracturing or fracking. This is a deliberate decision based on current public opinion that opposes fracking. While a 2012 study showed the majority of

⁴²Hansen (2002).

⁴³Parguel et al. (2015).

citizens had little or no knowledge of the practice,⁴⁴ more recent research shows that efforts to develop fracking have been met with opposition amid concerns about impacts on water, greenhouse gas emissions, and health effects.⁴⁵ Before the campaign aired, McNaughton wrote that recurring public support may be difficult because citizens in the United States and United Kingdom are skeptical of government and industry motives of the practice, and the lack of inclusion of the word in the advertising messages seems to support this.⁴⁶

Overall, these tactics provide messages with a lack of specificity that goes against the Green Guide's admonition to clearly indicate to what the claim refers. The lack of specificity allows the API to use the ads to address specific situations in society without changing the message. For example, the timing of the debut of the campaign in the Super Bowl attempted to persuade consumers to think more positively about oil and natural gas in a time when consumers were much more favorable to renewable energy sources. Restarting the campaign after the announcement that the United States would exit the Paris Agreement works to reinforce negative perceptions of the coal industry, an energy source that could see increased investments in the United States.

4.2 *FTC's Greenwashing Sanctions*

Will the FTC investigate and consider sanctions against the API? The agency's activity in this area since the release of the 2012 Green Guide revisions has been spotty with minimal actions taken. Shortly after the Green Guides were updated, the FTC sanctions five companies that market plastics as biodegradable in common disposal methods. The FTC found that their products do not degrade within normal disposal parameters, make claims without qualification, and do not have appropriate scientific testing to prove claims. The agency also sent warning letters to companies producing dog waste bags with the same concerns.⁴⁷ However, one judge found fault with the lack of specificity in the Green Guides definition of biodegradable, rendering some of the sanctions null.⁴⁸

Since then, the FTC has focused primarily on issuing warning letters about potentially deceptive environmental seals and certifications.⁴⁹ However, they have also warned one company, Green Mountain Power, to review their claims about renewable energy. Green Mountain Power's messages suggested that they provide

⁴⁴Boudet et al. (2014).

⁴⁵Thomas et al. (2017).

⁴⁶McNaughton (2017).

⁴⁷Bergeson (2015).

⁴⁸Weinzirel (2017).

⁴⁹FTC (2015).

energy from renewable sources to their customers, but in reality sells renewable energy credits to outside entities.⁵⁰

At the end of 2015, the FTC reviewed previous warnings to four retailers about their use of the term 'bamboo' to describe products that did not contain bamboo. Many consumers view bamboo as a natural product and therefore believe products with bamboo are better for the environment than products made with other types of materials. However, processing of bamboo involves the use of toxic chemicals. The FTC believes retailers broke the law by saying specific products were made of bamboo, when in fact they were nothing more than rayon. Despite receiving FTC warning letters in 2010, four companies continued with the deceptive claim.⁵¹

It is important to note that all these FTC actions dealt with messages that were likely to mislead reasonable consumers and, importantly, contained a statement (or omitted information) that was material—that is, important to a consumer's decision to spend money on the advertised item.⁵² With a message such as *Power Past Impossible*, that does not feature a specific product or service for a consumer to purchase, the FTC may have trouble assessing the materiality impact of the campaign.

The FTC has not reported any actions or sanctions relating to greenwashing since 2015. After his inauguration, Trump appointed Maureen Ohlhausen as interim Director of the FTC. Ohlhausen presided over the \$10 billion US government settlement with Volkswagen over its 'dieselgate' emissions but is a vocal opponent of excessive government regulation over business.⁵³ As of July, 2017, three of five commissioner seats remain unfilled, suggesting that the FTC may not increase its investigations of greenwashing in the foreseeable future, due not only to lack of personnel but also because of the pro-business and anti-environment agenda of the current administration.

However, FTC sanctions are not the only way that such messages can be punished. In 2012, the Western Sugar Cooperative sued the Corn Refiners Association and two companies, Archer Daniels Midland and Cargill for false advertising produced for the 'corn sugar' rebranding ads references earlier in this chapter. The Western Sugar Cooperative was seeking as much as \$2 billion. The Corn Refiners Association countersued, charging the sugar industry with making false and misleading statements that included a comment that high fructose corn syrup is as addictive as crack cocaine. They sought \$530 million. The case was settled out of court, and the settlement details are not publically available.

One difference between the corn sugar ads and *Power Past Impossible*, of course, is that the corn sugar lawsuit pitted two different lobbying organizations against one another. Who will stand up for the planet against the API? While the likeliest group would be the organizations that represent the alternative energy

⁵⁰Hirschfield (2015).

⁵¹Klara (2014).

⁵²FTC.

⁵³Dent (2017).

industries, these industries may not be in a financial position to battle the API, one of the most well endowed lobbying groups in the United States.

It may fall to individual cities and states to fight this battle, and it has already begun. In July 2017, the California counties of San Mateo and Marin counties, along with San Diego County's Imperial Beach, have filed lawsuits Monday against 37 oil, gas and coal companies, including Chevron, ExxonMobil, Shell and Marathon. The lawsuit accusing them of the continued extraction of fossil fuels even though they knew the resulting carbon pollution would have devastating effects on the planet.⁵⁴ Similar to lawsuits against Big Tobacco, the plaintiffs claim the defendants have known for 50 years that their products contribute to global warming, yet they participated in a coordinated effort to discredit scientific evidence and create public doubt about the causes and dangers associated with climate change. Oil, gas and coal companies also profited from production increases in oil, coal and natural gas. While this lawsuit is not directly related to the *Power Past Impossible* campaign, the false claims and overstated rhetoric could be used as evidence in the industry's attempts to manipulate the public.

4.3 *Are the Ads Working?*

This leads to the question: is the public being manipulated? The Super Bowl was viewed by over 100 million U.S. citizens and was the fourth most viewed program in television history.⁵⁵ The *Power Past Impossible* oil ad aired in the first quarter; USA Today's Ad Meter ranked it 57th out of the 66 ads rated by consumers during the game (USA Today, 2017).⁵⁶ This indicates that people did not like the Super Bowl ad that well—but have the ads changed people's minds about energy?

In several studies undertaken since the Pew Center study mentioned earlier, U.S. citizens continue to be wary about Big Oil. For example, a poll conducted a week after the Super Bowl by Quinnipiac University found that 51% of U.S. citizens opposed the restarting of the Keystone XL and Dakota access pipelines. A Gallup poll in March of 2017 showed that more U.S. citizens opposed rather than favored opening up federal land for oil exploration; in 2012, a majority favored opening up the land. A poll conducted by the University of Michigan in April and May of 2017 found that a majority of U.S. citizens, regardless of political ideology, supported increased use of solar energy in their home state.⁵⁷ In June, 2017, almost 75% of U.S. citizens favored protecting the environment over a focus of increased production of coal, oil and natural gas.⁵⁸ Even a poll conducted in 2017 by a pro-Big Oil

⁵⁴San Francisco Chronicle (2017).

⁵⁵Koblin (2017).

⁵⁶USA Today (2017).

⁵⁷Simon and Mills (2017).

⁵⁸Dugan and Newport (2017).

consulting firm found that an overwhelming majority of respondents in Massachusetts and New York strongly support moving towards clean and renewable energy, while only a quarter to a third strongly support pipeline expansion, nuclear energy, and offshore drilling.⁵⁹

An August study of voters in Ohio, a state that has welcomed both fracking and coal production and that is primarily a Republican state, found that a majority (87%) of respondents said they would tell elected officials to support policies that encourage energy efficiency and more renewable energy use. A total of 97% of Democrats were in favor of renewable energy; 79% of Republicans indicated support. Similarly, a national Gallup Poll published in early September 2017, showing that 27% of Democrats and 50% of Republicans indicated that they viewed the oil and gas industries either positively or very positively.⁶⁰ Responses from one coal-mining region in Southeast Ohio found that 79% of respondents said they would tell elected officials to support policies to encourage energy efficiency and greater use of renewable energy. These voters also indicated that they would like an average of 55% of Ohio's electricity to come from renewable resources, compared to an average goal of 61% in the state overall.⁶¹

In addition, U.S. citizens continue to be certain that global warming is occurring. A May 2017 study by the Yale Program for Climate Change Communication and George Mason University reported that 46% of U.S. citizens are either 'extremely' or 'very' sure global warming is happening with either 7% 'extremely' or 'very sure' global warming is not happening. The percentage of people with certainty that global warming is happening has risen steadily over the past two years, and is now at its highest level since November 2008.⁶² A poll of 1400 U.S. citizens by WPA intelligence in July, 2017, found that two-thirds of likely voters (67%) support re-entering the Paris Agreement to have a seat at the table to address climate change, including a majority of Republican voters (56%).⁶³ While these polls do not address the petroleum industry specifically, they do show the continued concerns that U.S. citizens have with current policy initiatives and that the campaign has not created a rapprochement between voters and elected officials.

Another indication that the campaign is having limited impact is the continued concerns about fracking, leading to calls for legislation on local and state levels. In April of 2017, the governor of the state of Maryland signed anti-fracking legislation into law. Maryland became the third state after Vermont (in 2012) and New York (in 2015) to ban fracking; other states including Florida, Nevada and Oregon and many cities in the United States have considered or enacted bans. Other states including Massachusetts and New Hampshire are examining increasing support for

⁵⁹Seidman (2017).

⁶⁰Saad (2017).

⁶¹Weigel (2017).

⁶²Leiserowitz et al. (2017).

⁶³WPA Intelligence (2017).

alternative energies. Public opinion does not seem to be quickly changing based on the American Petroleum Institute campaigns.

Finally, it should be noted that in a poll taken in September, 2017, the majority of U.S. Citizens indicated support for actions taken by some mayors and governors to honor the goals of the Paris climate agreement despite U.S. withdrawal. The same study showed that about 42% oppose withdrawal from the agreement, with the rest of respondents evenly distributed between people who support withdrawal and those who have no opinion.⁶⁴

5 Conclusion

The *Power Past Impossible Campaign* provides evidence of confusion, fronting and posturing. It shows confusion by selectively using information in a non-substantiated way, and by conflating oil as a raw material and oil as an energy source to create a halo effect. It uses fronting by showing the beneficiaries of oil (archers in need of artificial limbs, scientists, astronauts) to support the credibility of claims. Combined, these create an aura of posturing as the API tries to persuade internal and external stakeholders of the API's ethical commitments.

At the same time, there is also evidence that consumers are not persuaded by the messages—greenwashed or not. According to a number of public opinion polls, U.S. citizens have not been persuaded that oil and natural gas are preferable to alternative sources of energy, and to that end are influencing communities and states to investigate ways to increase alternative energy use and decrease fracking. In this case, then, a campaign that ain't your daddy's greenwashing seems to fail to meet its goals.

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Chapter 12

The Power of Visual Appeal: Designs Law and Clean Energy



Maree Sainsbury

Abstract The visual features of a clean energy product play an important role in promoting consumer desirability and sentiment, expanding the market for clean energy products and enhancing public buy-in. In the context of clean energy products, the visual features will be a secondary consideration to the functional features of the product. This chapter will outline the importance of visual features, and illustrate how they can be used to expand and consolidate a market for clean energy products. The registered designs system is one mechanism which could be used to secure rights in visual appearance. However, the designs system is underutilised in general, and particularly problematic where it comes to products where the primary consideration is the function. This chapter will outline the importance of design rights in the context of clean energy products and how these rights would assist in supporting the creators of such products and achieving policy aims with respect to clean energy. It will examine potential obstacles to effective protection, with some suggestions for improvement of the law.

Keywords Intellectual property • Designs law • Clean energy • Clean energy products • Registered designs • Design patent

1 Introduction

Designs law is often seen as the least relevant of the intellectual property rights. This is going to be particularly so where the focus of the industry is on how a product functions and performs. Thus, when considering how intellectual property laws may impact on promoting green energy products and policy, protecting the visual appearance of a product may be considered a low priority. However, the importance of visual appeal of an energy efficient product should not be overlooked. It has been demonstrated to be an important factor in consumer choice and

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in public buy in for energy efficient products. It can also be an important aspect in the branding of a product or a business. It is a feature in product design which should not be overlooked. We therefore need to ensure that the registered designs system is suitable for encouraging invention and achieving policy objectives in promoting clean energy.

In general terms, designs law protects the visual features of a product, whether they be the two-dimensional features of pattern or ornamentation, or the three dimensional features of shape and configuration. Intellectual property laws can play an important role in influencing both consumer and producer behaviour. Fry conceptualizes the role of design in minimising the diminution of finite resources and directing us to more sustainable modes of habitation.¹ While he is talking about design in a broad sense, there is a role for all intellectual property laws, including the registered design system, to assist in driving a policy agenda towards sustainability. While the creation of energy efficient products with visual appeal is not a policy end, the visual appeal is an important element in motivating consumer behaviour and influencing public acceptance.

In this chapter, the role of designs law in protecting energy efficient products will be considered. The strengths and weaknesses will be examined and proposals for law reform made. It will be shown that the features of a product which can be protected by design registration are an important aspect of the overall market appeal of a product. Design rights will be a valuable addition to the other forms of intellectual property which may exist and should not be overlooked. Similarly, consideration needs to be given as to whether the designs system can meet the objective of encouraging innovation in clean energy products and whether the balance is right between rewarding innovation and ensuring that monopoly rights cannot be used to thwart policy objectives. The use of design rights by rights holders to further policy objectives will also be examined.

2 The Relevance and Scope of Designs Law

The designs legislation is diverse in its scope: ‘from a lipstick to a steamship’ or from a ‘match to a city’.² Domestic laws are influenced by the Paris Convention 1883³ and the Hague Agreement 1925.⁴ The Paris Convention stipulates that industrial designs should be protected, but provides no more detail as to how this should occur.⁵ The Hague Agreement facilitates an international registration process for industrial designs.

¹Fry (2009).

²Heskett (1994).

³Paris Convention for the Protection of Industrial Property, signed at Paris on March 20, 1883.

⁴Hague Agreement concerning the International Registration of Industrial Designs 1925.

⁵Article 5quinquies of the Paris Convention 1883.

Domestic laws generally specify the scope of design protection as including two and three dimensional visual features, and impose some threshold requirement for originality. For example, the Australian legislation protects the ‘overall appearance of a product, resulting from one or more of its visual features.’⁶ The visual features of a product will include its shape, configuration, pattern and ornamentation.⁷ To be registerable, and thus result in exclusive rights for the design owner, the design must be new and distinctive when compared to the prior art base for the design.⁸

As with other forms of intellectual property, the designs law aims to encourage innovation. According to the Australian Law Reform Commission report which preceded the current designs legislation,⁹ the main objective of the legislation was to ‘encourage innovation in Australian industry to Australia’s net economic benefit’, including by preventing free riding on design innovation and providing investors in design with security for investment.¹⁰ Innovation in the visual features of a product is potentially an extremely valuable market asset, and often determines consumer preferences and decisions. Consequently, design has become increasingly important for firms in a range of industries. Many high-profile firms use design to create a competitive advantage, notable examples being Apple, Bang & Olufsen and Tesla.¹¹ However, as will be shown below, the registered design system remains underutilised in protecting this market advantage.

3 Visual Appeal and Clean Energy Products

When designing a functional product, the primary consideration must be that it works as intended. A consumer of clean energy products is likely to be attracted primarily by the environmental qualities of a product rather than its visual appearance. However, it has been found that marketing of clean energy products on other more mainstream benefits can broaden this consumer appeal, and potentially make the market for the product more viable, expanding the market beyond just the ‘green consumer’.¹² Other features of the product that may be attractive to the consumer include the practical benefits such as cost savings,¹³ convenience,¹⁴ consumer sentiment, and the visual appearance of the product.

⁶Designs Act 2003 (Cth), s 5 definition of ‘design’.

⁷Designs Act 2003 (Cth), s 7.

⁸Designs Act 2003 (Cth), s 15.

⁹Designs Act 2003 (Cth).

¹⁰Australian Law Reform Commission (1995).

¹¹Kwanghui et al (2014).

¹²Hartmen and Stafford (2013).

¹³For example, products designed to reduce personal energy or water consumption.

¹⁴Such as a long life light bulb.

Where the focus is on other aspects of the product such as its functionality, the design is an aspect that sometimes becomes relevant late in the process. To some users, the design system is only of peripheral importance in the business model of a company taking a new product to market.¹⁵ However, the visual appeal of a product has shown to be one important aspect in the uptake of energy efficient products. Caird and Roy identify some of the barriers to adoption of technology for assisting in carbon reductions in the UK and EU. They found that consumers are not always motivated by rational factors, such as a cost/benefit analysis. Other factors which were focused on included the ease, safety and satisfaction of use and also their aesthetic value. They note that their findings ‘set challenges for designers, marketers and manufacturers to develop more user-friendly and desirable products and systems that can be used to deliver the expected carbon reductions and fuel bill savings, and appeal to wider consumer markets’.¹⁶ Visual appeal is one aspect of this challenge in identifying a broader consumer market.

As a functional product becomes more sophisticated, it is increasingly possible to focus on aspects of design that are not fundamental to the products functioning. The case studies below show how visual features of energy efficient products become more significant once a base level of functionality is achieved. As the market for the product becomes more diverse, it is important to increase the range of features that may appeal to the consumer market, which include the visual aspects of the product.

Example 1: The Light Bulb

The evolution of the light bulb as a consumer product illustrates the increasing importance of visual appeal as the functional performance of the product improves. Caird and Roy used energy efficient lighting as one of their case studies in examining consumer motives for purchasing products. They identified a range of motives, including a desire to save energy, reduce bills and environmental reasons. For those that had considered compact fluorescent lamps but decided not to get any, the biggest deterrent was their size and perceived ugliness, followed by cost, incompatibility with existing shades and fittings and their light quality.¹⁷

44% of those that had adopted energy efficient lighting also suggested that a wider range of different designs would be an improvement. Only 51% of those that had adopted the technology were satisfied with their purchase. The main problems identified were with the light quality. 46% wanted a better fit for existing light fittings.¹⁸

¹⁵Kwanghui et al (2014).

¹⁶Caird and Roy (2008).

¹⁷Caird and Roy (2008).

¹⁸Caird and Roy (2008).

The design and technology of energy efficient lighting has improved considerably since their first introduction. First patented by Thomas Edison in 1879,¹⁹ early light bulbs had an extremely short life and were very hungry for energy. Thomas Edison's light bulb was the first to use a carbonized filament, which meant it would last longer. Thomas Edison was a prolific user of the patent, holding over 1000 over his life time. 100 of these related to the light bulb. It is said that 'Edison would be better understood as an early Bill Gates, his business success built on a keen appreciation of the power of aggressive intellectual property strategy and the frailty of antitrust law'.²⁰

Flourescent lighting was the next major advance in light bulb technology. It was Peter Cooper Hewitt's breakthrough in the early 1900s that became one of the precursors to the fluorescent lamp. Hewitt created a blue-green light by passing an electric current through mercury vapor and incorporating a ballast (a device connected to the light bulb that regulates the flow of current through the tube). The Cooper Hewitt lamps were more efficient than incandescent bulbs, but they had few suitable uses because of the colour of the light.²¹ The demand for this form of lighting grew throughout the early—mid 1900s, particularly with the energy demands during WW2. At this point, the focus on the development of the product was still very much on refining their function and efficiency, not on their visual features.

The early use of intellectual property laws to protect the light bulb also demonstrates how these laws can impede product development, particularly in industries where there is a lot of incremental and simultaneous invention, intellectual property rights can impede progress.²² Shaver argues that the existence of patent law impeded innovation in the invention and development of the light bulb. The granting of monopoly rights is based on the rationale that there is one inventor that can be identified and is deserving of all the rights. Where contributions are incremental, it is artificial to identify one inventor or author of the product.²³

Today, energy efficient light globes can be a design feature or a component part of a lighting fixture or lamp. The product has evolved to the point where visual appeal is a key market advantage. The light bulb is a good example of a consumer product where visual features do play a role in influencing consumer choice.

There is some evidence of use of the registered designs system to protect the visual features of light bulbs and related products. For example, the Australian

¹⁹Although they had been in use since 1835. There is debate over whether Edison infringed existing patents held by William Sawyer and Albon Man, who received a U.S. patent for the incandescent lamp (<http://energy.gov/articles/history-light-bulb>).

²⁰Shaver (2012). In *Consolidated Electric Light Co. v. McKeesport Light Co.*, 159 U.S. 465 (1895) (the Incandescent Lamp Patent case), Edison was accused of infringing the patent holder's rights in a bamboo filament bulb. The patent was found to be invalid. Edison also engaged in litigation to protect his innovations.

²¹See <http://americanhistory.si.edu/lighting/bios/hewitt.htm>.

²²Shaver (2012).

²³Shaver (2012).

database shows 45 applications that are registered or pending with the description 'light bulb' and a further 6 for 'light globe'.²⁴ There are many more when the search is broadened to include light fittings or fixtures, including light bulbs incorporated into component parts of cars and motor cycles. The Global Design Database returns 9839 results for 'light bulb'.²⁵

Example 2: Wind farms

The visual features of wind farms are relevant in several ways. First, a wind turbine can be a consumer product. A land owner may choose to install their own wind turbine to assist with their own energy needs.²⁶ Caird and Roy looked at factors influencing consumer choice in buying micro-wind turbines. 33% of adopters and 30% of non-adopters suggested that a visually attractive wind turbine was an influential factor.²⁷

The more common use of the wind turbine is to provide large scale energy production in the form of a wind farm. The visual appeal or visual features of the wind mill may then be an important consideration in gaining community acceptance of this method of producing renewable energy. Community buy-in to the placement of wind farms is a crucial factor in preserving a community's social well-being.²⁸ There is an array of factors that drive community perceptions. These include perceptions of fairness in deriving the benefits of the proposal and perceptions of fairness of the environmental impacts. The visual impact on the landscape is also a consideration. At a global level, the visual impact of a wind farm is the most significant consideration for the community.²⁹ In Australia, the emphasis is slightly different, and differs by location. In Victoria, opposition to wind farms is the strongest. Lothian has studied the impact of wind farms on the perceived scenic quality of landscapes, finding that where the landscape was of higher scenic quality, there was a greater negative impact. Where the landscape was perceived to be of lower scenic quality, there could be a positive impact on landscape.³⁰

The visual features are harder to address than other negative qualities such as noise, glint, bird strike and soil erosion.³¹ Also, it is generally the visual impact of the product in situ that is significant, rather than the visual features of the product itself. However, there is some scope for innovation with the product which may increase the visual appeal. For example, a Tunisian company has produced a wind

²⁴See IP Australia, http://pericles.ipaustralia.gov.au/adds2/adds.adds_simple_search.paint_simple_search?p_ref_search=TRUE.

²⁵See World Intellectual Property Organization, <http://www.wipo.int/designdb/en/index.jsp> (as at 30 November 2017).

²⁶Although, generally, solar is a better option. See <http://www.energymatters.com.au/wind-turbines-c-149.html>.

²⁷Caird and Roy (2008).

²⁸Gross (2007).

²⁹Lothian (2008).

³⁰Lothian (2008).

³¹Lothian (2008).

turbine which is ‘inspired by a hovering hummingbird’, with one of the features being that it is visually less noticeable. It is also quieter and less of a risk for bird strike.³² The key consideration in design of a wind turbine is always going to be its ability to extract energy from the wind, with the visual features being a secondary factor. However, a product with a focus on visual appeal may be more effective in gaining community acceptance.

Facilitating Consultation and Disclosure of Intellectual Property

In obtaining community acceptance of wind farms, community consultation is important to perceptions of procedural justice.³³ The process itself can be just as important as the outcome. Smith and McDonough note that in public participation processes, people judge fairness on factors including ‘representation, voice, consideration, logic and desired outcomes’ concluding that fair decision making processes should be a priority.³⁴

Consultation is only going to be effective where the full details of the proposal can be disclosed. Gross has found that the ‘adequacy, timeliness, scope, objectivity and availability of information provided by the proponent were significant issues’ in obtaining community acceptance of wind farms.³⁵

Where these features are visual, the disclosure during consultation prior to a design being filed will form a part of the prior art. If there is no grace period in the designs legislation, it will mean that they cannot later be protected through a design registration. The Australian law currently does not contain a grace period. This is a limitation to the consultation process. The recommendation for a grace period will be considered below.

The registered design system is used to some extent to protect the visual features of wind turbines. The Australian database has 28 registrations currently in force with the description ‘wind turbine’.³⁶ The Global Design Database shows 464.³⁷

4 The Effectiveness of the Law

4.1 Utilisation of Design Protection

Many businesses choose not to use intellectual property protection to protect their products. They may choose to use other business strategies such as being the first to

³²New Atlas (2017). Cf Nelson (2013).

³³Gross (2007).

³⁴Smith and McDonough (2001).

³⁵Gross (2007).

³⁶IP Australia, http://pericles.ipaustralia.gov.au/adds2/adds.adds_results.paint_results?p_message=N (as at 30 November 2017).

³⁷World Intellectual Property Organization <http://www.wipo.int/designdb/en/index.jsp> (as at 30 November 2017).

market, the design of complex products that are difficult to imitate or other legal mechanisms such as contract or confidentiality.³⁸

Design registrations remain quite low relative to utilisation of other intellectual property rights such as patents or trade marks. There are a number of possible explanations for this lack of uptake. First, the rights holder might take the view that the benefits of obtaining design protection do not outweigh the costs of both obtaining rights and enforcing them.³⁹ Design rights are limited in duration. A second explanation is that the law is complex, and rights holders may not appreciate the value or the necessity of registration of rights (Fig. 1).

With functional products such as those which have energy efficiency objectives, the focus of the rights holder is likely to be on protecting their patent rights.

4.2 *Registration of Rights*

One limitation for rights holders is the requirement in some jurisdictions that the design be registered before any rights are obtained.⁴⁰ This contrasts with copyright protection, which has generally been granted without any formalities, largely due to the prohibition in the Berne Convention.⁴¹

A registration based rights system does offer many benefits. First, it is easier to establish what is in the public domain and what can therefore be utilised. An unregistered design can be used, unless that use breaches other rights such as copyright. The public domain in design law is arguably more important with the advent of technology such as 3D printing which enable the use and adaptation of industrial products outside of a commercial manufacturing context. Previously the line between creators and users was more clearly delineated with respect to the types of products that designs law protects, as compared to copyright works. The public domain is also particularly important where the products are those with a public benefit, such as energy efficiency. A rights owner could choose to leave their work in the public domain by not registering.

Registration provides details of the owner and their contact details which may facilitate negotiation for use of an existing design. This encourages efficiencies, however also assumes that the owner of rights will make choices that further the purpose of the law and achieve a balance between their interests and those of the public or other rights users. The reality is that there are more incentives for them to be influenced by their personal economic interest.⁴² The registration process also

³⁸Productivity Commission (2016).

³⁹Productivity Commission (2016).

⁴⁰For example, s 10 of the Designs Act 2003 (Cth) grants rights only to the registered owner.

⁴¹Berne Convention for the Protection of Literary and Artistic Works of September 9, 1886, Article 5(2).

⁴²Elkin-Koren (2013).

Innovation-active businesses: Intellectual property protection methods, by employment size(a)(b), 2014-15

	0-4	5-19	20-199	200 +	Total
	persons	persons	persons	persons	
	%	%	%	%	%
Patents	1.2	4.6	5.0	17.2	3.1
Registration of design	2.2	4.1	5.7	15.6	3.4
Copyright or trademark	10.5	14.8	24.0	48.6	13.9
Secrecy/confidentiality agreements(c)	9.0	15.0	25.7	38.7	13.3
Complexity of product design	3.2	4.9	4.5	9.9	4.1
Any intellectual property protection methods used	21.0	30.3	43.2	67.0	27.3

- (a) Proportions are of innovation-active businesses in each output category.
- (b) Businesses could identify more than one type of intellectual property protection method.
- (c) Secrecy includes electronic protection methods.

Fig. 1 Australian Bureau of Statistics, Innovation in Australian Business, 2014–15, 8158.0

means that the details of the design are made publicly available and can be utilised within the limits of the monopoly granted to the owner.

However, a registration based system also has its drawbacks. Once rights are registered, the owner may then be unable to rely on copyright protection in certain circumstances.⁴³ Thus, the copyright/designs provisions can discourage application for registration. Copyright duration in Australia (life of the author plus 70 years for works) is far longer than designs protection (10 years maximum), and arises automatically, meaning there is no registration process and cost. Therefore, it may be more desirable as a means of protection of rights that relate to the visual features of a product.

⁴³Copyright Act 1968 (Cth), ss 74-77A. In particular, section 75 provides that, where copyright subsists in an artistic work, and a corresponding design has been registered, it is not an infringement of copyright to reproduce the copyright work by embodying that, or any other, corresponding design in a product.

The provisions that relate to the copyright/designs overlap in the Australian law are found in the Copyright Act and are designed to encourage the owners of rights in industrial products to seek protection through the designs legislation, rather than rely on copyright protection. The Explanatory Memorandum to the 1988 Bill that introduced ss 74–77 into the Copyright Act stated that the provisions were intended to remove copyright protection for essentially industrial products and eliminate the inequity and confusion caused by overlap.⁴⁴ That is, there was a perception of an excess of protection for industrial products under the copyright law. As copyright isn't registered, ownership and existence may be harder to establish, which hinders the manufacturing process.

The law achieves the objective of encouraging protection under the Designs Act by providing that the right to sue for copyright infringement is lost in certain circumstances. These circumstances include where there is a corresponding design (which only includes the three dimensional aspects within the definition of design: section 74 Copyright Act 1968 (Cth)) to an artistic work and the design has either been registered (section 75) or has been applied industrially and used commercially. There are some exceptions, notably for works of artistic craftsmanship, buildings or models of buildings) (section 77(1)(a)).

The effect of these provisions is that unless a rights holder has registered under the designs law, there is a real risk of losing all intellectual property protection where the product is used commercially and is mass-produced. This is illustrated by the decision in *Burge v Swarbrick*.⁴⁵ Mr. Swarbrick attempted to rely on copyright protection to prevent Mr. Burge from manufacturing a yacht based on a design produced by Mr. Swarbrick and provided to Mr. Burge by a former employee of Mr. Swarbrick. No design had been registered.

The Court noted that 'Mr. Swarbrick owned several books on copyright law, patent law and designs law; he said in his evidence that he believed that copyright in drawings used in the design of his yachts "extends to the three-dimensional object"'.⁴⁶ This would only have been the case if he could establish that his work was a work of artistic craftsmanship and thus within the exceptions to the copyright/designs overlap provisions. He was unable to do so, and as it had been applied industrially, this meant that he was not able to sue for copyright infringement. The Court considered the statements of Professor Denicola in his work 'Applied Art and Industrial Design: A Suggested Approach to Copyright in Useful Articles' in which he stated that '[t]he dominant feature of modern industrial design is the merger of aesthetic and utilitarian concerns. It is the influence of nonaesthetic factors, the nexus between what the product must do and how it must look, that distinguishes true industrial design from other artistic endeavors'.⁴⁷ In this case, the design features of the yacht and related

⁴⁴Copyright Amendment Bill 1988 (Cth), Explanatory Memorandum, Commonwealth of Australia.

⁴⁵*Burge v Swarbrick* (2007) 232 CLR 336.

⁴⁶Per Gleeson CJ, Gummow, Kirby, Heydon and Crennan JJ at para 7.

⁴⁷Denicola (1983), at para 76.

copyright material were constrained by the functional requirements to too great an extent for it to be a work of artistic craftsmanship. This is likely to be the case for many clean energy products, including wind turbines, where the scope for visual innovation is quite limited and constrained. This makes the registration of rights, design and patent, more important.

An alternative, which exists in many jurisdictions, is the possibility of relying on an unregistered design right. For example, the UK law provides an unregistered design right for the shape and configuration of an article, but not its surface decoration.⁴⁸ Duration is for 15 years.⁴⁹ The EU also provides protection for unregistered designs.⁵⁰

Changes to the current law in Australia are unlikely. The Australian Law Reform Commission conducted a design users survey and other consultations which demonstrated that manufacturers used the register to find out what designs their competitors had registered and also used their own design certificates to discourage potential copiers. Most supported the retention of the registration system.⁵¹ Similarly, the Productivity Commission in Australia has recently supported the retention of a registration based system. However, protection for unregistered designs would be advantageous. As noted, there are some complexities in the law relating to the copyright/designs overlap which mean a copyright owner can lose the right to sue for infringement where there is a corresponding design right. Providing unregistered design rights would offer some protection in these circumstances.

4.3 *The Grace Period*

It is common for registration based intellectual property rights schemes to provide a grace period within which the owner of the rights can use them prior to applying for registration. For example, under the Australian patent legislation, the rights holder has some scope for using the invention for certain purposes without then jeopardizing their ability to register for rights down the track. In particular, section 24 of the Patents Act 1990 (Cth) provides that for the purpose of deciding whether an invention is novel or involves an inventive step or an innovative step, the decision maker must disregard any information made publicly available in prescribed circumstances. These prescribed circumstances include the invention being shown or used at a recognised exhibition, available in a paper read before or published by a learned society, working the invention in public for reasonable trial of the invention. There is also a general grace period that allows disclosure provided that an application is made within 12 months (reg 2.2C).

⁴⁸Copyright, Designs and Patents Act 1988 (UK), s 213.

⁴⁹Copyright, Designs and Patents Act 1988 (UK), s 216.

⁵⁰The unregistered Community design right lasts for three years from the date the design was made available to the public. European Council Regulation (EC) no 6/2002.

⁵¹At para 8.2.

The purpose of a grace period is to encourage sharing at an early stage and allow researchers and academics to publish without risk. It is made problematic where there is no international consistency however. The grace period also protects those that might make inadvertent disclosures.⁵²

The grace period may be significant where the focus of the inventor has been on function, and the visual aspects only become important later. To test and commercialise the functional aspects of the product, there may be disclosure of some elements of original visual features before the need for protection of these features is considered. It may need to be tested in public before it reaches its final form. Further, where the product is a clean energy product which is going to be visible to members of the public, consultation on the impact of the technology is going to be important before the product is installed. As such, a grace period to allow disclosure to consult and refine a clean energy product is a useful provision. The introduction of a grace period into Australian designs law has been recommended on a number of occasions.⁵³

5 Defences and Licences

Maintaining a healthy public domain is an important consideration in defining the scope of intellectual property rights. This involves a delicate balancing act. Where property rights are not sufficient, there may be inadequate incentives for innovation. Where these rights are too extensive, innovation may be stifled and the interests of the public may not be met. Where the product is one which serves a greater good, such as clean energy products, the interests of the public in access to products and maximising distribution are an important consideration.

The public domain is maintained through several different mechanisms, including a fixed term for rights, defences to infringement and compulsory licences. A flexible scheme of defences and compulsory licences can greatly assist the ability of intellectual property laws to adapt to meet changing policy goals. The ability of the public to use intellectual property rights within limits without infringing on the right holder's monopoly can ensure that monopoly rights are not used to stifle innovation or prevent a public benefit. For example, patent law may include a provision to allow a party to seek a licence to exploit a registered patent where the requirements of the public are not being met.⁵⁴

The Australian designs act has the least provisions for defences to infringement and compulsory licences of all the intellectual property statutes.

Section 72 contains the 'spare parts' defence to allow someone to use a product embodying a design that would otherwise infringe a registered design, where that

⁵²Monotti and Ricketson (2003).

⁵³Australian Law Reform Commission (1995), Productivity Commission (2016).

⁵⁴Patents Act 1990 (Cth) s 135.

product is a component part of a complex product and the use or authorisation is for repairing that complex product so as to restore its overall appearance in whole or part.

Section 90 allows for a person to apply to the court for a compulsory licence where products embodying the design have not been made in Australia to the extent that is reasonable, there is no satisfactory reason for this failure provided by the registered design owner and the applicant has tried for a reasonable period to obtain a licence on reasonable terms and conditions. The nature of the product will be relevant to determining the extent to which making a product is reasonable—the public interest in clean energy products would be a relevant consideration.

This means that the holder of design rights could not hoard rights and there is an equivalent provision in the patents legislation where the visual aspects are accompanied by current rights relating to function.

This raises the question of whether these defences are sufficient, or is there a case for more extensive exceptions to infringement. One aim of defences and exceptions is to enhance the public domain where there are compelling public interest reasons for doing so. In the case of design rights, the protection is granted for visual appearance. Although this is a significant market advantage, it is generally the functioning of a product in which there is more of a public interest. The case for compulsory licencing of design rights is less compelling than that for patent rights.

An alternative to statutory schemes granting compulsory licences or providing defences to infringement lies in the approach of the rights holder to enforcement of their rights. Where the rights are registration based, the owner may decide not to register, or to let the rights lapse, so that they fall into the public domain. Alternatively, they may accumulate rights but choose to allow the use of those rights by the public, either freely or subject to conditions. An example of such an approach is the creative commons licensing.

Example 3: Tesla's use of IP rights and marketing strategy

Tesla's use of intellectual property rights is an example of the potential to accumulate intellectual property rights, but still contribute to the public domain and allow utilisation of rights in the public benefit.

The car manufacturer operates a highly successful business model. Tesla Motors was first incorporated in 2003 by engineers Martin Eberhard and Marc Tarpenning.⁵⁵ In 2010 it raised over \$225 million in an initial public offering, the first time a car manufacturer had gone public since Ford Motor in 1956. In 2012 it began selling all-electric vehicles.⁵⁶ Between March 2013 and February 2014 the price of Tesla stock increased nearly sevenfold.⁵⁷ This has been attributed largely to investor sentiment, a belief in 'a belief about future cash flows and investment risks that is not justified by the facts at hand'.⁵⁸ Baker and Wurgler note that investor

⁵⁵Larker and Tayan (2011).

⁵⁶Crane (2016).

⁵⁷Cornell and Damodaran (2014).

⁵⁸Baker and Wurgler (2007).

sentiment is more likely to be influential where stock values are hard to determine objectively. A part of this investor sentiment will arise because of the clean energy focus of the company. It will also be contributed to by their policies on use of their intellectual property rights, and the strong brand that the company has developed, in part due to the visual appeal of its products.

Tesla owns a large intellectual property portfolio. In its Annual Report for the year ending 2016, it notes that ‘We design, develop and manufacture and sell high—performance full electric vehicles, and energy storage systems, as well as install, operate and maintain solar and energy storage products’.⁵⁹ It goes on to state that ‘Our core intellectual property resides not only within our electric powertrain, but also within our ability to design a vehicle that utilizes the unique advantages of an electric powertrain and the latest advancements in consumer technologies’.⁶⁰ It is noted:

As part of our business, we seek to protect our intellectual property rights such as with respect to patents, trademarks, copyrights, trade secrets... Additionally, we previously announced a patent policy in which we irrevocably pledged that we will not initiate a lawsuit against any party for infringing our patents through activity relating to electric vehicles or related equipment for so long as such party is acting in good faith. We made this pledge in order to encourage the advancement of a common, rapidly-evolving platform for electric vehicles, thereby benefiting ourselves, other companies making electric vehicles, and the world.⁶¹

The pledge referred to was made in 2014, when Elon Musk announced in a blog that Tesla would no longer ‘initiate patent lawsuits against anyone who, in good faith, wants to use our technology’.⁶² There is no such pledge with respect to design rights. This enables Tesla to protect its market position by leveraging its brand, amongst other things. As noted, an important aspect of the Tesla brand is in its visual appeal to the consumer. The other aspect is its ‘green marketing’.

Where there are competing projects that are functionally equivalent, the visual appeal of the product will form a larger role in determining consumer preferences and decisions. Once an overall high—level impression has been formed, the consumer then moves to a more detailed analysis of the components and details (Jia et al. 2014).⁶³

Automotive Designs Process—Use By Tesla

A search of the United States Patent and Trade Mark Office for patents, including design patents, that are registered to Tesla reveals a total of 75 applications. Of these, only 7 were design patents. However, Tesla also utilize a number of suppliers that may provide these design rights. Automotive design involves a large number of

⁵⁹Tesla Inc., Annual Report on Form 10-K for the Year Ended December 31, 2016. Part I, Item 1.

⁶⁰Part I, Item 1 ‘Technology’.

⁶¹Ibid.

⁶²Contreras (2015).

⁶³Jia et al. (2014).

component parts. Tesla has at least 26 ‘Known’ Suppliers.⁶⁴ Therefore, Tesla’s current marketing and business strategy with respect to its intellectual property rights is focused very heavily on building consumer sentiment. While it does hold patents to protect the functional features of its products, it’s current position is that it will not necessarily enforce them.

Mangram has analysed the competitive strengths and weaknesses of Tesla, and illustrates why a focus on consumer appeal is an effective strategy.⁶⁵ Tesla entered the electric car market with its high end Tesla Roadster, a high performance vehicle with a modern, sporty appearance, designed to attract consumers in the luxury sports vehicle market occupied by automakers such as Ferrari and Porsche’.⁶⁶ The Roadster was replaced in 2012 by another luxury vehicle, the Model S. Since then, Tesla has expanded their product range with a lower cost sedan, the Model 3 and an SUV, the Model X.⁶⁷ Some of the market advantages enjoyed by Tesla include its vehicle battery technology, the barrier to entry into the market and increases in the cost of fuel which drives up the sales of electric vehicles.⁶⁸ Tesla’s stated marketing plan is to

1. Generate demand for its vehicles and drive leads to its sales teams;
2. Build long term brand awareness and manage corporate reputation;
3. Manage its existing consumer base to create loyalty and customer referrals, and
4. Enable customer input into the product development process.

While the functioning of the product, in particular the range of the battery, will be crucial in influencing consumer choice, attractive vehicle design is a major component.⁶⁹ They have adopted a similar strategy to Apple by focusing on the high end consumer as early adopters, then developing products which cascade down to more mainstream consumers.⁷⁰ The Tesla Model S was a ground breaking vehicle in terms of design and technology. ‘In terms of its ‘attractiveness’, the *New York Times* compares the Model S to the striking Maserati Quattroporte sedan, which sells for more than twice the Model S base price’.⁷¹ Like Apple, the branding of Tesla extends beyond its products. It has a series of stores which operate as showrooms, located in high profile, highly visible premium outlets.⁷²

This strategy aligns with the motivators of consumers with respect to green products. There are a range of factors which influence a consumer when purchasing a green product. The first is the functional value of the product. That is, the ‘perceived utility acquired from an alternatives capacity for functional, utilitarian or

⁶⁴ETF Daily News (2014).

⁶⁵Mangram (2012).

⁶⁶Aden and Barry (2008, p. 296).

⁶⁷Ibid., p. 297.

⁶⁸Ibid., p. 304.

⁶⁹Ibid., p. 304.

⁷⁰Ibid., p. 304.

⁷¹Gairthwaite (2011).

⁷²Aden and Barry (2008, p. 307).

physical performance'.⁷³ For example, in the case of an energy efficient car, the battery life and engine capacity will be a consideration. Green consumers are also influenced by social value, a perception of how society will response to their purchase. Emotional value is also a factor, which is where the visual appeal of the product will be significant. Emotional value is the 'perceived utility acquired from an alternative's capacity to arouse curiosity, provide novelty and/or satisfy a desire for knowledge'.⁷⁴ Tan, Johnstone and Yang found that functional value is the major influencer, but emotional concerns are important to green consumers.⁷⁵ It is this value that Tesla is prioritising in their strategy of high end design in addition to their stated policy of not enforcing their patent rights.

The Productivity Commission recommend the implementation of many of the recommendations of the Advisory Council on Intellectual Property,⁷⁶ including the introduction of a grace period. They note the general observation that the designs system is underutilised, with a small take up rate when compared to other registration based systems such as patents and trade marks.⁷⁷ Even where the system is utilised, there is a low rate of examination, with only one fifth of registrations ever examined. More Australian residents apply for rights overseas than they do in Australia.⁷⁸

6 Conclusion

This chapter has illustrated several different ways in which the visual features of an energy efficient product can be important. First, as an aspect of consumer appeal where it is a consumer product, visual features are an important component of a product. They will always be a secondary consideration to the functioning of the product, but, as has been shown above, once the functional aspects of the product are developed, the focus in the product design may shift to the visual features. Secondly, visual aspects of a product are important to gaining community buy in for products which are going to be accessible or able to be seen by the public. In terms of policy objectives, the law should provide sufficient rights to enable people to innovate and increase the marketability of green products with visual appeal. These rights, however, should not be used to lock up markets and stifle innovation which is in the public interest. The rights in the visual appearance of a product are far less

⁷³Sheth et al. (1991).

⁷⁴Sheth et al. (1991).

⁷⁵Advisory Council on Intellectual Property, 11.10.

⁷⁶Advisory Council on Intellectual Property, 11.10.

⁷⁷See Aden and Barry (2008, pp. 336–337).

⁷⁸World Intellectual Property Organisation, Statistical Country Profiles, Australia, 2016, http://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=AU.

significant in this respect than the rights in the functioning of a product, which is where the main benefits to the environment will lie.

While the visual features of a product can be protected under the registered designs system, this occurs infrequently. While there is some evidence of utilisation of the registered designs system to protect such interests, it appears underutilised when compared to patents and trade marks.

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Chapter 13

Key Change: The Role of the Creative Industries in Climate Change Action



Tim Hollo

Abstract The role of the creative industries—arts and artists—in helping to drive the changes in laws and behaviours that are necessary to tackle climate change, while not superficially obvious, is a deep one. Arts and artists of all kinds, as cultural practitioners, have been closely entwined with social change and social control since time immemorial, in large part because they help shape our understanding of the world, framing ideas, prefiguring change, and opening hearts and minds to new ways of thinking. They have played a major role in campaigns for law reform on many issues, and climate change should be no exception. Indeed, with climate change increasingly being seen as a deeply cultural issue, and its solutions as cultural ones to do with changing the way we understand our world and our place in it, the role of cultural practitioners in helping to address it should also increasingly be seen as central. It is curious, then, how comparatively little artistic engagement with climate change has taken place, how little engagement with the arts the climate movement has attempted, and how little theoretical and critical analysis has been undertaken on the role of the creative arts in climate change action. Through a literature review and a series of interviews with individuals working in relevant fields in Australia, this study examines and evaluates the role of the creative industries in climate change action and places it in a historical and theoretical context. It covers examples of the kind of artistic and activist collaborations that have been undertaken, the different roles in communication, campaigning for law reform, and deep culture change that arts and artists can play, and the risks and dangers inherent in the involvement of artists, both to climate change action and to the artist. It concludes that, despite the risks, a deeper and more thoughtful engagement of and by the creative industries in climate action would not only be useful but is perhaps vital to the success of the endeavours.

Keywords Arts • Artists • Music • Musicians • Climate change
Communications • Social change • Cultural change

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1 Introduction

In early 2014, a video was released of people in the Typhoon-ravaged Philippines dancing to Pharrell Williams' hit, 'Happy'. While it would be hard to find a song less 'political', the power of this video, with people showing happiness, strength and humanity amidst the devastation of Typhoon Haiyan, was such that it was soon replicated. Dancers in Tunis, Moscow and the Ukraine used the format to convey their struggle for freedom and what happiness means to them. PolicyMic, wrote of this phenomenon: "'Happy' came into the world apolitical, but it's something more now—it's a song of resilience and resolve under incredible hardship."¹

By tapping into emotions and opening up new ways of understanding the world for new audiences, and by building resilience and group identity in the dancers themselves and those around them, Pharrell Williams' song 'Happy' is helping to create social and political change.

The arts and artists have a long and proud tradition of helping to drive social change, from civil rights in the USA and Indigenous recognition in Australia to the feminist movement, from fights for freedom in Communist Eastern Europe and apartheid South Africa to the peace and disarmament movement and beyond. As creators of intellectually stimulating and emotionally powerful works, and as culturally influential people who can lead by example, artists find themselves in a position full of potential when facing the need to drive action on global warming. But the path is also fraught, both in its impact on art and in working most effectively towards a social and environmental goal.

With climate change coming to be seen more as a cultural issue rather than purely a technical one, the role of the arts in this field is crucial. This study examines the grounding for creative artists to most successfully engage in and help drive climate action. Starting with reflections on the cultural aspects of social change, it looks at the role of arts and artists in politics and social movements, how arts and artists can aid in difficult communications tasks, how they help define and create cultural movements for change, and what risks are inherent in this process. Given the breadth of the topic, music has been taken as a focal point and Australia as locus for discussion of specific examples.

2 Culture, Art and Social Change

Culture is a word with many meanings, from high art to yoghurt. The relevant definitions from the Oxford English Dictionary are '[t]he ideas, customs, and social behaviour of a particular people or society' and '[t]he attitudes and behaviour characteristic of a particular social group'. Arlene Goldbard defines it more poetically as 'the fabric of signs and symbols, customs and ceremonies, habitations,

¹Wang (2014).

institutions, and much more that characterize and enable a specific human community to form and sustain itself.² Essentially, it is about the complex web of meanings and relationships which each of us use both individually and collectively to understand our world and our place in it.

2.1 *Culture, Art and Change*

Culture has long been seen as critical to social and political change and control. By limiting or expanding our social and political discourse, culture underlies and circumscribes our behaviour, making it an immensely powerful tool of social and political control. Italian Marxist philosopher and linguist, Antonio Gramsci, considered culture central to his conception of 'hegemony', and another linguist philosopher, Noam Chomsky, wrote that '[t]he smart way to keep people passive and obedient is to strictly limit the spectrum of acceptable opinion, but allow very lively debate within that spectrum.'³ Arlene Goldbard writes that 'our capacity to act is conditioned on the story we tell ourselves about our own predicament and capabilities.'⁴

Guy Abrahams, CEO and co-founder of CLIMARTE, told this study:

Most of the time we're not even aware that we're enmeshed in a cultural fabric that is... both persuasive and sometimes restrictive in terms of where we think we can go. And so if you can move that net, move along that net, or put in new threads, that's when you give people the opportunity to move along.⁵

Former Director of CSIRO's Division of Atmospheric Research, Professor Graeme Pearman, is a climate scientist who has shifted his work towards researching human behaviour in order to examine these issues. 'For each of us,' Pearman says, 'the vast majority of our understanding of how the world, is based on culture, is based on religion, is based on hearsay. These are story lines that are very powerful and hard to move.'⁶ As Anna Rose, co-founder of the Australian Youth Climate Coalition, says, '[c]ulture is so crucial... in shaping the way people think about things, and normalising certain ways of being and certain ways of thinking.'⁷ Culture, says Tipping Point Australia's Angharad Wynne-Jones, is 'the base line. [It is] where change happens.'⁸

The relationship between arts and political activities is long, complex and multi-directional. Gramsci makes the point that 'cultural projects are a field of

²Goldbard (2013, loc. 113).

³Chomsky (1998, p. 43).

⁴Goldbard (2013, loc. 193).

⁵Abrahams, interview (2014).

⁶Pearman, interview (2014).

⁷Rose, interview (2014).

⁸Wynne-Jones, interview (2014).

political struggle, a site where counterhegemonic artists and intellectuals can also prefigure a new society and join with others to create it.’⁹ Those in power use the arts for social control and censor arts they believe challenge their control; those seeking power use the arts as a means of challenging those in power; and artists themselves use their art in order to express their view of how the world is, could be or should be.

Nancy Love and Mark Mattern suggest that art and politics may, in fact, be different sides of the same coin—engagement: ‘Power is potentially rendered accountable through arts and cultural practices in the same way it is rendered accountable through more traditional political avenues: that is, through the political engagement of citizens.’¹⁰ Their perspective is informed and inspired by John Dewey’s writings on aesthetics and the power of art to create shared experience,¹¹ as well as Martha Nussbaum’s view that ‘the arts and literature develop our ability to empathise.’¹²

One important strand of theory takes its lead from Theodor Adorno, whose seminal works such as *On Popular Music*¹³ bring a Marxist critique to the role of popular music in society. He argues that popular music becomes a commodity rather than a tool for liberty and democracy, and that the ‘*appearance* of opposition in... popular music masked its latent pacifying role.’¹⁴ While Adorno has been critiqued as elitist and not particularly informed about the music he criticised,¹⁵ the dynamics of power and capital in the music ‘business’ remain an important thread in this field of study, through to Garofalo’s dialectical critique of mega-events¹⁶ and Buxton’s linkage of rock music and the rise of consumerism.¹⁷

Tim Levinson, Australian hip-hop DJ Urthboy, argues that, rather than artistic culture being central or otherwise to the process of social change, the two go ‘hand in hand... If there is such a volume of community feeling, and there’s such a weight of pressure that is applied by a social movement, then the artists of the day are going to document it.’¹⁸ Composer Martin Wesley-Smith, like Levinson, sees the arts as contributory but not primary: ‘[t]he arts can certainly help, but by themselves will change little.’¹⁹

CLIMARTE’s Bronwyn Johnson, on the other hand, sees a more preemptive role: ‘[t]he arts has always been ahead of the general discourse around these things

⁹Love and Mattern (2013, p. 8), referencing Gramsci (1971).

¹⁰Love and Mattern (2013, p. 9).

¹¹Love and Mattern (2013, p. 128).

¹²Love and Mattern (2013, p. 10).

¹³Adorno (1941), as republished in Frith and Goodwin (1990, p. 301).

¹⁴Rosenthal and Flacks (2012, p. 16).

¹⁵Rosenthal and Flacks (2012, pp. 14–5), Street (2003, p. 116).

¹⁶Garofalo (1992).

¹⁷Buxton (1990, p. 427).

¹⁸Levinson, interview (2014).

¹⁹Wesley-Smith, interview (2014).

because they are engaging with the ideas of the world.’²⁰ Abrahams, further, contends that:

The broad arts community... perhaps become some of the people who are early adopters of the awareness, if you like. Given... information, they are the people who think about it and look at ways of feeding it back to us. In a way, it’s a bit of a feedback loop, and they can be very early on in that feedback loop.

Without cultural involvement of some kind, change will not be deep and long-lasting. Wynne-Jones encapsulates this in her comment that ‘in terms in sustaining change, I think culture is absolutely essential.’²¹ Activist Deborah Hart, who uses theatrical engagement such as the Climate Guardians and the Frackers’ Guild, reflects this in the metaphor of a tree: ‘If those roots aren’t really embedded well, there’ll be trouble.’²²

By guiding, limiting or expanding the way we see the world, art enables us to more deeply grapple with questions of how we want the world to be. If we are not satisfied with the world as it is, it enables us to tell new stories and paint new pictures of how it should be and how to get there.

2.2 *Culture, Art and Environment*

While it is relatively self-explanatory that the arts play a central role in creating and shaping culture, the relationship between nature and culture is more contested.

While Goldbard explicitly defines culture as ‘[w]hatever you see or hear that doesn’t fit the category of nature,’²³ others emphasise the critical element in culture that is the relationship between humanity and our environment, from how we understand it to how we alter it. Gabriella Giannachi, for example notes that: ‘Culture... is not only a means to represent, perform and understand nature but also a way of changing nature. Likewise, nature is a fundamental axis for cultural change. A change in nature is a change in culture.’²⁴ In that conception, a phenomenon in the natural world such as climate change is deeply cultural, in that it is a change in nature driven by human factors and the changes it wreaks will inevitably have deep impacts on our culture, changing the way we lead our lives and the way we understand our world and our place in it.

Indigenous Australian art and culture are a place where the relationship with nature is deeply expressed. From that perspective, Wesley Enoch beautifully explores the complex relationship between all three—art, culture and nature:

²⁰Johnson, interview (2014).

²¹Wynne-Jones, interview (2014).

²²Hart, interview (2014).

²³Goldbard (2013, loc. 125).

²⁴Giannachi (2012, p. 129).

Art is a way of mapping our landscape, story is a way of placing ourselves in the continuum of time, dance teaches us to be the animals and plants we live with. Art has a purpose that is beyond distracting you from your life. Art is about personal connections to the world around you... expressing what you have at stake.²⁵

Going back in history, the early environmentalist philosophy of Henry David Thoreau, for example, coincides with the fascination of romantic poetry and art with the beauty of the natural world. In a sense, the two ‘cultural’ movements went hand in hand. Julien Knebusch, in an editorial in the arts/sciences journal *Leonardo*, persuasively draws that earlier arts/culture interaction into our present circumstances:

Art should... help us to experience and reveal our inner participation with climate, the rupture of its balance and its meaning for our inner world, in the same way that landscape artists reframed the relationship of humans to their environment.²⁶

2.3 *Climate Change as a Cultural Issue*

Increasingly, climate scientists, technologists and activists are recognising that a technical focus is failing to build engagement, interest, priority and action. This is unsurprising given what we know about how social change happens at a cultural level.

Climate scientist, Mike Hulme, recognises that ‘climate change has moved from being predominantly a physical phenomenon to being simultaneously a social phenomenon’²⁷ and that ‘[t]he full story of climate change is the unfolding story of an idea and how this idea is changing the way we think, feel and act.’²⁸ Similarly, Australian climate scientist, Graeme Pearman, says ‘Climate change is really a human question, it’s not primarily a physical science question at all. It’s about what humans perceive they want or need.’²⁹

The RSA follows that lead, noting that:

[E]nergy demand is driven by perceived ‘need’, but this sense of need is highly contingent from a historical or cultural perspective. Global perception of energy demand is driven by the social practices ... we come to view as normal (e.g. two hot showers a day, driving short distances, regular flying), features of life relating to contingent norms of cleanliness, comfort and convenience rather than inherent features of human welfare.³⁰

²⁵Tipping Point Australia (2010, p. 4).

²⁶Knebusch (2007, p. 113).

²⁷Hulme (2009, loc. 275).

²⁸Hulme (2009, loc. 315).

²⁹Pearman, interview (2014).

³⁰Rowson (2013, p. 25).

If climate change is, then, a cultural issue, driven by cultural norms and requiring cultural transformation, that places the arts and artists in prime position to help lead the way. This is a position the arts have a long experience in.

2.4 *Historical Role of Arts in Social Movements*

The social role of the arts goes back millennia. According to William Danaher, '[m]usic and rhythm have been central to human history, in part, by motivating humans to act for the benefit of the group over and above themselves.'³¹ As John Street notes, 'From Plato to the Frankfurt School and beyond, the case has been made for regarding music (especially popular music) as a source of power'.³²

In an article entitled 'The Politics of Music and the Music of Politics',³³ Street traverses examples from the use of campaign songs in contemporary election campaigns³⁴ to the banning of all music in Afghanistan under the Taliban.³⁵ He discusses how the CIA's Voice of America, as well as national anthems such as 'God Save the Queen', can be considered 'a form of state propaganda', before moving to the more explicit use of militaristic and/or folk music by the Soviet, Nazi and South African apartheid regimes.³⁶ In each of these cases, the internal justification for this propaganda art appears to be around issues of identity politics, 'branding' or the simple abiding belief that music has the power to exercise or undermine social control.

The corollary of the promotion of certain 'desirable' art as propaganda is the censorship of 'undesirable' art. Street notes the prohibition of jazz and Jewish music under the Nazis and the banning of Fela Kuti's music in Nigeria, amongst other examples.³⁷ Many authors³⁸ have noted that censorship invests art with a power it may not have possessed or intended until the act of censorship itself. Singer-songwriter Shane Howard notes the banning of the 'Devil's interval', or augmented fourth, by the medieval church as an example of this.³⁹ However, Howard and others reflect that these kinds of clumsy interventions reveal a very real power. Abrahams reflects that art might strike fear into the heart of totalitarian regimes 'because they recognise that it's not something that can be controlled.

³¹Danaher (2010, p. 813).

³²Street (2003, p. 116).

³³Street (2003, p. 113).

³⁴Street (2003, p. 113).

³⁵Street (2003, pp. 119–120).

³⁶Street (2003, pp. 114–115).

³⁷Street (2003, p. 117).

³⁸Street (2003, p. 113). See also Rosenthal and Flacks (2012), Eyerman and Jamison (1998).

³⁹Howard, interview (2014).

They realise... that if culture is allowed to become political in an overt way, that's a really difficult thing to battle.⁴⁰

There are numerous historical examples of the use of arts by those seeking to drive political change.⁴¹ Rosenthal and Flacks note that:

music accompanies political struggles in much of the recorded and oral history of most of the world's societies: protest broadsides in Europe throughout the Middle Ages, a long tradition of travelling singer/poets in Latin America, singers of calypso in Trinidad arising in the 1920s, the pervasive mass singing in the South African struggle against apartheid, the nationalist songs of the Irish rebellion, the *twoubadou* tradition in Haiti, *rai* in Algeria, and on and on.⁴²

There is, of course, an overlap between the use of arts by political forces to help drive opposition and resistance, and artists' own exercise of their political voice. In some cases, these desires and aims are consistent; in others, there is a clear decision by political forces to co-opt artists; in yet others, it is unclear where the line lies.

The adoption of Bruce Springsteen's 'Born in the USA' by Ronald Reagan's 1984 presidential campaign is among the most famous examples of co-option, the songwriter being deeply unhappy that his music's intended critique of his country's treatment of Vietnam veterans was used as a simplistic patriotic anthem for a campaign he did not support.⁴³ A more cooperative approach was taken by early union organisers and the Communist Party in the USA, bringing in non-involved musicians to recruit supporters, becoming an alternative form of information from papers and employers.⁴⁴

Taking this approach to perhaps its logical conclusion, the Highlander Centre, one of the first activist training centres in the world, involved a substantial focus on music, recruiting and training musicians and workshopping campaign songs.⁴⁵ 'We Shall Overcome' is the most famous of many protest songs of the 1960s that had its origins there. The recent emergence of 'Tipping Point' projects in the UK and Australia, which bring together artists, scientists and campaigners to work on climate change, might be considered to follow a similar approach.

The second half of the 20th century saw an explosion of artists becoming involved with political campaigns, from anti-Vietnam war protests to Live Aid, from white power punk to Billy Bragg's Red Wedge, from civil rights campaigns to urban African-American rap and hip hop.⁴⁶ The same period saw the advent of environmental campaigns, and the immediate involvement of artists from Joni Mitchell to Pete Seeger.

⁴⁰Abrahams, interview (2014).

⁴¹Rosenthal and Flacks (2012), Garofalo (1992), Ross and Rose (1994).

⁴²Rosenthal and Flacks (2012, p. 5).

⁴³Rosenthal and Flacks (2012, p. 92).

⁴⁴Rosenthal and Flacks (2012, p. 75).

⁴⁵Rosenthal and Flacks (2012, p. 205). See also Eyerman and Jamison (1998, p. 3).

⁴⁶Historical examples given throughout Street (2003), Rosenthal and Flacks (2012), Eyerman and Jamison (1998), Garofalo (1992), Ross and Rose (1994).

The *Live Earth* concerts of 2007 saw musicians brought into help climate change campaigning, following the lead of Live Aid, Rock Against Racism and similar mega-events of the 1980s (examined and critiqued at length by Garofalo). *Live Earth* helped lift the profile of climate change even higher on the wave of the International Panel on Climate Change (IPCC) Fourth Assessment Report and Al Gore's *An Inconvenient Truth*, but had questionable impact beyond those already engaged.⁴⁷ More successfully, the Cape Farewell project 'brings artists, scientists and educators together to raise awareness about climate change'. Perhaps thanks to its more cooperative approach, it is 'widely acknowledged to be the most significant sustained artistic response to climate change anywhere in the world.'⁴⁸

3 The Roles Artists Can Play in Climate Action

'Activism at its best serves to highlight the gap between what is and what should be. And it does that through really dramatising that issue and forcing powerholders to respond, which in itself is a form of theatre.'⁴⁹ In saying this, Anna Rose is tapping into the point that Love and Mattern make, that art and politics are both essentially processes of engagement.

The various roles artists can play in driving climate action are all broadly related to the communication and dissemination of ideas. This can be as simple as drawing attention to an issue. More deeply, it can involve interpreting information, presenting ideas in a way which engages the audience at an emotional level, involving people in engagement with the ideas, or, most deeply of all, shifting the way the audience perceives the world, and therefore behaves, in relation to those ideas.

Given the hotly contested nature of climate change, the role of the arts is vital. Author Jay Griffiths writes, 'The issue of climate change needs persuasion rather than propaganda and art understands the psychology of persuasion'.⁵⁰ Alison Tickell, founder of UK green arts organisation Julie's Bicycle, writes that '[a]rt can shape and shift perceptions'.⁵¹ Professor Tim Jackson, economist and playwright, writes:

Science can sketch the nature of the problem. Technology can facilitate the solutions. Economics can point out the costs and the benefits. Art engages the soul... Art looks like the perfect addition to our instruments of change.⁵²

In recent years, the study of progressive political communication has been led by linguist George Lakoff, whose central insight is that political campaigns are not

⁴⁷Yale, Gallup, ClearVision (2007).

⁴⁸Boxall (2008).

⁴⁹Rose, interview (2014).

⁵⁰Julie's Bicycle, p. 7.

⁵¹Julie's Bicycle, p. 3.

⁵²Julie's Bicycle, p. 19.

won through rational argument, but through appeals to values with well-framed language. ‘Frames,’ Lakoff says, ‘are mental structures that shape the way we see the world... Reframing is changing the way the public sees the world’.⁵³

This has tremendous implications for the communication of climate change by arts and artists, particularly the school of thought, sceptical of the role of the arts, that says ‘[a] song, however powerful its performance, cannot win an argument’.⁵⁴ If driving climate action isn’t about ‘winning an argument’, that objection, however astute, is irrelevant.

Susanne Moser’s practical communications advice, rooted in the theoretical and psychological work of Lakoff and others, brilliantly summarises the challenges of communicating climate change: ‘[T]he distant problem must be brought home; the invisible causes and impacts must be made visible; the inconceivable solutions must be illustrated; perceived and real barriers to action must be shown as something ‘people like me’ have overcome.’⁵⁵ These are all challenges that the arts can assist with, in order to ‘find clearer, simpler metaphors, imagery, and mental models as well as compelling framing’.⁵⁶

Moser also articulates three main goals of climate change communication that are useful for examining the role of the arts: firstly, to educate and provide motivation to act; secondly, to ‘depict an ‘all hands on deck’ situation’; and, thirdly, ‘[aiming] even deeper by trying to foster not just political action or context-specific behavior modification, but to bring about changes in social norms and cultural values that act more broadly’.⁵⁷

3.1 *Raising Awareness, Drawing Attention, and ‘Educating’ Audiences*

When many people think of artistic involvement in climate change the first thing they think of is generally the role of art or artists in drawing attention to the issue. This may be through song lyrics, participation in events, or explicit campaigning.

Bearing in mind Lakoff’s advice, the goal of attention through art is not about ‘rational’ debate. It is more about raising awareness and providing a trigger and a forum for further discussion. Suzanne Vega reflects this when discussing her famous song about child abuse: ‘[Y]ou write a song like *Luca* and then people have a tool to talk about it with.’⁵⁸

⁵³Lakoff (2004, p. xv).

⁵⁴Street (1986, p. 60).

⁵⁵Moser (2010, p. 40).

⁵⁶Moser (2010, pp. 36–7).

⁵⁷Moser (2010, p. 38).

⁵⁸Rosenthal and Flacks (2012, p. 154).

Charlie Mgee is a musician whose band The Formidable Vegetable Sound System performs and records catchy dance tunes about ecology and permaculture. He explains his role as ‘someone who can translate fairly dry or dense theory and concepts into a more acceptable form. I really feel like music has... that ability to really get messages across to people in a digestible way.’⁵⁹

The hope on the part of artists seeking to drive change is that, by engaging audiences and creating a trigger and a space for discussion, they will encourage people to learn more and get involved. As Mgee says, ‘inspiring the enthusiasm is more important than giving the answers, and if people have the enthusiasm then they’ll go and find the answers.’⁶⁰ Mgee reflects:

I’ve tried to use a combination of uplifting dance music that inspires people to just dance and have a good time, and not having the lyrics as the focus of the music. So while I’ve put a lot of thought into the lyrics, and there’s a lot of science and principles and theories within them, it’s not what I’m trying to get across to the audience. The aim is to just really engage them through music that they want to dance to, and then later maybe they’ll sit down and listen to the words. Or some might get hammered home through repetitive lyrics [laughs].⁶¹

A closely linked issue is the role of art in galvanising pre-existing support for an issue. This is a role Tim Levinson, DJ Urthboy, feels very strongly about. Contrary to Vega and Mgee’s perspective, in his experience, music does not have the power to ‘kick start something’. An issue-based song, even if the writer cares very deeply about it, will ‘live the life of the hookiness of the song... if the movement in the community isn’t working in a parallel fashion.’ On the other hand, if the song taps into something that is already growing in the community, it can transcend its pure musical catchiness. This was his experience with The Herd’s song about racism in Australia, 77%: ‘77% slotted in with something that was already bubbling in the community, and there was a frustration there, so that’s for me why the song worked.’⁶²

Shane Howard had similar experiences with his two most famous issue-based songs, ‘Solid Rock’ and ‘Let the Franklin Flow’. The first, a song about Aboriginal rights, became a tremendous commercial success, but, according to Howard, it took a long time for its message to penetrate into the broader culture which was not ready to hear it: ‘I think every Aboriginal person in Australia who heard that song when it came out got it first time what was going on lyrically in the song. And I think, for a lot of mainstream Australia it took a lot longer for it to sink in.’⁶³

On the other hand, ‘Let the Franklin Flow’ was written both on the back of the commercial success of ‘Solid Rock’ and in the midst of a very high profile campaign to stop the damming of the Franklin River in Tasmania. ‘Some things have

⁵⁹Mgee, interview (2014).

⁶⁰Mgee, interview (2014).

⁶¹Mgee, interview (2014).

⁶²Levinson, interview (2014).

⁶³Howard, interview (2014).

their time,' Howard says. "'Let the Franklin Flow'" was adding a little bit of fuel to a fire that was already burning. It was able to move quickly to the centre stage.'⁶⁴

One critical question for artists attempting to draw attention to climate change and raise awareness of it is their role as messengers. As Moser says:

Messengers are integral aspects of the framing; they are also critically important in establishing the credibility of the information conveyed. Messengers give 'seals of approval' to information that an audience might otherwise have a hard time assessing as 'right' or 'trustworthy'... Trust in messengers, however, is context dependent. Religious leaders may be trusted as climate change communicators if the issue is framed as a moral one, but not necessarily if the issue is framed as a security, scientific or energy issue.⁶⁵

The question then becomes 'what kind of messengers are artists?' How can they be trusted or credible messengers on an issue such as climate change? They have neither scientific credibility nor moral standing. But they do have cultural credibility, and it is in their role shaping and guiding culture that they become powerful messengers.

Billy Bragg, among the world's most celebrated 'political' songwriters, says:

I think you have to reveal to the audience that you don't have all the answers and that you yourself are not completely sure that you know what you're doing, you're just trying to make the best of it, same as everyone else... It's not about offering answers, it's asking the right questions... It's the audience that has the answers.⁶⁶

Bragg is perhaps instinctively reflecting the Climate Change Action Group's recommendation for cultural messages to be carried by 'people 'like me'.⁶⁷ This is a process which Tim Levinson beautifully characterises as 'an authenticity exchange between the listener and the artist'⁶⁸ in which what an artist says publicly is seen through the prism of their art and vice versa. He notes African American hip hop artists touring Australia and visiting The Block in Redfern or wearing Aboriginal flags on their clothing.⁶⁹

In the field of study specifically into the role of artists in social *movements*, there is an effort made to translate the roles of art into traditional activist roles. Reebee Garofalo, for example, does so in his (unflattering) analysis of mega-events.⁷⁰ He articulates their role as fundraising, consciousness raising, artist/celebrity involvement and agitation/mobilisation,⁷¹ all aspects concerned largely with bringing an issue to greater public attention and motivating people to act.

⁶⁴Howard, interview (2014).

⁶⁵Moser (2010, pp. 40–1).

⁶⁶Billy Bragg, quoted in Rosenthal and Flacks (2012, p. 214).

⁶⁷Climate Change Advisory Group (2010, p. 8).

⁶⁸Levinson, interview (2014).

⁶⁹Levinson, interview (2014).

⁷⁰Garofalo (1992, pp. 7–8).

⁷¹Garofalo (1992, pp. 26–34).

Rob Rosenthal and Richard Flacks similarly discuss the role of arts and artists in terms of recruitment, conversion, mobilisation and retention of activists,⁷² with examples such as Sting drawing attention to Amazon deforestation, Madonna's strong image empowering young girls, and Rage Against the Machine's Tom Morello noting that Amnesty International and the Revolutionary Communist Party found fertile ground for grassroots recruitment the morning after the band had played. Their conclusion from the success of these activist artistic engagements is that:

Music carries suggestions of new ideas and identities, fixes others as something to be considered, ties these to other ideas and identities in ways that suggest they belong together, and does all of this with an emotional power that other forms of education only rarely achieve.⁷³

3.2 *Framing and Priming*

Framing is a word that itself paints a picture of a work of art within a frame which directs the viewer's focus, providing a specific perspective. And the arts play a key role in both framing ideas and priming audiences to accept new frames.

Susanne Moser explains that '[f]rames are triggered by words, imagery, symbols, and non-verbal cues such as messengers, music, tone of voice, and gestures'.⁷⁴ Karen Raney, in the editorial of *engage 21*'s superb special edition on 'Art and Climate Change', writes that:

Changing perceptions is something that art has always been in the business of... 'Art is a framing device' writes Lucy Lippard, 'for visual and/or social experience'. Art 'changes frames on the spot, offering views of the ways a space or place can be or is used'.⁷⁵

Rosenthal and Flacks, in discussing the role of the arts in the 'construction of political meaning', note that the arts 'may reinforce or disrupt common assumptions and the "schemas" or framing we use for understanding the world around us'.⁷⁶

Political scientist Brendan Nyhan has conducted studies into 'disconfirmation bias [and]... resistance to corrections'⁷⁷ to identify appropriate ways to help people to accept new frames. The results show that both graphical representations and 'priming' can be effective in shifting the frames of debates sufficiently to alter people's understanding of certain 'facts'. Graphical representation can involve mathematical graphs and tables or more artistic works representing the issue in question. Priming can be anything from smiling or actively boosting the

⁷²Rosenthal and Flacks (2012, Chaps. 7–9).

⁷³Rosenthal and Flacks (2012, p. 155).

⁷⁴Moser (2010, p. 39).

⁷⁵Raney (2008, p. 5).

⁷⁶Rosenthal and Flacks (2012, p. 155).

⁷⁷Nyhan and Reifler (2011).

self-confidence of the subject to playing music that triggers certain feelings, making the subject more receptive to new frames and messages. Whether it be hearing 'Respect' triggering frames about gender roles, or simply the positive social atmosphere of a gig and emotions triggered by the music itself, art can 'prime' people to accept new frames.

Drew Westen's neuropsychological studies into the way the brain makes political decisions have very clear implications for the use of arts in political communications. Westen specifically addresses the role of imagery, sound and music as critical to emotional engagement around political messages. He notes, for example, that it has been 'shown in a series of experiments that something as subtle as varying the musical score in a political ad can alter its power to persuade'.⁷⁸

Shane Howard is convinced of music's 'emotive force'. He believes it is 'possibly the most powerful of the arts for doing that'.⁷⁹ His analysis of the impact of 'Let the Franklin Flow' is that the message was carried more powerfully because of the music's 'capacity to open the soul, and in a way prepare us for a transformative message'.⁸⁰

Theatrical activist, Deborah Hart, has first-hand experiences of the emotional power of art to make climate change 'real' for people through her work making the issues 'beautiful and humorous and loving and sometimes frightening'.⁸¹ Her performance art protest group, ClimActs, catalyses all these emotions in bringing acts such as the Frackers' Guild, the Coal Diggers, the Flat Earth Institute and the Climate Guardian Angels to public and private events, engaging and confronting people directly in a way which draws on the ancient tradition of court jesters speaking truth to power.

With the more humorous acts, Hart has found that those whose values and behaviours are the target of the act often 'couldn't help laughing. [They are] wanting to be disapproving but actually thinking oh this is really fun.'⁸² In the case of one specific conservative person, Hart knows that the humour of the Coal Diggers 'reframed in her mind that the whole issue is about vested interests'⁸³ in a way that hours of conversation could not. Hart recollects one event which gets to the essence of how humour can prime people to radically shift frames and change their view of the world in a deeply serious way:

We had heard about this symposium which was being held... We went along to the Rialto Towers as the Frackers' Guild. We snuck in, managed to hijack a lift with some unsuspecting coal seam gas people.... We just completely took over and had a field day and they were all just standing staring. These were all people who think that they're green. And [there was] this one man, who was really charming and funny and clever – in his mind, he's

⁷⁸Westen (2008).

⁷⁹Howard, interview (2014).

⁸⁰Howard, interview (2014).

⁸¹Hart, interview (2014).

⁸²Hart, interview (2014).

⁸³Hart, interview (2014).

a good guy, because he's making these projects not as bad. We had a bit of fun with him. As we were leaving I turned around and looked at this man and his face haunted me for quite a few days. He really looked like what he had constructed to help himself sleep at night was in pieces on the floor. He couldn't pretend that the role that they were playing in this industry was anything but profiting from a really destructive, base industry.

Reframing is of paramount importance in shifting views and priorities around climate change, but it is also tremendously difficult. If, as these examples suggest, art and artists can prime people to accept new frames, using beauty, enjoyment, humour and other emotional appeals, that alone would be enough to make their engagement worthwhile.

3.3 *Identity Formation*

'There are few influences more powerful than an individual's social network,'⁸⁴ contends the Climate Change Action Group in highlighting the importance of identity in communicating and campaigning on climate change. And identity is one of the most critical aspects of culture that art has a strong influence on. Art can help define the identity of a broad national or ethnic culture, as with bluegrass, Jewish klezmer music, and so many other forms of traditional music, dance and more. But it can also help new and emerging subcultures define themselves in a way that can strengthen their internal coherence.

'Identity processes are inherent in all movements,' Rosenthal and Flacks explain, '[a]nd musicking... is the way many first try on that identity... Indeed, music is a major resource for identity construction in contexts that are remote from the political'.⁸⁵ 'Music and group identity,' they say, 'may become so intertwined as to be synonymous in the minds of group members and outsiders'.⁸⁶

One of the important roles for music in this identity process is as a social legitimiser. 'While the music creates the bond, the listeners... may then be motivated to carry out their political ideals not because the music 'says' they should but because many others feel the same way and that it is acceptable to express those opinions.'⁸⁷

Charlie Mgee has found this very process at work in his audience engagement:

If everyone's there listening to music about climate action or permaculture or whatever, just them being there, having a good time together, enjoying that, is bonding them in a way that validates what the music or the art is about.⁸⁸

⁸⁴Climate Change Advisory Group (2010, p. 8).

⁸⁵Rosenthal and Flacks (2012, p. 165).

⁸⁶Rosenthal and Flacks (2012, p. 94).

⁸⁷Rosenthal and Flacks (2012, p. 165).

⁸⁸Mgee, interview (2014).

Similarly, Tim Levinson nominates building a sense of shared identity as one of the few incontestable outcomes of his experiences recording and performing:

It really felt, from being inside the band, that there was a sense of relief from people who were that way inclined, who felt similarly, that there was a great sense of relief that they could jump up and down and yell it and express it at an event. I do know that that was some way of unifying people to feel like they were not alone, which definitely progressed a sense of what they were going to do about it.⁸⁹

As well as building a sense of shared identity, music plays a critical role in helping create, maintain and cement internal movement identity amongst campaigners. Anna Rose says music is key to ‘maintaining morale’ in the present climate movement, just as it was vital to giving people ‘strength and courage’ in the civil rights movement.⁹⁰ Shane Howard recalls the large number of songs written to support the Franklin River campaign which ‘on the ground... are lifting people’s spirits, they’re galvanising the intention, and reminding people why those issues are important.’⁹¹

Tim Levinson finds the perfect metaphor for this role, speaking passionately about the importance of ‘preaching to the choir’:

which I have no qualms with whatsoever. It’s one of those condescending comments ... that dismisses all this value, that misses the point of how vital it is to preach to the choir, to support what the damn choir is singing, to be the band behind the choir!⁹²

Identity is something the Australian Youth Climate Coalition (AYCC) have worked hard to build, and music and dance simply made sense in their search for activities ‘that would be attractive for young people to get involved in [because]... so much of youth culture is about music.’⁹³ And yet it was almost by accident that the AYCC stumbled on perhaps their most powerful tool for building shared identity—the flash mob. The first flash mob they organised was to close their 2009 national Powershift conference with a bang. They brought together 2000 young people in a dance on the forecourt of the Sydney Opera House:

The idea behind that was external initially. We certainly didn’t say ‘let’s give everyone a transformative experience and help shape their identity into being more closely aligned with the AYCC!’ It was about, well, ‘what can we do that will get us some media attention in a different way?’ If we’d had a rally it just would have had no media coverage, it wouldn’t have been very empowering for people to take part in. We wanted to do something more iconic... something that would be colourful and youthful. And it did get media attention, but more than that it got shared, huge shares on social media and people were really proud that they were part of it, learning the dance moves themselves, teaching each other the dance moves... People felt that it was something that allowed them to express how they felt about climate change and the hope of solving it.⁹⁴

⁸⁹Levinson, interview (2014).

⁹⁰Rose, interview (2014).

⁹¹Howard, interview (2014).

⁹²Levinson, interview (2014).

⁹³Rose, interview (2014).

⁹⁴Rose, interview (2014).

Having recognised the potency of this tool, AYCC made flash mobs a central part of their work. Rose recalls a particularly poignant moment where a flash mob brought together music and dance's ability to reframe events, build internal morale and draw others into a growing movement:

After the Copenhagen negotiations failed, everyone was really depressed at being really ineffective and AYCC decided we would try to cheer everyone up. We had all learned [a dance from *Slumdog Millionaire*] on the plane over... and we got up on stage and performed it for everyone... And suddenly everyone cheered up. And then we made this amazing video... called 'We're not done yet' and ... started to make plans for what we were going to do ... to make that sure this kind of deal isn't politically acceptable in the future. And the music and the dance and the hope that it gave people was tangible in turning around the mood from depressed to determined.⁹⁵

This begins to tap into art's deepest role in identity formation—the power of artistic work infused with that sense of identity, sometimes work which both reframes the world and helps to prime audiences to accept those new frames, to spread ideas wider in an almost viral way without people quite realising what they are spreading. As Rosenthal and Flacks explain:

The ethos developed in scenes and subcultures also functions powerfully to spread a worldview beyond their boundaries, particularly when there are avenues of communication, like modern mass media, that carry these outward... What begins percolating isn't a coherent ideology, but... 'structures of feelings', part emotional, part rational, a heady brew of social ideas, fashions, music, and so forth, both precursor to a developing ideology and more than simply an ideology, involving 'meanings and values as they are actively lived and felt' by each individual.⁹⁶

This connects the question of identity with the next layer. Alongside the framed ideas and shared identity that music and art can convey and build is its role in actually creating a picture of a new and different world and leading the way there.

3.4 Prefiguring New Worlds and Modelling Behaviour

Modelling behaviour for others to follow and actively representing new possible worlds are both vital to creating change, especially for an issue such as global warming. According to Love and Mattern, '[t]he arts and popular culture have a prefigurative capacity that rivals or exceeds other areas of human experience.'⁹⁷

Gabriella Giannachi cites examples of prefigurative art projects including painted on flood marks on façades of buildings in Bristol, the creation of a Global

⁹⁵Rose, interview (2014).

⁹⁶Rosenthal and Flacks (2012, p. 100).

⁹⁷Love and Mattern (2013, p. 11).

Warming Survival Kit, and a live broadcast of the sound of a melting glacier.⁹⁸ As she says of this last example, it:

succeeds in bringing a remote occurrence close by, thus also dealing with one of the biggest difficulties in climate change communication: the rendering of something occurring over time, often in remote environments, to diverse and distributed audiences.⁹⁹

Music and musicians, as cultural leaders and influencers, have a critical role to play in presenting and prefiguring a different world, through their behaviour, both on stage and off. Rosenthal and Flacks highlight the example of British multi-racial '2-Tone' bands presenting a reality in which 'race divisions were not inevitable.'¹⁰⁰

The importance of modelling behaviour has major implications for, on the one hand, the lifestyles of conspicuous consumption that some celebrity artists lead and, on the other, efforts to practically 'green' the arts, such as by Julie's Bicycle, Green Music Australia, the SLOW BOAT conference,¹⁰¹ and others. While an artist is, perhaps unconsciously, modelling excessive consumption, any work they do to promote sustainability cannot succeed as it lacks authenticity. By consciously shifting their behaviour to modelling greener lifestyles and business practices, artists can effectively contribute to changing cultural norms and thereby amplify their individual actions by orders of magnitude. This is at the heart of Green Music Australia's goal, for instance, to help put the music scene on a more sustainable footing practically in order to drive the deeper cultural change needed to address global warming.

Artists do not, of course, model behaviour simply as individuals, or even as celebrities. Their art plays a key role in their ability to influence, thanks to its emotional pull, its ability to 'prime' us for accepting new frames, and its cultural power to create coherent meaning out of disparate elements. As Rosenthal and Flacks explain:

In this role as soundtrack of our individual and collective lives, music not only takes part of its meaning from its setting, but also organises our memory of that setting, the symbol that ties it together in an accessible package, thus contributing to the meaning we attribute to it in later recollections.¹⁰²

In this sense, AYCC uses flash mobs as a modelling exercise, both for the practice of activism and for normalising caring about climate change. While the chain of causation is unclear, Rose sees a possibility that the flash mobs can also provide an entrée, in a sense, to deeper involvement in civil disobedience: 'A lot of the people who were at Powershift in 2009 are now at the Maules Creek blockade [of a proposed coal mine in NSW].'¹⁰³

⁹⁸Giannachi (2012, p. 127).

⁹⁹Giannachi (2012, p. 124).

¹⁰⁰Rosenthal and Flacks (2012, p. 115).

¹⁰¹Tipping Point Australia (2010, p. 9).

¹⁰²Rosenthal and Flacks (2012, pp. 88–89).

¹⁰³Rose, interview (2014).

A critical factor in this area is drawing audiences into participation. Active participation, whether by singing along, contributing in some way to the creation of an artistic work or to an activity held in parallel with the performance, ‘tends to encourage, as well as reflect, more active participation in the political struggle itself.’¹⁰⁴ The interviews turned up some fascinating examples of participation in artistic events as both behaviour modelling and prefiguring of a different world deliberately aimed at addressing climate change.

Mat Morris is a sustainability consultant who has worked closely with music festivals over many years to institute environmental practices and activities. He detailed two particularly successful programs: a tree planting program run during Splendour in the Grass at North Byron Parklands, and container deposit recycling programs run at several festivals over a number of years. The tree planting program, he says, involved:

a lot of people that maybe hadn’t had much camping experience, maybe hadn’t had a lot of experience being on a very large property, and certainly had not had experience planting endemic native species. It was overwhelming, the response to that. People really took a lot of pride in what they did there... They had a community feel about them, the people that got involved engaged with each other as much as with the program.¹⁰⁵

At festivals including Splendour in the Grass, Homebake, Field Day and others, Morris has organised container deposit recycling schemes where attendees pay a little more for canned drinks and can reclaim this ‘deposit’ by returning the can to recycling collectors. ‘Invariably,’ he says, ‘the event site maintained a level of cleanliness that it otherwise would not have.’ All the festivals saw substantially increased recycling, and one recorded a remarkable 90% recycling rate. Morris observed the reaction closely as part of his monitoring of the program:

People who had sat down and had a meal, generally speaking, when the site was deteriorating, would just get up and leave their waste where it was. What was happening when this program was in place was that they felt embarrassed, or they felt a responsibility to maintain what they saw around them. There was this communal level of pride which took place. Secondly, the people who were taking part were excited about the program.

In both cases, Morris believes that the atmosphere of a music festival, combined with the ‘natural high’ of the communal physical activity, creates a mix of memory, values and feelings that ‘almost stamps something in their brain... that will probably help to influence their decision-making process well into the future.’¹⁰⁶ In this way, running participatory environmental programs at music festivals can be an immensely powerful approach to effectively train young people in sustainable practices that will stay with them through their lives.

A radically different approach is the home art project run by Angharad Wynne-Jones’ Tipping Point Australia. The genesis of this innovative work was:

¹⁰⁴Rosenthal and Flacks (2012, p. 200).

¹⁰⁵Morris, interview (2014).

¹⁰⁶Morris, interview (2014).

thinking about how to create a live performance experience with as little emissions as possible, then thinking that that can happen in people's homes, using what they have already. So you're not travelling to a theatre, not setting up lights.¹⁰⁷

What it became was revelatory as much for Wynne-Jones and her collaborator, choreographer Lucy Guerin, as it was for the people who opened their homes for them and took part. Walking around North Melbourne, knocking on doors, Guerin and Wynne-Jones introduced themselves and offered to come and work with the householder in developing a very personal, private work, to be performed in their own home to their own community of friends, family and neighbours. Although they had their fair share of door slams, they found enough openness and involvement to be preparing to replicate the project in another suburb.

This very small scale exercise in creativity became a very large scale exercise in generosity, trust and community building. Wynne-Jones sees in this kind of participatory art a deliberate exploration and building of ideas around community resilience that can help us deal with the more challenging world we have created by triggering climate change.¹⁰⁸

Shane Howard sees the role for 'the artist to psychologically prepare people for change, or to explain change' as 'very subversive at times.'¹⁰⁹ This is because art can be and is used not simply to challenge certain behaviours but to actively change very deeply held views of the world.

This is where the role of prefiguring and modelling dovetails with the deepest layer of all—shaping and reshaping the very culture through which we understand our world and our place in it.

3.5 *Shaping Culture*

Susanne Moser puts culture at the deepest level of her goals of climate communication: 'to bring about changes in social norms and cultural values that act more broadly'.¹¹⁰ If we consider Goldbard's definition of culture as 'the fabric of signs and symbols, customs and ceremonies, habitations, institutions, and much more that characterize and enable a specific human community to form and sustain itself,'¹¹¹ the role of artists in helping to weave that fabric becomes apparent. Shane Howard explores this concept:

I think that one of the essential roles of art and creativity is basically to incrementally shift the dominant paradigm. [This] requires the artists to push the vision of the future forward, and then the legislators to show leadership and legislate for structural change... and what

¹⁰⁷Wynne-Jones, interview (2014).

¹⁰⁸Wynne-Jones, interview (2014).

¹⁰⁹Howard, interview (2014).

¹¹⁰Moser (2010, p. 38).

¹¹¹Goldbard (2013, loc. 113).

seemed problematic ten years ago is just common sense in the present... In the same way that legislators change law, the artists change thinking.¹¹²

Charlie Mgee suggests that music can perform a mnemonic function, placing an idea or set of behaviours into people's 'cultural repertoire that acts as a reminder and a pointer'. In coming to this he draws on:

the ancient roles of music which were aimed towards direct action – I'm thinking along the lines of the work songs, the sea shanties. In a way, musicians are the shanty people, guiding us along this course of change. Sea shanties were traditionally work songs that were mnemonics to help people engage in action that would get them somewhere they were trying to go, or to achieve a particular function in their community or culture.¹¹³

Mgee compares this to the modern use of jingles by advertisers, using catchy, simple and repetitive music to, as he puts it, 'encode public mnemonics' that can trigger certain decisions and behaviours in a given situation. He is experimenting with that approach in order to hopefully trigger environmentally sustainable behaviour:

so that when people are put in particular situations that are challenging to their lifestyle or particular circumstances arise, a song is inspired to come into their head that helps in that situation... [In that way] music is just a way that you can set people up to have the answers available when their troubles arise.

Just as artistic culture can influence and shift broad culture, the broader cultural environment can have an impact on art, creating a potent interweaving of the two. Eyerman and Jamison suggest that cultural changes driven by political movements can have a quite specific impact on the arts. For example, 'the resurrection of bluegrass music, as well as many other traditional musics, was inspired by the civil rights movement, and its actualisation of history, its linking of the past with the present'.¹¹⁴

More specifically, they argue that the participation by artists such as Brecht and Weill, Dylan and Baez, in social movements not only helps create our cultural understanding of those movements, but also had an impact on their art, engendering a creative feedback loop. This is central to Eyerman and Jamison's case that the interactive arts/cultural change relationship is one of the most crucial aspects of social movements for change, as it is a 'source of cultural transformation',¹¹⁵ becoming 'a central catalyst of broader changes in values, ideas and ways of life.'¹¹⁶

In these terms, Wynne-Jones reflects on a shift in how climate change is perceived that she has picked up among artists she works with. Whereas for many

¹¹²Howard, interview (2014).

¹¹³Mgee, interview (2014).

¹¹⁴Eyerman and Jamison (1998, p. 4).

¹¹⁵Eyerman and Jamison (1998, p. 4).

¹¹⁶Eyerman and Jamison (1998, p. 7).

years, artists struggled to come to grips with it, she feels that has recently changed because:

it's not an issue anymore – it's a condition of the world we live in. And so, in that sense, it becomes everybody's. I feel like that's a tipping point that's happened in the last few years. Now people are writing about it as part of the human condition in a sense. It's something that we're living with and dying from.¹¹⁷

The deepest layer of cultural communications and campaigning currently being researched is that of values mapping and how activating certain values can support or repress other values. The Climate Change Advisory Group notes one aspect of this strand of research:

Undue emphasis upon economic imperatives serves to reinforce the dominance, in society, of a set of extrinsic goals (focused, for example, on financial benefit). A large body of empirical research demonstrates that these extrinsic goals are antagonistic to the emergence of pro-social and pro-environmental concern.¹¹⁸

Only partially tongue-in-cheek, Wynne-Jones posits that, on this level, the arts are in and of themselves presenting a different set of values, prefiguring a different world, 'not unrelated to the fact that it doesn't make financial sense as an industry'. In this way, artists, other than the tiny number of hugely successful celebrity artists, present quite a different picture of 'what it is to be successful in a society that pretty much values economic success over anything else'.¹¹⁹

Perhaps the most fascinating concept of all, and filled with opportunity for the role of the arts in driving climate action, is raised in a recent paper published by Common Cause suggesting that 'engagement in arts and culture... [in and of itself can] encourage values that support well-being, social justice, and ecological sustainability'.¹²⁰

The evidence base in the values mapping work takes Wynne-Jones' idea to a fascinating new level. The values of creativity and curiosity sit on the map amongst the values collectively referred to as 'intrinsic', close to the values of care for the environment, social justice and universalism, and opposite 'extrinsic' values, such as desire for more material possessions, wealth, social status and power:

If we accept the sensible proposition that engagement in arts and culture activates values such as 'curiosity' and 'creativity,' then the implication from research on the value circumplex would be that the intrinsic portion of the human motivational system could be encouraged and strengthened, while the extrinsic portion could be suppressed, as a result of participating in arts and cultural activities... As such, it may be that the more that one engages in artistic activity for these kinds of intrinsic reasons, the more the intrinsic portion of the motivational system will be strengthened, and thus the weaker extrinsic values will become.¹²¹

¹¹⁷Wynne-Jones, interview (2014).

¹¹⁸Climate Change Advisory Group (2010, p. 6).

¹¹⁹Wynne-Jones, interview (2014).

¹²⁰Mission Models Money & Common Cause (2013, p. 8).

¹²¹Mission Models Money & Common Cause (2013, pp. 10–11).

It may well be that, beyond their role in helping to most effectively communicate messages, frame new ideas and prime audiences to accept new frames, build identity and prefigure a new and better world, the arts may in and of themselves be able to change our culture to one more conducive to tackling the climate crisis.

4 Dangers, Risks and Pitfalls

While there is a strong theoretical basis for, and many opportunities inherent in, artistic engagement with climate action, it is important not to lose sight of the fact that there are also risks, dangers and pitfalls in taking these steps.

This part divides these into three broad categories: risks surrounding the messenger, the message and the process.

4.1 *Risks Surrounding the Messenger*

Artists seeking to get involved with climate action, or campaigners seeking to involve artists in their work, need to grapple with a ‘minefield’¹²² of risks to do with their role as messengers. Mat Morris neatly summarises the issues faced by high profile musicians in particular in considering whether to commit to and support causes and, if so, which causes:

One is this pigeonhole effect – that they can be known as the guy who supports this or doesn’t agree with that. The second is that there are so many demands on them that their cachet or their impact can really be watered down by spreading themselves too thin. ... [Thirdly, as celebrities, their views] can be discounted.¹²³

Maxwell Boykoff, Michael Goodman and Ian Curtis note the power of celebrity voices to communicate with vast numbers of people about climate change, but they ask whether “celebrity effects’ inspire and foster grassroots, democratic movements and responses to climate change by and for ‘the people’, or are... plutocratic, unique and extraordinary elite behaviours of distraction’.¹²⁴ While setting out the ‘potential promises, pitfalls and contradictions’¹²⁵ of celebrity engagement, they state that ‘this question... should, perhaps be one of the fundamental considerations concerning the ‘effectiveness’ of the current tactics that have and continue to form the contemporary cultural politics of climate change.’¹²⁶

¹²²Levinson, interview (2014).

¹²³Morris, interview (2014).

¹²⁴Boykoff et al. (2010, p. 149).

¹²⁵Boykoff and Goodman (2009, p. 395).

¹²⁶Boykoff et al. (2010, p. 150).

Some research has been conducted in Australia into the persuasiveness of celebrities in climate change campaigning, with at least one major environmental organisation choosing to discontinue using celebrities at all in response to it, according to Anna Rose. Nevertheless, she points out that there are ‘ineffective and effective ways of using celebrity’ which have to do with who the celebrity is and the nature of their relationship with the target audience.¹²⁷

A key issue that Moser highlights is that of trust and credibility. If the celebrity does not add to the credibility of the message in the way it is framed, they can detract from it. Many artists are deeply concerned about this in relation to climate change, wondering ‘What right do I have to say this?’ Guy Abrahams turns the question on its head. ‘Why shouldn’t we use platforms that we have, the spheres of influence that we have, to speak about things we care about it?’ he asks. ‘Should artists be disqualified?’¹²⁸

A related aspect of the artist as messenger is the question of authenticity. Mgee says he does get challenged on the issue, and it becomes a key part of his musical act that he does have this authenticity and integrity:

While musicians need to be on the road touring and getting their message out there, I think it’s essential that if what they’re singing about is something that involves action and on the ground action there needs to be an element of doing that, and showing people that they’re doing that. And also [it is important to] become involved in action that is happening wherever you are... to find out what’s happening in the community, empowering those groups to keep doing what they’re doing. And that really gives people a lot of inspiration, to see someone who’s a messenger in these things actually come and be involved or be supportive of local action.¹²⁹

Levinson notes a particular reticence in Australia on the part of major artists to ‘talk about anything political... because I think instinctively they understand that their audience is not going to cheer them on and chant alongside them when they do this.’¹³⁰ Part of what is driving that, he feels, is the unpleasant way in which mainstream media has treated those who do take a stand. ‘There’s a lower chance that artists are going to get on board when,’ he says, ‘it’s become so politically toxic.’¹³¹

Martin Wesley-Smith believes that, while his music that dealt with environmental themes did not lead to him being disadvantageously labelled as a composer, his pieces about West Papua and East Timor did. He also believes that there are issues to do with funders, board members, audiences, financial pressures and thus administrators and programmers for classical music.¹³² He believes that, with some notable exceptions such as Julian Burnside’s commissions through Musica Viva,

¹²⁷Rose, interview (2014).

¹²⁸Abrahams, interview (2014).

¹²⁹Mgee, interview (2014).

¹³⁰Levinson, interview (2014).

¹³¹Levinson, interview (2014).

¹³²Wesley-Smith, interview (2014).

little contemporary music in the classical tradition is written in Australia on explicitly political or environmental themes because:

most composers know that retribution (dried-up commissions and performances) would be swift. There's not a Grand Inquisitor directing things but a system where self-censorship (by performing groups, commissioners, broadcasters, etc.) does the job very effectively.¹³³

Shane Howard reminds us that 'Bob Dylan... had to fight very hard to confound the perception of himself as a political songwriter.'¹³⁴ He himself, at times, fought against the label:

You have to spend a lot of your time trying to confound your own mythology and that can be very hard to do. There was a time for me, in the 90s, when I tried to run as far as I could from something like 'Solid Rock' and going 'there's more to my life and my career than this single issue and this song'.¹³⁵

Guy Abrahams draws attention to the fact that, in the context of bitter debate on an issue like climate change, the impacts on artists of becoming involved can be personal as well as professional. 'Different people have a different capacity to stand up and deal with the consequences, and that applies across the community. It's a personal decision, but I don't think there's something intrinsically about being an artist.'¹³⁶

4.2 *Risks Surrounding the Message*

Possibly the most consistent challenge for artists seeking to use their voice for political, social or environmental aims is to keep their art interesting. Some of those involved with Cape Farewell have discussed how 'you can't be seen to be producing art as propaganda', 'you have to be careful for work not to be seen as preaching'.¹³⁷ Street is not alone in pointing out that protest songs are often 'worthy... but musically uninteresting'¹³⁸ and that '[i]f singers say exactly what they mean, the musical form will collapse beneath the weight of their words. The price of accepting the constraints of the musical form, however, is that performers can never convey quite what they mean.'¹³⁹

Rosenthal and Flacks argue that whether or not the art is interesting is not about its subject but about the quality of the art: 'Political music making... is not inferior *because* it necessarily subordinates musical ends to political ends; it's inferior *when*

¹³³Wesley-Smith, interview (2014).

¹³⁴Howard, interview (2014).

¹³⁵Howard, interview (2014).

¹³⁶Abrahams, interview (2014).

¹³⁷Boxall (2008, pp. 41–42).

¹³⁸Street (2003, p. 128).

¹³⁹Street (2003, pp. 157–8).

its political passions subvert the impact of the piece rather than contributing to it'.¹⁴⁰ This is parallel to the reflection by a number of interviewees that the 'nervousness around didacticism'¹⁴¹ does not and should not prevent artists from exploring the issues to create challenging and interesting art—it is simply a risk that has to be managed, like any part of the creative process.

Another central part of the creative process that must be considered is the choice of art form, some of which may be more naturally suited to engagement with climate change.

Street's contention that '[i]f singers say exactly what they mean, the musical form will collapse beneath the weight of their words',¹⁴² may not apply, for example, to hip hop. As Levinson explains:

[Hip hop] lends itself to a greater level of self-expression... I mean you've gotta fill a goddamn verse with however many words versus a singer-songwriter. You can't just come up with a nice neat little metaphor and then come up with a little bit of imagery around it and develop a beautiful melody – which I'm not belittling! I'm so envious of it... [but] this necessity to fill a song with more detail... lends itself to rolling your sleeves up a little bit more with issues and with politics.¹⁴³

Levinson also points to hip hop's often aggressive sound, as well as its proud political history which cannot be divorced from its present form: 'We have the likes of Public Enemy who laid the foundations, particularly for older hip hop artists who have some kind of memory of when Public Enemy were really relevant. That's almost like a challenge to honour that era.'¹⁴⁴

On the other hand, Martin Wesley-Smith reflects that '[t]he "classical" music world is conservative by nature'.¹⁴⁵ While he says there are remarkably few contemporary classical composers effectively grappling with political or environmental themes, he believes that is more to do with cultural influences than the form itself:

Saying that classical music can't express particular political attitudes can be a cop-out that relieves composers of what some would say is their responsibility, as artists, to deal with the issues of their time. Add a voice, and the music can be as political as you want it to be. Add visual images: ditto.¹⁴⁶

The question of greenwashing and tokenism is closely linked to that of authenticity, but generally at a larger scale. Tokenism, for example, is a criticism often levelled at large events or major acts who engage a little with climate change but have not internalised it in their business or behaviour.

¹⁴⁰Rosenthal and Flacks (2012, p. 230). Emphasis in original.

¹⁴¹Johnson, interview (2014).

¹⁴²Street (2003, pp. 157–8).

¹⁴³Levinson, interview (2014).

¹⁴⁴Levinson, interview (2014).

¹⁴⁵Wesley-Smith, interview (2014).

¹⁴⁶Wesley-Smith, interview (2014).

Mat Morris notes the difference between ‘events like Peat’s Ridge’ which consider themselves festivals of both music and sustainability, and more mainstream events like the Big Day Out or Splendour in the Grass.¹⁴⁷ A handful do achieve the best of both worlds, specifically large and popular festivals such as Woodford Folk Festival and WOMADelaide, which have engaged deeply with environmental practices from their inception but nevertheless remain primarily music festivals.

While tokenism can be a problem if it leads attendees or fans to believe that minimal action is all that is needed to address an issue like global warming, the far greater problem is greenwashing, where artists use their cultural credibility to help companies pretend to be acting sustainably. Mgee takes particular aim at US artist will.i.am’s involvement with Coca Cola’s Ekocycle product range. Selling clothes made out of recycled plastic bottles while continuing to be one of the largest producers of plastic pollution in the world and lobbying against the introduction of container deposit recycling schemes is, in his opinion, greenwash, and will.i.am’s support for it unwise.¹⁴⁸

Tokenism and greenwash are, of course, matters of opinion. They are also avoidable when a considered approach is taken by artists, industry and activists. However, at their deepest level, they raise the contradiction at the heart of the entertainment industry—that art is not ‘material’, but the mainstream industry is. While the artist wishes to engage, entertain, challenge, even make their audience cry, the industry wishes to sell products.

4.3 *Risks Surrounding the Process*

Adorno’s theory, that art can ‘reconcile people to their domination’,¹⁴⁹ is highly relevant to art about global warming. It raises the question: does art which prepares us for the worst potentially suppress action by helping the audience to deal with it? If, through art, we can come to grips with the idea of mass extinctions, sea level rise forcing us to move whole cities, and other devastating visions, do we then become less moved to act to prevent them?

Guy Abrahams says ‘[t]he answer is yes—but that’s not all the arts do.’¹⁵⁰ He points out that this is but one of many functions and roles that art can play and that, together, they can be highly effective:

There is a therapeutic aspect to being involved in the arts... It can act as an emotional balm... If you’re in a state of complete constant anxiety about something, that’s not a very good state to act in, either. It’s a balancing act. I don’t think it’s about preventing action, but

¹⁴⁷Morris, interview (2014).

¹⁴⁸Mgee, interview (2014).

¹⁴⁹Love and Mattern (2013, p. 179).

¹⁵⁰Abrahams, interview (2014).

it can be about keeping us in a reasonably balanced state of being so that we can take action.¹⁵¹

Angharad Wynne-Jones acknowledges that '[i]t might actually enable us not to take action because we're looking at such a long time frame.'¹⁵² She notes that art operates on an utterly different scale from the political world. The political world tends to focus on such minutiae that if you try to talk about something as grand as climate change, people can't grapple with it. The world of the arts is almost the inverse:

A lot of artists take the really long view. By the nature of their practice and the reflection that comes with it, it's almost inevitable that they conceive of humanity and its trajectory, the inevitability that we will disappear from this planet at some point.¹⁵³

Nevertheless, art is still critical in building resilience in communities as we face up to what we have wrought. 'It's about how you live your life with all those potential impacts for yourself, for your kids.'¹⁵⁴

A more prosaic risk is the paradox that arts can not only help educate and recruit activists, but can also 'become *containment* of political activity',¹⁵⁵ where attendance at a performance or listening to an album replaces necessary action. In these situations, the arts have provided education, but not met Moser's goals of providing motivation to act or creating an 'all hands on deck' situation. This is an accusation that has often been levelled at high profile events such as the Live Earth concerts—that the bulk of attendees simply came for the music and left without contributing further to or engaging more with the cause.

Deborah Hart sees this as simply a function of human nature: 'I think it's always going to be a situation with anything that's voluntary.'¹⁵⁶ However, she believes that, reminiscent of Charlie Mgee's mnemonic theory, something of the experience and its meaning will be retained by people and return to them at relevant moments: 'Some people will just be entertained and they'll walk away, but maybe the next time they see some propaganda, they'll go 'oh, yeah'. Maybe.'

Shane Howard notes that this is a criticism that can be applied to any activism: 'There is a degree of "I gave to Greenpeace so I did my bit" or "I signed my name to an email petition from GetUp so I've ticked the boxes".'¹⁵⁷ Each of us does what we are able, he believes, and some will always do more than others.

Anna Rose, whose fledgling AYCC recruited many new members at Live Earth, reflects that the degree of containment depends in large part on organisers putting in

¹⁵¹Abrahams, interview (2014).

¹⁵²Wynne-Jones, interview (2014).

¹⁵³Wynne-Jones, interview (2014).

¹⁵⁴Wynne-Jones, interview (2014).

¹⁵⁵Rosenthal and Flacks (2012, p. 185).

¹⁵⁶Hart, interview (2014).

¹⁵⁷Howard, interview (2014).

the effort to engage people, follow up, and ensure that those who want to get involved have every opportunity to do so.

There's effective ways to do cultural protesting or cultural work, and there's ineffective ways of doing it, just like all tactics. An effective way of doing it would include ladders of engagement for people who are interested in getting more deeply involved to get more deeply involved, recognising that not everyone will... If you're doing effective cultural engagement, you should have the option for people to get more deeply involved afterwards, which is resource intensive, but is really important.¹⁵⁸

A final critique to do with the process of artistic involvement in climate action is to do with its immeasurability. As Guy Abrahams says, '[t]he response to art is unpredictable... You don't actually know what's going to happen.'¹⁵⁹

Tim Levinson is confident that The Herd's song 77% did draw people together around a shared feeling, but he is quite honest that, beyond that, he cannot know its impact:

As to what they did go and do about it, I can't be certain... Those things are only ever going to be anecdotal. And I certainly don't know what kind of impact that song had on people who were not of that way of thinking.¹⁶⁰

However, he also says that '[a]s a musician it's almost like not my responsibility to know.' While for activists it is important to understand what impact their actions have, artists can teach them the value of the immeasurable, as culture is always immeasurable. 'You don't want to be caught up on the statistics of how your music has impacted on people's actions,' Levinson says.¹⁶¹

Anna Rose makes perhaps the critical point in saying '[i]t's very very hard to measure, like most activism.'¹⁶² A deep understanding of activism as an attempt to shift cultural norms, tell new stories that shape the world, alter the weave that creates the patterns of our society, will recognise that it is immeasurable. We can, over time, measure changes in behaviour such as energy use, voting and waste streams. But we will never know what impact any individual action had.

In summary, the risks and dangers involved in artistic engagement with climate action can all be managed with care, and many of them are risks which apply equally to any form of activism.

¹⁵⁸Rose, interview (2014).

¹⁵⁹Abrahams, interview (2014).

¹⁶⁰Levinson, interview (2014).

¹⁶¹Levinson, interview (2014).

¹⁶²Rose, interview (2014).

5 Conclusion and Lessons

There are a number of clear conclusions that can be reached. Firstly, the arts have already played a role in this movement for change, albeit one which is surprisingly limited. Secondly, there is an important function for the arts in framing climate change and climate action, priming people to accept those frames, triggering emotional engagement with the issue, and bringing the distant problems and inconceivable solutions close to home. Thirdly, the arts can assist through their long practice of bringing issues to public attention in such a way as to recruit and mobilise support for action, building identity amongst people in a way that helps create and maintain a strong movement for change. And fourthly, there is a critically important role for the arts in helping to reshape our culture so it can face up to the challenge, in leading by example and embodying cultural change, as well as simply by embodying values that support and buttress care for each other and the environment which sustains us.

On the other hand, it is also clear that there is a risk of artistic involvement becoming a placebo for, or leading to containment of, more important personal and political activity. Additionally, the difficulties surrounding the role of artists, particularly celebrities, as messengers, and the problems of greenwash and tokenism must be avoided.

Fundamentally, the risks to both art and cause can be managed, and the benefits to both increased, by thoughtful engagement with the theory and practice.

The last word must go to Rosenthal and Flacks, whose book, while being the most comprehensive analysis of the role of music in social movements, is also honest about its limitations. They acknowledge that the arts ‘like any factor alone—is limited in its ability to change minds and actions’, adding that:

What is crucial to see is that music itself is a part of that context, not a separate entity that arrives after our context and thoughts are set and then finds a welcoming or hostile reception. Music, as all culture and indeed all activity, helps to create, sustain, and alter the social world as well as reflect that world.¹⁶³

‘Culture’ and ‘culture’ are not separate meanings for the same word—they are different aspects of the same concept. By bringing the two together, it is possible to create an extraordinarily potent brew that will drive the cultural shift needed in order to prevent climate catastrophe while making society more resilient and able to cope with changes that are coming.

¹⁶³Rosenthal and Flacks (2012, p. 141).

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Part IV

Privacy and Trade Secrets

Chapter 14

Environmental Sousveillance, Citizen Science and Smart Grids



Bruce Baer Arnold

Abstract Enhancing water, energy, transport and communication infrastructure through a distributed or centralised sentience—‘smart grids’—involves questions about power. Those questions are as much about data, knowledge and environmental activism as they are about technical protocols for internet refrigerators, congestion pricing of road networks and remote reading of domestic electricity meters. This chapter explores who gets to collect, access and use data from smart grids. It highlights emerging debate about privacy, including systemic surveillance by grid operators/partners, and security. It discusses scope for environmental mashups that inform public policymaking and environmental activism but conflict with legal frameworks for the ownership of data and quarantining of knowledge. It looks ahead to ask whether citizens can establish participatory environmental monitoring networks that are independent of grids operated by network providers such as power and water utilities.

Keywords Privacy • Patents • Copyright • Surveillance • Smart grids
Smart cities • Drones • Internet of Things • Activism • Climate change
Citizen science • Open access

1 Introduction

Climate change is a fact. It is, however, a fact that on occasion is denied, obfuscated or simply ignored. It is a global fact, affecting everyone but affecting people on a differential basis. Change in Pacific micronations such as Kiribati and Tuvalu or in low-lying Bangladesh, already prone to monsoonal flooding, is for example likely to be more existential than change in those parts of Europe, North America and

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Australia that will not be directly threatened by rising sea levels and extreme weather events.¹ Climate change coexists with and is exacerbated by processes of industrialisation, resource extraction and large-scale urbanisation that result in rivers ‘running black’ and immediate harms to health through air and other pollution.² It occurs in a world where there are opportunities for change and for amelioration but agency is inhibited by perceptions that policy development/implementation is best left to apolitical technocrats and by restrictions—notably through intellectual property law—on the sharing and community use of environmental data.

Effective responses to climate change and immediate crises such as killer smog or water contamination involve both understanding and action at local, national and global levels. The unprecedented and inter-generational nature of climate change—different from past acute crises such as the 1918–1920 Spanish Influenza and mediaeval Plague pandemics or transient ‘Little Ice Ages’—necessitates the involvement of individuals and civil society bodies to realign consumption, reshape infrastructure investment and more broadly influence public policy.³

Climate change is, in essence, too important and too complex to be left to officials and politicians whose timeframe is shaped by election cycles and whose conceptualisation of policy choices is determined by special interests such as ‘Big Coal’.⁴ It is an opportunity to revivify democracy through individual and community participation that offsets the disengagement identified by political scientists such as Putnam, uses ‘smart grids’ as a foundation for an inclusive ‘citizen science’ and requires thinking about access to information outside the bounds of copyright.⁵

This chapter is accordingly concerned with mechanisms for climate justice⁶ Environmental fairness as justice at the end of the Anthropocene or the Chthulucene involves a Rawlsian minimisation of those burdens on the disadvantaged that are attributable to climate change.⁷ It also involves action by individuals, enterprises, civil society bodies and governments to prevent or minimise harms to future generations across different jurisdictions rather than to engage in reparation at the local level regarding the acts or omissions of past generations. This chapter valorises agency and openness in looking beyond the Paris Agreement, the erasure of climate change information under US president Trump and a technocratic literature about the ‘smart city’ or resilient energy networks. It calls for environmental sousveillance: environmentally-literate and responsible citizens collecting, analysing, integrating and disseminating environmental data from public/private sources

¹Karim and Mimura (2008), Mimura (1999), Nicholls (1995), Goodell (2017).

²Economy (2004).

³Johnson and Mueller (2002), Grove (2004), Shearman and Smith (2007), Semenza et al. (2008), Habermas (2010).

⁴Pearse et al. (2013), Goodell (2007).

⁵Putnam (1995), Levy and Peart (2017), Dickinson and Bonney (2012).

⁶Page (2007), Nussbaum (2012), Posner and Weisbach (2010), Schlosberg (2012).

⁷Rawls (1971), Haraway (2015), Lancet (2017).

rather than being passive recipients of ‘top down’ information from regulators that may be muzzled for voicing what Al Gore characterised as ‘an inconvenient truth’.⁸

The following paragraphs initially identify presumptions regarding climate justice. They discuss smart grids, typically conceptualised as urban traffic management systems or regional energy networks but usefully construed as a sentence that is potentially available in rural areas and is significant in autocratic states where official environmental data is mistrusted, unreliable or unavailable. The chapter then introduces the notion of environmental sousveillance, arguing that its salient attributes are agency and openness rather than mere data collection. The chapter situates that sousveillance within the history of citizen science and discusses the implications for intellectual property practice, in particular an open access policy by operators of commercial infrastructure networks governments that have construed their role as owners rather than custodians of environment data and have accordingly been unsupportive of non-commercial initiatives such as geospatial mashups. The chapter concludes with a discussion of grid issues such as privacy, terrorism and tort liability.

2 Towards Climate Justice

Economist John Maynard Keynes questioned the laissez-faire market ideology of the ‘long run’, that is the belief that action could and should be deferred because in the long term immediate problems solve themselves in ways that are beneficial to society at large.⁹ That is an ideology conducive to states avoiding intervention in markets and, in particular, avoidance of regulatory burdens that affect stakeholders now but potentially avert serious harms across an intergenerational timeframe.

Keynes commented that the ‘long run’ is

a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task, if in tempestuous seasons they can only tell us, that when the storm is long past, the ocean is flat again.¹⁰

Autocratic states, preoccupied with a recurrent ‘great leap forward’ into modernity or parity with economically advanced peers, have similarly relied on the long run as justifying their sacrifice of one generation for the projected benefit of future generations. At its most egregious, that philosophy in the People’s Republic of China, North Korea, much of the Middle East, North Africa, the Soviet Union and satellites in Eastern Europe has treated political participation (underpinned by a free flow of information), prevention of foreseeable environmental harms and immiseration of whole populations as acceptable or even necessary costs for the achievement of wonders such as the Three Gorges Dam complex, the Moscow

⁸Dimmock (2007), Semenza et al. (2008).

⁹Keynes (1923).

¹⁰Keynes (1923, 80).

Metro, the White Sea Canal and steelworks on the steppe.¹¹ The same mixture of national pride, technocratic hubris and disregard of human costs in the ‘here and now’ is evident in states such as India with a tradition of ‘nation-building’ megaprojects alongside bureaucratic incapacity to enforce environmental protection frameworks at the local level.¹²

The challenge for climate justice is accordingly three faced.

It involves recognition that we are alive now, meaning that we need to address immediate environmental harms such as the profound degradation of air and water quality in emerging mega-cities such as Beijing, Dhaka, Delhi, Mexico and Lagos attributable to state incapacity, prioritisation of economic growth over sustainability, and capture of policymaking by sectoral interests.¹³ People are likely to be motivated to respond to what they perceive as directly affecting them (or imperil the next generation) rather than an abstraction situated in an indefinite future. A willingness to act beyond the present might be encouraged by integrating information about the ‘now’ with information about the future of ‘here’ and ‘everywhere’.¹⁴ That might serve to offset for example the populism underlying the race for growth evident in economies such as India, Thailand, Indonesia and the People’s Republic of China where environmental protection has often been construed as a luxury that can only be afforded after reaching parity with Japan and the United States.

The challenge is also to recognise an inter-generational duty, accepting costs now on the basis that if action is not taken to minimise climate change on a progressive basis at both local and global levels even elites in the most fortunate societies will in future face a physically and politically more precarious existence. Global warming cannot be switched on or off overnight. To adapt Keynes, the ‘storm’ may continue for several hundred years. When the ‘ocean is flat again’ long after we are all dead the waters will have permanently submerged several nations rather than merely inundated cultural treasures such as Venice and key manufacturing centres such as the Pearl River Delta or reshaped the insurance sector.¹⁵

The third face, perhaps most salient for this chapter, is to recognise that action or inaction at local, regional and national levels affects the global ecosystem and potentially contributes to climate justice as a matter that extends across time, jurisdictions and law regarding intellectual property. All politics may be local but choices have impacts beyond specific consumers and communities, albeit those impacts may be inadequately understood or communicated. On that basis climate change is not something that only affects other people and other jurisdictions or for which individuals have no responsibility.

In thinking about intellectual property (construed as both a manifestation of dignity and an incentive for creativity or investment resulting in public goods) and

¹¹Brunn (2011), Mainguet and Létolle (1998), Shapiro (2001).

¹²Nüsser (2003), Edmonds (1992).

¹³Bartone (1991), Davis (2006), Marlier et al. (2016).

¹⁴Montgomery (1988).

¹⁵Carbognin et al. (2010), Tracy et al. (2007), Dlugolecki (2008).

climate justice one mechanism for resolving the three challenges is to recall Kant's categorical imperative.¹⁶ People in other locations and other times are not to be regarded as a means to our own ends of comfort and achievement of the capabilities identified by Martha Nussbaum.¹⁷

Kant, along with precursors such as political philosophers such as Aristotle and contemporary theorists such as John Rawls, conceptualised dignity—and by extension justice—as a matter of individual agency and responsibility.¹⁸ A contention of this chapter is that achieving climate justice after the Paris Agreement requires individual and collective action.

Diverse environmental information systems that can be characterised as 'smart grids' in conjunction with open access to environmental information potentially serve as tools for that action.¹⁹ They are not ends in themselves, are not located outside the political sphere and, despite Foucauldian anxieties about a 'soft' or 'hard' panopticism (discussed below), are not inherently antithetical to democratic policy-making that fosters common goods. They may instead serve to revivify participation in liberal democratic states and non-liberal states where there is disengagement because political processes have been captured by special interests and because policy-making is perceived to be determined by technocrats who are unresponsive to community needs at the local level or exclusively 'own' science.²⁰

The effectiveness of smart grids as tools for achieving climate justice is predicated on an openness in the dissemination and enhancement of data. That openness is potentially at odds with intellectual property practice that treats knowledge as a commodity for exploitation by commercial enterprises or otherwise to be jealously guarded by entities that, in the words of James Scott, seek to 'see like a state' in ways that disempower the community.²¹

3 Distributed Smartness

The 'smart grid' is a serviceable piece of jargon that was initially used in relation to strengthening the resilience of regional electrical power networks but has since been appropriated to refer to other utilities (gas, water, waste) and transport networks (particularly urban roads). It is increasingly used in conjunction with jargon such as the 'smart city', 'digital urbanism' and even 'smart government', often in a context where supposedly irresolvable political problems attributable to sectional interests at the local level are to be sidestepped by managers who have both a broader vision

¹⁶Kant (1997).

¹⁷Nussbaum (2011).

¹⁸Kant (1997), Aristotle (1996), Rawls (1999).

¹⁹Gabrys (2016).

²⁰Fischer (2017).

²¹Scott (1998).

and the expertise to deploy hitherto unavailable rich sets of data through a process of digital panopticism.²²

The defining characteristic is the use of digital technologies for sensing of activity on the particular network and communication of data from that sensing in order to enable changes in the immediate or short term (for example minutes or hours) of how the network is used by consumers, in addition to providing an empirical basis for policy development and review. That modification of consumer behaviour might involve autonomous decision-making by specialist devices, manifestations of the Internet of Things, rather than directly by individuals. It potentially has a range of environmental benefits, such as reduced demands for energy and reductions in the output of airborne contaminants. Some of those benefits may be readily discernable by consumers and perceived as justifying what might otherwise be regarded as inappropriate erosion of privacy or investment in public/private infrastructure. The smart grid may also increase private amenity, such as a more comfortable ride for commuters (in the here and now few people in Bangkok, Los Angeles or Sydney want to spend their time in traffic jams) and an improved micro-environment in residential settings. That amenity is potentially important as serving to foster support for climate change abatement measures that would be unsupported by people who are change denialists or are merely indifferent to environmental harms.²³

One simple example regarding a transport grid involves devices that sense road traffic flows and on the basis of that data signal to drivers that specific routes or locations should be avoided because of congestion, accidents, public events or terrorism. That dynamic signalling at a local level, typically reinforced by changes to the operation of traffic lights, moves beyond ad hoc non-government advisories from radio broadcasters based on observation from 'spotter' aircraft (helicopters, light planes and drones). It is environmentally advantageous because by minimising the idling of vehicles, particularly heavy trucks, it reduces both noise and air pollution. A smarter road grid with smoother rides, shorter rides and more reliable public transport may similarly reduce consumption of non-renewables such as petroleum. If knowledge fosters use of public transport, an on-demand SMS about bus/light rail availability can serve to green the road grid.

A more subtle example is dynamic congestion pricing in urban cores or other locations, with consumers modifying their behaviour when sensors detect that a specific number of vehicles are transiting or parked within a precinct and a premium is imposed via a wireless tag identifying the particular vehicle or user. That price-based behavioural nudge is justified as enhancing the amenity of the precinct. Implicitly it may also foster the use (and potential public or private investment) in environmentally friendly mass transport such as light rail as an alternative to individual cars.

²²Townsend (2013), Rassia and Pardalos (2017), Picon (2015), La Scala et al. (2017), Kitchin (2014), Marvin et al. (2016).

²³Bain et al. (2012).

From an environmental perspective, especially in relation to electricity as an indispensable utility (given that few people are in a position to go ‘off-grid’), a more important ‘smartness’ involves the incorporation of sentience into devices such as dishwashers, dryers, toasters, domestic air-conditioners, washing-machines and robot vacuum cleaners that are often in a stand-by mode but do not operate continuously.

Smartness on the power grid might involve them autonomously interpreting real-time data indicating that standard generators are at capacity, accordingly deferring a switch from stand-by into service on the basis that deferred operation will not greatly inconvenience the consumer and will preclude the need for the utility operator to use backup/supplementary generating capacity. Decision-making about deferral would be by the devices rather than through direct intervention by individual consumers, significant because many consumers are attention-poor and some although voicing a commitment to greening are selfish on an instance by instance basis. As with precinct congestion a differential price structure, if effectively explained to consumers, might encourage both compliance and environmental awareness. You would not, for example, be prohibited from running your air-conditioner in the middle of the heat-waves that are likely to be an aspect of climate change in some locations but in overriding data from the utility you would agree to pay a premium price for that use of the network. A progressive response to climate change might be to mandate that only smart energy-efficient devices might be sold, predicated on governments fostering industry standards on a global basis. Such a restriction is akin to shaping of the automobile market through restrictions on the availability of leaded petrol as a public health/environmental protection measure and the global phase out, under the Montreal Protocol On Substances That Deplete the Ozone Layer, of devices reliant on chlorofluorocarbons.²⁴ Mandating does however require political engagement with civil society concerns regarding for example privacy, cybersecurity and industry standards as discussed below.

Sentience and consequential agency does not need to be restricted to domestic whitegoods or transport infrastructure. As the Internet of Things becomes more widespread (and thus potentially more robust rather than merely affordable) we could envisage taxpayers and municipal governments benefitting from a smartness that addresses the tendency of pre-set irrigation systems in public parks and sports fields to start spraying without regard for whether there has been rain. That is pertinent given the amount of water wasted in some jurisdictions, such as California and Northern China, that are especially vulnerable to global warming in the face of existing water shortages and concerns regarding competition between industrial, domestic and recreational users of a threatened resource.²⁵

Some cities are experimenting with a simpler mechanism: assign an identity number to every street tree in a municipality and then encourage people to ‘adopt’ a tree, find its biographical profile online and text its number to a database that will autonomously dispatch a service squad if the tree is ailing. We could envisage

²⁴Previdi and Polvani (2017).

²⁵Xia et al. (2007), Sokolow et al. (2016), Brooks (2017).

consumers taking advantage of smartness in the family home to remotely open blinds, turn down the heating, increase the ventilation or otherwise change their micro-environment in ways that both respond to a financial nudge and result in community benefit through lower demands on utilities.

Such innovations have attracted the attention of journalists, manufacturers, network operators, privacy advocates and environmentalists. For non-specialists they are less exciting than smartness that would provide for remote reading of your utility meter or allow your wireless refrigerator to seamlessly detect that its stock of beer and frozen pizza has been depleted, thence autonomously ordering fresh supplies from an online retailer for delivery by drone or conventional transport and paying for that transaction using a secure electronic wallet. We might however step beyond manufacturer headlines about internet toasters (protected through patent and trade mark law) and academic research on the development of standards for embedding sentience in devices or protocols for online pizza payments, instead thinking about other smart grids—those specifically concerned with the collection, interpretation and dissemination of environmental data.

Such networks raise questions about openness, include conundrums about authority and integrity in the creation and use of intellectual property. As foreshadowed above, they provide opportunities for citizen re-engagement with political processes and for the achievement of climate justice. They also raise questions about a misplaced emphasis on smart infrastructure in public/private ownership rather than an active, informed and thus capable smart citizenship exercising both rights and responsibilities in ways that address information determinism.²⁶

4 Environmental Smartness

Preceding paragraphs have suggested that a smart grid is a matter of distributed sentience, founded on devices of varying sophistication and robustness that in collecting data from their environment facilitate agency. That data might be *about* the environment, for example about air and water quality or about precipitation or wind speed or temperature or arboreal density, rather than about electricity pricing or whether a vehicle has come into proximity with a set of sensors. The connection might be ongoing or once-only or sporadic, through for example a wireless or wired connection or link to a function-specific reader or docking with a mobile phone or tablet for transfer to a remote repository. It might involve terrestrial wireless, wi-fi, mesh, cable, satellite or even laser technologies ... some of which, like pollution, will be invisible and thus under-recognised by non-specialists.

Data, like information, has a social life and a cultural context.²⁷ The collection of data about the environment has a long history, was a preoccupation of what we would

²⁶Srinivasan et al. (2017).

²⁷Brown and Duguid (2000).

now dub the amateur scientist (an anachronistic notion given that until recently state incapacity precluded a corps of professional scientists within public bureaucracies), involved manual—often weakly standardized—mechanisms for data generation and was rarely communicated on a large-scale instantaneous basis. Histories of science for example highlight heroic exploits of socially privileged people such as English clergy who altruistically recorded local observations of rainfall, snow, cloud cover, wind direction, wind speed and the seasonal presence of life-forms such as rabbits, frogs and vegetation. Bureaucratisation of that practice has resulted in information mechanisms such as the weather maps and temperature forecasts, available through devices such as smartphones that we take for granted and that are used by insurers in climate change risk allocation. The same histories highlight a trajectory of epidemiological studies from pioneers such as John Snow to contemporary systematised monitoring by specialist agencies (or their proxies) of contaminants and other environmental degradation such as the bleaching of the Great Barrier Reef or the loss of koala, ape and panda habitats through deforestation.

Environmental data collection by non-specialists has become less important as a basis for public governance and scientific advances over the past eighty years but is not new and is not inherently unusable as a basis for evidence-based public policy-making. One reason is the likely emergence of low-cost and robust devices for collecting environmental data and for its transmission over digital networks, discussed below. Those devices might be used directly by consumers and by people who conceptualise themselves as environmental activists or stewards. They might instead be used in small-scale laboratories, operated on a commercial basis by village entrepreneurs or by a local school, processing samples collected by children, parents and even minor officials. Environmental protection after Paris encompasses both ‘big science’ (including the integration of very large-scale data collections across jurisdictions) and a citizen science in which non-specialists are active, have ‘ownership’ and contribute data that is outside the capacity of thinly-resourced public agencies.²⁸

Handheld or other portable devices for assessing water and air quality for example are likely to reflect development in the health and law enforcement sectors of ultra-compact one-off ‘lab on a chip’ analysers for specific medical disorders and for the detection of illicit drugs, both cheaper and more sophisticated than contemporary ‘use once and throw away’ handheld breathalysers.²⁹ They are also likely to reflect market demand in response to consumer anxieties about food, water and other contamination in a world where the mass media has recurrently featured scares about food poisoning (attributed to poor hygiene or tampering), product adulteration (notably introduction of melamine into milk powder in the People’s Republic of China on several occasions or sale in Europe of horse meat labelled as

²⁸Dickinson and Bonney (2012), Cooper et al. (2012), Jordan et al. (2012), Cheshire and Uberti (2017).

²⁹Chin et al. (2007), Pol et al. (2017), Zhang et al. (2017).

beef), benzene or polychlorinated biphenyls in drinking water, and spiking of entertainment venue beverages by people intent on date rape or theft.

Mass production of standardised devices that are oriented to consumers and that do not require substantial calibration by users goes some way to address traditional problems with operator error in data collection. It is also likely to foster their deployment as sensors across informal smart grids. Those devices might be mobile, typically hand-held and activated at the command of the user or sensing continuously while borne as part of an individual's clothing or baggage.³⁰ They might use a free App, with data being transferred periodically (for example at the end of the day via a dock and internet-connected personal computer) or on an ongoing basis without any intervention by the user apart from renewing the device's power supply. They might instead be attached to a public or private vehicle. Google, for example, is reported to have trialled environmental data collection while gathering 'street view' data via its mapping vehicles.³¹ Given that some pollution is invisible, why not build robust particle monitoring devices into rail carriages and buses, building up dynamic maps that display data to passengers in the particular vehicle and that feed into a rich interrogable urban map of pollution hotspots?

They might be formally and systematically deployed at fixed points on a transport grid—public roads, ferry terminals, bike paths—or other locations, such as rivers. They might be found in homes or offices or retail malls or a university lecture theatre. They might be mobile: carried or flown on private drones or kites or fixed to a bicycle pannier or car bonnet, rather than locked into a specific location. They are as much about the smart washing machine or internet toaster as they are about the fire detection sensor. They might be the size of a car or not much bigger than a thumbnail, what some enthusiasts are referring to as smart dust.

The emergence of a global market for consumer-level environmental sensing technologies and more broadly for pervasive public/private environmental surveillance is not unthinkable. One model is uptake of mobile phones followed by smartphones (implicitly a networked personal computer in your pocket, one with a real-time geospatial capability). Another is the proliferation of personal entertainment devices such as tablet computers and handheld electronic game devices. A third is the adoption of self-surveillance through personal 'wellness' devices such as wristband step monitors and heart rate monitors.³²

As discussed below, those precedents also highlight potential constraints on the adoption and usefulness of consumer-level environmental surveillance technologies. A salient constraint is the proprietary nature of smartphones and other microcomputers immured in patent thickets evident in the multi-jurisdiction dispute between Apple and Samsung. A less recognised constraint is the 'walled garden' nature of wellness services that are product vendor-specific and do not allow

³⁰Miller (2017), Fujinami (2016).

³¹Peters (2017).

³²Lupton (2016).

individual consumers to pass data from one service to another or meaningfully interrogate data collected by the particular service from other consumers.

For climate justice after the Paris Agreement one requirement of environmental smart grids is that the data collected by participants is potentially disseminated to institutional, community and other databases for integration with data from other users and from official sources. That aggregation frees it for collective enhancement and to become accessible information, in contrast to data accumulated by isolated citizen scientists prior to the 1920s. Aggregation is a function of the digital nature of the data, more readily transmissible than handwritten (and thus sometimes marginally legible) records prior to Turing and Shannon.

From an environmental perspective what is also salient about likely adoption of such tools in coming decades is the meshing of pervasive data collection with communication and command to provide dynamic big pictures of local environments and foster what might be dubbed environmental sousveillance.

Put simply, in smart grids devices that have varying forms and capabilities can be readily networked to distribute environmental data on an ongoing automated basis or on demand. That communication might involve traditional wired infrastructure and sensors that are formally authorised by the operators of infrastructure networks, such as roads, canals, wastewater drainage systems, gas and electricity grids. It might instead involve informal networks that bring together civil society organisations, academic specialists or other professionals, and people who may not understand the technologies or their implications but see personal and civic value in collecting data that is fed to nodes where that data is manually or automatically integrated and enhanced for expression as statistical reports, geospatial mashups and other information products that are publicly accessible. Enhancement might involve integration with government or commercial data sources, such as street maps and official statistics, for display on a multi-purpose or function-specific online dashboard or a print/online report. The outcome of that data collection, integration and dissemination as information is a ‘bottom-up’ mechanism for climate justice, in particular provision of ordinary people with an awareness of their environment beyond anecdote and intuition.

5 Environmental Sousveillance for Open Justice

One resonant theme in literature about disquiet regarding distributed sensing technologies such as smart grids is that they are panoptical: aspiring to observe all, everywhere and all the time. Another is that they are ‘top down’. In other words, although data may be collected from everywhere on an ongoing or ‘as needed’ basis the information that results from that observation is available only to a privileged few, who choose policy and determine the scope for action.³³

³³Gandy (1993).

One example is the formal networks of closed circuit television cameras that are increasingly pervasive in public streets or squares, transport nodes such as rail and bus stations or airports, and in precincts around retail malls or ‘high-risk’ facilities such as legislatures and court houses. Those networks capture facial images for comparison with biometric registers that often have a mandatory basis, for example registration is a prerequisite for access to entitlements such as income support or a passport.³⁴ They may instead capture vehicle registration number data, using automated number plate recognition (ANPR) software and mandatory registration of vehicles—a registration that is typically associated with registration of individuals through driver licensing.³⁵ Integrating data from images captured across different locations and integration with other data sources allows the tracking of people and other entities in ways that are not readily subverted, that are outside the control of a surveilled individual and involving data to which that individual has no ready access. (Absent a court order the operator of such a network will typically not provide you with data that will allow you to readily map your own travel or the travel and identity of specific peers.)

Panopticism is not restricted to images; in principle it encompasses any interaction of an individual or cohort with digital networks. Controversy in Europe and Australia about mandatory telecommunications metadata retention by telecommunication service providers and government access on request to that data, which because of high teledensity in those jurisdictions covers most of the population, has accordingly featured substantive claims that officials will be able to identify both the movement of individuals and identify their contacts simply by discerning the locations—points on the mobile device network—at which calls were made/received and the entity on the other end of that voice or text communication.³⁶ Neither senders nor recipients of the communication will know when the metadata is being accessed by an official. Knowledge that surveillance is taking place and knowledge of how such data is being used, or misused, is one basis for holding public and private panoptacists to account through privacy or other law that is discussed below.

Theorisation about site/incident-specific and pervasive surveillance in networked and non-networked environments over the past two decades has fostered the notion of ‘sousveillance’. It is a notion that can be usefully adapted as a mechanism for contributing to climate justice through participatory environmental monitoring networks.

Sousveillance as articulated by enthusiasts such as Steve Mann is a social practice rather than a discrete technology. In essence it involves a bottom-up recording and potential dissemination of action by law enforcement officers and other agents of the state or actors such as private security personnel. Mann and associates thus referred to

³⁴Mann and Smith (2017), Lyon (2008).

³⁵Warren et al. (2013).

³⁶Fernandes and Sivaraman (2015).

using wearable computing devices to perform “sousveillance” (inverse surveillance) as a counter to organizational surveillance. A variety of wearable computing devices generated different kinds of responses, and allowed for the collection of data in different situations. Visible sousveillance often evoked counter-performances by front-line surveillance workers. The juxtaposition of sousveillance with surveillance generates new kinds of information in a social surveillance situation.³⁷

A simple example is public and private use of body-cams, digital cameras that are worn rather than carried and that capture video or still and audio images of what is seen by the wearer. That data might be recorded for archiving and subsequent retrieval or might instead be disseminated in real-time, on the model of the wireless/wired webcams used by academics, anxious parents (the ‘nannycam’) and others. A political demonstration might thus feature official capture of images of protestors confronting police and informal capture by cameras worn by the protestors, with the latter potentially having scope to substantiate claims about abuses in a way that has more impact than a traditional narrative, that may persuade people who were not in attendance and that offsets the withering of traditional media organisations.

Kranzberg referred to sousveillance as ‘little brother’, something likely to increasingly coexist with the state’s Big Brother and the private sector’s Big Sister given large-scale adoption of video-capable smartphones and complementary 4G and 5G telecommunication networks that enable low-cost speedy transmission of images.³⁸ The characterisation is apt, because surveillance by non-state actors is not necessarily benign. Can we have an environmental little brother or little sister, collecting environmental data through smart grids and fostering community understanding (alongside public/private accountability) through community publishing mechanisms?

A contention of this chapter has been that formal environmental smart grids are already here. They are likely to become more prevalent, broader (more comprehensive coverage through more widely and more closely distributed sensors) and deeper (capture of a range of environmental information alongside improvements in the integration of data and, most importantly, its display for specialists and non-specialists alike). That development is a function of advances in systems integration and reduction in the costs of sensors. It is also a function of emulation—organisations adopting models developed by peers—and responsiveness to consumer demands, sometimes on the basis that being seen to collect and disseminate data is a substitute for action that is outside the particular institution’s capacity.

There is no reason why environmental sensing, analysis and communication should be the exclusive preserve of the state or of proxies such as specialist contractors who undertake data collection and interpretation on behalf of governments. There is thus scope for an environmental sousveillance, a bottom-up cognisance, that has the following facets.

³⁷Mann et al. (2003).

³⁸Kranzberg (1985).

Firstly, it draws on data from private and public sector environmental sensing devices in informal and formal grids. Some of those grids might be stable and pervasive; others might be volatile and small-scale.

Secondly, it is founded on an ethic of environmental stewardship by people who have an awareness of environmental issues at the local and/or global level but are not empowered by the state to engage in data collection and rewarded by the state for the exposition of the information based on that data. It is a manifestation of citizen science, traceable back to the Enlightenment.

Thirdly, it relies on values of openness in terms of generating and disseminating environmental information, an openness that has implications for access to public/private sector data resources such as maps and more broadly for policy regarding intellectual property at the end of the Anthropocene.

Finally, and most saliently in regimes where environmental truths are inconvenient, it provides a mechanism for fostering the accountability of powerful actors such as government agencies, entrenched rural elites and resource-extractive multinational corporations. In looking up, rather than looking down, it inverts the conventional pyramid by seeing like a community rather than seeing like a state.

What might environmental sousveillance involve? This chapter referred to China, like India and Nigeria, as a jurisdiction where the rivers run black and the state on a top-down technocratic basis has perpetrated ecological disasters such as the Three Gorges Project. Recent years have seen recurrent discontent about the authenticity of environmental statistics in China. It is common for example to see expressions of bewilderment on the part of activists, tourists, ordinary citizens and others about official reports claiming that the water is pure and the sky is blue even though fish are a distant memory and smog chokes the skyline. Put simply, on occasion the official environmental statistics are false rather than merely inadequate.

One way of talking truth to power in such a regime is to build volatile low-cost, robust and user-friendly community smart grids that collect and share environmental data for processing on a distributed basis and publication by citizen journalists—domestic or safely offshore—in real time. In China we can expect such citizen science to attract a negative response from senior party officials. It is, however, something that might be explored by NGOs and foreign nationals living in China. Take a microsensor and an environmental app along with the selfie stick when you visit Urumchi and the Great Wall. Contribute to a panoptic environmental dashboard that is hosted in a jurisdiction that values openness.

What about cities? William Gibson famously quipped that ‘the future is already here, just unevenly distributed’.³⁹ The past of course is also here, also unevenly distributed and presumably going to remain so. Much of the literature on the smart city centres, often exclusively, on major metropolitan centres in the First World. They are locations where wireless networks are expected to link increasingly sentient devices in public grids that overlay and enhance existing infrastructure. In thinking about climate change it is important however to recognise that in the

³⁹Meyer (2000).

coming fifty years much urban growth will involve mega-cities in Indonesia, the Philippines, Nigeria, Brazil and other jurisdictions where public infrastructure is thin and where disadvantaged people are inordinately vulnerable to hazards such as flash flooding, the contamination of water through industrial activity and inadequate sanitation, air pollution attributable to absent restrictions on industrial emissions, exposure through dumped heavy metal and chemical carcinogens. The 2017 Lancet Commission on Pollution and Health highlighted concerns in commenting that toxic particles in New Delhi's air was 13 times the World Health Organisation's 'safe' level; nationally an estimated 2.5 million Indians died premature, pollution-related deaths in 2015.⁴⁰

It is beyond the capacity of activists within those disadvantaged populations or people from other jurisdictions to quickly implement the road, drainage and other infrastructure that people living in 'the future' (typically readers of this chapter) take as a given. Sousveillant data collection in, by and for the poorer inhabitants of emerging mega-cities may however both give those people a voice and underpin resource allocation by aid agencies. Gibson's quip is also reminder that if modernity is a matter of urbanisation, many people continue to live in rural areas—especially in emerging economies such as Bangladesh and Sudan—where state incapacity means that there is no systemic collection of environmental data. A bottom-up approach using mobile devices rather than a fixed network of official sensor might be of benefit. One reason is that data collection at the local level by local people rather than transient experts might provide those people with a sense that 'science' is not something that just happens to them, or a preserve of a Westernised metropolitan elite.

6 Whose Smart City?

This chapter has recurrently referred to panopticism: seeing from above and seeing pervasively. That panoptic view has often been jealously guarded. It might however be shared, with for example non-specialists outside government contributing to data collections in publicly-accessible online repositories maintained by public agencies and drawing on data from such repositories to present information that is perceived by the community as being pertinent and intelligible. That openness raises questions about democratic agency in the smart city.

One exemplar of openness is the Open Data Camden initiative in the United Kingdom.⁴¹ Its website states:

Welcome to Open Data Camden

Open Data Camden is the place for the public, researchers and developers to access, analyse and share information about the borough. All data may be viewed, re-used and downloaded

⁴⁰Landrigan et al (2017).

⁴¹Camden (2017).

under an OGL Licence; you can access the datasets through the main catalogue or by the categories below. Open Data Camden can be used to create and post your own visualisations and maps. All of the datasets are API enabled, allowing for the creation of apps that will help foster innovation and technological solutions.

The site brings together a suite of environmental indicators, in map and other formats, on air quality (nitrogen dioxide, nitrogen oxides, particulate matter, sulphur dioxide, ozone and carbon monoxide), demographic data, infrastructure such as parking and hygiene ratings for food retailers.

Local, state and national governments in other jurisdictions have similarly established dashboard sites that bring together a range of data (and often encourage contribution/reuse) or sites that are specific to a particular environmental concern such as air quality, water quality and the incidence/severity of contaminants in reclaimed industrial precincts.

Camden is an exemplar because it embodies an ‘open government’ philosophy, with an expectation that the information on the site will be accessed (and understood) by people across the community and that data will be readily licensed by the local government body in accord with national policy. Put simply, the data will not be a resource that is hoarded by officials or that is sold to the highest bidder. That philosophy fosters the accountability of government (both legislators and administrators). It is potentially at odds with the way that environmental data has traditionally been situated within the law, in particular the commodification of data as intellectual property. It is predicated on ongoing access by citizens to environmental data, access that is potentially challenged by law and administrative practice.

One example is the suppression of information within the United States federal government under the auspices of President Trump.⁴² It is clear that government agencies have been seeking to delegitimise public discourse regarding climate change and more broadly reduce institutional accountability to removing both reports and un-abstracted environmental data from institutional websites.⁴³ That suppression is reinforced by claims that archiving and/or reuse of the data by private sector actors such as academic institutions and civil society advocates is contrary to intellectual property law, claims that may not be successful if contested in a higher court but likely to chill public discourse. Another example is the practice in autocratic states of not publishing detailed statistics on a timely basis and not encouraging access to archived public data, with the hoarding of data by officials reinforced by the absence of freedom of information statutes that empower citizens.

⁴²Cross (2017), Fenster (2017).

⁴³Hyland (2017), Ellperin (2017), Manoff (2017).

7 Smart Grids as Machines for Seeing

Any smart grid is a machine for seeing. It is typically construed as a machine that enables a privileged few to see like a state, in ways that are unresponsive to the dignity of those people who are treated as data subjects—manifestation of attributes—rather than individuals.⁴⁴ It might however be used to look at the environment, including how the state and dominant actors within society are shaping the environment. In the context of citizen science that seeing like an environmental steward might be emancipatory.

In thinking about grids and sciences from a legal perspective we can discern three classes of issues: data collection, data dissemination and data use. Those issues are broader than concerns regarding network in/security that have preoccupied many civil society analysts.⁴⁵

It is axiomatic that smart grids, along with the internet and traditional telecommunication networks, can be used to profile individuals in relation to the consumption, movement and personal relationships of each person who uses a mobile phone, drives a registered vehicle, conducts an internet search, moves through a public transport portal or relies on networked devices such as an internet refrigerator. A pragmatic response to those affordances is to bound misuse by private and public actors through both a coherent principles-based legal framework, an effective set of watchdogs, recognised causes of action (notably the tort for serious invasion of privacy) and meaningful standards that are backed by insurers as tacit regulators of private practice. That bounding potentially encompasses negligence on the part of consumers, network operators, manufacturers and vendors. It also encompasses illegal data capture, data matching or other enhancement, and data sharing by officials, corporations and private individuals. It should be construed through a lens of human rights and information law, rather than something specific to formal smart grids.

In considering the emergence of smart grids we do not need to succumb to the alarmism evident in popular ‘cybergeddon’ literature about terrorists using infrastructure grids to hack into nuclear power plants or agents of hostile states remotely contaminating water supplies by gaining command of the valves at a wastewater facility or petrochemical plant.⁴⁶ We will encounter characterisations of grids as so fundamental as to necessitate extraordinary protection. Grids as critical information infrastructure do not however require novel and draconian anti-terrorism legislation. Australian law currently provides a reasonable conceptualisation of many computer offences, although penalties may be inadequate. The increasingly threadbare privacy regime however remains strongly biased towards bureaucratic convenience rather than law that is proportionate and respects our dignity. Some anxieties about thieves identifying soft targets by wirelessly snooping on the smart family home or

⁴⁴Gandy (1993), Goold (2008), John Gilliom and Monahan (2006).

⁴⁵Clarke and Wigan (2011), Zedner (2008).

⁴⁶Sullivan and Kamensky (2017).

hacking the nannycam are overstated.⁴⁷ The criminal who wants to steal the flat screen television can, for example, rely on indicators such as whether a resident responds to a knock on the front door or whether the residence's lights are on.

What about environmental sousveillance as a matter of principle and practice? Unauthorised deployment by citizen scientists of sensing technologies potentially brings into being questions about trespass and privacy, given that placement of a device in a private precinct (or a public precinct where such placement is prohibited) is contrary to the exclusive rights of property owners. It also raises questions about theft and about liability for injury, if for example an air quality monitor falls out of a tree and harms an unwary passer-by or a drone crashes onto a highway. Such challenges are surmountable. We might, for example, see civil society organisations encouraging the use of truly mobile devices that preclude the need to trespass on private/state property or emphasising transient sampling (collect sufficient water or soil for later remote analysis and then depart without fuss). Environment smart grids might be volatile and ad hoc rather than formal, fixed and readily discernable.

What about data enhancement and dissemination, through for example mashups? One implication of the Paris Agreement is the importance of thinking about how closed data can be opened for public access and thence action. Preceding paragraphs have noted environmental data collection by corporations such as Google alongside the traditional collection by environmental protection, meteorological and other government agencies. Much of that data is not readily accessible outside those institutional silos in either machine-readable or person-readable formats. When it is potentially available it may be tightly bound through copyright law and, perhaps as importantly, through restrictions under contract law. International law regarding copyright has belatedly heeded advocates for people with disabilities and encouraged states to reshape national copyright law to better meet the needs of those people. It has not recognised environmental information as having a special status under copyright law. International agreements have not engaged with freedom of information (about the environment or about other aspects of public governance) as a justiciable right requiring support by government, as distinct from journalists and self-funded environmental stewards or environmental advocacy organisations. Such an engagement appears unlikely in the coming decade. That should be of concern, given the ambivalence about 'open government' in nations such as Australia, the erasure of access under Trump noted above and an official ethos in much of the world that construes FOI as bureaucratic freedom from interference.⁴⁸

Operation of a formal grid, particularly an infrastructure grid, is a matter of power, the power to exclude and shape expectations. It is useful to recognise that corporate infrastructure operators own the data collected through their grids and have discretion about which entities, other than for example an energy regulator, gets to sight and analyse the operator's data holdings. A fortunate and particularly

⁴⁷Katz (2008).

⁴⁸Banisar (2010).

tenacious citizen scientist might be able to use freedom of information or even planning law to access public sector information about particular grids, for example the incidence and location of accidents on a road network or the number of vehicles (and thus inferred pollution) traversing an urban neighborhood and threatened pocket of wilderness. That is not necessarily the case where infrastructure has been developed by or transferred to a private sector owner.

An under-recognised issue with access is that as smart infrastructure grids proliferate consumers are likely to only exceptionally sight raw data—and the real-time civic dashboards—rather than abstracted information. They are unlikely to access the proprietary algorithms used by the grid operator to make sense of that data, in some instances because the operator regards the data as confidential and relies on a third party's software licence.⁴⁹ Put simply, do not expect to see the dashboards or get inside every black box. Users might want to get inside the box to ascertain the effectiveness of the algorithms (in the same way that people have sought to evaluate the proprietary algorithms used in consumer credit decision-making). They might want to gain raw data for use in environmental mashups, dynamic or static reports by nongovernment actors.

Although the Camden example noted above highlights the potential for integrating public and private data to create truly rich and persuasive environmental information resources for both public and private use, it is not inevitable that data can only (or primarily) come from institutional sources if it is to be trusted and useful. We might think about whether there is a role for citizen scientists in data collection, integration and exposition. Underpinning that activity there is a need to reconceptualise some practice, for example thinking about an environmental information commons, and consequently consider mechanisms such as Creative Commons licensing and open source software that enables the portability of data across different online repositories.⁵⁰ The development of environmental metadata sets is one opportunity for collaboration that brings together open source theorists, environmental stewards, taxonomists and other people with different skill sets but a common purpose in ameliorating climate change. Some of those skill sets will also be useful in the development of new low-cost devices that are intended for data collection and analysis by enthusiasts or by, for example, anyone who buys a tablet computer, mobile phone or personal wellness wristband.

Many of the devices in a smart grid are or will be wrapped in patent and trademark law, sometimes embodying greenwashing. Some will be covered by designs law. Some of the communication protocols are open source; others are proprietary. The sentence in individual devices, the algorithms used to analyse data and power those dashboards (potentially addressed as business methods patents) and the software for

⁴⁹Daly (2017), Pasquale (2015).

⁵⁰Hess and Ostrom (2006).

commanding action on the grid will be patent and copyright protected. It would be unfortunate if institutional and consumer adoption of environmental smartness was inhibited by patent thickets and corporate disagreements about interoperability.

8 Conclusion: Power and an Ethic of Responsibility

Climate change necessitates an ethic of civil responsibility. In Australia and elsewhere it is time for people to build a capacity to see like a state and take responsibility for seeing, rather than leaving the seeing to the state.

That capacity is a matter of attitude and expectation.⁵¹ It is potentially also a matter of building ‘citizen smart grids’ and interfaces for informed policy-making that powers environmental protection and fosters social flourishing.

The notion of environmental data as a basis for citizen science after the Paris Agreement requires thought about the power of information. That power is shaped through copyright, confidentiality, privacy, tort, national security and other law. It is also shaped through a sense of possibility and dignity. In contrast to Michel Foucault’s nihilistic view of knowledge as necessarily repressive, this chapter embodies a belief that environmental information can emancipate. Processes for collecting and sharing the data on which that information is founded can also foster agency and thereby reinforce dignity.

As scholars and citizens readers of this book are accordingly encouraged to ask whose smart grid/s. We should aspire to grid management and development that fosters individual and social flourishing, a flourishing underpinned by engagement with science rather than the climate change denialism evident in populist politics and by an openness to the sharing of information.

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⁵¹Schrock and Shaffer (2017).

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Chapter 15

Protecting and Promoting Clean Energy Innovation Through the Trade Secrets Regime: Issues and Implications



Darshana Sumanadasa

Abstract This chapter explores the role that the trade secrets regime plays in protecting information relating to clean energy technologies and implications of such protection. It observes the increasingly important role played by trade secrets in protecting and promoting clean energy technologies from the embryonic phase to commercialisation phase. It is evident that secretly held valuable information, including renewable energy know-how, is subject to an ‘IP stealing arms race’, especially in relation to the global trade and cybersecurity arsenal. Therefore, it can be suggested to introduce more harmonised and stringent laws including the criminal sanctions for trade secrets misappropriations. However, this chapter argues that the policy makers should be more cautious over possible repercussions relating to over-protection and over-reliance on the trade secrets regime. These repercussions may include its impact on follow-on innovation, knowledge diffusion and technology transfer which are essential aspects in battling climate change. This chapter argues that trade secrets law should provide a balance in its effect which equally addresses the important protective aspects of clean energy technologies but also the protection of the need for knowledge diffusion and technology transfer.

Keywords Trade secrets • Clean energy innovation • Knowledge diffusion
Technology transfer • Developing countries • Confidential information

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1 Introduction

Promoting and fostering clean energy innovation began to take root over the last decade and accelerated with the adoption of the Paris Agreement 2015.¹ As of November 2017 there were 197 parties to and 170 ratifications of the Paris Agreement which requires member-states to lower greenhouse gas emissions, decarbonise their economies, and combat the threat of climate change.² The overall intention of the agreement is to set a path by which temperature rise can be kept below two degrees of centigrade.³ With this global push, clean energy technologies have been increasingly adopted with the aim of replacing fossil fuels almost entirely. These technologies include energy storage innovation such as fuel cells and advanced batteries; transportation fuel efficiency technologies such as hybrid and electric vehicles; energy infrastructure technologies such as smart grids and energy efficient power and lighting systems such as compact fluorescent lamps (CFLs) and light emitting diodes (LEDs). Collectively, such technologies have become a key element in the global agenda of fighting climate change. For instance, in 2017, global renewable energy investment totalled \$241.6 billion—roughly double that invested in fossil fuel generation.⁴

Key questions that arise in this context are: (1) what is the role of intellectual property (IP) protection, and more specifically trade secrets, in promoting the uptake of renewable energy?; and (2) how can IP policies and trade secrets be integrated with the aims of global environmental governance? This chapter deals with an important aspect of this issue: what are the issues and implications of protecting clean energy technologies through the trade secrets regime? As such, Part 2 analyses the increasing significance of trade secrets, with particular attention paid to clean energy innovation. Highlighting the vulnerability of trade secrets, Part 3 of this chapter explores some legal battles over clean energy related trade secrets what is described as a ‘stealing arms race’. Part 4 describes the present international legal regime and the global trends in trade secrets law. Part 5 evaluates the extent to which protection of clean technologies can be effected through the trade secrets law, with particular references to knowledge diffusion, follow-on innovation and technology transfer. It is argued that protecting clean energy technologies through trade secrets may create an anomaly due to its global legal fragmentation and its doubtful

¹United Nations Framework Convention on Climate Change (UNFCCC) (2015) Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations. 12 Dec 2015 FCCC/CP/2015/L.9/Rev.1 http://unfccc.int/paris_agreement/items/9485.php. Accessed 28 Nov 2017. Hereinafter referred to as Paris Agreement.

²See Preamble, Article 4 and Article 5 of the UNFCCC.

³Article 2 of the UNFCCC.

⁴Frankfurt School—UNEP Collaborating Centre for Climate and Sustainable Energy Finance (2017).

contribution towards the public interest and technology transfer. Therefore, this chapter highlights the need of having robust laws which provides for a better protection of trade secrets while ensuring public interest.

2 Clean Energy Innovation and Trade Secrets

In recent years, global attention has been focused on clean energy sources and technologies. This follows almost 150 years of modest investment in these technologies, including photovoltaics, hydroelectricity and wind turbines. Today global research and discussion on these technologies has grown exponentially based on government support of renewable technology development, together with a growth of market forces attracting commercial research and investment. Owing to these global developments, energy companies and inventors are becoming increasingly attracted to investment in and carrying out research on clean energy technologies. For example, energy giant BP expects that clean energies will account for half of the growth in energy supplies over the next 20 years.⁵ Intellectual property law can play a crucial role in raising the confidence of investors to invest in the renewable energy industry by ensuring adequate protection for the fruits of their innovative efforts. For instance, there has been significant growth in green patent filing under the Patent Cooperation Treaty (PCT)⁶ in the last decade reaching to 207,147 in 2014.⁷ However, little is known about the role played by trade secrets in facilitating the growth of the clean energy industry. There is little empirical evidence on the use of trade secrets in the clean energy industry on account of the nature of trade secrets which promotes secrecy rather than public exposure.

The trade secrets regime is sufficiently broad to encapsulate a large array of valuable technical and commercial information which is not generally known or readily ascertainable.⁸ Its reach now spreads to sectors such as food and beverages,⁹ sports,¹⁰ mass media,¹¹ pharmaceuticals,¹² chemicals,¹³ information technology and social media.¹⁴ It can be argued that trade secrets amount to capital in this

⁵BP (2017).

⁶Patent Cooperation Treaty, TIAS 8733; 28 UST 7645; 9 I.L.M. 978 (1970).

⁷OECD (2014).

⁸See Article 39.2 of the TRIPS Agreement 1994.

⁹For example, the formula of Coca-Cola, ingredients of the original recipe of Kentucky Fried Chicken and the recipe of Nutella.

¹⁰For example, Lena Blackburn's baseball rubbing mud.

¹¹For example, the New York Times's best seller list.

¹²For example, Premarin: The manufacturer keeps some information relating to the ingredients (using of horse pee and the process of extracting the equine estrogens) of the drug.

¹³For example, WD-40.

¹⁴For example, Google search algorithm, content moderation of social media such as Tweeter and Facebook.

information age since they are eclipsing other material sources of competitive advantage. With regard to the clean energy technologies, trade secrets may protect information relating to energy generation, energy storage, energy infrastructure, energy efficiency and commercialisation.

Energy companies may be interested in trade secrets protection for several reasons. For instance, obtaining trade secrets protection is arguably easier than other forms of IP protection. In particular, unlike patent protection, novelty and non-obviousness¹⁵ are not regarded as prerequisites for trade secret protection. Any information can be qualified as a trade secret if it has commercial value and therefore can be subject to reasonable measures to maintain its secrecy.¹⁶ In practice, these requirements are flexibly applied. Thus, potential commercial value in addition to actual commercial value and relative secrecy in addition to absolute secrecy qualify for trade secrets protection. For this reason, the trade secrets regime can cover a wide array of technical as well as commercial information related to clean energy inventions which do not meet the patent qualification threshold. Under trade secrets this may include a diverse range of technologies such as hardware, software and even related tacit know-how relating to the expected use of such technologies.

Moreover, in addition to the cost involved, considerable delays and encumbrances are associated with obtaining or registering a patent. Thus, fast-moving industries inevitably rely on the trade secrets protection at least as a provisional measure of protection for an invention which is subject to a pending patent grant. As Bently remarks, 'important inventive breakthroughs are preceded by very considerable levels of research and development [R&D], typically conducted in confidential environments.'¹⁷ Bently continues that 'most patentees will inevitably rely on secrecy some of the time.'¹⁸ As a result, arguably, and no less so in the protection of renewables, the two systems are not mutually exclusive, but are in fact complementary.¹⁹ Therefore, these two systems are able to co-exist reasonably well.

Since trade secrets law often promotes non-disclosure, some inventors may choose trade secrets protection as against patents since they do not want to transmit valuable private information to their rivals.²⁰ It is possible that they believe that a patent application itself may result in revealing some valuable information—irrespective of the fact of whether patent was granted or not.²¹ Moreover, as Erkvall remarks: '...winners of early R&D races may be reluctant to patent in order to get a

¹⁵See Article 27.1 of the TRIPS Agreement 1994.

¹⁶See Article 39.2 of TRIPS Agreement 1994.

¹⁷Bently (2012, p. 74).

¹⁸Ibid.

¹⁹Jorda (2007, p. 1051).

²⁰Horstmann et al. (1985, p. 838).

²¹Scotchmer and Green (1990, p. 132).

head start in the subsequent races.’²² This is a particular feature of incremental or cumulative (new developments that build on existing technology) innovation. In other words, inventors or firms may prefer to keep some of their intellectual works secret to have a competitive advantage over competitors. This is particularly true in the renewable energy sector where cumulative developments of technologies are common.

Also, there is a particular need to protect research, development and demonstration activities in the clean energy sector since it typically requires large and often risky investment. Energy installations such as wind turbines and tidal lagoons are examples of this. Clean technologies may have dissimilar origins: for instance, the accidental development of solar cell technologies stemming from R&D in satellite and semiconductor industries.²³ Thus, if there was no protection for R&D, inventors and investors would not be able to secure returns from their innovative efforts and to amortise them. Thus, keeping technologies as secrets and especially protecting R&D may bring greater competitive advantage than from revealing it with a patent application.

To be more explicit, the trade secrets regime plays a pivotal role in protecting knowledge and technologies from the inception of an idea to the production of a new technology which cannot be protected under other intellectual property regimes. Specifically, in the embryonic stage, there is no intellectual property yet created in a form which can be protected. Thus, knowledge relating to this stage is highly vulnerable and susceptible to theft.²⁴ If inventors and investors are unable to guard these embryonic technologies, their already heavy investment may easily come to nothing.²⁵ If they are stolen by a competitor, this presents an opportunity for competitors to offer competing technologies or products at cheaper prices and which would result in erosion of the true inventors’ incentive to continue their research and even eventually to their losing the opportunity to recover the cost of R&D and possible future profits.²⁶ Arguably, even ‘negative know-how’—that is erroneous research approaches or results of failed experiments—can have considerable hidden values that can be used for future R&D. This may be a particularly important issue for the renewable energy sector which is currently in its development stages and in which countries are currently increasing their expenditure.²⁷

²²Erkal (2004, p. 430).

²³Lewis (2014, p. 547).

²⁴Keller and Reece (2013, p. 6).

²⁵Ibid.

²⁶Ibid.

²⁷See for example, Chile-\$3.4 billion; Mexico-\$ billion; South Africa-\$4.5 billion; Brazil-\$7.1 billion; Germany-\$8.5 billion; India-\$10.2 billion; United Kingdom-\$ 22.2 billion; Japan-\$36.2 billion; United States-\$44.1 billion and China-\$ 102.9 billion: Harrington (2016).

Moreover, due to some particular provisions in the patent regime, obtaining patents can pose a threat to inventors who dedicated their time, money and intellectual labour on an invention. In particular, broad exceptions such as compulsory licensing,²⁸ parallel imports²⁹ and the bolar exemption³⁰ may weaken the patent protection. This may be especially the case when there is a national emergency or other circumstances of extreme urgency and where there is a need to enforce an exception in the context of public non-commercial use.³¹ Arguably, the impacts of climate change and the consequent need for using clean energies in combatting climate change can be regarded as a national emergency. For example, if an island nation is sinking due to global warming induced rising sea levels, such a national emergency may dictate the use of renewable energies to reduce or mitigate global warming and thereby assist these nations to avoid such a catastrophe.

When the trade secrets regime is examined, it is clear it is an issue that is under-explored and under-discussed in terms of the application of its exceptions to the renewable energy sector. While independent development and reverse engineering are considered as exceptions, if a particular invention is difficult to copy or imitate, in that case, trade secrets may be a better option to protect an invention. Unlike patent law, there is no government involved mechanism which requires compulsory licences in trade secrets law. In fact, a government neither can force a company or an inventor to disclose trade secrets nor issue a compulsory licence, since the particular know-how will not have been revealed to any government authorities in obtaining protection. Hence, by contrast, trade secrets protection may be a worthy option for the renewable energy sector to protect their valuable information relating to their inventions and related information.

Notwithstanding their growing importance, trade secrets are highly vulnerable in this information age and subject to an arms race in theft between multinational technological companies and even among countries. The risk of trade secrets theft is doubly so today due to ‘the globalisation of supply chains; rapid advances in ICT; the growing use of external data storage and processing facilities; the increasing importance of innovation and know-how as sources of competitive advantage; and greater job mobility.’³² As discussed below, this is all the more true for clean energy inventions and related information which are protected as trade secrets.

²⁸A government may allow someone else other than the patentee to produce the patented product without the consent of the patentee in national emergencies: See Article 31 of the TRIPS Agreement 1994.

²⁹Importing of a patented original product purchased at a lower price in another country: See for example, Section 107A(b) of the Patent Act 1970 (India) (as amended).

³⁰Research or safe harbour exception: See *Roche Products, Inc. v. Bolar Pharmaceutical Col., Inc* 733 F.2d 858 (Fed. Cir. 1984).

³¹See Article 31 of the TRIPS Agreement 1994.

³²Brant and Lohse (2014 p. 14).

3 The ‘Stealing Arms Race’

In this century, intellectual property including trade secrets is regarded as a kind of ‘invisible gold’ given its critical importance in the knowledge-based economy. Also, there is an exceptionally large increase in the fostering of intellectual products relating to clean energy in most of countries irrespective of whether they are already developed or are in the development stage. This global trend is leading to a cold-war between technologically stimulated and empowered companies and countries over clean energy inventions. Moreover, given the strategic importance of natural resources, and in particular fossil fuels, there has evolved in the 21st century something akin to an energy war. As a number of writers point out, energy has been a primary reason for the conflicts that have occurred in the Middle East (e.g. Iraq and Syria); Russia, Ukraine and Crimea; Nigeria and South Sudan and in the South China Sea.³³

Indeed, the not always friendly rivalry between the United States (US) and China has been the basis for a modern cold-war in acquisition of intellectual property and in energy security. It is no coincidence that these two countries are, globally, some of the largest energy consumers and greenhouse gas emitters. At the outset, in 2009, both countries established a common agenda to enhance cooperation on climate change, energy and the environment.³⁴ This was on the basis that co-operation between them was critical to enhancing energy security, combating climate change and protecting the environment and conserving natural resources.³⁵ These common goals were supposedly tightened by the Paris Agreement. Nonetheless, as with a fire under ashes, due to the competition for geo-political leadership, a trade war between the United States and China has erupted. For its part, the United States alleges that China is systematically stealing its valuable proprietary know-how.³⁶ Its concern is based on the fact that it relies heavily on gaining and sustaining competitive advantages through patented inventions and research and developments. China on the other hand seeks to gain market advantage by mass production. For example, four of the world’s top five solar panel manufactures are Chinese companies.³⁷

This competitive adversarial relationship has intensified given, in this modern information age, IP related information including trade secrets is mostly digitalised. In other words, developments of information technologies poses a practical threat to the protection of trade secrets given the often relative ease with which hackers or

³³See for example, Humphreys (2005).

³⁴Memorandum of Understanding on Enhancing Cooperation on Climate Change, Energy and the Environment at the U.S.—China Strategic and Economic Dialogue Bureau of Public Affairs (2009) Office of the Spokesman. Washington <https://2009-2017.state.gov/r/pa/prs/ps/2009/july/126597.htm>. Accessed 29 Nov 2017.

³⁵See also US-China Clean Energy Research Centre (CERC) <http://www.us-china-cerc.org/>.

³⁶See Halbert (2016, p. 258).

³⁷Rimmer (2012).

infiltrators are able to steal valuable undisclosed information. In the world of cyber espionage, such tactics include phishing, hacking and cracking. For example, phishing is a process by which commercial spies send an email or online message, leaving the recipient unaware that the message is a hoax. Once the embedded link is opened, a malware starts to invade the recipient's computer and then the whole network of a company. Hence, commercial spies are enabled to steal valuable secrets virtually exceeding the geographical boundaries through the internet. This issue greatly complicates the current intellectual property system which is largely confined to the domestic application of law.

As observed by Rowe and Mahfood, the 'IP stealing arms race' is a large and growing problem that both governments and private businesses have long struggled to confront effectively.³⁸ For example, mass media revealed the existence of a hacker unit maintained by the Chinese People's Liberation Army targeting US government data and corporate trade secrets.³⁹ Similarly, a whistleblower, Edward Snowden revealed that the US National Security Agency engaged in economic espionage planting software in almost 100,000 computers around the world.⁴⁰ Unfortunately however, it is hard if not impossible to address such a phenomenon which involves the geopolitical cold war among great powers. From a legal perspective, the principle of territoriality provides that a state has jurisdiction only over the acts that have taken place within its territory.⁴¹ Therefore, in general, a country has no jurisdiction over extraterritorial acts although this is subject to limited exceptions. This extraterritoriality problem applies to all IP regimes and is not necessarily limited to the trade secrets regime.⁴² However, it is a particularly large problem when trade secrets law becomes highly fragmented globally in contrast to other types of laws applying to IP regimes.

These issues remain where there is misappropriation of renewable energy technology. Recent high-profile cases highlight the increased utilisation of trade secrets in protecting and promoting renewables on the one hand and their vulnerability on the other. In *United States v Sinovel Wind Group Co., Ltd.*,⁴³ a Chinese wind turbine manufacturer, Sinovel, was alleged to have stolen American Superconductor Corporation's (AMSC) trade secrets relating to codes and design of software for controlling the flow of electricity in wind turbines. In this case Sinovel, which was initially a customer of AMSC, bought software and equipment from AMSC until March 2011, contributing to more than seventy per cent of AMSC's revenue.⁴⁴ However, suddenly, Sinovel refused to continue with the purchases and

³⁸Rowe and Mahfood (2014).

³⁹Li (2014).

⁴⁰Kirschbaum (2014).

⁴¹Dinwoodie (2009).

⁴²Rowe and Mahfood (2014, p. 65).

⁴³*United States v Sinovel Wind Group Co., Ltd* 794 F.3d 787 (7th Cir. 2015), Rehearing En Banc Denied Sept. 17, 2015.

⁴⁴*United States v. Sinovel Wind Grp. Co.*, 794 F.3d 787 (7th Cir. 2015) (No. 13-CR-84-BBC).

it was later revealed that Sinovel had stolen AMSC's key software through a Serbian employee of AMSC's subsidiary in Austria.⁴⁵ As a result, Sinovel was able to produce wind turbines without paying for AMSC's source code and design of software. This trade secrets theft led AMSC's stock prices to fall by more than 85%.⁴⁶

The main legal issue to arise was whether the US courts had criminal jurisdiction over the defendants who were neither US citizens nor working in the US. In this case, a Serbian who worked at AMSC's subsidiary in Austria was recruited on a sham employment contract by Sinovel in order to obtain AMSC's proprietary information. He downloaded trade secrets of AMSC to a laptop provided by Sinovel and subsequently transmitted it to Sinovel. He then travelled to China and adapted the AMSC software to Sinovel's turbines. Having analysed the issue in greater detail, the US Court of Appeal, Seventh Circuit held that the United States had the jurisdiction over Sinovel since it had a subsidiary in the USA which could be regarded as the 'alter ego' of Sinovel.⁴⁷ However, had there been no subsidiary, the court would have not been able to invoke jurisdiction over Sinovel. It should also be noted that there is no legal provision in the US law to bring a civil action against a foreign company in the case of a trade secrets misappropriation.

In January 2018, Sinovel Wind Co. was found guilty of orchestrating the theft of software code in a criminal trial.⁴⁸ A Silicon Valley attorney, David Bohrer, said that the case was 'an example of the tremendous harm that can be done to a U.S. company by virtue of the theft of its trade secrets overseas.'⁴⁹ He maintained: 'It's a big deal for the U.S. Justice Department to make the decision to bring criminal prosecution against a Chinese company, given all the politics.'⁵⁰ Assistant U.S. Attorney Timothy O'Shea said: 'The free lunch on American intellectual property is over'.⁵¹ He maintained: 'The U.S. Department of Justice and the FBI are going to stand behind American innovators and American workers whose ideas are stolen.'⁵²

Similarly, it has been alleged that China started a Wave Power Project by using the confidential information which was contained in the stolen laptops from Pelamis

⁴⁵Ibid.

⁴⁶Weisman (2012).

⁴⁷*United States v. Sinovel Wind Group Co.*, 794 F.3d 787 (7th Cir. 2015) (No. 13-CR-84-BBC). The court said that 'Sinovel USA's sole function was and is to do the acts and bidding of Sinovel China, while giving Sinovel China a jurisdictional firewall against liability and culpability. Sinovel USA was Sinovel China's puppet, so that its presence and acts in the U.S. can be imputed to Sinovel China.'

⁴⁸*United States v. Sinovel Wind Group Co. Ltd.*, 13-cr-00084, U.S. District Court, Western District of Wisconsin (Madison).

⁴⁹Hanna et al. (2018).

⁵⁰Ibid.

⁵¹Ibid.

⁵²Ibid.

Wave Power Ltd., a cutting-edge Scottish company.⁵³ However, no case has been proceeded with due to the lack of evidence.

Moreover, a battle of wits between motor car manufacturing companies over electric and hybrid car technologies reflects the use and vulnerability of trade secrets in the motor vehicle industry. For example, Tesla Motors, Inc (Tesla) uses trade secrets together with patents to protect some of their industry-altering technologies, including their battery pack, the car's layout and mechanics. In 2008, Tesla sued Fisker Coachbuild for misappropriation of its trade secrets. In this case, Tesla contended that Fisker stole its confidential design information and trade secrets while Fisker was assigned to design the 'white Star' sedan car after which he used this secrets information for his own car the 'Karma'.⁵⁴ However, the case was referred to an arbitrator as there was an arbitration clause in the contract between Tesla and Fisker.⁵⁵

In *United States of America v Yu Qin and Shanshan Du*, defendants were charged with stealing General Motors's trade secrets relating to hybrid vehicles.⁵⁶ In this case, a former employee of General Motors, Du, was alleged to be downloading and keeping a large number of her erstwhile employer's documents containing trade secrets which she was planning to send to a Chinese manufacturer. In 2010, a grand jury indicted the defendants for, *inter alia*, conspiring to possess trade secrets without authorisation and unauthorised possession of trade secrets in violation of § 1832 of Economic Espionage Act.⁵⁷ This decision was affirmed by the Court of Appeal.

These intelligence arms races are not only limited to the US, but also extend to territories in other parts of the world. For instance, in *Nippon Steel & Sumito Metal Corporation v Posco and Posco America Corporation*,⁵⁸ a Japanese steel company, sued South Korean Posco alleging it had engaged in a multiyear programme of corporate espionage, including theft of electric steel sheet technology used in hybrid cars and electric generators of power plants. This case was settled after Posco paid 30 billion yen to the plaintiff.⁵⁹

Highlighting the intensity of these issue, in 2014 for the first time in the US history, the US government filed criminal charges against a known state actor for

⁵³MacAskill (2016).

⁵⁴*Tesla Motors v. Fisker Coachbuild* CIV 472032 4/14/2008 Cal.Super; See also *Fisker Coachbuild Llc v. Tesla Motors Inc* 30-2008-00115679-CU-PT-CJC, 12/4/2008, Cal. Super.

⁵⁵Lamonica (2008).

⁵⁶*United States of America v. Yu Qin and Shanshan Du* 688 F.3d 257 (6th Cir. 2012) United States Court of Appeals, Sixth Circuit; See also *United States of America v. Shanshan Du and Yu Qin*, 570 F. App'x 490 (6th Cir. 2014) June 26, 2014, United States Court of Appeals, Sixth Circuit.

⁵⁷*Economic Espionage Act* 1996, 18 U.S.C. § 1832(a)(5) and 18 U.S.C. § 1832(a)(3).

⁵⁸*Nippon Steel and Sumito Metal Corporation v Posco and Posco America Corporation* No. CIV. A. 12-2429 DMC, 2013 WL 1867042 (D.N.J. May 2, 2013).

⁵⁹Bultman (2015).

hacking.⁶⁰ In this case, a grand jury in the Western District of Pennsylvania indicted five Chinese military officials for stealing trade secrets of six US companies including pipe technical and design specifications, pipe supports and pipe routing designed by Westinghouse for its AP1000 power plant, as well as proprietary information relating to cash flow, manufacturing metrics and production line information of SolarWorld.⁶¹

As such, it is evident that secretly held valuable information, including renewable energy know-how, is subject to a stealing arms race, especially in relation to the global trade and cybersecurity arsenal. Rivalry between companies and even countries is seen as being responsible for creating this battlefield in which the spoils are the acquisition of valuable information relating to intellectual creations. In fact, this has become a geopolitical issue in which technological developments and intellectual property have become crucial factors in helping to determine a country's competitive advantage. However, it is ambiguous whether and to what extent current international law effectively addresses these emerging issues.

4 International Legal Framework⁶²

The World Trade Organization's TRIPS Agreement represents the current level of protection of trade secrets at the international level. Article 39 of the TRIPS Agreement in the cross-referencing of Article 10 *bis* of the Paris Convention, suggests that protecting trade secrets should be by way of specifying it as undisclosed information⁶³ under the unfair competition regime.⁶⁴

According to Article 39.2 of the TRIPS Agreement, protection must apply to information that is secret, which has commercial value because it is secret and has

⁶⁰*United States of America v Wang Dong, Sun Kailiang, Wen Xinyu, Huang Zhenyu, Gu Chunhui* 1 May 2014, Criminal No. 14-118 United States District Court for the Western District of Pennsylvania (Pittsburgh).

⁶¹*Ibid.*

⁶²Sumanadasa (2017).

⁶³Article 39 provides for the protection of undisclosed information and test data. 'Trade secrets' and 'undisclosed information' are interchangeably used to denominate the same.

⁶⁴Article 10 *bis* of the Paris Convention for the Protection of Industrial Property 1883 provides that "any act of competition contrary to honest practices in industrial or commercial matters constitutes an act of unfair competition". It does not contain any specific mention specifically relevant to trade secrets. Instead, it states following three examples of unfair competition: (i) all acts of such a nature as to create confusion by any means whatever with the establishment, the goods, or the industrial or commercial activities, of a competitor; (ii) false allegations in the course of trade of such a nature as to discredit the establishment, the goods, or the industrial or commercial activities, of a competitor; (iii) indications or allegations the use of which in the course of trade is liable to mislead the public as to the nature, the manufacturing process, the characteristics, the suitability for their purpose, or the quantity, of the goods.

been subjected to reasonable steps to keep it a secret. It is observed that the TRIPS Agreement does not recognise the proprietary or positive rights of trade secrets as reflected by the language of Article 39. Instead, the holder of trade secrets is granted the right to prevent the unauthorised use by third parties. Article 39.2, provides that 'persons shall have the possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by other without their consent in a manner contrary to honest commercial practices'. In interpreting this provision, Correa argues that the use of the word 'persons' instead of 'owners' denotes the non-proprietary nature of the rights recognised by Article 39.⁶⁵ Thus, this provision leads countries to consistently depend on their pre-existing legal regimes. That is, for the reason footnote 10 of the TRIPS Agreement provides:

a manner contrary to honest commercial practices shall mean at least practices such as breach of contract, breach of confidence and inducement to breach, and includes the acquisition of undisclosed information by third parties who knew, or were grossly negligent in failing to know, that such practices were involved in the acquisition.

Therefore, the TRIPS Agreement provides scope for countries to confine to their own legal strategies in protecting trade secrets, viz, laws relating to breach of contract, breach of confidence or unfair competition.

The historical reasons behind the language of Article 39 lay in the twists and turns that occurred in the drafting stage of Article 39.⁶⁶ Most developing country negotiators, led by India, were vehemently opposed to recognising the property nature of trade secrets proposed by the USA.⁶⁷ However, Article 39 explicitly stipulates that the protection of undisclosed information arises under pre-existing industrial property principles of unfair competition and common law actions such as breach of confidence. Otherwise, in general, member countries have the discretion to adopt a legal framework of their choice in order to afford protection for trade secrets as stated in Article 1.1.⁶⁸ This appears to be the reason why trade secrets regimes are highly fragmented compared to other IP regimes.

As a result, there is no uniform way of establishing protection mechanisms for trade secrets among countries. While countries such as Sweden and the US have unique legislation to protect trade secrets, a number of countries such as Sri Lanka provide for trade secret protection through a general IP type protection introduced in compliance with the TRIPS obligation. Thus, trade secrets protection is treated as a sub-set of unfair competition. By contrast, most common law countries such as the United Kingdom, Australia and India still use the common law, i.e. breach of contract and breach of confidence, in protecting trade secrets.

⁶⁵Correa (2007, p. 368).

⁶⁶Rowe and Sandeen (2015, p. 26).

⁶⁷WTO (1989). This view was supported by a group of developing countries including India, Brazil, Argentina, Chile, China, Colombia, Cuba, Egypt, Nigeria, Peru, Tanzania and Uruguay.

⁶⁸See Article 1.1 of the TRIPS Agreement 1994: 'Members shall be free to determine the appropriate method of implementing the provisions of this Agreement within their own legal system and practice.'

4.1 Towards More Robust Laws

In the absence of stringent and globally harmonised trade secrets laws, individuals and businesses including the energy sector are likely to lean on self-help or internal security measures. Put another way, a robust trade secrets law, on the one hand, can replace an owner's investment based on internal strategic precautions and help prevent an appropriator investing in stealing the secret, on the other. Therefore, it prevents or greatly reduces wasteful expenditure on the IP stealing arms race. Thus, implementing legal deterrents is recommended in successfully fighting trade secrets misappropriation.

One proposition in this regard is to introduce criminal sanctions to complement civil laws. For instance, the US Economic Espionage Act 1996 criminalises the theft of a trade secret for the benefit of a foreign government, foreign instrumentality, or foreign agent and the theft of trade secrets for commercial or economic gain by an individual or a competitor.⁶⁹ The underlying argument is that criminal penalties may bring a greater deterrent effect than civil penalties.⁷⁰ Also, the involvement of government through criminal prosecution enhances the investigation of a trade secrets case as the government officials are better empowered with expertise, investigative tools and financial and human resources. Introduction of criminal sanctions can also be considered as an effective way of fighting foreign economic espionage.⁷¹ However, criminal measures for trade secrets theft are only to be found in the United States and some civil law countries.⁷² On the contrary, most of common law countries including the United Kingdom and Australia largely rejected criminalisation.⁷³ The reason is that common law tradition believes that criminal offences such as theft focus on possession and ownership aspects or property characteristics, which are not reflected in information such as trade secrets.

As part of strengthening international trade secrets law, a wave of harmonisation has been occurring in the last few years. This is exemplified by the Defend Trade Secrets Act (DTSA) of the United States, the EU Trade Secrets Directive and Trans-Pacific Partnership Agreement (TPP). Such initiatives indicate that at least these regions now recognise the substantial value of trade secrets to their regions and the significance of having harmonised and robust laws. For instance, having identified that the legal fragmentation adversely affects the appropriation and dissemination of information, know-how and technology,⁷⁴ the European Union (EU) enacted a directive in 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and

⁶⁹18 U.S.C. § 1831—Economic Espionage; 18 U.S.C. § 1832—Trade Secret Theft.

⁷⁰US Chamber of Commerce (2013).

⁷¹For example, the Economic Espionage Act 1996—18 U.S.C. § 1831—Economic Espionage.

⁷²van Caenegem (2014, p. 19).

⁷³See Lord Upjohn per *Boardman v Phipps* (1967) 2 AC 46; Latham CJ per *Federal Commissioner of Taxation v United Aircraft Corp* (1943–1944) 68 CLR 525.

⁷⁴Baker and McKenzie (2013).

disclosure.⁷⁵ Accordingly, common standards introduced by the directive have become a legal *acquis* of the European Union after 2016 with members being given two years to incorporate these standards in their domestic legal systems.⁷⁶ As such, it harmonises the civil trade secrets protection in European Union member states by providing uniform definitions; by establishing ways that misappropriations and lawful appropriations can be defined; as well setting out minimum standards for remedies and procedures. More importantly, the directive sets a floor on the basic legal requirements with which member countries able to carve out their own laws so as allow for more stringent law if desired.⁷⁷

The highly controversial US-led TPP requires signatories to provide a strong and cost-efficient protection for trade secrets, including criminal sanctions.⁷⁸ Whereas the TPP may be dead with the withdrawal of the US from it, trade secrecy provisions of it shows a readiness of Pacific Rim countries to adopt a harmonised trade secrets legal regime. Similarly, in 2016, Defend Trade Secrets Act (DTSA) was introduced by the US creating a federal civil cause of action for trade secrets misappropriations. Accordingly, 'an owner of a trade secret that is misappropriated may bring a civil action ... if the trade secret is related to a product or service used in, or intended for use in, interstate or foreign commerce.'⁷⁹ It provides for a domestically harmonised civil law framework for the protection of trade secrets.⁸⁰ This is an indication that the US continues to have a strong desire to have stringent and harmonised trade secrets laws, despite its withdrawal from the TPP.

⁷⁵Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure.

⁷⁶Article 19: 'Member States may, in compliance with the provisions of the TFEU, provide for more far-reaching protection against the unlawful acquisition, use or disclosure of trade secrets than that required by this Directive, provided that compliance with Articles 3, 5, 6, Article 7(1), Article 8, the second subparagraph of Article 9(1), Article 9(3) and (4), Article 10(2), Articles 11, 13 and Article 15(3) is ensured.'

⁷⁷The European Union has adopted a common definition on trade secrets which is similar to the TRIPS definition (Article 2). The Directive specifies the circumstances when the acquisition, use and disclosure of a trade secret is unlawful or lawful (Article 3 and 4); and the measures, procedures and remedies that should made available to the rightful holder of trade secrets in case of alleged misappropriation (Articles 6–9 and 12–14). It also provides provisions for the preservation of confidentiality of trade secrets in the course of legal proceedings. (Article 9 and 15).

⁷⁸Article 18.78 of the Trans-Pacific Partnership 2015.

⁷⁹Defend Trade Secrets Act of 2016, S. 1890, 114th Cong. § 2 (2016), <http://dfat.gov.au/trade/agreements/tpp/Pages/trans-pacific-partnership-agreement-tpp.aspx>

⁸⁰Among other things, it provides for a uniform definition of 'trade secrets' and 'misappropriation'; civil seizure and other remedies; and safe harbour for whistle-blower employees. Nevertheless, it provides that 'nothing in the amendments made by this section shall be construed ... to pre-empt any other provision of law' and thus will not pre-empt existing state trade-secret laws. Therefore, DTSA simply layers a new federal law on top of the state trade secrets laws adding more laws instead of creating uniform national law.

Hence, these legal initiatives highlight that there is an initiation in the international level in encouraging a more harmonised and stringent trade secrets laws.⁸¹ However, this cannot be regarded as a global movement as it is currently confined to the USA and the European region. Thus, the international trade secret regime is still deficient in terms of its legal fragmentation and ununiformed enforcement measures: for example, enforcement of law in extra-territorial trade secrets misappropriations. Even though some criminal legislation such as Economic Espionage Act 1996 of the United States provides provisions for extra-territorial application,⁸² there is no civil law application to this matter even in the United States. Therefore, there remains a need for introducing better harmonised laws with effective mechanisms which can implement them internationally.

Nevertheless, it is argued that policy makers should be more cautious over possible repercussions relating to over-protection and over-reliance on the trade secrets regime. These repercussions may include its impact on labour mobility, follow-on innovation and knowledge diffusion. Furthermore, promotion of secrecy through the trade secrets law may, paradoxically, contradict the global need for a smoother process of technology transfer. As argued below, these issues are pivotal with regard to generating clean energy technologies—critical in the global battle over climate change.

4.2 *Implications of Protection*

4.2.1 Knowledge Diffusion, Follow-on Innovation and Hidden Environmental Costs

The public policy goal of intellectual property law including patent law is to promote disclosure of information and knowledge behind the intellectual creation in exchange for obtaining its protection for a limited time period. Thus, it is believed that such a disclosure furthers knowledge spill-over thereby encouraging follow-on innovation. However, disclosure and dissemination of knowledge is limited under trade secrets law since it merely enables sharing of related knowledge within a limited group such as employees and business partners.⁸³ Hence, there is a risk in trade secrets law's aim of preserving secrecy that the public will never come to know of an invention and related information.⁸⁴ This carries two-fold consequences. First, the public will not per se benefit from such an invention. Secondly, it

⁸¹Sibble (2014, pp 18–20).

⁸²See § 1831 and 1832 of Economic Espionage Act.

⁸³Trade secrets law supports 'relative secrecy' as against 'absolute secrecy'. Therefore, it allows the sharing of protected information contained in trade secrets with a limited group of individuals and businesses.

⁸⁴Bently (2012, p. 82).

may have a chilling effect on follow-on innovation. This phenomenon can be explained through the analogy of non-restriction or non-protection of the ‘poliomyelitis (IPV) vaccine’ as against patenting of ‘cervical cancer vaccine’. Once Jonas Salk invented the IPV vaccine in 1955, he neither obtained a patent nor sought trade secrets protection. He rhetorically said that ‘there is no patent...would you patent the sun?’⁸⁵ With the free access to the vaccine, the global fight against the polio epidemic could be effectively and successfully perused. Only 37 polio cases were reported in 2016 and more importantly, the World Health Organisation declared in 1999 that the polio virus type 2 had been totally eradicated.⁸⁶ By contrast, while a vaccine was developed for human papilloma virus (HPV) in 1991, currently half a million women a year still develop cervical cancer half of whom die from it.⁸⁷ This may be attributed to the fact that 93 patents relating to HPV vaccine were filed in the United States (or as PCT applications) thereby restricting access to the vaccine.⁸⁸

Such ramifications may be repeated if a globally-important invention is protected as a trade secret instead of obtaining a patent. That is, while patent law grants a monopoly over a product or process in exchange for revealing the full details of an invention, trade secrets law does not promote disclosure at all. And more importantly, there is no 20 years-limitation for trade secrets protection as in the case of patents.⁸⁹ Even though trade secrets protection may bring a competitive advantage and financial benefits to the owner, it is highly doubtful whether a secretly held invention—including clean energy inventions—would benefit the public. Put another way, trade secrets law may impede the knowledge-flow which is an essential element of further innovation.

In fact, knowledge can be considered as the gene of innovation since the existence and dissemination of knowledge contributes to increased innovation. That is, innovative creativity does not occur in a vacuum: knowledge, thoughts and ideas depend to a large extent on the knowledge of the previous generations.⁹⁰ Given this vital interdependence, intellectual products can be considered as social products.⁹¹ Conversely, the trade secrets regime can be seen as a talisman for preventing access to information or technological know-how, rather than incentivising the next generation to further explore a particular invention or technology. In a broader sense, it is questionable whether a trade secrets owner should be able claim sole ownerships of an invention and block others while he or she has already benefited from the previous knowledge of others. That is, he or she is an integral part of a technological development phase. Moreover, blocking knowledge may hinder the

⁸⁵See Haberman (2016).

⁸⁶WHO Medical Centre (2017).

⁸⁷Parry (2007).

⁸⁸Chandrasekharan et al. (2015, pp. 6366, 6370).

⁸⁹See Article 33 of the TRIPS Agreement 1994.

⁹⁰Chandra (2010, p. 69).

⁹¹Hettinger (1989, p. 38).

technological growth and innovation in a particular industry, including the renewable energy sector. Thus, there may be created an occluded phase in the continuance of the growth of a particular technology. Consequently, future research may repeat previous but undisclosed work and thus represent wasteful investment.

This can be a crucial issue in keeping new clean energy technologies secret. Broadly speaking, creating and harnessing new renewable energy technologies has become a global agenda and is no longer regarded as merely an issue of trade, business or competitiveness. Thus, covering up a swath of knowledge through the blanket of trade secrecy may act as an inhibitor to follow-on innovation in the renewable energy sector. Consequently, large scale diffusion of climate change mitigating technologies on which the success of the Paris Agreement depends, would be put at risk.

Moreover, it is accepted that trade secrets law should play a vital role in protecting the interests of renewable energy companies to keep their trade secrets out of 'wrong' hands, such as competitors who may seek a free ride from their IP.⁹² Nonetheless, the problem is that companies may use the trade secrets protection to shield information from potential 'right' hands such as government authorities, public watchdog groups and consumers.⁹³ For instance, non-disclosure of proprietary information could pose a threat to the environmental sustainability and possibly public health.⁹⁴ In particular, renewable energy technologies are designed to contribute to energy efficiency and mitigate climate change. However, if renewable energy technology is kept as a trade secret, it is difficult for government authorities and environmentalists to access and evaluate that technology—which may in fact produce other harmful environmental effects. For example, there is some conjecture and controversy in a number of countries over the health impact of wind turbines.⁹⁵ Moreover, although hydropower is known as a clean energy, hydropower plants can release millions of tonnes of greenhouse gases through bacteria degradation of the vegetation submerged in water reservoirs.⁹⁶ As such, blocking the access to renewable energy technologies with the application of trade secrets law, may also contribute to non-divulgence of such potential environmental impacts that may occur through the clean energies.

4.2.2 Technology Transfer and Developing Countries

Circulation of clean energy inventions, technologies and related knowledge throughout industries and national boundaries is a vital aspect of achieving the

⁹²Varadarajan (2014–2015, p. 1405).

⁹³Ibid.

⁹⁴Ibid.

⁹⁵Chief Medical Officer of Health of Ontario (2010); See also The Senate—Select Committee on Wind Turbines (2015).

⁹⁶Adam (2007).

global objective of combating climate change. Currently, 80% of clean energy related patents are owned by few countries, namely, Japan, the United States, Germany, Korea, the United Kingdom and China.⁹⁷ Therefore, dissemination of technologies behind these patents and other related knowledge to other countries is essential to successfully overcome the global issue of climate change.

In general, technology transfer of clean energy technologies may occur in different stages including variously, technology development, demonstration and implementation. Such transfers may not relate just to IP products such as machinery, but also to IP involved in tacit knowledge and skills.⁹⁸ Indeed, technology transfer can be regarded as a part of knowledge dissemination or a cumulative learning process.⁹⁹ However, currently, there is no an overarching pathway to transfer technology but rather different pathways to be determined by the stakeholders, viz., government, the private sector and the community.¹⁰⁰ Also, there is a serious doubt as to how trade secrets law can contribute to the broader dissemination objective which promotes non-disclosure.

Technology transfer has been a key objective of international environmental law agendas since the 1972 Stockholm Declaration on Human Development.¹⁰¹ It has also become a focal point of discussion following the adoption of the UNFCCC in 1992.¹⁰² By establishing 'technology mechanism', the UNFCCC's *Cancún Agreement* attempted to promote technology transfer and mitigate environmental harms.¹⁰³ However, the Cancún Conference did not explicitly address the intellectual property issues relating to technology transfer.¹⁰⁴

As emphasised by the Paris Agreement, on transferring technology, supporting the related needs of developing countries is seen as a critical factor in improving their resilience to climate change and reducing greenhouse gas emissions.¹⁰⁵ Without an effective mechanism to transfer technology to developing and technologically underprivileged countries, it may be difficult to significantly reduce greenhouse gas emission within the agreed time-frames. This is a pivotal issue since developing countries are responsible for 63% of current carbon emissions.¹⁰⁶ In fact, the initiatives aimed at dissemination of IP can be underpinned by the principle of 'common but differentiated responsibility of protecting the environment'. The

⁹⁷European Patent Office (EPO), the United Nations Environment Programme (UNEP), and the International Centre for Trade and Sustainable Development (ICTSD) (2010).

⁹⁸Grübler (1998, p. 462).

⁹⁹Brooks (1995).

¹⁰⁰Gallagher et al. (2006, p. 208).

¹⁰¹UN General Assembly (1972) United Nations Conference on the Human Environment, 15 December 1972.

¹⁰²UN Framework Convention on Climate Change, New York, 9 May 1992, International Legal Materials (1992).

¹⁰³Doc. No. FCCC/CP/2010/7/Add.1, 15 March 2011 (Decision CP.16).

¹⁰⁴Correa (2016, p. 87).

¹⁰⁵See Article 10 of the Paris Agreement 2015.

¹⁰⁶Center for Global Development (2015).

Paris Agreement provides that ‘parties should protect the climate system ... on the basis of equality and in accordance with their common but differentiated responsibilities and respective capabilities.’¹⁰⁷ The term ‘respective capabilities’ refers to the notion that countries should have different responsibilities based on their financial and technological capabilities and their contribution to environmental harm.¹⁰⁸ As such, technologically advanced developed countries such as the USA on the one hand, and countries which contribute substantially to climate change such as China on the other, have a responsibility to actively participate in the mitigation of climate change. For example, a key initiative could be to share their cutting edge knowledge and technologies relating climate change mitigation and energy efficiency.

In the case of the intellectual property regime, technology transfer is supported by Article 66 (2) of the TRIPS Agreement which provides that, ‘developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base.’ This is in line with the broader objective of the TRIPS Agreement which specifies that it intends to ‘promote innovation and facilitate the diffusion of technology, in a manner conducive to social and economic welfare, and to a balance of rights and obligations.’¹⁰⁹ The importance of increasing the flow of technology to developing countries was further emphasised by the WTO Doha Ministerial Declaration.¹¹⁰ In response to the Doha proposals, the TRIPS Council interpreted the implementation of Article 66.2 as requiring developed countries to submit annual reports on action taken or planned in pursuance of their commitments under the Article 66.2.¹¹¹

However, commenting on the practical application of these initiatives, Carlos Correa observes that the room provided by the TRIPS Agreement for technology transfer is quite small and that it is implemented in uneven ways.¹¹² Firstly, the role

¹⁰⁷See Article 3 of UN Framework Convention on Climate Change 1992: ‘parties should protect the climate system ...on the basis of equality and in accordance with their common but differentiated responsibilities and respective capabilities.’

¹⁰⁸The Rio Declaration on Environment and Development (1992) Principle 7 states: ‘In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.’

¹⁰⁹See Article 7 of the TRIPS Agreement 1994 which sets out that intellectual property protection ‘should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations’.

¹¹⁰See Article 37: Trade and Transfer of Technology of the Doha Ministerial Declaration 2001; and the Doha Declaration on the TRIPS Agreement and Public Health 2001.

¹¹¹WTO (2003).

¹¹²Correa (2005, pp. 254–256).

of intellectual property legal mechanisms in transferring clean energy technologies is unclear.¹¹³ Secondly, there is no international mechanisms established to do so and there is no compensatory system to encourage inventors or developed countries to do so. Even where there are individual country endeavours to establish technology transfer mechanisms within the TRIPS framework, there is lack of support from other countries. For example, in 2013 Ecuador made a proposal to the TRIPS Council to establish ‘a multilateral trading system in global strategies to enhance access to clean energy, increase energy efficiency and accelerate worldwide implementation of renewable energy technologies from the standpoint of intellectual property.’¹¹⁴ However, this proposal was unsuccessful given several key developed nations, including the United States, opposed it.¹¹⁵

A further issue is that in the case of the trade secrets regime in particular, there is serious doubt as to whether and to what extent the protection of clean technologies as trade secrets is a responsive mechanism for promoting effective technology transfer. As pointed out by Bone, ‘secrecy required constant vigilance, however, since ideas, like wild animals, had a tendency to escape. Once gone, they returned to the commons as public property.’¹¹⁶ In other words, the trade secrets law per se provides protection for information being kept as secret—protection which is lost once the secrets is disclosed. However, technology transfer brings a high risk of divulging trade secrets and there is no protection once the cat is out of the box.

According to commentators such as Jorda, transferring a technology protected as a trade secret can be considered as a so-called ‘black box’¹¹⁷ in that unrestricted disclosure of a proprietary know-how would result in the certain loss of trade secrets rights.¹¹⁸ Thus, the transferee and related parties should be bound with contractual confidentiality obligations through non-disclosure or non-competition clauses. However, the law relating to this matter is entirely governed by domestic law which may vary widely between countries depending on their legal traditions and legal systems. For instances, for common law countries such as the United Kingdom and Australia it is accepted that such an agreement *prima facie* is void unless that is regarded as reasonable between parties and in the eyes of public interest.¹¹⁹ In the USA this issue is governed by the state laws which are for some extent based on common law values.¹²⁰ However, such principles are not found in civil law countries which are mainly governed by the civil codes or legislations of

¹¹³Rimmer (2011, p. 110).

¹¹⁴WTO (2013).

¹¹⁵Zhuang (2017, p. 363).

¹¹⁶Bone (1998, p. 278).

¹¹⁷Jorda (2007, pp. 1043–1057).

¹¹⁸AIPPI (2010).

¹¹⁹*Nordenfelt v Maxim Nordenfelt Guns and Ammunition Co Ltd* (1894) AC 535, 565.

¹²⁰Rowe and Sandeen (2015, p. 90).

each country.¹²¹ Hence, globally, there is little evidence of a conducive environment for trade secrets based technology transfers.

As a whole, where trade secrets law is concerned, there is a policy dilemma in which the law ought to foster the global need for the transferring of clean energy technologies to developing countries without interfering with the incentives available to inventors.¹²² But trade secrets law, as it has been established, is not conducive to achieving these aims owing to the promotion of secrecy through the law, the global fragmentation of laws and non-availability of globally-accepted enforcement mechanisms. Therefore, it is difficult to argue that protection of clean energy technology through trade secrets promotes the objectives of the Paris Agreement relating to knowledge diffusion and technology transfer. Ultimately, most developing countries are neither in a position to adequately invest in clean energy inventions nor buy such technologies or inventions.

5 Conclusion

As indicated in this chapter, there is a significant rise in the use of the trade secrets regime in protecting technological and commercial information of inventors and business firms. This is no less true for the clean energy sector even though there is little literature which underlines this fact. It needs to be accepted that trade secrets are highly vulnerable in this information age due to globalisation, advancement of ICTs and the subsequent 'IP stealing arms races'. In particular, legal protection for trade secrets is relatively weak—for example due to cross-border misappropriations even in the post-TRIPS era. Thus, on the one hand, it can be argued there is a need for robust and stringent legal protection for trade secrets. On the other hand, such a proposal may be problematic in light of trade secrets law's dubious contribution to knowledge diffusion and in stimulating follow-on innovation. Also, trade secrets protection may be used as a shield to cover hidden costs or dangers attached to a technology claimed to be a clean technology. In particular trade secrets protection can produce an anomaly with regard to technology transfer given the ever present risk that unrestricted disclosure of trade secrets through technology transfer may result in losing them. For these reasons, this chapter argues that trade secrets are a problematic means for protecting, harnessing and promoting clean energy technologies. Nevertheless, trade secrets do play a role in the intellectual property system in promoting the development of clean energy technology. Thus, there needs to be a robust and well balanced level of protection for trade secrets in order to encourage investment on innovation. For instance, having a global mechanism for the enforcement of trade secrets laws, especially in extra-territorial trade secrets misappropriations, is an important aspect to be considered by global leaders. But at

¹²¹Ibid., pp. 203–260.

¹²²Sandeen and Levine (2016).

the same time, trade secrets law should provide a balance in its effect which equally addresses the important protective aspects of clean energy technologies but also the protection of the need for knowledge diffusion. In this way, clean energy inventors and global leaders in the sector can effectively contribute to the global agenda of combating climate change while ensuring protection of trade secrets. Otherwise, the trade secrets regime may become little more than an instrument which sustains competitive advantages without equally providing society with a mechanism which delivers a robust flow of information dissemination and exchange.

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Part V

Open Innovation

Chapter 16

Energy Democracy, Renewables and the Paris Agreement



Angela Daly and Caitlin Archbold

Abstract This chapter examines the relationship between renewable energy, especially in the form of ‘energy democracy’ initiatives, and international law. Both instruments under the United Nations Framework Convention on Climate Change, including the Paris Agreement, and other international law instruments such as the Energy Charter Treaty and World Trade Organization regime, are considered, with particular regard paid to whether they explicitly mention renewable energy, and whether in practice they have encouraged the take-up and roll-out of renewables projects. The picture painted of this relationship between international law and renewables is a mixed one: while clean energy is mentioned in some of these instruments, there is limited research about their actual impact on the take-up of renewables, and even less research on the specific impact they may have on small scale energy democracy projects. Furthermore, inconsistent policy objectives of different areas of international law, especially between the climate change and trade liberalisation agendas, may inhibit the positive effects of including renewable energy as a topic of international law.

Keywords Paris Agreement • Climate change • Renewables • Energy democracy
International law • Regulation • Prosumers • Trade

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1 Introduction

‘Energy democracy’ is a term which has come to be used for the novel and innovative ways in which energy is being produced, shared and consumed, as compared to the norm especially in developed economies for at least the last century. Energy democracy has come to describe the production of energy, usually involving renewable energy technologies, in a small-scale way, by individuals who own and operate the production equipment, and may have it installed on their houses (in the case of solar panels) or on their land (in the case of small wind turbines).¹ Community energy initiatives also form part of this ‘democratisation’ of energy, and in some cases—notably Germany with its advanced *Energiewende* transition—there is municipal ownership over some energy infrastructures.²

This chapter examines the extent to which first renewable energy, and second the small scale deployment of that energy in the form of ‘energy democracy’ initiatives, has been affected by international climate change instruments and other instruments of international law. For initiatives that usually start from the ‘bottom-up’, to what extent does the ‘top down’ character of international law interact with them, and if so, is this interaction a positive or negative or indifferent one?

The discussion will commence by explaining more about energy democracy initiatives, before going on to examine the interaction of international law instruments and renewables. Starting with the United Nations Framework Convention on Climate Change (UNFCCC) and associated agreements, we look also to other international law instruments including the Energy Charter Treaty (ECT) and World Trade Organization (WTO) regime to understand the different treaties which interact with renewable energy and energy democracy initiatives. Since renewable energy initiatives fall between the topics of ‘energy’ and the ‘environment’, it is not only instruments whose purpose is to address climate change and environmental issues which are relevant.

2 Energy Democracy Initiatives

In industrialised developed countries, energy production has hitherto generally occurred on a centralized basis due to the economies of scale this production has involved. With a few notable exceptions such as hydropower via damming projects (which have not been without environmental controversy) and geothermal energy (particularly in countries such as Iceland and Italy which experience significant seismic activity) much of this centralized energy production has involved ‘fossil fuel’

¹See: Fairchild and Weinrub (2017).

²See: Morris and Jungjohann (2016); Wagner and Berlo (2017).

sources such as coal, natural gas and petroleum—or nuclear power, which while not a fossil fuel, is problematic for the radioactive waste it leaves behind.

However, recent years have seen the increasing availability of methods to produce energy on a small-scale, decentralized basis due to the declining price of photovoltaic technology (solar panels) and, to a lesser extent, wind turbines. While solar and wind power are deployed at a mass, centralised level in large wind or solar farms, they are also available at prices affordable to consumers in developed jurisdictions, and increasingly also in developing economies, and can operate entirely ‘off grid’ to power an individual home or business, or can be deployed as part of a microgrid in a small geographical area. These developments have led to the relevance of the term ‘prosumers’ to energy since individuals now have the ability and means to produce energy as well as consume it.³ Individuals can also opt to remain connected to the centralized grid even if self-producing energy, and can sell back to the grid excess energy that they have produced—although the development of accessibly-priced small scale energy storage such as Tesla’s Powerwall home battery would lessen further individuals’ need to remain connected to the centralized grid. For instance, in Australia, a large pool of energy prosumers has emerged—one sufficiently large and coordinated to have organised themselves into a lobby group, Solar Citizens, to agitate for Federal support for renewable energy, and to have formed smaller community energy initiatives in both urban and rural settings.⁴

The importance of the production and supply of energy via renewables by individuals and in small-scale initiatives for combatting climate change, reducing carbon emissions and achieving universal energy access has been recognised. Indeed, the International Renewable Energy Agency (IRENA) predicts 60% of the additional power generation needed to achieve universal electricity access by 2030 will come from off-grid production, but achieving this depends on the correct combination of policies, financing, technology and institutional capacity.⁵ Globally, stand-alone systems and mini-grids are more affordable and reliable than ever before.⁶ IRENA has identified key points for supporting renewable energy-based mini-grids, including: well-designed tariff regulations; and minimal touch points between private sector and governments to improve efficiency and reduce transaction costs.⁷ In terms of business models, IRENA identified a consumer-driven, bottom-up approach as being desirable for the rapid deployment of off-grid renewable energy solutions.⁸

³Burger and Weinmann (2013).

⁴See: Kuch and Morgan (2015).

⁵International Renewable Energy Agency (2017a).

⁶International Renewable Energy Agency (2016).

⁷Ibid p. 7.

⁸Ibid p. 12.

3 International Law Instruments and Renewables

Renewable energy initiatives have not been developing in a legal vacuum and indeed there is already a growing body of work examining the interaction of intellectual property and green technologies including renewables,⁹ and at a more domestic level, the interaction of renewables, especially in the form of energy democracy initiatives, with national energy regulatory frameworks.¹⁰ Here, the scenario for renewable and international law is considered, a topic which has received much less attention to date, despite a transition to renewable energy being one way of achieving reduced carbon emissions. Indeed, the International Energy Agency's (IEA) 2016 World Energy Outlook places renewable energy at the forefront of the energy market until 2040.¹¹ In 2016, renewable energy accounted for 18.3% of the total final energy consumption.¹² The IEA in its 2017 World Energy Outlook expects 40% of all power generation capacity by 2040 to come from renewables.¹³

Wilder and Drake argue that analysing renewable energy from an international law perspective is important as renewables play a 'key role' in mitigating the effects of climate change, international law plays an 'important role' in encouraging worldwide cooperation to reduce barriers to investment in renewable energy, and 'the renewable energy sector provides key areas for growth in developing countries'.¹⁴ However, Leal-Arcas and Minas have argued that 'effective renewable energy governance at the international and European level has become a major challenge of public international law and EU law due to the fragmentation of the system and the proliferation of institutions'.¹⁵ The spread of several institutions attempting to address renewable energy, each with different actors and geographical scope, results in a 'polycentric and complex institutional structure'.¹⁶ This has manifested in institutional overlap on renewable energy governance: the World Trade Organization and the Energy Charter Treaty both have rules applying to 'the trade, investment and environmental protection aspects of energy'.¹⁷

Here, we examine the international law instruments more directly pertaining to climate change in the context of the UNFCCC framework, before examining other international law instruments which, although not explicitly on the topic of climate change, are nevertheless pertinent to renewables.

⁹See eg Rimmer (2011), Sovacool (2008).

¹⁰See eg Butenko and Cseres (2015), Butenko (2016), Lavrijssen and Carrilo (2017).

¹¹International Energy Agency (2016).

¹²International Energy Agency (2017).

¹³International Energy Agency (2016).

¹⁴Wilder and Drake (2016, p. 359).

¹⁵Leal-Arcas and Minas (2016, p. 622).

¹⁶Ibid p. 623.

¹⁷Ibid p. 624.

3.1 *United Nations Framework Convention on Climate Change*

According to Bruce, '[i]n 1981, renewable energy was directly addressed, for the first time, through intergovernmental policy' by the United Nations Conference on New and Renewable Sources of Energy,¹⁸ leading to the establishment of the Committee on the Development and Utilisation of New and Renewable Sources of Energy, which in turn became part of the Division for Sustainable Development.¹⁹ Renewable energy was again emphasised in the Brundtland Commission Report in 1987, where the need for sustainable and sustained commitment to further research and development of renewable energy was acknowledged.²⁰ Subsequently, this led to a period of sustainable development resulting in the Stockholm Declaration and the Rio Declaration.²¹ The Rio Declaration's non-binding Agenda 21 on 'Promoting Sustainable Human Settlement Development' addressed renewable energy numerous times including in the section on '[p]romoting sustainable energy and transport systems in human settlements' in terms of promoting research and technology transfer.²²

1992 marked the international community's formal recognition of the role of human activities in the increase of greenhouse gases and the resulting impact on climate change in the form of the United Nations Framework Convention on Climate Change (UNFCCC).²³ The objective of the Agreement is to stabilise greenhouse gas concentrations in the atmosphere at a safe level.²⁴ The UNFCCC allows Parties 'the freedom to choose domestic measures that advance the "ultimate objective"',²⁵ with 'the primary obligation ... to establish an inventory of GHG emissions'.²⁶ While there is no explicit reference to renewable energy in the UNFCCC, Article 4(1)(c) requires Parties to '[p]romote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of

¹⁸United Nations Conference on New and Renewable Sources of Energy, GA RES 36/193, UN GAOR, General Assembly, 36th sess, 103rd plen mtg, UN Doc A/RES/36/193, (17 December 1981).

¹⁹Bruce (2013, p. 13).

²⁰Report of the World Commission on Environment and Development: Note by the Secretary-General, UN GAOR, 42nd sess, Agenda Item 83(e), UN Doc A/42/427 (4 August 1987) annex ('Report of the World Commission on Environment and Development: Our Common Future'), [74].

²¹Bruce (2013, p. 13).

²²United Nations Conference on Environment and Development; Rio Declaration on Environment and Development; Agenda 21.

²³United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994) preamble.

²⁴Ibid art 2 of the UNFCCC.

²⁵Bruce (2013, p. 19).

²⁶Bruce (2013, p 18).

greenhouse gases' including in the energy sector.²⁷ Further, the Convention requires parties to promote and cooperate 'in scientific, technological, technical, socio-economic and other research',²⁸ and in the 'full, open and prompt exchange' of this information.²⁹ Lastly, Article 4(5) requires developed countries to facilitate and finance the transfer of environmentally sound technologies (ESTs) to developing countries,³⁰ which is relevant to renewable energy in regards to transfer of suitable technology.

The Kyoto Protocol to the UNFCCC was adopted in December 1997. However, the conditions for its entry into force were not complete until 2005 when Russia ratified the Protocol. The Kyoto Protocol created emission targets for certain developed countries, while developing countries were not obliged to reduce their emissions. The Kyoto Protocol also provides for three market-based mechanisms to assist countries to meet their targets: International Emissions Trading (IET),³¹ the Clean Development Mechanism (CDM), and the Joint Implementation Mechanism (JIM). The CDM involves developed countries implementing emission reduction projects in developing countries, which generate certified emission reduction (CER) credits that can contribute towards the developed country's emission targets. According to Leal-Arcas and Minas, 'by 2015, over 7900 CDM projects and programmes had been registered in 107 countries, resulting in over 1.6 billion CERs', with renewables making up 71% of these projects.³² Within the Kyoto Protocol itself, the sole reference to renewable energy is in Article 2(1)(a) where it is suggested state parties research, develop, promote and increase the use of new and renewable forms of energy.³³

The outcomes of the Kyoto Protocol, particularly on reducing emissions, are difficult to discern. It took 8 years to enter into force after it was adopted, and even after adoption some high-income countries (USA, South Korea and Singapore) did not ratify the Protocol, and Canada withdrew from the Protocol in 2011.³⁴ As regards emissions reductions, Grunewald and Martinez-Zarzoso argue that ratifying the Kyoto Protocol had a 'negative and significant effect on emissions', but this effect is lower than previous studies,³⁵ also highlighting the difficulty in discerning whether

²⁷Ibid art 4(1)(c) of the UNFCCC, Bruce (2013, p. 19).

²⁸Ibid art 4(1)(g) of the UNFCCC.

²⁹Ibid art 4(1)(h) of the UNFCCC.

³⁰Ibid art 4(5) of the UNFCCC.

³¹As the US did not ratify the Kyoto Protocol, the emissions trading scheme has had limited success. See Pflieger (2014) p. 520. In addition, Bachram (2006: 8–9) has argued the emissions trading scheme was under regulated and opened the door for 'climate fraud' where large companies were giving incentives for effectively doing nothing.

³²Leal-Arcas and Minas (2016, p. 632).

³³Kyoto Protocol to the United Nations Framework Convention on Climate Change, opened for signature 16 March 1998, 37 ILM 22 (entered into force on 16 February 2005); Bruce (2013, p. 19).

³⁴Grunewald and Martinez-Zarzoso (2016, p. 5).

³⁵Ibid p. 10.

the emission reduction was solely due to the Kyoto Protocol or other factors. Almer and Winkler provide a more critical analysis of the Kyoto Protocol concluding there is ‘little evidence’ that a binding emission target under the Kyoto Protocol induced significant emission reductions by the 15 developed countries investigated.³⁶

The body of literature analysing the effect of the Kyoto Protocol on renewable energy is underdeveloped. One study by Luo examined panel data of 109 countries from 2000 and 2011 to analyse the relationship between the CDM (established under the Kyoto Protocol) and renewable energy development.³⁷ Currently, as mentioned above, renewables count for 71% of the over 7900 CDM projects.³⁸ However, the results of this study show there is ‘no significant association between CDM investment and the share of renewable energy in a country’—in fact, the association could potentially be negative.³⁹ Luo points to the possibility of ‘governance and corruption issues’ being a barrier to renewable energy takeup in developing countries.⁴⁰

Yet, earlier studies have argued the CDM ‘can be used as a tool to promote renewable energy in the developing world’.⁴¹ For instance, ‘the CDM enables developing countries to gain financial supplements and technology transfer from developed countries’, which allow renewable energy to compete against fossil fuels.⁴² However, Luo notes there is little quantitative literature on whether the CDM has positive effects on renewable energy across countries at an aggregated level, but finds that in practice investment in CDM projects does not correlate with the share of renewables in the countries sampled.⁴³ However, Luo considers that the Paris Agreement, in encouraging technical assistance on renewable energy policies, shows ‘the international regime has realised the importance of renewable energy and national policies on climate change mitigation’.⁴⁴

3.2 *International Transfer of Renewable Technology*

Technology transfer is frequently referred to in climate change policy instruments such as Article 4 of the UNFCCC and Article 10 of the Kyoto Protocol. Technology

³⁶Almer and Winkler (2017, p. 134).

³⁷Luo (2016).

³⁸UN Centre on Energy, Climate and Sustainable Development (2017).

³⁹Luo (2016, p. 18).

⁴⁰*Ibid.*, p. 16.

⁴¹Luo (2016, p. 5), citing Schroeder (2009), Lewis (2010), Wang and Chen (2010), Spalding-Fecher (2012).

⁴²Luo (2016, p. 9).

⁴³*ibid* p. 3.

⁴⁴*Ibid* pp. 19–20.

transfer has been defined as ‘a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change’.⁴⁵

As noted above, three market-based mechanisms were introduced under the Kyoto Protocol, with one aim of these mechanisms being to facilitate the transfer of environmentally-sound technologies. The CDM aims to encourage technology transfer into host countries to maintain sustainable development. Similarly, the JIM allows developed countries to meet their obligations under the Protocol by investing in an emission reduction project in another developed country—thereby facilitating the transfer of relevant technology. However, a UN report looking at the effect of the CDM discovered that clean technology transfer was part of only 36% of documented CDM projects.⁴⁶

In relation to REEEP’s experience with the CDM, Parthan et al. identify the CDM as having ‘helped grid-connected renewable energy projects and industrial energy efficiency projects to benefit from carbon finance’, but it had not succeeded ‘in making any difference to smaller renewable energy and energy efficiency systems’.⁴⁷

In any event, Xiang argues that intellectual property rights have not been a ‘major barrier’ to the international transfer of green technology,⁴⁸ and ‘proposes a solution based on domestic innovation, international aid and international technology collaboration instead of the international transfer of clean technology’.⁴⁹ Indeed, Lane has suggested a number of ways that technology transfer has occurred in the private sector regardless of intellectual property rights.⁵⁰

3.3 *The Paris Agreement*

The Paris Conference (or COP21), resulting in the Paris Agreement was ‘the culmination of a string of annual climate conferences’, picking up the pieces from the Copenhagen COP15 in 2009.⁵¹ The Paris Agreement represents the first global commitment to limit global temperature increase to ‘well below’ 2 °C above pre-industrial levels.⁵² It also sets the ambitious goal to limit increase the increase to 1.5 °C above pre-industrial levels. According to Cléménçon, ‘most scientists

⁴⁵Metz et al. (2000, p. 3).

⁴⁶Seres and Haites (2008), Xiang (2015).

⁴⁷Parthan et al. (2010, p. 89).

⁴⁸Xiang (2015, p. 219).

⁴⁹Ibid pp. 200–201.

⁵⁰Lane (2010).

⁵¹Cléménçon (2016, p. 8).

⁵²Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) art 2(1)(a); Cléménçon (2016, p. 9).

interpret this goal to mean global net emissions must to reach zero by 2060–2080'.⁵³

The PA requires parties to prepare and communicate Intended Nationally Determined Contributions (INDCs), and introduces a five-year review cycle on their long-term low greenhouse gas emission development strategies, with each successive step required to be at least as strong as the current one.⁵⁴ There are two main ways in which the Paris Agreement differs from the Kyoto Protocol. Firstly, there are no legally binding emission reduction commitments. Secondly, the split between the developed and developing countries has been abandoned, though the principle of Common But Differentiated Responsibilities is still mentioned a number of times.⁵⁵ The obligations therefore apply to all UNFCCC parties, and not just developed countries.⁵⁶ At the time of writing, 173 Parties have ratified the Paris Agreement of 197 Parties to the Convention. On 5 October 2016, the threshold for entry into force was reached and the treaty entered into force on 4 November 2016.

There are arguments both supporting the potential of the Paris Agreement and criticising its lack of force. Some have praised the Agreement's ability to reach universal participation, however others have argued this has come at a cost of any real ambition.⁵⁷ The pledge and review system has been viewed as a way to increase ambition, as the INDCs may need to be 'reevaluated in light of the goals articulated in the Agreement'.⁵⁸ Jacquet and Jamieson note the pledge and review system has already worked in motivating 184 countries to submit their INDCs in advance of COP21 '[w]ith no legal obligation to do so'.⁵⁹ However, countries can simply not perform the commitments made under their INDCs, as is currently the case with the United States. The Paris Agreement could also provide more guidance and encouragement for the private sector to invest in climate mitigation technologies, including renewable energy technologies.

Cooper argues the Paris Agreement is of major importance for global climate change policy, but it was made in the context of 'underlying technological and economic forces': the reduction in cost of supply of solar and wind and the improvement in battery storage played a part in making the Agreement possible; and the tie between economic growth and energy consumption also being severed.⁶⁰ However, if the Paris Agreement's goals are to be achieved, 'significant increases in renewable energy generation' will be required.⁶¹ Yet this may well

⁵³Cléménçon (2016, p. 9).

⁵⁴Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) arts 4(9) and 4(3).

⁵⁵Ibid Preamble, arts 4(3), 4(19), 2(2) of the Paris Agreement 2015.

⁵⁶Droege et al. (2016, p. 8).

⁵⁷International Institute for Sustainable Development (2015, p. 44).

⁵⁸Ibid.

⁵⁹Jacquet and Jamieson (2016, p. 645).

⁶⁰Cooper (2016).

⁶¹Leal-Arcas and Minas (2016, p. 14).

happen: Leal-Arcas and Minas pointed to the UNFCCC Secretariat's report which found '[r]enewable energy was highlighted in many INDCs'.⁶² Further, the Paris Agreement 'commits nations to "strengthen cooperative action on technology development and transfer" including through the establishment of a 'technology framework' to guide the work of the Technology Mechanism'.⁶³

Outside of the formal Paris Agreement, Gielen, Boshell and Saygin identify various renewable energy initiatives which emerged from the COP21 meeting, including: the Africa Renewable Energy Initiative; the Global Geothermal Alliance; the Lighthouses' Initiative for small island developing states; the International Solar Alliance focusing on development in tropical countries; and the RE100 business initiative for renewable energy development and use.⁶⁴

Two other initiatives were also launched at COP21 with the aim of increasing innovation in this field and thereby making renewable energy more affordable.⁶⁵ Mission Innovation is an initiative announced at the beginning of the Paris Climate talks in 2015. Each participating country has pledged to double its funding for clean energy research and development over the next five years.⁶⁶ Secondly, Breakthrough Energy Coalition is 'a group of 28 billionaires that have committed to provide venture capital to overcome the "valley of death" between technical viability and market-based large-scale deployment'.⁶⁷

3.4 Summary

The instruments examined in this section do promote and encourage the development and use of renewable energy in form, but the extent to which they cause and facilitate this take-up in practice is unclear, and even disputed. It would seem that other factors beyond these treaties such as the economics of renewable energy have contributed to their take-up, but it is unclear the extent to which this has happened in a fashion fully divorced from the treaties and commitments, or to what extent the treaties were one factor of many in facilitating the take-up of renewables. On the issue of energy democracy, there is no explicit encouragement of the small-scale roll-out of renewable energy projects as opposed to large-scale projects, although it may well be in practice that some of the CDM projects may have been small-scale and may fall under the definition of 'energy democracy' as detailed above.

⁶²Ibid 15.

⁶³Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) arts 10(2)-(4).

⁶⁴Gielen et al. (2016).

⁶⁵ibid.

⁶⁶Mission Innovation (2016).

⁶⁷Gielen et al. (2016).

4 Other International Law Instruments

The meetings and instruments from UNFCCC including the Paris Agreement are not the only international processes and treaties which concern energy, and in particular renewables. Here, the Energy Charter Treaty (ECT) and the World Trade Organization (WTO) regime, and their interactions with renewables, are presented.

4.1 *Energy Charter Treaty*

One other prominent instrument is the Energy Charter Treaty (ECT). The ECT was signed in 1994 and entered into force in 1998, and provides a framework for international energy cooperation ‘designed to promote energy security through the operation of more open and competitive energy markets, while respecting the principles of sustainable development and sovereignty over energy resources’.⁶⁸

Zhang has argued that one of the ECT’s purposes is to promote sustainable development.⁶⁹ The ECT’s preamble ‘affirms the importance of energy efficiency’, reviews the UNFCCC and other international environmental agreements, and ‘acknowledges the pressing need for environmental protection’.⁷⁰ Article 18 ‘affirms each state’s sovereignty over its energy resources and recognises each state holds the right to regulate the environmental and safety aspects of the exploration and development of its energy resources’.⁷¹ Article 19 refers to sustainable development and requires each Party to strive to minimise its environmental impacts ‘in an economically efficient manner’.

Again, the body of literature analysing the ECT’s effect on renewable energy is underdeveloped. Leal-Arcas and Minas view that the ECT is part of the ‘patchwork of institutions’ that make up renewable energy governance; indeed ‘both the WTO and Energy Charter Treaty have rules that apply to the trade, investment and environmental protection aspects of energy’, although the ECT does not have a separate protocol for any specific energy type.⁷² However, Bruce argues it is possible to extrapolate renewable energy obligations from two treaty sections.⁷³ Firstly, Article 1(5) of the ECT defines ‘Economic Activity in the Energy Sector’ to include ‘production’ among other aspects of the energy cycle, and activities which are ‘illustrative’ of production include the construction and operation of power

⁶⁸International Energy Charter (2015).

⁶⁹Zhang (2015).

⁷⁰Energy Charter Treaty (opened for signature 17 December 1994) 2080 UNTS 95 (entered into force 16 April 1998) preamble.

⁷¹Zhang (2015).

⁷²Leal-Arcas and Minas (2016, p. 624).

⁷³Bruce (2013, p. 24).

generation facilities, particularly those powered by renewable energy sources.⁷⁴ Further, Article 19 refers to ‘Environmental Aspects’ and subsection (d) requires Parties to have particular regard to renewable energy sources. Bruce argues that ‘while the ECT exhorts broad legal obligations relating to environmental protection, it is devoid of meaningful legal content and contains weak policy recommendations at best’.⁷⁵ In line with Zhang’s analysis above, Bruce views the ECT as ‘a pro-investment treaty that favours traditional, non-renewable forms of energy’ and therefore its relevance to renewable energy is limited.⁷⁶

4.2 *World Trade Organization*

One way of achieving global renewable energy use is ‘to facilitate trade and exchange in green technology through trade liberalisation’.⁷⁷ However, ‘the word “energy” does not appear in any Agreement signed within the framework of the WTO’.⁷⁸ Yet, there are provisions that might be applicable to the energy sector and to renewable energy specifically.⁷⁹ A number of the measures governments use to foster the diffusion of renewable energy goods may be subject to trade rules under the WTO Agreements,⁸⁰ although it may be possible to interpret these rules in favour of increased diffusion of renewable energy.

Yet, conflicts have arisen where governments attempt to fulfil their obligations under UNFCCC Agreements but by doing so implement policies that may be contradictory to WTO rules. Feed-in-Tariffs and subsidies (often used to encourage renewable energy technology) have been the subject of various disputes at the WTO.⁸¹ Lewis argues that these renewable energy-focused trade disputes demonstrate ‘the challenge of addressing environmental concerns within the context of the broader dynamic of global competition’.⁸² Lewis also suggests four likely drivers of these disputes:

- (1) the increasing scale of the renewable energy industry; (2) the increasing role of emerging markets, especially China; (3) the increasing imbalances between renewable

⁷⁴Ibid.

⁷⁵Ibid p. 25.

⁷⁶Ibid.

⁷⁷Farah and Cima (2013, p. 708).

⁷⁸Ibid p. 709.

⁷⁹Ibid p. 711.

⁸⁰Including the General Agreement on Tariffs and Trade (GATT), the Agreement on Subsidies and Countervailing Measures (ASCM), the Agreement on Agriculture (AoA) and the Agreement on Technical Barriers to Trade (TBT).

⁸¹Farah and Cima (2015, p. 525).

⁸²Lewis (2014, p. 11).

energy technology producers and users; and (4) the rise of locally owned technology manufacturers in key markets.⁸³

Farah and Cima note '[r]enewable energy subsidies are crucial for combating climate change, and yet the world's international legal infrastructure is not designed to accommodate them'.⁸⁴ Indeed, renewable subsidies exist at the meeting point of 'two legitimate policy concerns': 'cultivation of renewable energy and the prevention of unfair trade practices'.⁸⁵ A question has arisen in WTO disputes as to whether measures supporting renewable energy qualify as 'subsidies' according to the WTO's Agreement on Subsidies and Countervailing Measures (ASCM). The ASCM initially divided subsidies into three categories: prohibited, actionable and non-actionable (Art I & III), but the provisions on non-actionable subsidies expired in 1999. Prohibited subsidies are, as the name suggests, completely disallowed; in the case of actionable subsidies, 'the complaining country has to show the subsidy has an adverse impact on its interests'.⁸⁶

As of 31 December 2013, six cases had been brought under the ASCM concerning renewables.⁸⁷ The issue that commonly arises is whether there is a benefit, as measures supporting renewable energy are generally a public financial contribution.⁸⁸ In *Canada—Renewable Energy* and *Canada—FIT Program* it was held the analysis of whether there is a benefit 'should not focus on whether the recipient is better off than its competitors, but rather whether it is better off than it would have been without the financial contribution'.⁸⁹ The role of the 'relevant market' was also analysed in *Canada—Renewable Energy* by both the Panel and the Appellate Body, with diverging opinions between the two bodies. The Appellate Body's narrow definition led to the Appellate Body not being able to determine whether the measure challenged or actually conferred a benefit, and 'in the end, failed to complete an analysis of whether a subsidy existed'.⁹⁰ Further, there was a suggestion that government action towards the creation of a new market 'does not, in itself, amount to a subsidy'.⁹¹ It has been argued the narrow definition of relevant market and exclusion of the government's role in creating a new market from the

⁸³Ibid p. 21.

⁸⁴Farah and Cima (2015, p. 516).

⁸⁵Ibid p. 517.

⁸⁶Farah and Cima (2013, p. 715).

⁸⁷Shadikhodjaev (2015, p. 484).

⁸⁸Farah and Cima (2013, pp. 723–4).

⁸⁹Ibid p. 724. In *Canada—Renewable Energy/Canada—FIT Program*, the main issue concerned Canada's feed-in-tariff program where a public organisation paid fixed prices to generators of renewable electricity (produced from wind and solar) that were intended to cover their costs and reasonable amounts of return. Shadikhodjaev (2015, p. 485).

⁹⁰Weber and Koch (2015, p. 767).

⁹¹Shadikhodjaev (2015, p. 487).

definition of ‘subsidy’ ‘will make it more difficult to secure legal remedies against many renewable energy programmes’.⁹²

In theory, the General Exceptions in Art XX of the General Agreement on Tariffs and Trade (GATT) and resulting from the introductory provisions apply to renewable energy. Farah and Cima have identified arguments both for and against applying the exceptions set out in the GATT Art XX to the ASCM. The arguments against applying the exceptions generally include the fact that the ASCM does not mention GATT Art XX, Art 3.1 ASCM specifically excludes from the scope of the provisions what is ‘provided in the Agreement on Agriculture’, and the ASCM used to have its own exception in Art 8, which is now no longer in force.⁹³ Arguably since the Parties did not renew these exceptions, it would be counter to their intentions to apply exceptions present in other agreements. The arguments for applying GATT Art XX General Exceptions include the principle of *lex specialis derogat legi generali*: ‘while the provisions of the ASCM—as *lex specialis*—take precedence over those of the GATT—*lex generalis*—in case of a conflict’ the GATT can ‘fill in possible gaps’.⁹⁴ There is a second argument that ‘denying the applicability of exceptions set out in GATT Art XX to subsidies would create irreversible and unjustified policy inconsistencies’.⁹⁵ Lastly, Farah and Cima make an analogy with *China—Publications and Audiovisual Products* where the Appellate Body agreed Art XX could apply to China’s Protocol of Accession.⁹⁶ Shadikhodjaev considers that ‘renewable energy subsidies are not eligible for GATT general exceptions’ and instead ‘genuine legislative improvements’ are required.⁹⁷ He suggests that WTO members should amend the ASCM Agreement ‘in a manner that would preclude actions against’ Art XX-justifiable ‘green subsidies’ or make the Art XX exception ‘common to all WTO obligations’.⁹⁸ Weber and Koch also argue the ASCM in its current form is ‘outdated’ and ‘does not leave enough space for “green measures”’.⁹⁹

Another area of conflict for renewable energy policies is the overlap between different WTO agreements. Government subsidies may bring about remedies both under the ASCM, but also under anti-dumping regulations. This leads to the possibility of ‘double remedies’.¹⁰⁰ Art VI of the GATT condemns dumping: the practice of introducing a product into a country at a price lower than the ordinary

⁹²Ibid.

⁹³Farah and Cima (2013, p. 726).

⁹⁴Ibid p. 727.

⁹⁵Ibid.

⁹⁶Ibid.

⁹⁷Shadikhodjaev (2015, p. 505).

⁹⁸Ibid.

⁹⁹Weber and Koch (2015, p. 778).

¹⁰⁰Barthelemy and Peat (2015).

price for that product.¹⁰¹ The WTO Anti-Dumping Agreement builds on these provisions.¹⁰² While the act of dumping is not expressly addressed in WTO rules, Members are able to impose anti-dumping duties.¹⁰³ Barthelemy and Peat analyse the interaction between subsidies for renewable energy that are subject to unilateral countervailing duties and simultaneously subject to anti-dumping duties.¹⁰⁴ In *US-AD/CVD*, the Appellate Board stated ‘the obligation to impose an “appropriate amount” of countervailing duties under Article 19.3 of the ASCM Agreements prohibited the imposition of double remedies’.¹⁰⁵ Barthelemy and Peat note it is still unclear which remedy would be declared illegal.¹⁰⁶ After an analysis of recent anti-dumping duties imposed by the US and EU against China, the authors note outstanding legal and economic issues in the application of double remedies in regards to renewable energy technology.¹⁰⁷

4.3 Summary

This brief consideration of other international law agreements shows the pertinence of these instruments to renewable energy, although unlike the UNFCCC regime they may actually present barriers to the take-up of renewables rather than encouragements. While the ECT contains language that could be interpreted to promote the take-up of renewables, and even to some extent an idea of energy democracy given its discussion of sovereignty and sustainability, its operation has mainly concerned traditional centralised fossil fuel energy. The WTO regime has arguably placed certain obstacles in the way of the national incentivisation of renewables, or at least the interaction of trade rules and programmes to incentivise renewables has given rise to trade disputes and created uncertainty as to the legality of some kinds of government programmes.

¹⁰¹Marrakesh Agreement on Establishing the World Trade Organization, opened for signature 15 April 1994, 1867 UNTS 3 (entered into force 1 January 1995) annex 1A (‘General Agreement on Tariffs and Trade 1994’) art VI.

¹⁰²Marrakesh Agreement on Establishing the World Trade Organization, opened for signature 15 April 1994, 1867 UNTS 3 (entered into force 1 January 1995) annex 1A (‘Anti-Dumping Agreement’).

¹⁰³Barthelemy and Peat (2015, p. 6).

¹⁰⁴*Ibid.*

¹⁰⁵Barthelemy and Peat (2015, p. 13). Appellate Body Report, *United States—Definitive Anti-Dumping and Countervailing Duties on Certain Products from China*, WTO Doc WT/DS379/AB/R (11 March 2011).

¹⁰⁶Barthelemy and Peat (2015, p. 14).

¹⁰⁷*Ibid.*

5 Other Initiatives

There are a number of non-state institutions in addition to those already mentioned above that have an impact on the global proliferation of renewable energy technology. These activities of non-state institutional actors such as IRENA demonstrate a pathway towards achieving renewable energy cooperation beyond those pertaining to international law.¹⁰⁸

5.1 *International Solar Alliance*

The International Solar Alliance (ISA) was launched at the 2015 Paris COP21 meeting. It is a

platform for cooperation among sun-rich countries lying fully or partially between the Tropics of Cancer and Capricorn who are seeking to massively ramp up solar energy, thereby helping to bend the global greenhouse emissions curve while providing clean and cheap energy¹⁰⁹

The Alliance includes 120 countries that support the “Declaration on the occasion to launch the international solar alliance of countries dedicated to the promotion of solar energy”. The ISA intends to augment solar power generation through joint efforts in policy, projects, programmes, capacity building measures and financial instruments.¹¹⁰ On 22 April 2016, 25 countries agreed to take action through targeted programs to lower costs of clean energy and input a potential investment of USD\$1 trillion into solar assets.¹¹¹ It was also announced the ISA would work with the United Nations Development Program (UNDP) to promote solar energy globally.

5.2 *International Renewable Energy Agency (IRENA)*

IRENA is an intergovernmental organisation that supports worldwide adoption of policies to support renewable energy investments, provides tools and policy advice for the deployment of renewable energy and facilitates knowledge sharing and technology transfer to achieve the ultimate goal of a transition to sustainable energy.¹¹² IRENA was established in Bonn in 2009 with 75 nations attending the

¹⁰⁸Bruce (2013, p. 11).

¹⁰⁹UNFCCC Newsroom (2015a).

¹¹⁰UNFCCC Newsroom (2015b).

¹¹¹UNFCCC Newsroom (2016).

¹¹²International Renewable Energy Agency (2017b).

Founding Conference. The organisation currently has 154 Members, with 26 States starting the formal process of becoming members.¹¹³ According to Bruce, some of IRENA's actions include:

releas[ing] a Nationally Appropriate Mitigation Actions handbook to assist in the transition to sustainable energy production and consumption; engag[ing] representatives from Gulf states to discuss increasing regional renewable energy; agree[ing] on a memorandum with the Dubai Electricity and Water Authority to accelerate Dubai's renewable energy uptake; and creat[ing] the Global Atlas for Renewable Energy Resources.¹¹⁴

In 2014, 'IRENA developed a global renewable energy roadmap in pursuit of doubling the share of renewables in the global energy mix by 2030'.¹¹⁵ The organisation has 'the power to influence but no binding mandate'.¹¹⁶ However, Leal-Arcas and Minas argue its programmes and advocacy 'improve the conditions for pro-renewable regulation', pointing at the increase in subsidies and other forms of financing directed at promoting renewable energy over the last few years.¹¹⁷

5.3 REEEP

The Renewable Energy and Energy Efficiency Partnership (REEEP) is an international partnership working to accelerate the deployment of renewable energy systems in developing countries, established in 2002 by the United Kingdom together with other governments, business and NGOs.¹¹⁸ The Partnership is funded mainly by sovereign governments, multilateral and international organisations. Australia has funded most of REEEP's projects in the Pacific region. Parthan et al. provide an analysis of REEEP's activities over five years, with the authors arguing that REEEP provides 'on-the-ground, bottom-up examples of lessons and good practice that public policy makers can utilise' and they identify potential for the partnership to scale up its activities.¹¹⁹

5.4 Summary

While again it is difficult to understand the precise impact of these other, non-international law initiatives, their presence suggests a further means to

¹¹³International Renewable Energy Agency (2017c).

¹¹⁴Bruce (2013, p. 29).

¹¹⁵Leal-Arcas and Minas (2016, p. 640).

¹¹⁶Bruce (2013, p. 29).

¹¹⁷Leal-Arcas and Minas (2016, pp. 641–2).

¹¹⁸Parthan et al. (2010, p. 84).

¹¹⁹Ibid p. 92.

incentivising renewable energy beyond the climate agreements. However, it is unclear as to whether they also promote in their activities energy democracy initiatives rather than just the roll-out of renewable energy more generally.

6 Conclusion

The preceding discussion paints a mixed picture for the take-up of renewables in the context of relevant international legal instruments, both explicitly aimed at addressing climate change and energy, and also the WTO regime, which ostensibly concerns trade, but in practice also has an impact on the dissemination of renewables. There is limited research about the impact of these instruments on the take-up of renewables, and even less research on the specific impact they may have on small scale energy democracy projects. The other international level initiatives mentioned in the previous section do play a role in incentivising and realizing renewable energy roll-out, but the extent to which small scale energy democracy projects are encouraged is not clear.

However, to the extent that renewables, and energy democracy are methods of addressing climate change, the problems with the international regime may be much deeper. Indeed, some scholars have argued that many of the international climate negotiations fail to consider structural problems underlying the causes for climate change.¹²⁰ Cléménçon argues the Paris Agreement fails to address the ‘problems with the global capitalist system’ and how this preferences the burning of fossil fuels as a fast and efficient way to secure economic growth.¹²¹ There is also a link made between the potential inconsistencies of attempting to increase trade liberalisation through institutions such as the WTO while attempting to pursue climate goals through the UNFCCC.

It may be that for international law to play a positive or even leading role in decarbonisation and the incentivisation of renewables, especially in energy democracy initiatives, that a more wholesale reform is needed, where trade, energy and environmental policies are coherent and ‘joined up’ rather than the current patchwork (which also has involved conflicts in the trade space). This may also require much more profound reform, in moving away from the current neoliberal capitalist economic paradigm on which the current global economic system is based.¹²² While this is an ambitious goal, the existential threat presented by climate change would seem to necessitate such action at all levels of our law, politics, economy and society.

¹²⁰Bachram (2004), Cléménçon (2016).

¹²¹Cléménçon (2016, p. 11).

¹²²See: Klein (2014).

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Chapter 17

Climate Change and Open Data: An Information Environmentalism Perspective



Robert Cunningham

Abstract Increasingly, climate change mitigation will rely upon open data. In turn, open data flows from access to and use of the information commons. This chapter advances governance principles aimed at protecting and nurturing the information commons. These principles are distilled through the lens of information environmentalism, which encompasses the analytical frameworks of welfare economics, the commons, ecology, and public choice theory. Several emergent concepts are traversed, including informational national parks, information commons rights and the contemporary application of the public trust doctrine. Operationalising the governance principles advanced in this chapter is at once an intellectual and political project.

Keywords Climate change • Open data • Information environmentalism
Commons • Information commons • Information commons rights
Tragedy of ignoring the information semicommons • Informational national
parks • Separation of economic power doctrine • Methodological
interrelationalism • Public trust doctrine • Governance • Intellectual property

1 Introduction

Climate change symbolises the troubled relationship between human beings and nature. It is of course not the only important environmental issue, but it has gained currency over the last few decades because it is all encompassing.¹ Moreover, it has spillover effects, which influence other environmental concerns such as biodiversity

¹Burke et al. (2015, 235). Concerning the interface between climate change and intellectual property, see: Rimmer (2011).

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and the viability of endangered species. Further still, the sustainability of many human communities is at stake.

At present the political prospects of addressing the causal factors underpinning climate change seem diminished.² President Barack Obama, for all of his faults, was making reasonable progress from a climate change policy perspective, particularly with respect to leveraging open data to secure better climate change mitigation outcomes.³ In the rear-vision mirror, the climate change and open data initiatives announced by Obama, especially in his second term, look extremely progressive when contrasted with the first year of the Trump administration.

This chapter is predicated on the assumption open data relies upon access to and use of the information commons.⁴ For this reason, any analysis of climate change and open data must include a discussion about how to protect and nurture the information commons.⁵ This chapter seeks to fulfil this mandate by advancing several macro governance principles.

Structurally the chapter is presented in three parts. Part 2 will surmise the four analytical frameworks of information environmentalism: welfare economics, the commons, ecology and public choice theory. Part 3 will follow with a discussion concerning how best to protect and nurture the information commons. This part will traverse the emergent concepts of informational national parks and information commons rights, along with the contemporary application of the public trust doctrine to the information commons. Part 4 will briefly consolidate the chapter by presenting in table form applicable governance principles, which can be drawn upon to advance progressive outcomes with respect to climate change mitigation and open data.

2 The Four Analytical Frameworks of Information Environmentalism

Part 2 surmises the four analytical frameworks of information environmentalism: welfare economics, the commons, ecology and public choice theory.⁶

²Herrmann (2017), Hutchens (2017).

³See, for example, Data.gov <https://www.data.gov/climate/> (cited 16 August 2017). It is noteworthy that over six months after Trump took power, this initiative still existed on the USA government website.

⁴Benkler (2016). For an example of a practical initiative with respect to open data and the information commons, see <https://opendatacommons.org/about/> (cited 16 August 2017).

⁵For early pioneering scholarship concerning the role of the information commons, see Litman (1990).

⁶A more comprehensive overview of these four analytical frameworks can be found in Cunningham (2014). For a brief summary of this work, see Cunningham (2017b).

2.1 Welfare Economics

Property rights have a tendency of concealing ethical considerations. This has been referred to as the ‘veil of property’.⁷ History provides a litany of examples of this dynamic. An illustration can be found in the myths of Homer whereby Odysseus, upon his return from the wars in Troy, hung ‘a dozen slave-girls of his household whom he suspected of misbehaviour’.⁸ When recounting these myths, Aldo Leopold reflected:

This hanging involved no question of propriety. The girls were property. The disposal of property was then, as now, a matter of expedience, not right and wrong.⁹

The application of the *terra nullius* doctrine as it purportedly pertained to Australia in 1788 provides another significant historical exemplar of where property rights served to conceal fundamental ethical concerns.

The ethical concealment function of property rights also bears relevance to contemporary environmental issues. Property rights, alongside accompanying markets, have often served to disguise the true costs associated with the economic system. This is because, despite, or perhaps because of, Demsetzian theory, property rights often outsource externalities to the public at large.¹⁰ The formula is simple: benefits are privatised and costs are socialised.

Of course there are many ways to problematise climate change, but the *externalities* frame has been important.¹¹ Essentially, this means we do not pay the appropriate price for goods and services because the carbon cost associated with those goods and services is not fully accounted for.¹² In this way the atmosphere becomes a sink filled with fragmented interests and unrepresented damages claims.¹³

While environmental challenges such as climate change are sometimes conceptualised as ‘market failure’, in truth the problem really begins as a ‘property failure’. This is because no market can properly exist without strong property rights (and enforceable contracts).¹⁴ But whichever way the externalities problem is conceptualised, property rights and accompanying markets are an important aspect of the equation.

Several questions lurk. What relevance do property rights and accompanying markets have to the contemporary challenge of climate change? What function do

⁷Cunningham (2014, 15).

⁸Leopold (1949, p. 217).

⁹Ibid.

¹⁰For literature that links property with economic efficiency see, for example, Demsetz (1964, 1967), Manne (1975), and Posner (1977).

¹¹Intergovernmental Panel on Climate Change (IPCC) (2013).

¹²Barker et al. (2016, pp. 211, 211–2).

¹³Stone (1974, pp. 27–28).

¹⁴Coase (1960, p. 31), Demsetz (1967).

property rights have, if any, with respect to climate change mitigation? And does the governance of information have any bearing on this analysis? In answering these questions we must distinguish between situations where property rights and accompanying markets are appropriate, and where they are not. This is a difficult task.

Yet even without the benefit of a formal cost-benefit analysis, it is sometimes obvious that the costs that flow from particular economic activity do not outweigh the benefits.¹⁵ Turning old-growth forest into toilet paper is exemplary.¹⁶ At the margins, however, the equation becomes increasingly complex. If we take carbon emissions associated with energy production, car usage or meat consumption, where do we draw the cost/benefit line? When we add temporal considerations associated with intergenerational equity, the calculus becomes further complex still.

From a welfare economic perspective, the relationship between property rights and markets is important because it speaks to a fundamental issue: when should property rights and markets be deployed and when should alternatives be explored? There is a live paradox at play here because property rights are often used as a method of overcoming market failure.¹⁷ This has especially been the case with respect to climate change mitigation.¹⁸ That is, climate change is a consequence of market failure to the extent that carbon emissions are an externality not fully accounted for within the economic system. Nevertheless a prevailing solution is to establish further property rights and accompanying markets with respect to carbon emissions.¹⁹ In this way we establish 'new' property rights to create fresh markets to overcome 'old' market failures.²⁰ In other words, 'the market' is often used as the default method to overcome 'market failure'.

We can deduce from this brief discussion of welfare economics that property rights and markets are not always the most appropriate method of overcoming environmental challenges such as climate change. It should be of no surprise marginal utility applies to property, as it does with virtually everything else. Welfare economics is useful here because it reminds us, normatively speaking, that the core function of property is not so much to facilitate markets but rather to mediate between private and public interests. If property and accompanying markets do not appropriately fulfil this mediating function then it becomes imperative to explore alternatives. Examining the commons is one way of advancing this governance discussion.

¹⁵Pigou (1952). See, for example, Baulmol and Oates (1975) (capturing the essence of the environmental economic focus on market failures that began with Pigou in the 1920s but was consolidated during the 1960s and 1970s). See also, Yandle (2001, p. 593).

¹⁶Krien (2012, p. 71).

¹⁷Coase (1960, p. 31), Demsetz (1967, p. 347).

¹⁸Stern (2006).

¹⁹Explanations of Emission Trading Schemes abound elsewhere so will not be dealt with here. See, by way of example, Ellerman (2007).

²⁰Cunningham (2014, Chap. 3).

2.2 *The Commons*

If we accept that property rights and accompanying markets cannot solve every problem under the sun, including that of climate change, then we must ask the follow-on question: what are the alternatives?

Throughout most of history various methods of commons governance have dominated.²¹ The commons can be defined as ‘for joint use, shared; land belonging to the community’.²² A key attribute of the commons is that no single person or organisation has exclusive control over use or disposition of a particular resource.²³ Rather, those resources governed by commons may be used or disposed of by anyone (within a relevant community) in accordance with rules that may range from ‘anything goes’ to quite crisply articulated formal rules that are effectively enforced.²⁴ In a very loose sense, the commons can be thought of as ‘the opposite of private property’.²⁵

From a governance perspective, the commons has pros and cons. While tragedy of the commons discourse has broadly discredited the commons, Hardin’s 1968 article originally aimed to explain why private incentives would lead firms to pollute their environment even against their own long-term interest, and thereby justifying pollution controls.²⁶ In other words, Hardin’s core thesis was not so much that all commons are tragic, but rather that commons often require (state) regulation. Neoliberalism has often pushed the tragedy in the other direction calling for more private ownership in order to ‘protect’ the commons.²⁷ Coasian and Demsetzian theory has usually been marshalled to support this push.²⁸

None of this discussion is to say commons are never tragic. Sometimes they are. As Ostrom eloquently articulated, the difference between those who fall victim to the ‘commons dilemma trap’ and those who do not, generally flows from factors internal to a given group.²⁹ The participants may not have the ability to

²¹Ostrom (1990), Rose (1986).

²²*The Australian Oxford Pocket Dictionary* (Oxford University Press, 1976). For further discussion concerning the commons see Lessig (2002, pp. 19–20), Rose (1994, pp. 105–6) (noting that US legal doctrine has strongly suggested that some kinds of properties should not be held exclusively in private hands but instead should be open to the public or at least subject to public right of use). See also Pasquale (2006).

²³Benkler (2003), 6.

²⁴Ibid.

²⁵Boyle (2003).

²⁶Hardin (1968).

²⁷Smith (1981). See also Welch (1983) (at 171: ‘the establishment of full property rights is necessary to avoid the inefficiency of overgrazing’).

²⁸Along with allocative efficiency, the tragedy of the commons issue is often married to negative externalities. See Smith (2002) (arguing at 457: ‘The Demsetzian account of the rise of property rights fits in well with the traditional story of the ‘tragedy of the commons’”).

²⁹Ostrom (1990).

communicate with each other (read: prisoner's dilemma), no means to foster trust, and no sense they share a common future.

Part of the challenge is that property is often conceived of in binary terms. In particular, the intellectual dominance of neoliberalism, between say 1980–2010, led to property being perceived as an on/off switch. This is because, according to the traditional neoliberal analysis, the prime function of property rights is to facilitate markets.³⁰ As property and markets have been viewed as more 'efficient' than the state or any other alternative, the dominant (neoliberal) standpoint is that wherever possible resources should be privatised so the market can set about effectively allocating. Put another way, according to neoliberal discourse, the property switch should usually be turned on so the market can get on with the business of efficiently allocating resources. Yet this is not the only way to conceptualise property.

An alternative perspective, as alluded to above with reference to welfare economics, is to think about property as a mediator between private and public concerns. This view accords with reality to the extent that virtually all types of property simultaneously possess private and public characteristics.³¹ Once we confront this simple fact the nexus between property rights and markets becomes murkier than neoliberalists would have us believe.

Pufendorf illustrated a more nuanced perspective of property thus: 'the oak tree was no one's, but the acorns that fell from it became his who gather them'.³² Governance models built on the commons have the vital job of reclaiming Pufendorf's nuanced perspective. Recognising 'the tragedy of ignoring the semi-commons' is an important part of this equation.³³ This means we must recognise the dynamic efficiencies that exist between private property and the commons. Doing so makes redundant the idea all property should be private.

Pufendorf also distinguished between positive community (*res communis*) and negative community (*res nullius*).³⁴ According to the positive community perspective, 'resources are considered to belong to everyone and therefore any use of such resource is required to be for the benefit of the public at large'.³⁵ In contrast, the negative community perspective suggests that 'resources belong to no one and are therefore unclaimed and for the taking'.³⁶ Correspondingly, positive community benefits 'the weak', whereas negative community benefits 'the strong'.

³⁰Coase (1960, p. 31), Demsetz (1967).

³¹Smith (2000, pp. 131–132).

³²Carr (1994, p. 185).

³³Cunningham (2010).

³⁴Carr (1994, p. 185). Aside from natural law theorists such as Pufendorf, the positive/negative distinction has also been relied upon by philosophers such as Isaiah Berlin with respect to freedom. See Berlin (1958).

³⁵Chander and Sunder (2004, p. 1356), especially footnote 133. This perspective also accords with the 'positive community' and 'negative community' descriptions discussed by Drahoš (1996, pp. 45–46, 57–59, 65–66, 68).

³⁶*Ibid.*

From a climate change perspective, the commons encompasses the atmosphere at large. According to *res nullius* this resource belongs to everyone and therefore any use of this resource must be for the benefit of the public as a whole. In this way, the biospheric commons becomes a ‘site of struggle’—a battleground of opposing interests.³⁷ In contrast to the *res nullius* perspective, adoption of *res communis* holds the potential to foster positive climate change mitigation outcomes—at least, theoretically. But how do we actually realise *res communis* with respect to the atmosphere so as to address the climate change challenge? Applying the analytical framework of ecology is a useful next step in addressing this inquiry.

2.3 Ecology

Drawing upon welfare economics and the commons we have seen so far that property and accompanying markets is not always the best way to solve contemporary problems. The following passage by Drahos reflects these sentiments:

[Property rights] allow owners of those rights to escape the true costs of the negative externalities generated by various production processes. For example, while mining companies operate under many environmental constraints, the true costs of the exercise of their mining rights – in terms of atmospheric pollution and biodiversity loss – are still not being met. Even if we devise property-based schemes to help internalize the externalities (e.g. emission trading schemes), all models of economic growth underpinned by property rights eventually hit the wall of natural resource finitude. Property rights do not save us from the tragedy of the commons. Instead, under the cover of false dawn of natural resource management they unleash in owners of the means of production a much deeper and more aggressive assault upon the biospheric commons.³⁸

How can we counteract this ‘aggressive assault upon the biospheric commons?’ We have seen above that applying *res communis* within a commons governance framework is a useful starting point. But this only gets us so far. What other lessons can we extract from ecology?

There are many ways in which we can understand the concept of ecology. It stems from the convergence of two Greek notions being that of *oikos* (relating to household) and *logos* (relating to study).³⁹ Hence, literally speaking, ecology is the study of ‘life at home’. If we consider the earth to be our home, a literal translation still holds. Broadly speaking, ecology has facilitated: (i) a scientific understanding of the natural world; (ii) a set of governance principles; and (iii) an (ecological) ethic.⁴⁰ Each of these functions can be used to support the application of *res communis* to the global commons of the atmosphere.

³⁷Atteberry (2010, p. 329). See also Liang (2010, pp. 369–370).

³⁸Drahos (2011, pp. 33–34).

³⁹Odum and Barrett (2004, 3).

⁴⁰Cunningham (2014, 90–92).

While the focus of this chapter is on governance principles, it is useful at this juncture to briefly surmise some scientific and ethical insights relating to ecology. This is because these perspectives flow into governance considerations. To this end, a discussion of methodological interrelationalism, along with diversity and resilience, is warranted.

2.3.1 Methodological Interrelationalism

Neo-Liberalism tends towards methodological individualism. With its emphasis on the individual this perspective falls into the trap of the ‘individualist fallacy’ whereby relevant relational features of society are ignored.⁴¹ The individual is paramount and, at the extreme, ‘there is no society upon which to speak’.⁴² In contrast, communist ideology often falls foul of the ‘collectivist fallacy’.⁴³ This fallacy essentially consumes the individual within a collectivist framework. The collective dominates and the individual becomes collateral damage.

Of course, if we move away from strict ideology, in the real world individuals and society both co-exist. Moreover, there is an interrelational dynamic between the individual and society and vice versa. In this way, we arrive at a ‘third pathway’ being that of ‘methodological interrelationalism’.⁴⁴ According to this perspective we can observe how an individual relates to the collective while also simultaneously recognising the systemic effect of this relationship on the individual.

The methodological interrelational perspective accords with ecological systems. From an ecological point of view, an understanding of interrelationalism is crucial because it underscores the fact that harm to one part of a system is likely to have detrimental flow-on effects to the system as a whole. Of course, climate change is emblematic of this interrelational dynamic.

From a governance point of view, an appreciation of methodological interrelationalism reminds us to take into account not just private interests and public interests, but also the dynamic interaction between these interests. This was a theme advanced above with reference to Pufendorf, and it is also apparent within the tragedy of ignoring the semicommons.

2.3.2 Diversity and Resilience

Diversity is one of the key lessons of ecology. In Rachel Carson’s classic *Silent Spring*, she explained that by homogenising nature through agricultural practices

⁴¹Carter (1999, 66–67).

⁴²Margaret Thatcher’s comment to Woman’s Own magazine on 31 October 1987 is emblematic: ‘there is no such thing as society’.

⁴³Carter (1999, 66–67).

⁴⁴*Ibid.* at 82.

humans have either consciously or unconsciously set about undermining the ‘built-in checks and balances by which nature holds the species within bounds’.⁴⁵ The lesson that flows from this understanding is the more diverse a system is the more likely the system will be stable over time and therefore resilient.

There are various ways of incorporating understandings of diversity and resilience within social systems. But if we cast our mind back to the earlier welfare economic discussion it will be recalled that property rights and accompanying markets have tended to dominate the intellectual landscape. This brand of ‘property fundamentalism’ leads to homogenous political and economic outcomes.⁴⁶ By rejecting the default mode of propertisation we can begin to explore alternate social systems that foster, rather than crush, diversity and resilience.

In this context, in the same way liberal economic democracies have been encouraged to foster a ‘mixed economy’, in the contemporary age it is incumbent upon such states to foster ‘mixed governance modalities’. Exploring public choice theory is useful in this respect.

2.4 Public Choice Theory

Public choice theory implies that public decisions are likely to be detrimental when concentrated interests trump the interests of the collective as a whole.⁴⁷ The theory highlights: (i) the regulatory capture/rent-seeking activities of concentrated interests, and (ii) the significance for civil society in overcoming collective action problems.

The issue of climate change validates both limbs of public choice theory. That is, inaction has been fostered by the regulatory capture/rent-seeking activities of concentrated interests. Yet at the same, civil society has made significant progress in overcoming the collective action problems associated with climate change mitigation. In other words, although the success has been only partial, the contemporary environmental movement has made some inroads in relation to climate change mitigation by simultaneously counteracting regulatory capture/rent-seeking, while also overcoming collective action problems through civil society organisation activity.

In the same way the commons is ‘a site of struggle’, so too the two limbs of public choice theory symbolise a battle between private economic interests and the public interest of civil society. Most, if not all, battles involve a tussle for power. In contemporary liberal economic democracies, *constitutionalism* is used as the formal

⁴⁵Carson (1962) [1968], 27.

⁴⁶Drahos (1996, p. 201) (proprietaryism is not a theory so much as ‘a creed and an attitude which inclines its holders towards a property fundamentalism’).

⁴⁷Buchanan and Tullock (1962). See also Chomsky and Herman (1988), (arguing that the media radically distorts the flow of information at the behest of private commercial interests).

mechanism to resolve tensions arising from the deployment of power.⁴⁸ In particular, many constitutions have sought to dilute the concentration of control by *separating* the power of the legislature, executive and judiciary.⁴⁹ Federalist structures such as the US and Australia go further by *dividing* power between Commonwealth and state governments.

When power resides in the political sphere, the separation (and division) of power is reasonably effective. However, when power shifts from the political sphere to the economic sphere, as has happened over the last century, new methods are required to dilute (economic) power.⁵⁰ This claim underpins ‘the separation of economic power doctrine’.

2.4.1 Separation of Economic Power Doctrine

The key to understanding ‘the separation of economic power doctrine’ is to appreciate the significance of the competitive tension that exists between the various productive forces of the state, the market, the firm, and society.⁵¹ To surmise, each of the dominant production modes has comparative advantages over the other in a given circumstance.⁵² For instance, if we are to manufacture an aeroplane the firm is likely to be most efficient; if we are building public infrastructure such as roads or railway the state is usually pretty effective; if we are considering the delivery of low-barrier-to-entry goods such as fruit and vegetables, or services such as massage, the market does a reasonable job; and if we are concerned with the production of information goods where the allocation of human creativity and/or intellectual input are required—such as computer software—then social production often trumps.⁵³ A simplified political economic representation of the production modes can be found in Fig. 1.

Of course, in reality much production is hybridised between the production modes such that it is common for the state and the firm, for instance, to enter into a partnership to deliver a particular good or service.

Given that climate change is largely a consequence of economic activity, it is important to understand the characteristics of each production mode. It is also crucial to appreciate how power amasses through each of these modes. This was a core concern of Adam Smith in *The Wealth of Nations* to the extent he was interested in leveraging the economic power of the citizen through market activity

⁴⁸Buchanan and Tullock (1962), Posner (1982), Farina (2005), in Backhaus (ed) (2005), 190.

⁴⁹See, for example, the Australian Constitution 1901.

⁵⁰Cunningham (2010), 1.

⁵¹Ibid.

⁵²Cunningham (2014, Chap. 10).

⁵³Ibid.



Fig. 1 The political economics of production modes [derived from Stilwell (2000, p. 124)]

so as to wrestle political power away from the monarchy.⁵⁴ This aspect of Smith’s work has been repurposed by the neoliberal intellectual tradition to argue that private enterprise, or the ‘invisible hand of the market’, is always the most effective way to allocate resources.⁵⁵ But the irony here is that Smith was one of the first to recognise the market sometimes fails in relation to public goods. To this end, Smith was a strong advocate of state production in overcoming the public goods market failure:

[One] duty of the sovereign or commonwealth is that of erecting and maintaining those public institutions and these public works, which, though they may be in the highest degree advantageous to a great society, are, however, of such a nature, that the profit could never repay the expense to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect or maintain.⁵⁶

⁵⁴Smith (1786) [1904].
⁵⁵As a moral philosopher, Adam Smith was profoundly interested in matters of ethics (and religion). In this regard, the reference to the ‘invisible hand’ in the eighteenth century was likely to have been a reference to the ‘hand of providence’. This had religious, or at the very least ethical, connotations. See Baumol and Wilson (2001, pp. 81–82).
⁵⁶Smith (1786) [1904], cited in Hope (2008, p. 132, footnote 52).

Pigou adopted a similar view.⁵⁷ This is not a submission that state production will always triumph over the market or the firm. Rather, the point here is that temporality and context have bearing on the most appropriate production mode. This becomes particularly important when considering climate change mitigation strategies.

So what bearing do production modes have on climate change? This is a difficult question to answer in the abstract because factors such as technology may be as crucial as political economic arrangements. Yet the centralisation of economic power is surely one factor that has led to detrimental climate change consequences. This is why it is fruitful to explore the productive forces and the competitive tension between them. We will see in Part 3 that an important aspect of this equation is protecting and nurturing the information commons.

3 Information Commons

Given we are in the information age, and that access to and use of information is likely to be a key driver for climate change mitigation, it is imperative we get the setup right concerning the governance of information. Protecting and nurturing the ‘information commons’ forms a vital part of this picture. After briefly elaborating upon the relationship between social production and the information commons, this part will discuss three emergent concepts: informational national parks, information commons rights and the application of public trust doctrine to the information environment.

3.1 *Social Production and Information Commons*

Economic production in the nineteenth and twentieth centuries tended to favour property rights and exclusivity. But as Benkler reminds: ‘non-proprietary strategies have always been more important in information production than they were in the production of steel or automobiles’.⁵⁸ This is a key issue for climate change mitigation because most, if not all, of the solutions are likely to be information-based. This is true whether we are considering the data used to diagnose climate change or whether we are considering intellectual property rights underpinning renewable energy technology. In other words, access to and use of the information commons will be a key factor in any climate change mitigation strategy. We can deduce from Benkler’s work that ‘non-proprietary strategies’ are likely to play a greater role than ‘proprietary strategies’ in the context of climate change mitigation.

⁵⁷Pigou (1952).

⁵⁸Benkler (2006, p. 4).

Another way of conceptualising Benkler's 'non-proprietary strategies' is to consider 'social production'. While social production is often thought of as a novelty, Benkler reminds such methods have been in operation since time immemorial.⁵⁹ The disciplines of science, law, education and music all provide examples of non-proprietary social production methodology.⁶⁰ Most social production is built upon the two critical traits of decentralist and commons-based. Benkler implicitly alluded to these social production characteristics in the following passage:

[I]n *[social] production*, we are seeing an avenue of resistance to the hierarchical exercise of economic power that does not flow through the state. More Kropotkin than Lenin, this source of *power in the hands of people networked together* is, I think, the single most attractive feature of the information commons.⁶¹

This passage hits on a key point: the information commons will be a critical component of social production in the 21st century. We can further deduce that social production is likely to have an increasingly important role in climate change mitigation.

Hence, we must protect and nurture the information commons in order to facilitate competitive tension between social production and the alternatives being state-, firm- and market-based production. To progress this submission the chapter now turns to three emergent ideas: informational national parks, information commons rights, and the application of the public trust doctrine to the information environment.

3.2 *Informational National Parks*

Informational national parks are a rhetorical device that can be used to capture the imagination of those with an interest in protecting and nurturing the information commons. Part of this project is bringing people from different walks of life together. As Boyle states:

Right now, it seems to me that, in a number of respects, we are at the stage that the American environmental movement was at in the 1950s or 1960s. At that time, there were people – supporters of the park system, hunters, birdwatchers and so on – who cared about what we would now identify as 'environmental issues'. In the world of intellectual property we now have start-up software engineers, libraries, appropriationist artists, parodists, biographers, biotech researchers, and others.⁶²

⁵⁹Ibid. See also Benkler (2002, p. 383). See also, Schultz and Urban (2012, p. 15), Chesbrough (2003, 2006), Shirky (2008a, b).

⁶⁰See, for example, Drahos (1996, p. 15) (referring to China as an example of a society that achieved spectacular scientific and innovative outcomes without an IPR system).

⁶¹Emphasis added. Benkler (2010 p. 231).

⁶²Boyle (1997, p. 108).

Just as it was deemed necessary in the nineteenth century to create national parks to protect and nurture the physical environment, in the twenty-first century it is necessary to create informational national parks to protect and nurture the information commons. This suggestion is not so strange when considering open source social production initiatives such as Wikipedia, Mozilla Firefox and Creative Commons. While such initiatives are useful, they are ultimately private-ordering systems. The idea of information national parks differs because such information commons reserves would be publicly ordered.

The theoretical basis of informational national parks is that there is a symbiotic relationship between looking after the health of the information environment and securing a sustainable physical environment.⁶³ In particular, a sustainable future will require access to and use of an information commons, which embeds useful information that can in turn be accessed or used to secure positive environmental outcomes.⁶⁴ The concept of information here is broad, encompassing a wide range of human activities embracing everything from culture through to education and innovation.

The central idea underpinning informational national parks is that information relating to certain public goods such as health, education or the environment would be accessible and usable. Given the different categories of intellectual property rights—copyrights, patents, trademarks, design, know-how—it is difficult to specify precisely, within this chapter, the appropriate legal mechanisms. Clearly, more research is required here.⁶⁵

Practically speaking, some scholars have already set about systematically defining the information commons.⁶⁶ This work could be leveraged to assist in clarifying the contours of informational national parks. In some instances relevant climate change information will already fall within the information commons broadly defined. In other instances it will be necessary to expand the categories of information that remain accessible and usable. In the domain of patents, for instance, compulsory licensing geared towards climate change mitigation might become a feasible and desirable consideration. With respect to copyright, Crown ownership might automatically be subject to a licence akin to Creative Commons where the relevant copyright related to the diagnosis or resolution of climate change.

Ultimately, the contours of informational national parks will be established through local political processes.

⁶³The 'information environment' can be thought of as those processes and procedures relating to the production, consumption, communication, distribution and diffusion of information. The 'physical environment' can be simply thought of as the surroundings or conditions in which an animal, plant or human lives.

⁶⁴The 'information commons' embodies information that can be accessed and used by the public. For a nuanced perspective of the information commons, see: Cunningham (2010).

⁶⁵For a thought experiment concerning what this type of research might look like, see: Cunningham (2017).

⁶⁶See, for example, Greenleaf and Lindsay (2018).

If we move beyond the rhetorical aspect of informational national parks, it will also be necessary to establish *procedural* and *substantive* legal mechanisms that can be used to protect and nurture the information commons. It is in this context that Information Commons Rights (ICRs) and the public trust doctrine are respectively explored.

3.3 *Information Commons Rights*

A core claim of this chapter is that the information commons plays an important role in climate change mitigation (among other things). Thus, allowing the public to speak on behalf of the information commons is one way of indirectly ensuring better climate change mitigation outcomes.

A key aspect of ICRs is that the public would be provisioned with standing rights to speak on behalf of the information commons. This process has been used to good effect with respect to the physical environment. For instance, section 123 of the Environmental Planning and Assessment Act 1979 (NSW) established open standing provisions to allow the public to speak on behalf of the environment. Why not also establish parallel provisions with respect to the information commons? ICRs would serve to foster the public interest aspects of the information environment as a counterbalance to the private interest claims of IPRs.

In many ways ICRs are a natural development of safeguards already built into the IPR regime. It is no coincidence that IPRs have a duration limit, and fair use and other provisions inherent within IPRs are geared towards ensuring the information commons is not unduly diminished. IPRs are leaky for a reason. As Breyer J states in relation to the intellectual property clause within the US Constitution:

The Clause exists not to ‘provide a special private benefit’, but to stimulate artistic creativity for the general public good... The ‘reward’ is a means, not an end. And that is why the copyright term is limited. It is limited so that its beneficiaries – the public – ‘will not be permanently deprived of the fruits of an artist’s labors’.⁶⁷

Moreover, the information commons serves many functions that are critically important yet difficult to measure. Referring to the public domain, Pamela Samuelson lists eight functions of the information commons: ‘[A]s building blocks for the creation of new knowledge, enablers of competitive imitation, enablers of follow-on innovation, enablers of low cost access to information, enablers of public

⁶⁷This argument was initially stated in *The Clothworkers of Ipswich*, 78 Eng Rep (1615) at 148 cited in Walterscheid (1999/2000, pp. 323–324, footnote 29). But see also *Stewart v Abend* 495 US 207, 228 (1990) cited in Rimmer (2007, p. 29, footnote 35). See also, *Twentieth Century Music Corp. v Aiken*, 422 US 151, 156, 186 USPQ (BNA) 65, 67 (1975) (stating that the ultimate aim of copyright is to ‘stimulate artistic creativity for the general public good’); and Harrison (2005, p. 3, footnote 4).

access to cultural heritage, enablers of education, enablers of public health and safety, and enablers of deliberative democracy.’⁶⁸ Most, if not all of these functions, serve to benefit climate change mitigation.

While private ordering initiatives such as the General Public Licence already exist to protect various aspects of the information commons, it is also important to establish publicly ordered initiatives geared towards protecting the information commons. ICRs are one way in which to do this.⁶⁹ Relying upon the contemporary application of the public trust doctrine is another.

3.4 Public Trust Doctrine

Protecting and nurturing the information commons requires numerous approaches. Informational national parks make a *rhetorical* contribution, and information commons rights would facilitate *procedural* avenues through legal standing. The contemporary application of the public trust doctrine would provide a *substantive* channel to protect and nurture the information commons.

In the 1970s, flowing from the contemporary ecological thinking of the day, legal scholarship emerged which sought to ‘bestow legal rights of existence on animate and inanimate objects’ within nature.⁷⁰ For instance, in 1972 Christopher Stone published his original work *Should Trees Have Standing?* arguing for the application of legal rights to nature.⁷¹ At around the same time, in 1970, Joseph Sax sought to revitalise the ‘public trust doctrine’ as a legal instrument for citizens to protect the environment.⁷²

Historically speaking, the public trust doctrine evolved from Roman law concepts of public property, or more specifically the Justinian Code inherent within Byzantine law, whereby rivers, air and the sea were dedicated to the public and therefore incapable of private ownership.⁷³ The doctrine was to some extent codified within the Magna Carta and it was eventually adopted by most medieval

⁶⁸Pamela Samuelson quoted in Bannerman (2009, p. 168). See also Wirten (2008, p. 6) (referring to Pamela Samuelson’s ‘thirteen public domains’).

⁶⁹By way of grounding the ICR notion, patent oppositions systems reflected in patent legislation of many countries, as exemplified by section 25 of the Indian Patent Act, provides one tangible example of how ICRs might be operationalised in practice. To create a notion of ‘essential intellectual property’ in parallel with the ‘essential facilities’ doctrine inherent within competition law provides another practical alternative when seeking to realise ICRs.

⁷⁰Pepper (1986, pp. 88–89).

⁷¹Stone (1972).

⁷²Sax (1969, pp. 478–489), Sun (2009, p. 8), Ryan (2004, p. 348) [pointing out that Sax’s article is one of the most cited law-review articles of all time—referring to Shapiro (1985, pp. 1551–53)].

⁷³The Institutes of Justinian bk, 2, tit. 1, pts. 1–6, at 65 (J Thomas trans., 1975).

European legal systems.⁷⁴ For instance there is clear evidence of the doctrine operating within eleventh century French law.⁷⁵

A more modern version of the public trust doctrine was embedded within the landmark US Supreme Court case of *Illinois Central Railroad v Illinois* where the Court disallowed privatisation of navigable waters of Lake Michigan as these resources were regarded as being ‘held in trust for the people of [Illinois]’.⁷⁶ The Court stated:

[The title to submerged lands] is a title different in character from that which the State holds in lands intended for sale. It is different from the title which the United States hold in the public lands which are open to preemption and sale. It is a title held in trust for the people of the State that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein freed from the obstruction or interference of private parties.⁷⁷

Inherent within *Illinois Central* is a basic principle—the public possesses certain rights in resources. This principle limits the power of legislative representatives to alienate such resources.

There are two dominant themes inherent within the public doctrine, which are relevant when determining the doctrine’s application: (i) fiduciary obligations and (ii) judicial review.

According to the fiduciary aspect of the public trust doctrine an individual may abandon her private property but a public trustee cannot abandon public property.⁷⁸ Here it would seem that either the public itself possesses a property right in relation to public resources; or in the alternate, the state owes a duty to the public to protect public resources.⁷⁹ The following comments from the US case *National Audubon Society v Superior Court* (1983) are illustrative:

The public trust is more than an affirmation of state power to use public property for public purposes. It is an affirmation of the duty of the state to protect the people’s common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust.⁸⁰

The judicial review perspective of the public trust doctrine, on the other hand, tends to lead courts to view ‘low visibility decision making’ in an unfavourable

⁷⁴Bloch (1966, p. 183).

⁷⁵Ibid.

⁷⁶*Illinois Central Railroad v Illinois*, 146 US 387 (1892).

⁷⁷*Illinois Central Railroad v Illinois*, 146 US 387 (1892).

⁷⁸The case of *Arnold v Mundy* 6 NJL 1, 71–78 (1821) ‘marks the origin of the fiduciary aspect of public trust doctrine’. See also *State v Cleveland & Pittsburgh R.R.*, 94 Ohio St. 61, 80 113 NE 677, 682 (1916).

⁷⁹In *Re Complaint of Steuart Transp. Co.*, 495 F Supp 38, 40 (1980); *National Audubon Society v Superior Court*, 33 Cal. 3d 419, 441 (Cal. 1983).

⁸⁰*National Audubon Society v Superior Court*, 33 Cal. 3d 419, 441 (Cal. 1983).

light.⁸¹ Such decision-making occurs where critical resource-allocation decisions are made without adequate notice or publicity.

Regardless of whether the fiduciary obligation or judicial review perspective is adopted, the public trust doctrine operates to ensure the state does not revoke the public's collective rights by trading them away and/or transferring them to private parties. This is why the Court adopted the following view in *Illinois Central*:

The only proper exception to the general rule of inalienability is that the State can transfer public trust resources to private parties if they 'are used in promoting the interests of the public' or the transfer is made 'without any substantial impairment of the public interest'.⁸²

Evidently, the public trust doctrine provides the jurisprudential foundation for courts to act on behalf of citizens' to override unreasonable privatisations of public resources carried out by the State.⁸³

According to the analysis advanced in this chapter, the 'unreasonable privatisations of public resources' would extend to the information commons generally, and climate change related data and information in particular. The basis of this claim is that everyone has a vested interest in climate change mitigation, and clearly such mitigation relies upon climate change related data and information remaining accessible and usable.

4 Climate Change and Open Data Governance Principles

Before concluding, and to consolidate the contents of the chapter, several governance principles can be advanced, which can in turn be drawn upon in the context of climate change (mitigation) and open data. The principles are as follows (Table 1).

These climate change and open data governance principles are a combination of abstract and concrete. This is because the information environmentalism project is at once intellectual and political. Governance principles and practical solutions are natural complements. As Kurt Lewin once said: 'there is nothing quite as practical as good theory'.⁸⁴ It is for others to determine whether the theoretical perspectives advanced in this chapter are 'good'.

⁸¹Araiza (1997, p. 398); Ryan (2000), 700.

⁸²*Illinois Central Railroad v Illinois*, 146 US 387 (1892) at 452–453.

⁸³*Ibid.* at 491–565.

⁸⁴It is unclear whether the 'nothing quite as practical as good theory' notion should be traced to Kurt Lewin (the founder of social psychology) as per Lewin (1945, p. 129), or, in the alternate, John Dewey in accordance with his general pragmatist theories [e.g. Dewey (1938, pp. 12–22)].

Table 1 Climate change and open data governance principles

Analytical framework	Climate change and open data governance principles
Welfare economics	Counteract property fundamentalism by ensuring property rights serve the key function of appropriately mediating between private and public interests
The commons	Apply commons-based governance models that instil <i>res communis</i> —commons resources belong to everyone and must be used for the benefit of the public at large
Ecology	Adopt governance frameworks that incorporate insights flowing from methodological interrelationism, diversity and resilience
Public choice theory	Operationalise the separation of economic power doctrine by protecting and nurturing the information commons in order to facilitate competitive tension between the productive forces of the state, the firm, the market, and society
Information environmentalism	Promote informational national parks as a rhetorical device to encourage the accessibility and usability of the information commons, particularly in relation to climate change related data
Information environmentalism	Establish information commons rights in order to provision the public with legal standing so it can advocate on behalf of the information commons, particularly with respect to climate change related data
Information environmentalism	Revitalise the public trust doctrine by applying it to the information commons, especially climate change related data

5 Conclusion

This chapter is built upon the core claim that the diagnosis and resolution of climate change will largely depend upon access to and use of information. For this reason it is important to protect and nurture the information commons, particularly as it relates to data and information concerning climate change.

The chapter begun by surmising the application of four analytical frameworks: welfare economics, the commons, ecology and public choice theory. Each of these analytical frameworks has bearing on both the physical environment and the information environment. We saw, for example, that welfare economics hazards against using property to fix every problem under the sun. We also begun to appreciate the nuances inherent within commons governance: not every commons needs to be tragic. Applying *res communis*—where resources are considered to belong to everyone and therefore any use of such resource is required to be for the benefit of the public at large—is a useful starting point. Thinking about the application of the ecological principles of methodological interrelationalism, diversity and resilience also moves us in the right direction. From a social systems perspective, the separation of economic power doctrine—derived from public choice theory—is one method of realising desirable ecological principles. This doctrine ultimately seeks to foster competitive tension between the productive forces of the state, the firm, the market and society. From a governance perspective, such competitive tension would have positive spillovers for climate change mitigation.

Implicitly, each of the four analytical frameworks speaks to the importance of protecting and nurturing the information commons. Consequently, Part 2 of the chapter traversed emergent concepts that might assist in this regard: informational national parks, information commons rights, and the public trust doctrine. Each of these concepts has the potential to play an important complementary role in protecting and nurturing the information commons. For instance, information national parks are a *rhetorical* device that can be used to ignite the public imagination and bring together people from different walks of life that have an interest in the information commons. Information commons rights represent a *procedural* legislative instrument that can be leveraged by the public to speak on behalf of the information commons. And the contemporary application of the public trust doctrine provides the *substantive* legal underpinnings to protect and nurture the information commons. Together, informational national parks, information commons rights, and the public trust doctrine, hold the potential to advance progressive climate change mitigation outcomes.

The chapter concluded by advancing several governance principles that can be drawn upon when seeking a theoretical foundation for climate change mitigation as it relates to open data. The work has refrained from fleshing out the details of applying the suggested governance principles. This research is for another time and place. Rather the objective has been to propose a set of governance principles that can be relied upon when thinking about the interaction between the physical environment and the information environment, particularly within the context of climate change and open data.

The transition from President Obama to President Trump has brought to the fore the importance of institutions. A follow on query is whether our current institutional frameworks are fit-for-purpose. This chapter has advanced ideas that, if embraced, would lead to institutional evolution. The overall aim being to ensure that the prevailing political, legal and economic institutions can survive present and future onslaughts.

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Chapter 18

Open Government Data in an Age of Growing Hostility Towards Science



Bernadette Hyland-Wood

Abstract Policy-making is inherently political, and bound up with different beliefs, values and viewpoints, as public policy scholars studying climate change policy know all too well. This is why there has, and always will be debate in policy-making circles about the relevance and reliability of particular sources of evidence (Wells, 2007). However, support for open government data to inform policy has generally been supported by the U.S. executive and legislative branches of government. President Reagan made Global Positioning System (GPS) data available for peaceful, civilian use in 1986. Earth observation data, including greenhouse gas (GHG) emissions, air quality and surface temperatures, is used by experts worldwide to address the growing demand for energy, food and water. The Trump administration (beginning January 2017), has broken with previously observed protocols, highlighting the fragility of open government data upon which science and policy experts depend. What is the impact of an ‘America First’ stance on open government data? Do federal agencies have the ability to protect and preserve environmental data as administrations transition? Does the President and Congress receive guidance on open government data policies and laws impacting the global transition to low-carbon development contemplated under the Paris Agreement?

Keywords Climate change • Earth observation • Environmental data
Paris agreement • Open government data • Suppression of science

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1 Introduction

Open government data is ‘content that is published on the public Web by government authorities in a variety of non-proprietary formats.’¹ Earth observation data is a large subset of open government data includes measurements of greenhouse gas (GHG) emissions, air quality and surface temperatures. This data is used by policy relevant experts to address the growing demand for energy, food, and water. The U.S. has been collecting and disseminating Earth observation data, at taxpayers’ expense, since the mid-Nineteenth Century,² and has become the largest distributor of this type of information in the world.³

The public and private sectors became accustomed to working in partnership, and thanks to their combined efforts access to open government data increased over successive administrations, beginning with former President Reagan. However, from the start, the Trump administration rejected climate change as fake,⁴ and the U.S. Environmental Protection Agency (EPA) became singled out as an example of bloated government and unnecessary red-tape.⁵ What followed in the first months of the Trump administration were announcements of significant budget cuts and the appointment of political executives, renowned for their skepticism towards environmental regulation and climate change research.⁶ The new administration’s stance on climate change abruptly disrupted the growth trajectory of open government data. Considering the vast majority of climate change researchers accept that ‘greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever’,⁷ and that urgent action is needed, one could argue that Earth observation data is vulnerable at precisely the time that support for publicly-funded science and international collaboration is most needed. The Paris Agreement, ratified by 173 countries of the 197 States party to the Convention,⁸ is arguably the largest scientific, industrial and policy collaboration project humanity has ever undertaken.⁹

This profound transformation will not be easy and will involve difficult decisions. Leadership is needed now more than ever. And the contribution to this transformation by business, subnational governments, indigenous people, youth, women and many others cannot be overlooked.

Executive Secretary of UNFCCC, Patricia Espinosa

¹Hyland-Wood et al. (2013).

²Hearn (2003, p. 3).

³Office of Science and Technology Policy (2014, 1).

⁴Zurcher (2017).

⁵Brady (2017a).

⁶Tabuchi (2017).

⁷Pachauri and Meyer (2014).

⁸United Nations (2018).

⁹Zhang et al. (2017, pp. 213–14).

At the 22nd Conference of the Parties to the UN Framework Convention on Climate Change 2016¹⁰

The United States, the world's second largest emitter of greenhouse gas emissions, withdrew from the Paris Agreement in the first year of the Trump administration.¹¹ This decision, announced on June 1, 2017 accelerated the determination of many United States and international stakeholders to continue their efforts.¹² Nonetheless, President Trump and several of his political appointees at science agencies displayed open hostility towards science, with the harshest scorn arguably directed at the environmental research and regulatory communities.^{13,14}

Despite international consensus on human-caused global warming, and a climate science report released by 13 federal science agencies which stated it is 'extremely likely' that human activities are the dominant cause of recent climate warming,¹⁵ United States Environmental Protection Agency (EPA) Administrator Scott Pruitt, and Energy Department Secretary Rick Perry questioned the extent of a human role in climate change. Mr. Trump has previously portrayed climate change as a hoax, 'created by and for the Chinese in order to make U.S. manufacturing non-competitive.'¹⁶ Rather than merely engage in a war of words to discredit science, Mr. Trump's 'America First' policy immediately prioritized the interests of the energy and transportation industries over long standing environmental regulation and transparency efforts. A case in point is the approval of the Dakota oil pipeline, and the brushing aside of various environmental concerns.¹⁷ More importantly, open access to information on climate change on prominent government websites, including the White House website, was removed.^{18,19}

In a year rocked by political disruption, assumptions about usual and customary behavior regarding publicly-funded science have arguably been shattered. This raises a number of important questions for those interested in the nexus between policy-research and policy-uptake. For example, it raises the perennial question of the conditions under which evidence-based policy can occur,^{20,21} as well as the question of what can be done to prevent disruption due to a sudden populist 'mood-swing' and growing skepticism towards elites and their expert knowledge.²²

¹⁰United Nations (2016).

¹¹U.S. State Department (2017).

¹²Figueres (2017).

¹³Davenport (2017b).

¹⁴Davenport (2017c).

¹⁵U.S. Global Change Research Program (2017).

¹⁶Trump (2012).

¹⁷Brady (2017c).

¹⁸Mooney and Eilperin (2017).

¹⁹Paris et al. (2017).

²⁰Head (2010, pp. 77–94).

²¹Sanderson (2002, pp. 1–22).

²²Mols (2012, pp. 329–45).

As for those committed to supporting the transition to a low-carbon economy, how might an ‘America First’ stance impact them?

In this chapter, the author considers each of these questions, and uses the Trump administration as the exemplar to illustrate that evidence-based policy-making becomes an uphill struggle when leaders actively undermine faith in research, and take measures to suppress or remove publicly funded open government data. This chapter leverages the author's firsthand experience participating in open government data projects at the U.S. Environmental Protection Agency, between 2011 and 2017.

Before considering recent political developments in the United States, and the ramifications for climate change research more generally, it may be useful to gain a deeper understanding of what open government data is, where it originated, what are the benefits and how it impacts society at large.

2 Open Government Data and Its Antecedents

Public policies related to information sharing are among the most fundamental policies of a democracy.²³ These policies reflect societal choices about ‘how information should be produced, processed, stored, exchanged, and regulated.’²⁴ Indeed, to view open government data in a mere pragmatic way, would be to overlook the important role it plays, alongside other procedures and mechanisms, in upholding the values enshrined in the constitutions of most Western democracies. For example, without access to good quality information, many other rights (e.g. freedom of expression), become meaningless. The United States was one of the earliest countries to codify freedom of information and promote it within federal government.²⁵ The Freedom of Information Act was signed on U.S. Independence Day in 1966 with the statement:

I signed this measure with a deep sense of pride that the United States is an open society in which the people's right to know is cherished and guarded.

— President Lyndon Johnson (1966)

The Freedom of Information Act of 1966 (FOIA) was the milestone that enabled the American public to gain access to government records, guard against mismanagement and corruption, and stimulate innovation in science and industry.²⁶

²³Dawes (2010, p. 377).

²⁴Benkler (1998, p. 3).

²⁵Sweden adopted access to information in 1766, followed by Finland in 1951, and the United States followed in 1966—Banisar (2006, p. 19).

²⁶Ibid, p. 7.

Internationally, freedom of information, defined as the freedom to ‘seek, receive and impart information and ideas through any media and regardless of frontiers’ is in Article 19 of the Universal Declaration of Human Rights.

Public information, paid for by taxpayers, is collected and archived in our nation’s universities, public libraries, and research institutions. For centuries, public information has been painstakingly maintained on paper ledgers and forms, and later often buried in cabinets or stored at inaccessible facilities. During the later Twentieth Century, government data stewards began digitizing public information, storing it on computer servers, tapes and personal computers.

Often government data was in proprietary formats, accessible to only a few who had access privileges and the appropriate software licenses. Software technology advances including use of the Internet for commercial use,²⁷ the creation of World Wide Web, and open licenses, were the catalysts for a renaissance in worldwide information sharing by the early 2000s.

Publishing open government data on the Web was a natural extension to support FOIA. As the following extract from a speech by President Obama illustrates, public sector officials, reformers and advocates recognized that open government data has the potential to transform how the public engages with government.²⁸

The Freedom of Information Act should be administered with a clear presumption: In the face of doubt, openness prevails. The Government should not keep information confidential merely because public officials might be embarrassed by disclosure, because errors and failures might be revealed, or because of speculative or abstract fears.²⁹

It was the combination of technology and the U.S. policy on freedom of information that allowed any information that is not sensitive for national security or personal privacy reasons, to be made available for re-use and sharing by anyone, anywhere, for any purpose. In a period spanning nearly five decades beginning in the 1970s, tens of billions of dollars of public funding were invested to collect and distribute Earth observation data to advance science, empower industry and inform the public. Earth observation data measures physical, chemical and biological systems, typically acquired by satellites, airborne platforms, and in situ measurements on land, water and the atmosphere.³⁰ While certain data remains not shared, as Fig. 1 illustrates, open government data includes a wide array of open environmental data, that is essential for climate change researchers to continue their work.

Science leadership by government agencies such as the National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA) enables petabytes of Earth observations to be made

²⁷‘Origins of the Internet’ (2017).

²⁸Open Knowledge Foundation (2012), Organisation for Economic Co-operation and Development (2008), Pew Research Center (2015).

²⁹Obama (2009a)

³⁰CSIRO (2017).

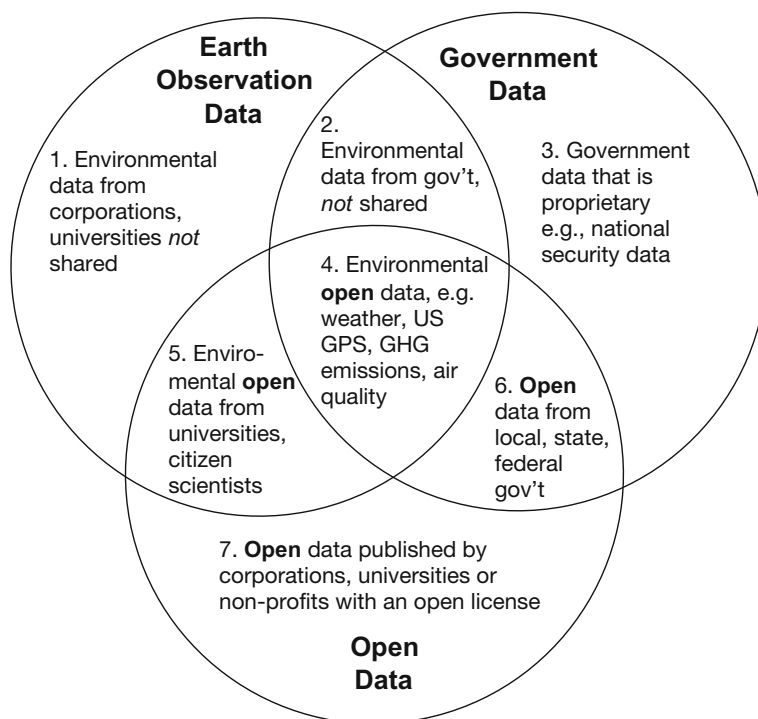


Fig. 1 Categories of open government data, including Earth observation and open data

available as open access, open government data through the Web.³¹ Open access implies content is digital, online, free of charge, and free of most copyright and licensing restrictions.³² The vast majority of open government data are scientific in nature, and is published openly for the world to share.³³

In the following brief history of Earth observation, I will explain how the United States came to collect data worldwide, and highlight the ways in which these efforts helped build economic and scientific interdependence.

³¹NASA (2017).

³²Suber (2015).

³³Linking Open Data Cloud (2017). This diagram shows the majority linked open government data is science and observation related data. Linked Data leverages the concepts of the World Wide Web to describe the real world. Linked data uses web identifiers (Uniform Resource Identifier or URIs, often in the form of an http location to 'link' facts, concepts, people, places and phenomena.

3 The Evolution of Earth Observation Data

In order to appreciate the value of Earth observation data and subsequent economic and scientific interdependence, it is worth considering the history of how the U.S. became the world's largest collector and disseminator of Earth observation data.

3.1 Nineteenth Century Open Data Pioneers

Provision of U.S. open government data arguably began in earnest during the Nineteenth Century with American oceanographer Matthew Fontaine Maury. Maury, a naval officer, is widely considered to be the father of modern oceanography. Maury developed a uniform system for recording oceanographic information in his role as superintendent of the U.S. Naval Observatory, which included seasonal winds, currents and the migratory patterns of whales. He supplied specially formatted logbooks to ship's captains, and asked them to record information during their passages. Within several years, three quarters of the world's nations involved in international commerce were regularly sending oceanographic observations to Maury.³⁴ In exchange for contributions, Maury curated the data, created charts and distributed them worldwide.³⁵ The resulting charts allowed shipmasters to reduce voyages by weeks or months.³⁶

In 1848, Maury was a pioneer in the formation of the American Association for the Advancement of Science (AAAS), the non-profit organization that promotes cooperation to 'advance science, engineering, and innovation throughout the world for the benefit of all people.'³⁷ As of 2017, the AAAS is the largest general scientific community with over 120,000 members from 91 countries and is the leading publisher of research through its Science family of journals.

Maury's legacy is somewhat obscured by history as Maury, a Virginian, resigned his commission in the U.S. Navy to join the Confederacy during the U.S. Civil War.³⁸ Notwithstanding, Maury should also be considered the father of the open government data movement.

3.2 Twentieth Century Earth Observations

During the Twentieth Century, Earth observation techniques rapidly advanced due to technologies including aerial reconnaissance and early space reconnaissance programs.³⁹ Under President Eisenhower's administration, reconnaissance data was typically classified.⁴⁰ Burrows noted 'space reconnaissance has quietly evolved into an immense and extremely intricate electronic contest that elite intelligence

³⁴Williams (1963).

³⁵Maury (1852).

³⁶Hearn (2003, p. 3).

³⁷AAAS (2017).

³⁸Hearn (2003).

³⁹Burrows (1986).

⁴⁰Ibid.

organizations on both sides of the East-West political chasm play by a gentlemen's agreement that excludes their respective citizenries.'⁴¹ Burrows argued the purpose of this contest was to confirm compliance with arms control agreements, not to foster scientific collaboration. In effect, space-based intelligence systems used during the Cold War were very expensive and technically sophisticated mechanisms for peace-keeping. During this period in American history, the open government data effort was diminished, becoming a small component of the government's agenda.

In 1973 the U.S. Department of Defense launched 24 satellites for the Global Positioning System (GPS). The resulting data was initially used exclusively by the military, yet the justification for spending billions of dollars on GPS research and development was civil aviation safety.⁴² The GPS system began a slow conversion from a secret military system to a source of valuable open government data in 1983 when President Reagan ordered GPS with 'Selective Availability' be made available for civilian use. Selective Availability was the intentional degradation of public GPS signals implemented for national security reasons. Opening up GPS data was a critical first step to enable others to use Earth observations and leverage location information. Initially, it was government and industry scientists who used location-based information via the Internet. In subsequent decades, use of GPS data by civilians worldwide grew as applications using open government data increased.

3.3 Global Positioning System: Crown Jewel of Open Government Data

Arguably the most significant open government data milestone of the Twentieth Century was the policy directive issued by former President Bill Clinton in 1996 to make GPS also available for civilian use, in addition to existing military use. GPS produced an explosion of commercial products. As of 2000, former President Clinton stated GPS was used for air, road, rail, and marine navigation, precision agriculture and mining, oil exploration, environmental research and management, telecommunications, electronic data transfer, construction, recreation and emergency response.⁴³

Former President Clinton authorized the creation of an interagency GPS Executive Board to manage it as *national asset*. This permanent interagency GPS Executive Board is jointly chaired by the Departments of Defense and Transportation, and 'will collaborate with U.S. departments and agencies, industry, foreign governments involved in navigation and positioning system research, development, and use... We will continue to provide the GPS Standard Positioning Service for peaceful civil, commercial and scientific use on a continuous, world-wide basis, free of direct user fees.'⁴⁴ It is interesting to note that former President Obama set forth subsequent executive directive as part of a National Space Policy, updating his predecessor's U.S. Global Positioning Policy. Both Presidents Clinton

⁴¹Burrows (1986, xiv).

⁴²Madry (2015, p. 7).

⁴³The Clinton White House (1996, p. 1).

⁴⁴Ibid.

and Obama⁴⁵ set forth executive policies versus sign legislation, to ensure continuous civilian access to U.S. GPS. Given that the majority of the operating budget to run GPS is directed by the U.S. Department of Defense, and the enormous economic interdependence on this Federal system, it is unlikely to suffer the vagaries of funding cuts that many agencies including National Institutes of Health (NIH), Department of Energy, Environmental Protection Agency (EPA), NASA and NOAA, are expected to experience in 2018.⁴⁶

Will the Federal Government ever restrict access to GPS? So far, ‘since GPS was operational in 1995, the GPS system has never been deactivated, despite U.S. involvement in wars, anti-terrorism, and other military activities.’⁴⁷ The GPS.gov website states that millions of GPS users continuously monitor the real-time performance of the civilian GPS service and that there is no evidence that it has been interrupted by its operators, the U.S. Air Force.⁴⁸ As of 2017, GPS is available to over 200 million smartphone users in the United States and to over 2 billion people worldwide.⁴⁹ This is just one of the many reasons why the federal government’s multibillion dollar investment in GPS is considered the poster child for open government data, paid for by the U.S. taxpayer, for the benefit of the public and private sectors worldwide.

The U.S. GPS system produces the majority of Earth observation data used by U.S. researchers, industry, government and non-governmental organizations monitoring and supporting human life. Using observation data, scientists, first responders and public health officials assess and respond to weather and climate disasters including droughts, floods, freezes, storms, tropical cyclones, and wildfires.⁵⁰ Timely capture and dissemination of Earth observation data has life and death implications for millions of people impacted by an increasing number of extreme weather events and raising sea levels, including millions of Americans impacted by Hurricanes Harvey, Irma and Maria and the California wildfires in 2017. According to a report from NOAA National Centers for Environmental Information,⁵¹ released in January 2018, the U.S. experienced extreme hurricanes and wildfires in 2017 making it the costliest disaster year in U.S. history.⁵²

In sum, it should be clear from the above historical overview that the U.S. has a long tradition in facilitating and funding data collection and sharing, and that, as I will explain in more detail in the next section, the direct and indirect benefits to society of open government data, are manifested in all kinds of policy-domains, should not be underestimated.

⁴⁵Obama (2017a).

⁴⁶Science News (2017).

⁴⁷National Coordination Office for Space-Based Positioning, Navigation, and Timing (2014).

⁴⁸Ibid.

⁴⁹Pew Research Center (2018).

⁵⁰NOAA National Centers for Environmental Information (2017).

⁵¹NOAA National Centers for Environmental Information (2018, p. 1).

⁵²Mooney and Brady (2018).

3.4 Scientific and Economic Benefits of Navigation Satellite Systems

Recognizing the scientific and economic benefits of navigation satellite systems, other countries have been making steady progress in space engineering to build regional systems, with specific capabilities that support their country or region's use cases. The term Global Navigation Satellite System (GNSS) is used for any satellite navigation system that has global coverage. As of late 2016, the following global navigation satellite systems existed: U.S. GPS, Russia's GLONASS and the European Union's Galileo positioning system. GLONASS was developed in the Soviet Union and is operated by the Russian Aerospace Defense Forces. The Galileo positioning system is a joint venture between the European Union, the European Space Agency, China and Saudi Arabia. As of 2017, Europe's Galileo constellation consists of 18 satellites and is expected to be completed in 2020 with 30 satellites in orbit.⁵³ Copernicus is comprised of data collection systems including Earth observation satellites and in situ sensors including ground stations, airborne and sea-based sensors. Copernicus, along with support from Japan and the U.S., provides a complex collection of sensor data provides up-to-date information to support environmental and security issues.⁵⁴

There are other positioning systems that are more limited in coverage including China's BeiDou Navigation Satellite System, India's NAVIC, and Japan's Quasi-Zenith Satellite System.

3.5 Technologies for 'Openness'

Technology precursors to creating worldwide access to open government data included transformative advances in communications protocols, open software and the advent of the World Wide Web. Information sharing via networks was accelerated circa 1976 when the X.25 telecommunications standard, a critical protocol for the early Internet, was released by the International Telecommunications Union (ITU). This open standard was available for anyone to implement and fostered worldwide adoption making it far easier and more cost effective to share information via networks.

The GNU Project, initiated at Massachusetts Institute of Technology (MIT) Artificial Intelligence Laboratory during the 1980s, introduced the concept of widely disseminated free software. The Linux operating system would be introduced in 1991, the same year that the first World Wide Web servers began operating at the European Organization for Nuclear Research, known as CERN. Coincident with the release of GPS information into the public domain was the dawn of global information sharing via the World Wide Web ('the Web') circa 1994 by Sir Tim Berners-Lee, the inventor of the Web. The creation of the Web emerged because the international scientific research community was seeking better ways to share documents and data. By the early 2000s, the Web evolved to become the ubiquitous 'write once, run anywhere' information sharing platform. The legal

⁵³European Commission (2016).

⁵⁴Copernicus Atmosphere Monitoring Service (2017).

framework for sharing information was supported by Creative Commons, a non-profit organization founded in 2001 by experts in education, technology, law and philanthropy.⁵⁵ Creative Commons helps people and organizations share creative works legally, mostly by providing widely applicable licenses. Using a Creative Commons license, creators specify which rights they reserve and which rights they waive for the benefit of others.

Transparency advocates with legal expertise prepared government data licensing guidelines, allowing federal government agencies to ‘preserve the United States’ long legal tradition of ensuring that public information created by the federal government is exempt from U.S. copyright and remains free for everyone to use without restriction.’⁵⁶ Together with Creative Commons, the framework of a U.S. Government Work allows for the reproduction of the work in print or digital form, derivative works, display and digital distribution to the public.⁵⁷ The Creative Commons license used by many U.S. Government agencies and departments to ensure assignment to the public domain is Creative Commons CC0 1.0 Universal Public Domain Dedication. The following language is recommended when the data is believed to not be copyrightable:

As a work of the United States Government, this package is in the public domain within the United States. Additionally, [Agency Name] waives copyright and related rights in the work worldwide through the CC0 1.0 Universal Public Domain Dedication.⁵⁸

Some critics suggest the licenses do not address all the differences among varying forms of media, nor address various concerns some authors may have.⁵⁹ Nevertheless, sharing creative works legally with a common set of free licenses was instrumental to the growing uptake and beneficial use of open government data. By 2006, there were over 140 million Creative Commons licensed works, and by 2015 the number rose to 1.1 billion.⁶⁰

3.6 Linking Open Data

By 2007, Sir Tim Berners-Lee challenged the world to go beyond just sharing documents on the Web, and to focus on opening and linking *data sets* using Web principles.⁶¹ The Linked Open Data Project started the following year.⁶² Just as the

⁵⁵Creative Commons, <https://creativecommons.org/>, accessed 3 January 2018.

⁵⁶Tauberer (2013) (Copyright Act of 1976 (US)) Copyright protection is not available for works of the United States Government under 17 USC § 105 unless a specific exemption applies. The U.S. copyright law states ‘a work prepared by an officer or employee as part of that person’s official duties’, under section 105 of the Copyright Act, is not entitled to domestic copyright protection under U.S. law and is therefore in the public domain.

⁵⁷United States Government (2017).

⁵⁸See Creative Commons, <https://creativecommons.org/publicdomain/zero/1.0/>.

⁵⁹Elkin-Koren (2006).

⁶⁰Creative Commons (2017).

⁶¹In contrast to sharing human readable documents which was the majority of the content on the Web up until this period, circa 2007.

⁶²W3C (2008).

early Web made documents available to a worldwide audience, the Web of data began to make open data available in human and machine-readable formats. Berners-Lee outlined a ‘5 star ranking system’ for deploying open data.⁶³ By 2011, the U.S. Government’s open data portal ‘listed twenty-one countries whose governments publish open data regarding the operation of their public sector, with roughly one third, including the U.S., publishing Linked Data using the data standards of the World Wide Web Consortium.’⁶⁴ Linking data using Web hyperlinks and standard vocabularies soon proved to be an essential component of sharing authoritative open government data worldwide. As of 2017, there are many examples of scientists and engineers collaborating on Web data standards and best practices to make Earth observation data interoperable and re-usable.^{65,66}

As the following excerpt by former President Obama’s chief science and technology advisor illustrates, Earth observations are the foundation of our understanding of climate systems.

Observations that provide these data are critical to our understanding of all Earth-system phenomena, including weather and climate, natural hazards, land-use change, ecosystem health, and natural-resource availability

— John P. Holdren

Chief science and technology advisor to President Obama⁶⁷

Earth observation data is now so thoroughly interwoven into the world’s scientific, regulatory, economic and political frameworks, that few could imagine it being removed or no longer updated. Governments, scientific advisors, non-profits, media and the public, require open access to Earth observation data to assess and respond to the growing demand for energy, food, and water.

As the following extract shows, President Obama expressed concern about the need to address climate change, and his administration provided consistent support for federal science and open government data:

Climate change ‘is the one [issue] that will define the contours of this century more dramatically perhaps than the others. No nation, whether it’s large or small, rich or poor, will be immune from the impacts of climate change’⁶⁸

In sum, as we saw open government data has a long pedigree, beginning with oceanographer Matthew Fontaine Maury. By the turn of the Twenty-first Century, technological advances paved the way for an explosion of open data via the Web,

⁶³W3C (2013).

⁶⁴Wood (2012, vii).

⁶⁵Open Geospatial Consortium (2017), (‘Spatial Data on the Web Best Practices’ 2017).

⁶⁶W3C (2008, 2014a, b).

⁶⁷Office of Science and Technology Policy (2014).

⁶⁸Obama (2017b).

and ultimately worldwide scientific and economic interdependence. We are now at a moment in history in which technology can help us to be better prepared to meet future challenges such as global climate change. However, whether we will be able to reap the benefits of these technological advances will depend in great measure on our leaders and their attitudes towards scientific research. In the next section I will consider recent events in the U.S., and evaluate the challenges and opportunities facing transparency advocates and the scientific community who promote open government data and evidence-based policy-making.

4 A Tradition of Bipartisan Support

Before discussing recent developments, and the challenges facing transparency advocates and the installation of Donald Trump as the 45th U.S. President, it may be useful to consider the radically different approaches used by previous U.S. administrations. I begin this section by outlining the efforts of successive presidents to increase open access to open government data commencing with Republican President Reagan through President Obama. The move to codify Obama's executive directive for 'open by default' is described.⁶⁹ As the following extract shows, expectations would gradually change, with citizens calling for greater access to information:

Information on anything that's inspected, spent, enforced, or licensed. That's what I want, and that's what the public wants.

— Jennifer LaFleur, Director of Computer-Assisted Reporting, ProPublica⁷⁰

4.1 Bipartisan Efforts to Promote and Codify 'Open by Default'

A drive towards 'openness' beginning in the 1990s, driven by technological advances including the World Wide Web, provided an opportunity to move towards greater access to government data. Emphasis on technology and openness helped leaders like UK Prime Minister Tony Blair revive interest in evidence-based policy-making in the mid-1990s. By 1996, U.S. President Bill Clinton opened the Global Positioning System (GPS) for commercial and scientific use; and by 2000, an explosion of commercial and scientific applications emerged using open government data.

During the administrations from President George W. Bush to Barack Obama, there was bipartisan support for government transparency and accountability. In a 2005 speech, Senator John Cornyn (R-TX) stated 'open government is

⁶⁹The OPEN Government Data Act (S. 760/H.R. 1770). On September 27, 2017, this bill was voted out of the Senate as part of the National Defense Authorization Act (NDAA). The NDAA is now in the process of being conferenced with the House version of the legislation. Passage of a compromise NDAA was expected to place in November/December 2017.

⁷⁰Jennifer LaFleur defining desired data from the U.S. Government, March 18, 2011.

fundamentally an American issue, not a Republican or Democrat issue.⁷¹ While the emphasis between conservatives and liberals varies, both parties have generally shown support for transparency and opening government data.⁷² Former President George W. Bush's notable accomplishment on open government data included passage of the Federal Funding Accountability and Transparency Act of 2006 (FFATA). Public Law 109–282, requires that federal contract, grant, loan, and other financial assistance awards of more than \$25,000 be displayed on a publicly accessible and searchable website to give the American public open access to information on federal spending.⁷³

4.2 Open Government Executive Directives on Transparency and Open Government

On January 21, 2009, the first day of the Obama administration, the President issued a memorandum to the heads of executive departments and agencies with the 'subject: transparency and open government.' In this memorandum, President Obama stated:

My Administration is committed to creating an unprecedented level of openness in Government. We will work together to ensure the public trust and establish a system of transparency, public participation, and collaboration. Openness will strengthen our democracy and promote efficiency and effectiveness in Government.⁷⁴

The Transparency and Open Government Executive Order 2009, was an important milestone to support the use of evidence-based policy.⁷⁵ During the Obama administration, executive directives, transparency advocates, helped power a social movement that supported entrepreneurs and large companies worldwide. Industry leaders from Amazon Web Services to Zillow Group,⁷⁶ met with Congressional leaders, to explain the economic and technology benefits of legislating long-term access to open government data.⁷⁷ Business pundits Michael Porter and Mark Kramer successfully made the case that openness and technical advances will allow for the shared use of resources and the co-creation of shared value.⁷⁸ During Mr. Obama's second term, he signed an executive order in May 2013, declaring all

⁷¹Piotrowski and Van Ryzin (2005, p. 17).

⁷²Ibid.

⁷³Federal Funding Accountability and Transparency Act of 2006 (2009).

⁷⁴Obama (2009b).

⁷⁵The Obama White House (2015).

⁷⁶Zillow Group runs an U.S.-centric online real estate data service <https://zillow.com>.

⁷⁷Center for Data Innovation (2017). Industry Letter of Support for OPEN Government Data Act, 86 businesses, industry groups, civil society organizations, and transparency advocates, write to express strong support for the bipartisan Open, Permanent, Electronic, and Necessary (OPEN) Government Data Act (H.R. 1770).

⁷⁸Porter and Kramer (2011).

government information to be ‘open and machine-readable’ by default. More specifically, the Open Data Executive Order stated:

In order to ensure that the Federal Government is taking full advantage of its information resources, executive departments and agencies must manage information as an asset throughout its life cycle to promote openness and interoperability, and properly safeguard systems and information.

The executive order states that ‘going forward, newly generated government data shall be made freely available in open, machine-readable formats, while appropriately safeguarding privacy, confidentiality, and security.’⁷⁹

The May 2013 directive was celebrated by transparency advocates as a landmark moment, paving the way for the development of robust and open systems. Open government data was officially described and recognized as a *national asset*, maintained by the Federal Government, to be released in an open format for discovery at <https://data.gov> or any successor to <https://data.gov>. The directive specified that open government data is to be:

- (a) machine-readable;
- (b) available in an open format;
- (c) not encumbered by restrictions that would impede use or reuse; and
- (d) based on an underlying open standard that is maintained by a standards organization.

The directive further specified that open government data be made available via an *open license*, meaning that the open government data asset is made available:

- (e) at no cost to the public; and
- (f) with no restrictions on copying, publishing, distributing, transmitting, citing, or adapting; and
- (g) is part of the worldwide public domain or, if necessary, published with an open license.

4.3 Open Government Data Laws

Managing Federal Government data to make it open, available, discoverable, and usable to the general public, businesses, journalists, academics, and advocates promotes efficiency and effectiveness in Government, creates economic opportunities, promotes scientific discovery, and most importantly, strengthens our democracy.

President Barack Obama, 2013

President Barack Obama’s 2013 directive became the framework to codify ‘open by default,’ starting with federal spending data. An important milestone was achieved with the passage of the DATA Act. In May 2014, President Obama signed the

⁷⁹Burwell et al. (2013).

Digital Accountability and Transparency Act of 2014.⁸⁰ The 2014 DATA Act seeks to improve oversight and facilitate evidence-based decision making.

It is worth mentioning, the DATA Act leveraged the grassroots efforts of an initially small and dedicated group of civil servants, open data and transparency advocates, and crucially, a highly effective non-profit advocacy group, Washington DC-based Data Coalition. Over a five-year period, the Data Coalition, with the support of its members, educated and lobbied Congress and the White House for the adoption of non-proprietary data standards, machine readable formats, and advocated for legislative and regulatory mandates.⁸¹ The U.S. Department of the Treasury and the Office of Management and Budget, in collaboration with transparency advocates and industry members, initiated implementation of the DATA Act in 2015.

These legislative milestones have relevance to the Paris Agreement because they set a precedent for bipartisan collaboration and produced policy and technology frameworks that can be reused by others. Indeed, frameworks, international data standards and best practices have proven extremely useful to others. As an example, in 2017, Australia enacted its first ever air quality product emissions standard to reduce adverse impacts of air pollution on human and environmental health.⁸² At the 2017 biennial international clean air and environment conference,⁸³ in a keynote on developing product emission standards, Declan O'Connor-Cox, Director of Air Quality at the Commonwealth of Australia's Department of the Environment and Energy, said 'without leveraging the U.S. EPA's framework for air quality emission standards, Australia would not have the Product Emissions Standards Act of 2017.'⁸⁴

The next U.S. open government data legislation expected to be signed into law is the OPEN Government Data Act, approved by the Senate in December 2017.⁸⁵ The bill is expected to be carried by the House of Representatives sometime in 2018. Thousands of open government data advocates will be watching closely to see whether President Trump will support or obstruct this important piece of legislation.

Certainly, no single piece of legislation will guarantee the continued flow of open government data. However, what is essential is bipartisan support to ensure the core principles and mechanisms for preserving and sharing open data become institutionalized and enshrined in statutes and standard operating procedures. Now that the members of the current Congress understand and support the benefits of open, machine readable federal spending data, the capacity and willingness to

⁸⁰DATA Act, Public Law 113-101.

⁸¹The Data Coalition, <https://www.datacoalition.org/about/>, accessed 5 January 2018.

⁸²The Parliament of Australia (2017).

⁸³Biennial International Clean Air and Environment Conference, 15–18 Oct 2017, Brisbane Australia, accessed 15 December 2017. <http://casanz2017.com/>.

⁸⁴Contemporaneous notes taken by the author who attended the CASANZ 2017 Conference, Brisbane Australia, Oct 2017.

⁸⁵Senator Schatz, Brian (D-HI) 2016, (S.2852).

support preservation of and long-term access to Earth observation data for the public good should be the next focus of legislation.

4.4 Science and Technology Policy Advisors

During the 1970s through 1990s, the legislative branch received scientific advice from the Office of Technology Assessment (OTA). Scientific advice typically took the form of documented assessments produced by its 200-person staff, in consultation with outside experts. OTA were a 'low-key part of the policy process, serving to distill reliable facts, clarify debates, and improve congressional understanding.'⁸⁶ A group of Republicans however viewed the OTA as liberal, staffed with largely Democrats, who used the terms 'scientific objectivity' and 'policy neutrality' to find fault with conservative policy ideas and promote liberal approaches instead.⁸⁷ Perhaps not surprisingly, 1994 the OTA was disbanded in 1994 when a small block of conservatives in the Republican controlled House and Senate wanted to get tough on cost-cutting.⁸⁸ One Democratic Senator reportedly said the Republican's effort to cut the OTA was akin to a 'person deciding they were going to go on a diet and concluding that the way to start was to eliminate their brain.'⁸⁹ A parallel structure to the OTA has not been established by Congress. The vacuum has been filled with relationships Congressional leaders and their staffers cultivate independently and by Washington DC-based lobbyists.

By contrast, the executive branch historically has been well supported with science and technology advisors. The White House Office of Science and Technology Policy (OSTP) was established in 1976 for purposes of advising the president and his staff on 'scientific, engineering, and technical aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics.'⁹⁰

President Barack Obama's Science Advisor was John Holdren, who served 2009 through January 2017, overseeing environment and energy, national security and international affairs, and technology and innovation. Dr. Holdren presided over 135 OSTP staff, two thirds of them were from other agencies and outside institutions. President Obama gained a reputation for being science and technology savvy president. He approved the establishment of a federal portal named *Data.gov* to make it easier to find, access and download open data.⁹¹ The upward trajectory of open government data was rapidly used by burgeoning startups and established industries including agriculture, automobile navigation, and healthcare. The Obama administration, is said to have

⁸⁶Keiper (2004, p. 36).

⁸⁷Ibid, p. 40.

⁸⁸Ibid, p. 19. The irony of this action was that the OTA cut saved just \$20 million in an overall total federal budget of \$1.5 trillion.

⁸⁹Ibid, p. 41.

⁹⁰National Science, Engineering, and Technology Policy and Priorities Act of 1976 (US) The OSTP's mission is defined by statute in the National Science and Technology Policy, Organization, and Priorities Act of 1976 (Pub. L. 94–282).

⁹¹Jackson (2009).

energized civil servants, entrepreneurs, industry and public sector leaders who came together, often in the thousands, to attend conferences, hackathons, datapaloozas, venture capital forums, and executive roundtables.^{92,93}

Of particular note is the Federal Drug Administration (FDA), which achieved high profile success in large scale, programmatic provision of open government data on adverse drug reactions (called events), drug product labeling and recall enforcement reports.⁹⁴ Other examples included engaged citizens using data from the Census Bureau's American Community Survey, to set up cooling stations for people affected by extreme heat events. Flood data disseminated by NOAA continues to be used by homeowners and business owners during coastal flood events to make evidence-informed decisions before rebuilding. The list of innovative uses of U.S. open government data is indeed long and growing, and from this historical perspective it becomes easier to appreciate the importance of sustained support for open government data for both the public and the private sector.

5 Rolling Back Progress

As we have seen, until recently open government data could depend on bi-partisan support, with both major parties recognizing the benefits for the national and global economy. It is not hard to envisage the hypothetical scenario of a party or administration becoming less enthusiastic about open government data, and proposing budget cuts, say as part of a broader range of austerity measures, or to lessen what is referred to by corporations as, 'the burden regulation.' However, what would until recently have seemed much less plausible was the installation of an administration that actively discredits research and has removed information on climate change or related topics from government websites.⁹⁵ However, as this section will show, this seemingly unlikely scenario became an everyday reality beginning with the Trump administration in 2017. To illustrate this point, this chapter will focus on the Trump administration's 'America First' policy and the effect it had on climate and environmental researchers' ability to conduct their research.

As many experts have underscored, up-to-date, long-term permanent access to Earth observation data, including surface and air temperatures, and methane emissions for example, are critical for climate models.⁹⁶ If high quality Earth observation data is interrupted or not updated, climate modelers will be unable to provide accurate forecasts and assessments. The fragility of the systems and staff required to gather environmental data, and ultimately to provide evidence-based climate assessments came into sharp focus in 2017. During his candidacy,

⁹²Health Datapalooza (2016).

⁹³Honey (2016).

⁹⁴U.S. Federal Drug Administration (2017).

⁹⁵Beeler (2017), Davenport (2017a).

⁹⁶Guo et al. (2015, p. 108).

Mr. Trump promised to ‘make America great again’, should he be elected. These slogans were effective, because they appealed to voters’ national identity and national pride, and suggested that an administration led by Trump would redirect funds to national rather than international priorities. By framing climate change and climate change research as a Chinese hoax,⁹⁷ Trump created a narrative that would subsequently be used to justify cuts to science agencies including the EPA, based on the conservative stance that industry can regulate itself and that government should not intervene in the free market.

President Trump was open about his intentions. For example, on the campaign trail, Mr. Trump foreshadowed that he would cut back his predecessor’s ‘*burdensome*’ efforts to regulate the energy industry, and relieve power plants of ‘*unnecessary expense*’ to reduce carbon dioxide emissions. It comes as no surprise that during his first year as president, Mr. Trump’s ‘America First’ policies lead to the withdrawal from the Paris Agreement,⁹⁸ and the appointment of government executives who maintain views well outside the mainstream on science and climate change. While Mr. Trump cannot unilaterally cancel existing legislation, his public admonishments of science and ideologically driven appointments are likely to harm public health and safety, have already threatened to reduce Earth observation monitoring programs, and are reportedly discouraging future generations of scientists from seeking research positions in the Federal Government.⁹⁹

5.1 The Significance of Withdrawal from the Paris Agreement

While it is usual and customary to change priorities, and adjust funding levels, it is rare for U.S. presidents to withdraw from international partnerships where the U.S. had previously played a leading role. Once in office, on June 1st, 2017, Mr. Trump announced that his administration would cease all participation in the Paris Agreement, and withdraw the U.S. as an official signatory of the Agreement. Mr. Trump said that his decision is a ‘reassertion of America’s sovereignty’ and that he was ‘elected to represent the citizens of Pittsburgh, not Paris.’¹⁰⁰ Mr. Trump said, the ‘Paris Accord will undermine the economy,’ and ‘puts the United States at a permanent disadvantage.’ At the time of this announcement, besides the United States, there were only two other countries who held out as signatories on the Paris Agreement, Nicaragua and Syria (both of whom later joined the Paris Agreement).

The Trump administration’s policy to put ‘America First’, includes reducing diplomatic efforts and cutting foreign aid by as much as 28%.¹⁰¹ Among significant cuts to U.S. State Department funding, Mr. Trump has proposed the elimination of \$2 billion dollars of aid for U.N. climate change programs, including the Green Climate Fund, that aim to foster low-carbon economic growth in poorer countries.

⁹⁷Trump (2012).

⁹⁸Hunt et al. (2017).

⁹⁹Rosenberg and Rest (2018, p. 7).

¹⁰⁰Hunt et al. (2017).

¹⁰¹Mohammed (2017).

That being said, President Trump's proposed cuts still have to be reviewed and approved by Congress (expected early 2018), prior to implementation, and it is hence uncertain whether these cuts will be implemented. What is more, there has been strong opposition to the withdrawal of the United States by the President. Nearly 400 American mayors indicated their intention to uphold the Paris Agreement goals in their cities. The mayors have signed on to the Climate Mayors Statement,¹⁰² and vowed to 'strengthen local efforts to reduce greenhouse gas emissions and efforts for binding federal and global-level policymaking'.¹⁰³

5.2 Revoking President Obama's Climate Legacy

As political scientists will be able to attest, new executives have considerable discretion on how to prioritize their campaign promises. A newly elected president chooses what information is put in the public record, including what is added, removed or maintained on the White House website. The Trump administration is promoting its priorities with proposed deep budget cuts to regulatory and science agencies, not filling appointments (such as in the Office of Science and Technology), and rolling back his predecessors environmental and energy policies. Mr. Trump signed an executive order in March 2017 that revoked his predecessor's climate legacy.¹⁰⁴ Mr. Trump's executive appointees were guided to remove information related to clean power, ecological assessments, climate change, the greenhouse effect and global warming.¹⁰⁵

5.3 U.S. Environmental Protection Agency Losing Ground

EPA Administrator Pruitt in his first four months serving has 'moved to undo, delay or otherwise block more than 30 environmental rules, a regulatory rollback larger in scope than any other' administrator in the agency's 47 year history.¹⁰⁶ Mr. Pruitt is overseeing the removal of information on climate change, land use, pollution and toxic chemicals.¹⁰⁷ During Mr. Pruitt's first public hearing before the House Energy and Commerce Environment Subcommittee on December 7th, 2017 (attended by the author), he expressed discomfort with evidence-based policy and the burden put on industry by environmental regulation.¹⁰⁸ Coal-burning electricity plants and the trucking industry, two of the largest contributors of air pollutants linked to premature death, cancer, heart attacks, exacerbation of respiratory diseases such as asthma and other health problems, have been given a warm reception at Mr. Pruitt's EPA office in Washington D.C. Relaxation of existing air quality regulation has

¹⁰²Climate Mayors (2017).

¹⁰³Ibid.

¹⁰⁴Meyer (2017), Tollefson (2017).

¹⁰⁵Eilperin (2017), Mooney and Eilperin (2017).

¹⁰⁶Davenport (2017c).

¹⁰⁷Paris et al. (2017), Tollefson (2017).

¹⁰⁸Sworn testimony by EPA Administrator Scott Pruitt on December 7th, 2017 in Washington D.C. <https://www.c-span.org/video/?438060-1/epa-administrator-testifies-house-energy-panel>.

been proposed, however, is fiercely contested by environmental groups and the trucking industry. Larger trucking manufacturers such as Volvo N.A. have invested millions of dollars in research and development on green, clean burning trucks. They are opposed to the relaxation of air quality regulation for a small number of high polluting trucks (called gliders).¹⁰⁹

Mr. Trump has proposed a 31% cut to the EPA's budget for the financial year 2018/19, reducing it from \$8.2 billion to \$5.7 billion, the lowest level in 40 years.¹¹⁰ The media has extensively covered EPA's reductions in force, proposed budget cuts and appointment of the top executive who had previously sued the EPA 14 times, in his prior role as Attorney General of Oklahoma. By executive order, Mr. Trump directed EPA Administrator Pruitt, to 'suspend, revise, or rescind' rules governing emissions from new and existing power plants.¹¹¹ Former President Obama's Clean Power Plan was designed to reduce carbon dioxide emissions from fossil-fuel burning power plants by reducing demand, increasing the efficiency of existing power plants, and supporting renewable energy sources. The Clean Power Plan aimed to reduce CO₂ output by 32% below 2005 levels by 2030.¹¹² The Clean Power Plan was put on hold in February 2016 pending a legal challenge from 27 states and was not approved by Congress prior to the completion of Mr. Obama's second administration.

The diminution of science and evidence-based policy made international news on March 9, 2017, when EPA Administrator Pruitt said:

I think that measuring with precision human activity on the climate is something very challenging to do and there's tremendous disagreement about the degree of impact, so no, I would not agree that it's a primary contributor to the global warming that we see... I happen to think the Paris accord, the Paris treaty, or the Paris Agreement, if you will, should have been treated as a treaty, should have gone through senate confirmation.¹¹³
(DiChristopher 2017)

Several months later, Mr. Pruitt removed qualified scientists from three major science advisory committees, the Scientific Advisory Board, the Board of Scientific Counselors, and the Clean Air Scientific Advisory Committee. Each committee examines scientific issues including environmental assessments of toxic chemicals, drinking water, air quality, health impacts, pollution regulations, and research and development priorities. Scientists on these national science committees were from leading universities and government research institutions and have ensured scientific integrity at EPA.¹¹⁴

An ideological commitment to rolling back established regulation designed to protect public health and the environment has emerged. Dennis Brady wrote, 'In legal

¹⁰⁹Oge (2017).

¹¹⁰Plumer (2017).

¹¹¹Tollefson (2017).

¹¹²Ibid.

¹¹³DiChristopher (2017).

¹¹⁴Cornwall (2017).

manoeuvres and executive actions, in public speeches and closed-door meetings with industry groups, he [Scott Pruitt] has moved to shrink the agency's reach, alter its focus and pause or reverse numerous environmental rules. The effect has been to steer the EPA in the direction sought by those being regulated.'¹¹⁵ The EPA's communications team oversaw major revisions to the website regarding global warming and climate change. The EPA's global warming page redirects to a signpost page that says:

The page is being updated. Thank you for your interest in this topic. We are currently updating our website to reflect EPA's priorities under the leadership of President Trump and Administrator Pruitt. If you're looking for an archived version of this page, you can find it on the January 19, 2017 snapshot.¹¹⁶

Note, the signpost page has been in place for nine months as of the writing of this chapter. It was posted on April 28, 2017, just a week after millions of people worldwide marched in over 600 organized science marches, from New Zealand to Hawaii.¹¹⁷ The press reported common theme from the hundreds of science marches worldwide was public support for open science and more evidence-based policies to address climate change.¹¹⁸

The prior climate change page¹¹⁹ was replaced with a page with a catchall header, 'Climate Change Indicators in the United States', with links to explore softer phrases such as 'climate change indicators':

- Greenhouse gases
- Weather and climate
- Oceans
- Snow and Ice
- Health and Society
- Ecosystems

A former acting assistant administrator of EPA's Office of Air and Radiation said, 'you would expect a new administration to reflect their policies on their website however, EPA leadership traditionally made a point of keeping the regulatory history of different administrations available on its website even when leadership changed hands.'¹²⁰

'Historical and factual information about these issues, and regulations over time, is something that EPA has always made available to people... It belongs to the people, and people should be able to find it easily'

— Janet McCabe, former Acting Assistant Administrator, EPA's Office of Air & Radiation

¹¹⁵Brady (2017b).

¹¹⁶EPA under Administrator Pruitt is overseeing revisions on global warming. Accessed 10-Jan 2018. <https://www.epa.gov/globalwarming/>.

¹¹⁷Nature Staff (2017).

¹¹⁸Webb and Mitchell (2017).

¹¹⁹Trump administration's EPA website landing page for climate change indicators. Accessed 10-Jan 2018. <https://www.epa.gov/climate-indicators>.

¹²⁰Mooney and Eilperin (2017).

Of perhaps greater concern is the removal of references for international commitments at the time when international diplomacy and scientific collaboration are most needed. My review of the EPA website conducted during early January 2018 revealed no mention of EPA programs that have historically been instrumental in addressing global climate change, including the collection of data on greenhouse gas emissions and sinks. There is no reference of activity with the U.S. as a party to the UN Framework Convention on Climate Change.¹²¹ Language regarding many-country (multilateral) partnerships and activities has also been removed including:

- Global Methane Initiative
- Global Data Center Energy Efficiency Task Force
- Carbon Sequestration Leadership Forum
- Group on Earth Observations

EPA's current web page titled, 'EPA's Role in International Climate Adaption', described four projects on climate adaption in Africa.¹²² The 'International Cooperation' webpage,¹²³ lists EPA involvement with the UN Environment Programme, The World Health Organization, the UN Economic and Social Council, and the International Maritime Organization. By contrast, international partnerships¹²⁴ were significantly more comprehensive under the Obama-era EPA Administrator Gina McCarthy.

EPA Administrator Pruitt's proposed budget cuts target the successful open access pollution inventory called the Toxics Release Inventory (TRI), that contains emissions and toxic releases self-reported by industries. Open access to the EPA pollution inventory dataset provides 'valuable empirical evidence for many environmental justice studies and activist claims'.¹²⁵

Newly appointed heads of organizations including the Bureau of Land, Environmental Protection Agency (EPA), Department of Interior and the U.S. Geological Survey (USGS), are ordering government employees and contractors to remove data collections, cease making updates and/or reduce maintenance so as to effectively make new data collection and dissemination impractical. The phrase used by EPA's public relations team is 'political determination', more commonly known as policy change due to politics.¹²⁶

¹²¹UN Framework Convention on Climate Change 1992 (UNFCCC) Accessed 10-Jan 2018. <http://unfccc.int/2860.php>.

¹²²U.S. Environmental Agency 2017b. EPA's Role in International Climate Adaption web page under Administrator Pruitt. Accessed 10-Jan 2018.

¹²³U.S. Environmental Agency 2017a. EPA's International Cooperation web page. Accessed 10-Jan 2018.

¹²⁴Obama era EPA website climate change landing page detailing International Climate Partnerships. Accessed 10-Jan 2018. https://19january2017snapshot.epa.gov/climatechange/international-climate-partnerships_.html.

¹²⁵Mohai et al. (2009), Paris et al. (2017, p. 38).

¹²⁶Mufson (2017), Cornwall (2017).

It is worth noting that other federal websites, including those operated by the General Services Administration (GSA), that are operating with few appointments from the Trump Administration, continue to host information related to climate change and open climate data.

5.4 The Problem with Disappearing Environmental Data

Major revisions on EPA's website occurred in April 2017, at which time content related to energy policy for state, local and tribal governments was significantly overhauled.¹²⁷ There was no official EPA news release pertaining to the removal of climate related documents. After sixteen months under EPA Administrator Pruitt's leadership (17-February 2017 until his resignation on 6-July 2018 due to alleged ethical and legal violations), EPA's website including <https://epa.gov/climatechange> and <https://epa.gov/climate-impacts> still redirect to a holding page with the following message¹²⁸:

This page is being updated. Thank you for your interest in this topic. We are currently updating our website to reflect EPA's priorities under the leadership of President Trump and Administrator Pruitt. If you're looking for an archived version of this page, you can find it on the January 19, 2017 snapshot.¹²⁹

The decision to exclude climate change references was explained on the site as follows:

As is standard with a change in administration, the Agency's website has been updated periodically over the past few months to include additional priorities of the Agency under new leadership, and we will continue to update the website to keep people informed.

Key climate resources that have been removed can, as of this writing, only be found on the EPA website archive¹³⁰ published by EPA staff one day before the Trump Administration took office.¹³¹ Given the January 19th [2017] snapshot is hosted on the epa.gov domain, it is subject to control by appointed EPA senior management.

The removal of datasets, poses an even more pernicious problem than rewording on web pages. Climate data is vulnerable because of its 'proximal value to a narrow band of experts' according to Denice Ross.¹³² Simply put, science breaks when data is removed. Data driven applications and reports depend on information resources derived from multiple programs and agencies. Recently, an Arctic researcher found dead links (also known as '404: Page not found') for resources on the U.S. National Strategy for the Arctic and a corresponding implementation plan. Researcher Victoria

¹²⁷EDGI (2017).

¹²⁸EPA's website redirects to a 'holding page' for climate change and climate impacts, see <https://www.epa.gov/sites/production/files/signpost/cc.html>, accessed 5 January 2018.

¹²⁹U.S. Environmental Agency (2017d).

¹³⁰EPA snapshot dated January 19, 2017. Accessed 10-Jan 2018. <https://19january2017snapshot.epa.gov/>.

¹³¹EOT Archive (2017), U.S. Environmental Agency (2017d).

¹³²Ross (2017).

Herrmann found missing datasets and policy documents that she cited for Arctic research systematically removed under the Trump administration.¹³³ Herrmann immediately searched the Web for archived copies of ‘our country’s most important polar policies’, including statistics about Arctic permafrost thaw or renewable energy.¹³⁴ Scientists fear that deleting datasets, either intentionally or unintentionally, poses a threat to scientifically-informed policies and decision-making.

Concerns about lack of government transparency and silencing publicly-funded scientists are not new. Under the Harper government (2006–2015), some Canadian scientists reported that research was curtailed or not funded entirely when it did fit with the government’s policy priorities on water quality and climate change. In 2008, scientists working for Environment Canada were asked to refer enquiries, including those on research into climate change, fisheries and matters related to the Alberta tar sands, to the department’s public communications staff.¹³⁵ The impact was, journalists could no longer speak to scientists when investigating potentially controversial initiatives, such as the Keystone XL pipeline project. During the Harper Government, 16 research libraries, including many from Department of Fisheries and Oceans, were closed, citing consolidation and lack of public interest as the reason. The library closures proximately lead to the loss of historic journals and diaries over a century old.¹³⁶ Data on environmental life, aquatic ecosystems and polar research was lost, having been dumped into landfills and in some cases, burned.

Open government data is often used intra and inter-agency. EPA publishes hundreds of datasets, including open data on 4 million regulated facilities, over tens of thousands of toxic substances, accidental releases of toxic chemicals, disposal of hazardous waste, greenhouse gas emissions, air quality, and pollution cleanup activities. Government staff who support various environmental programs possess complex knowledge to ensure the open government data is verified, reliable, and the context is correctly described in published datasets. For example, various EPA offices specialize in collection and distribution of data on air and radiation,¹³⁷ chemical safety and pollution prevention,¹³⁸ international and tribal affairs,¹³⁹ and land and emergency management.¹⁴⁰ The Office of Environmental Information,¹⁴¹

¹³³Herrmann (2017).

¹³⁴Ibid.

¹³⁵Klinkenborg (2013).

¹³⁶Mandel (2015).

¹³⁷EPA Office of Air and Radiation. <https://www.epa.gov/aboutepa/about-office-air-and-radiation-oar>. Accessed 15 December 2017.

¹³⁸EPA Office of Chemical Safety and Pollution Prevention. <https://www.epa.gov/aboutepa/about-office-chemical-safety-and-pollution-prevention-ocspp>. Accessed 15 December 2017.

¹³⁹EPA Office of International and Tribal Affairs. <https://www.epa.gov/aboutepa/about-office-international-and-tribal-affairs-oita>. Accessed 15 December 2017.

¹⁴⁰EPA Office of Land and Emergency Management. <https://www.epa.gov/aboutepa/about-office-land-and-emergency-management>. Accessed 15 December 2017.

¹⁴¹EPA Office of Environmental Information. <https://www.epa.gov/aboutepa/about-office-environmental-information-oei>. Accessed 15 December 2017.

is responsible for identifying and implementing linked open datasets containing regulated facilities, toxic substances, and chemical releases. Program specialists provide needed context to other researchers who reuse this open government data. Thus, a wide range of data sets come from different program offices and agencies, but together form essential building blocks for a wide range of environmental and Earth system research, and regulatory oversight.

As a technical consultant to the U.S. Environmental Protection Agency, the author led the EPA linked open data strategy (2011–2017). On August 2016, a pioneering web service was launched featuring 20 gigabytes of high quality, machine readable data conforming to the U.S. Open Government data mandate.¹⁴² The EPA open data web service provided human and machine-readable data on 30 years of industrial pollution on facilities ranging from hospitals to coal burning power plants and thousands of toxic substances.¹⁴³ EPA's crown jewel of environmental regulation is the Toxics Release Inventory (TRI), a critical tool for informing and empowering communities on the use and release of toxic chemicals. EPA's pollution inventory program has served as a reference framework for at least 50 countries implementing Right-to-Know initiatives worldwide.¹⁴⁴ The EPA linked open data web service is used for climate science research, life cycle assessment, health impact analysis and environmental justice research. This linked open data web service linked to authoritative open data published by other government organizations including the U.S. National Library of Medicine and National Institutes of Health.¹⁴⁵

Due to priorities set by the Trump administration, programs that report on climate change, pollution, greenhouse gas emissions, or related topics, are being starved of funding and are in danger of being removed or turned off. In April 2017, while serving as a contractor to the EPA, the author received a written request from an authorized representative to 'enact a shut-down of [EPA's] Linked Data Service in a manner that allows for it to be reconstituted at a later time' (U.S. Environmental Agency 2017e). This message was sent several days before millions of people marched on April 22, 2017 in over 600 sciences marches around the world in support of science and open access to data.

¹⁴²EPA linked open data web service with 30 years of pollution inventory data, over 100,00 toxic chemicals and 4 million EPA regulated facilities. <https://opendata.epa.gov>. Accessed 5 January 2018.

¹⁴³EPA linked open data web service available on <https://opendata.epa.gov>. Accessed 15 December 2017. The author was advised by an anonymous source with the EPA familiar with the open data service, that the Authority to Operate (ATO), an administrative authorization required for cloud-based applications, is set to expire in March 2018. If EPA senior management does not support the ATO update, it will be at risk of being shut down.

¹⁴⁴30th Anniversary of the Toxics Release Inventory Program. <https://www.epa.gov/toxics-release-inventory-tri-program/30th-anniversary-toxics-release-inventory-tri-program>. Accessed 10 January 2018.

¹⁴⁵U.S. National Library of Medicine and National Institutes of Health PubMed open data. Accessed 15 December 2017.

EPA's intention to turn off its open data web service effective April 28th, 2017 spread via the media.¹⁴⁶ Researchers and transparency advocates monitoring environmental datasets frantically downloaded the EPA's linked open data prior to an anticipated shutdown.¹⁴⁷ Public outcry and calls from the media to EPA's newly appointed head of public affairs may have caused the impending shutdown to be discussed with 'senior leadership.' EPA's newly appointed public relations manager tweeted the web service is 'open, working and not going anywhere. This website & the EPA belong to you.'¹⁴⁸ We will never know whether public outcry was responsible for temporarily reversing the decision to decommission the open data web service but it served to allow the site to operate and serve the public for an additional year.¹⁴⁹ On May 30, 2018, the pioneering EPA linked open data web service was deactivated due to budgeting issues. The web address <https://opendata.epa.gov> now redirects to a data catalog with reduced functionality for users. Significant budget cuts were proposed for many EPA programs, including the flagship Toxics Release Inventory (TRI) Program, established in 1986 through the Emergency Planning and Community Right-to-Know Act (EPCRA), however have subsequently been funded for the current financial year. The TRI system is sometimes called the 'gold standard' for pollution inventories. This EPA program is used as a reference by over 50 other countries.¹⁵⁰

The Department of Energy's research and development programs to accelerate transition to new and cleaner energy technologies is also being targeted for steep cuts of \$2 billion. NASA's Earth-monitoring programs have also 'come under attack by conservatives who don't appreciate the agency's forays into climate science and think NASA should focus on space exploration instead,' according to Brad Plummer.¹⁵¹ Programs to help coastal communities adapt to climate change such as NASA's Sea Grant Program would be defunded entirely. These proposed budget cuts directly impact data collection and publishing programs where the Federal Government had previously demonstrated leadership and innovation.

5.5 Trump's Office of Science & Technology Policy

Trump is the first U.S. president to rely on his own personal advisors rather than eminent scientists in the White House's Office of Science and Technology Policy.¹⁵² Since 1976, presidents have been advised on research budgets, information infrastructure and emerging technology issues by the nation's leading

¹⁴⁶Hyland-Wood (2017).

¹⁴⁷Hyland-Wood (2017).

¹⁴⁸<https://twitter.com/i/moments/856767411311095808>, accessed December 15, 2017.

¹⁴⁹On EPA's website <https://opendata.epa.gov>.

¹⁵⁰Hyland-Wood (2016), U.S. Environmental Agency (2017c).

¹⁵¹Trump's budget would hammer climate programs at EPA, NASA, NOAA, and Energy. <https://www.vox.com/energy-and-environment/2017/3/16/14943826/trump-budget-proposal-climate-change>. Accessed 15 December 2017.

¹⁵²Kang and Shear (2017).

science and technology experts. Mr. Trump was quoted in March 2017, saying ‘a lot of those jobs, I don’t want to appoint, because they’re unnecessary to have.’¹⁵³

Members of the public and the scientific community are expressing dismay over the forced resignation of independent experts from scientific advisory committees, and their replacement with ‘industry-tied representatives with views well outside the scientific mainstream.’¹⁵⁴ Scientific American reported that three ‘troublesome developments’ are unfolding: ‘the loss of senior scientists in public service, the dwindling of new scientific and technical talent coming into the public service, and the chilling effect on the work of scientists who decide to stay.’¹⁵⁵

As of the first year, the Trump administration has only filled only one of the senior science roles at the Office of Science and Technology Policy (OSTP). Michael Kratsios, a former chief of staff to Silicon Valley billionaire and venture capitalist Peter Thiel, was appointed Deputy U.S. Chief Technology Officer in October 2017. Mr. Kratsios does not hold any academic credentials in science, technology, engineering or math. Vint Cerf, one of the chief architects of the Internet and vice president of Google said, ‘The impression this leaves is that Trump isn’t interested in science and that scientific matters are a low priority at the White House.’¹⁵⁶ Ed Felten, a Princeton University researcher who served as Obama’s deputy chief technology officer said, ‘If the Office of Science and Technology Policy is not well staffed, it will be difficult to make policy well in the areas where science matters.’¹⁵⁷ As of January 2018, the Trump Office of Science and Technology Policy has not any published science or technology initiatives on its website.¹⁵⁸ As of this writing, the OSTP landing page provides only a physical address for the Eisenhower Executive Office Building at 1650 Pennsylvania Avenue, Washington D.C., with a phone number and an email address for ‘press or stakeholder engagement’, stating that emails should include the word ‘MEDIA’ in the subject line.¹⁵⁹

The lack of appointments to a president’s science and technology related policy staff means that new working groups cannot be formed and the uncertainty of budget causes work to grind to a halt. In a 2017 interview by Nature News, Jackie Richter-Menge, a polar researcher with the US Army Corps of Engineers’ Cold Regions Research and Engineering Laboratory said, ‘the 16 agencies that coordinate the U.S. Arctic research programmes have been working harder on issues such

¹⁵³Ibid.

¹⁵⁴Halpern (2017).

¹⁵⁵Rosenberg and Rest (2018).

¹⁵⁶Kang and Shear (2017).

¹⁵⁷How Donald Trump crippled U.S. technology and science policy, <https://www.recode.net/2017/3/31/15139966/trump-white-house-technology-science-policy>, accessed 5 January 2018.

¹⁵⁸White House Office of Science and Technology Policy landing page, <https://www.whitehouse.gov/ostp/>, accessed 5 January 2018.

¹⁵⁹Office of Science and Technology Policy (2018).

as data collection, scientific infrastructure and international cooperation since Trump took office.’

A president’s stance on science and technology extends beyond key science and regulatory agencies. Consumers of U.S. open government data are often international partners with no practical mechanism to communicate with relevant data stewards at U.S. government agencies. For example, EPA’s datasets on greenhouse gas emissions are used by Mexico and Canada as part of a cooperative environmental agreement in support of the North American Free Trade Agreement (NAFTA).¹⁶⁰

As we have seen, the Trump administration, like Canadian Prime Minister Harper’s government before it, deprioritizes science and government transparency. Unannounced website changes, static signpost pages on key topics, defunding basic research and existing pollution monitoring programs underscore the fragility of taxpayer-funded data collection and dissemination in the current political climate.

As public policy researchers know all too well, policy-making is inherently political, intersubjective, and bound up with competing values and beliefs systems. While there may always be debate in policy-making circles about particular sources of evidence, most agree that freedom of information, ‘openness’ and open access to science is necessary to address the most pressing issues facing humanity. In recent times faith in evidence-based policy appears to have reached an all-time low, due to the rise of populist anti-establishment parties that are operating well-outside the scientific mainstream. Indeed, these anti-establishment sentiments played a prominent role in the election of President Trump, a candidate who campaigned on reducing regulation and re-invigorating the fossil-fuel industry. Scientists and policy experts may have hoped that Mr. Trump’s skeptical stance towards climate science and environmental regulation would soften once elected, however they did not. In March 2018, perhaps bolstered by broad citizen support for public sector science and government transparency, in a bipartisan effort U.S. Congress rejected Trump’s proposed funding cuts and approved the largest research funding increase to federal science agencies in a decade. The American Association for the Advancement of Science analysis showed that R&D spending will reach ‘176.8 billion, an increase of 12.8% or 20.1 billion above FY 2017 estimated R&D spending. Basic and applied research funding will receive its largest year-over-year increase since’ the 2009 economic stimulus package. EPA maintained their prior year budget of \$8.05 billion for FY2018, and indicated their support for programs including chemical regulation and research. According to the AAAS report (published 6-Sept 2017), research programs were generally protected from steep cuts recommended by the Trump Administration in 2017. One might think that institutional strength and public engagement helped to deliver the largest year-over-year increase since the 2009 economic stimulus package under president Obama. What matters equally, if not more, is whether federal science is politicized or allowed to be independent.

¹⁶⁰Commission for Environmental Cooperation website. <http://www.cec.org/>. accessed 5 January 2018.

6 Developing Open Government Data Resiliency

There exist formal and informal mechanisms for protecting and preserving open government data. There are legislatively mandated roles and responsibilities, as well as, generally observed protocols, when a new administration takes office. This approach worked reasonably well over the last several decades, allowing the peaceful transition from one administration to the next. However, the Trump administration's ideologically-driven removal of climate related data violated these previously observed protocols.

The process followed by prior administrations has been that newly appointed executives take it upon themselves to fulfill a new president's agenda and respond to his direction. U.S agencies are tasked with certain operations in which they are required to collect data. The agencies themselves most often choose which data to collect, how the data are collected, and whether or not the data are published.

6.1 Preserving the Peoples' Information

Who is responsible for archiving of an outgoing administration's policies and data for future reference? Who preserves publicly-funded Earth observation data? Historians and the media, at a minimum, will surely wish to retain access to the policies and data from the prior administration. It is beyond the scope of this chapter to detail the complex landscape of digital preservation and long-term access to Federal Government content; however, the roles of several organizations are highlighted.

It may surprise readers to learn that the Federal Government does not have defined roles and responsibilities to preserve and provide long-term access to digital content produced by it, especially at the end of a president's term. It has fallen to individuals within an agency, or volunteers with digital library and Web crawling expertise, to make a snapshot of a given website. For example, EPA staff created and posted a snapshot of static website content taken on January 19th, 2017, a day before the inauguration of President Trump. Snapshots such as this however, do not contain databases, data-driven pages, or other large collections of content, so they are far from accurate representations of dynamic, data-driven websites.

6.2 Laws & Mandates for Digital Preservation

The key legislation regulating U.S. Government agencies in their creation and enforcement of agency-level regulations is the Administrative Procedure Act (APA) of 1946,¹⁶¹ as amended in 1966 by the Freedom of Information

¹⁶¹Administrative Procedure Act 1946 (US) The Act states in part, 'Except to the extent that there is involved (1) any function of the United States requiring secrecy in the public interest or (2) any matter relating solely to the internal management of an agency... Every agency shall separately state and currently publish in the Federal Register... statements of the general course and method by which its functions are channeled and determined, including the nature and requirements of all formal or informal procedures available as well as forms and instructions as to the scope and contents of all papers, reports, or examinations.'

Act.¹⁶² U.S. law provides strict penalties for those who would remove or destroy government information.¹⁶³ Agency heads are required to notify the Archivist of the United States of any ‘actual, impending, or threatened unlawful removal, defacing, alteration, corruption, deletion, erasure, or other destruction of records in the custody of the agency’.¹⁶⁴ The Archivist is required to report to both Congress and the Attorney General if an agency head fails in their duty.

However, these rules only apply to U.S. Government agencies. The U.S. Supreme Court found in 1992 that ‘The President’s actions are not reviewable under the APA. He is not specifically included in the APA’s purview, and respect for the separation of powers and the President’s unique constitutional position makes textual silence insufficient to subject him to its provisions.’¹⁶⁵ The U.S. President may therefore direct the head of an agency (a political appointee of the President himself) to take action that the agency head would be theoretically prohibited from taking themselves. When the traditionally practiced protocols to preserve and make available as open access documents and data of prior administrations is ignored, this has profound implications and unintended consequences.¹⁶⁶

6.3 The Government Publishing Office and the National Archives

The Federal Government names key appointments to protect official publications and keep records. The Government Publishing Office (GPO) has a congressional mandate to preserve documents deemed essential to American democracy. GPO’s mission is to provide electronic access to and maintain secure sources for official publications and products of the Federal Government. GPO runs vital permanent public access programs through the nation’s thousands of universities. However, this represents a small fraction of the hundreds of terabytes of data and documents produced by the Federal Government.

The Archivist of the United States is mandated to safeguard and make available for study valuable records of the federal government. Valuable records have been defined as original Declaration of Independence, Constitution and Bill of Rights. The president nominates the Archivist, he is confirmed by the Senate, and has no term limit. The current Archivist committed the National Archives and Records

¹⁶²Freedom of Information Act of 1966 (US) The Freedom of Information Act was intended ‘to clarify and protect the right of the public to information’ primarily upon request. Thus, agencies that collect data must generally make that data available to members of the public upon request. There is no provision in the law for that requirement to be affordable or convenient. Unfunded or underfunded challenges in complying with FOIA requests often lead agencies to choose between two paths: resist fulfilling such requests, or publish the data proactively to avoid FOIA requests.

¹⁶³18 U.S.C. §2071 - Concealment, removal, or mutilation generally <https://www.gpo.gov/fdsys/granule/USCODE-2011-title18/USCODE-2011-title18-part1-chap101-sec2071>.

¹⁶⁴44 U.S. Code § 3106.

¹⁶⁵*Franklin v. Massachusetts* 1992.

¹⁶⁶The Presidential Records Act of 1978 (44 U.S.C. §§ 2201–2207) the Presidential and Federal Records Act Amendments of 2014 (44 U.S. Code § 2203, 2204, 2208, 2904 and 2906) mandated U.S. administrations to retain records related to their operations.

Administration to the principles of Open Government—transparency, participation, and collaboration.’¹⁶⁷ Through amendment, the role of the Archivist of the United States in securing records was enhanced to include electronic records such as websites. It was in compliance with this law that the websites of former administrations were retained by the National Archives and Records Administration, allowing scholars, journalists and activists to compare information that was removed or changed by subsequent administrations. In 2004, The Archivist made a decision *not* to perform an end of term Web crawl. This unassigned and vital task to support government transparency and accountability fell to volunteers with government digital preservation and library expertise.

6.4 Grassroots Action to Preserve Open Government Data

The visionary founder of the Internet Archive, Brewster Kahle states that ‘the average life of a Web page is 100 days before it’s either cleaned or deleted.’¹⁶⁸ Internet Archive’s Wayback Machine provides an invaluable resource to government and academic librarians, saving 4–5 billion pages a week. The pioneering Internet Archive joined forces with academic and government librarians from the California Digital Library, Library of Congress, University of North Texas Libraries, and U.S. Government Publishing Office, in a loose confederation called the End of Term Web Archive Project.¹⁶⁹ This grassroots team with digital preservation, library science and Web data crawling expertise has been capturing federal government websites since 2008. They produce a comprehensive snapshot of the ephemeral federal government Web, preserving otherwise disappearing data including some Earth observation data. Over 200 terabytes of government web content were archived from the Obama administration.¹⁷⁰

The architecture of the public Web allows ‘cooperation without coordination’

— David Wood, W3C Working Group chair 2011

Unless one is a digital research librarian or serves a data intensive government organization, it is difficult to comprehend the complexity and sheer scale of archiving government websites. In November 2016, researchers and students at the University of Pennsylvania’s Program in Environmental Humanities initiated the Data Refuge project to make trustworthy copies of federal environmental data.¹⁷¹

However, no matter how efficient the grassroots efforts are, they cannot gather information to which they don’t have access. For example, the EPA linked open data service dynamically generated over half a billion machine and human readable Web pages from data stored in underlying databases. Web crawlers can only archive the generated web pages, not the underlying data itself. This means that

¹⁶⁷‘David Ferriero Biography’ 2017.

¹⁶⁸Internet Archive Wayback Machine. <https://web.archive.org/>. Accessed 15 December 2017.

¹⁶⁹EOT Archive (2017).

¹⁷⁰Jefferson (2017).

¹⁷¹Data Refuge Project (2017), and Penn Program in the Environmental Humanities (2017).

without permission from the publishing agency, the underlying data is inaccessible and potentially lost to history.

The infrastructure and expertise cannot fall on any one organization or group. Librarians, academics, scientists and the public set out to preserve valuable information that may not align with the priorities of the Trump administration.¹⁷² Securing digital content tagged as ‘at risk’ began. Self-organizing volunteer groups, some with affiliation to Library of Congress and the Government Publishing Office, joined forces with the End of Term Web Archive Project and Data Refuge Project and worked to protect open government data that was flagged as at risk of removal.^{173,174} Many of the volunteers are experts in digital preservation, Web crawling, and outreach. Scientists and subject matter experts continue to work verifying hundreds of terabytes of data downloaded from government websites (i.e., gov., mil, other). Universities and non-profits are tracking and in some cases hosting open data threatened by funding cuts or staff reductions. The University of Pennsylvania Data Refuge Project and the nonpartisan, non-profit Sunlight Foundation are actively tracking confirmed news reports of open government data removal.¹⁷⁵

The Environmental Data and Governance Initiative (EGDI), a 501(c)(3) non-profit organization, brings together environmental researchers and professors from the U.S. committed to protection of environmental data and governance practices.¹⁷⁶ The EDGI team is actively monitoring, archiving and analyzing federal websites. The team publishes comprehensive reports analyzing environmental data loss, regulatory rollback and environmental justice.¹⁷⁷

6.5 International Science Collaboration

Global climate change is considered by the international scientific community, as the greatest risk facing humanity in the 21st Century.

Michael Mann, 2016

International scientific collaboration using Earth observation data from the U.S. and European partners allowed researchers to deliver the message that ‘warming of the

¹⁷²Brady (2016).

¹⁷³The End of Term Web Archive captures and saves U.S. Government websites at the end of presidential administrations. Beginning in 2008, the End of Term Archive has thus far preserved websites from administration changes in 2008 and 2012, and is currently working on for the End of Term 2016-17 archive. Accessed 10-Jan 2018. <http://eotarchive.cdlib.org/2016.html>.

¹⁷⁴Data Refuge has created a site for federal data and supports climate and environmental research and advocacy. Accessed 10-Jan 2018. <https://www.datarefuge.org/>.

¹⁷⁵Penn Program in the Environmental Humanities (2017), Sunlight Foundation (2017).

¹⁷⁶Environmental Data & Governance Initiative, see <https://enviroadatagov.org/about/>, accessed 7 January 2018.

¹⁷⁷Paris et al. (2017).

global climate system is unequivocal.’¹⁷⁸ The United States has enjoyed a long history of collaboration on collection and dissemination of open science with the World Meteorological Organization (WMO), a specialized agency of the United Nations.¹⁷⁹ Publicly funded U.S. scientists supported WMO’s mission ‘to standardize weather, water, climate, space weather and other related environmental hazard and risk information and develop identifiers for cataloguing weather, water and climate extreme events.’¹⁸⁰

Other multilateral collaborations supported by U.S. Federal funding to date, include the Group on Earth Observations (GEO), a partnership of 105 national governments and 118 Participating Organizations comprised of mostly non-government organizations (NGOs). GEO collaborates with national and regional groups to collect, curate and share global observation systems to respond to climate-related hazards and natural disasters around the world.¹⁸¹ GEO’s partners include the World Meteorological Organization (WMO), the Global Climate Observing System (GCOS) and the Food and Agriculture Organization (FAO).¹⁸² Another recipient of Federal funding is the International Council for Science (ICSU) who is actively collaborating on open access for science and governance matters based on open data principles.¹⁸³ These international partnerships are at high risk of being negatively impacted by an ‘America First’ policy.

7 Conclusion

In this chapter, I used Earth observation data, a widely used subset of open government data, to illustrate that (a) the US has a long tradition of support for freedom of information and making open government data available for peaceful, civilian use; (b) there is significant economic and scientific interdependence on this data; and (c) it is widely used by researchers, policy-makers, intergovernmental organizations, and multilateral organizations to address complex issues such as energy security, crop failures, water shortages, and sea level rise.

Past U.S. administrations from Reagan to Obama, supported open access to Earth observation and other relevant open science data, albeit through executive directives. Unfortunately, directives are vulnerable to cancelation by subsequent administrations. U.S. Congress has historically demonstrated bipartisan support for open government data on the basis of its economic, scientific and public value. Researchers, policy experts and industry appreciate that value but may now begin

¹⁷⁸‘Climate Change 2014: Synthesis Report’ (2015, p. 40).

¹⁷⁹World Meteorological Organization (2017).

¹⁸⁰Ibid.

¹⁸¹Obregón (2017).

¹⁸²Ibid.

¹⁸³International Council for Science (ICSU) et al. (2015, 2).

to see the vulnerability of an open data ecosystem that isn't adequately protected by legislation and organizational capacity.

The Trump administration has significantly disrupted traditionally observed protocols to preserve and make available as open access documents and data of prior administrations. These profound and unintended consequences have the potential to wreak havoc on international partnerships dedicated to low carbon development and climate mitigation. Trump's America First policies, including withdrawal from the Paris Agreement, and proposed budget cuts to science agencies, expose the fragility of Earth observation data programs. When Earth observation data is removed without notice, it causes a domino effect with transnational impacts. Distorting or disregarding the causes of water pollution, drought and catastrophic agricultural losses through a disregard for evidence has profound impacts and presents challenges to borderless threats, including climate change.¹⁸⁴

After all, science is essentially international, and it is only through lack of the historical sense that national qualities have been attributed to it.

Marie Curie, Physicist, 1926

Legislation to support former President Obama's '*open by default*' mandate is complicated and time consuming at the best of times. Indeed, it will take years of effort to codify policy, and build bipartisan consensus on a bill that eventually becomes law. Considering the Trump administration's hostile stance towards science funding and transparency, the prospects for collaboration have become even more challenging. That said, the benefits of publishing open government data are many, with Earth observation and open science data fueling innovation and economic growth, and this may well be the (pecuniary) reason why, in due course, the current administration might have a change of heart and adopt a more positive stance.

America's admired position as a science and technology innovator is in jeopardy if populist 'mood-swings' or populist zeitgeist,¹⁸⁵ fueled by leaders who are unfamiliar with, or hostile to, publicly-funded science are allowed to rollback hard earned progress. Applying an America First policy puts U.S. science and technology innovation, especially in relation to a clean energy and a low-carbon economy, at serious risk.

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Chapter 19

Elon Musk's Open Innovation: Tesla, Intellectual Property, and Climate Change



Matthew Rimmer

Abstract This chapter considers Elon Musk and his company Tesla, and evaluates their statements in respect of intellectual property, open innovation, and climate change. It is worth situating the story in the context of the growing literature on intellectual property and clean technologies. This paper considers Tesla's shifting strategies in respect of patent law, policy, and practice. The work explores Tesla's embrace of an open source philosophy, and the motivations behind this business strategy. The chapter analyses the larger issues about business development relating to electric vehicles and clean technologies. It examines how Tesla's rivals have responded—particularly looking at Toyota Motors. This paper concludes by considering Tesla in light of larger initiatives in respect of clean technologies, renewable energy and climate change. Of particular note is sustainable transportation; the development of a Gigafactory; Elon Musk's complementary work at SolarCity in promoting solar technologies; and the big battery project in South Australia. The chapter concludes with a consideration of Elon Musk's advocacy for the adoption and implementation of the Paris Agreement 2015.

Keyword Intellectual property • Open source licensing • Open innovation
Tesla • Elon Musk • Renewable energy • Patent law • Trade secrets
The Paris Agreement • Clean technologies • Electric vehicles • Solar power
Battery storage • Tesla Motors • SolarCity • SpaceX

1 Introduction

Tesla is an innovative United States manufacturer of electric vehicles. In its annual report for 2012, the company summarizes its business operations:

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We design, develop, manufacture and sell high-performance fully electric vehicles and advanced electric vehicle powertrain components. We own our sales and service network and have operationally structured our business in a manner that we believe will enable us to rapidly develop and launch advanced electric vehicles and technologies. We believe our vehicles, electric vehicle engineering expertise, and operational structure differentiates us from incumbent automobile manufacturers. We are the first company to commercially produce a federally-compliant electric vehicle, the Tesla Roadster, which achieves a market-leading range on a single charge combined with attractive design, driving performance and zero tailpipe emissions.¹

The company notes that ‘the commercial production of a highway capable, fully electric vehicle that meets consumers’ range and performance expectations requires substantial design, engineering, and integration work on almost every system of our vehicles’.² Tesla makes much of its inventive labour force: ‘Our roots in Silicon Valley have enabled us to recruit engineers with strong skills in electrical engineering, power electronics and software engineering’.³ The company observes: ‘We believe these capabilities, coupled with our focus solely on electric vehicle technology as well as our strong in-house engineering and manufacturing capacity, will enable us to sustain the electric vehicle industry leadership we created through the production of the Tesla Roadster and Model S.’⁴

The chief executive officer and product architect of Tesla, Elon Musk has established a reputation for being an innovative entrepreneur, across a range of technological fields, including information technology, clean technology, electric cars, and spacecraft.⁵ His Tesla biography gives a sense of this diverse array of interests:

At Tesla, Elon has overseen product development and design from the beginning, including the all-electric Tesla Roadster, Model S and Model X. Transitioning to a sustainable energy economy, in which electric vehicles play a pivotal role, has been one of his central interests for almost two decades, stemming from his time as a physics student working on ultra-capacitors in Silicon Valley.

At SpaceX, Elon is the chief designer, overseeing development of rockets and spacecraft for missions to Earth orbit and ultimately to other planets...

In addition, Elon is the non-executive chairman and principal shareholder of SolarCity, which he helped create. SolarCity is now the leading provider of solar power systems in the United States.

Prior to SpaceX, Elon co-founded PayPal, the world’s leading Internet payment system, and served as the company’s Chairman and CEO. Before PayPal, Mr. Musk co-founded Zip2, a provider of Internet software to the media industry.⁶

¹Tesla Motors (2012).

²Ibid.

³Ibid.

⁴Ibid.

⁵Vance (2015).

⁶Tesla Motors, Executives: Elon Musk, <http://www.teslamotors.com/executives>. Accessed 1 May 2018.

Musk has shown a particular interest in the impact of disruptive technologies upon established business models. There are also striking synergies between his various ventures. Tesla is reinforced by such infrastructure projects as SolarCity⁷ and the Gigafactory.⁸

Traditionally, Tesla had professed to take a strict approach to the protection of intellectual property. In 2012, the company observed: 'Our business will be adversely affected if we are unable to protect our intellectual property rights from unauthorized use or infringement by third parties.'⁹ Tesla warned:

Any failure to protect our proprietary rights adequately could result in our competitors offering similar products, potentially resulting in the loss of some of our competitive advantage and a decrease in our revenue which would adversely affect our business, prospects, financial condition and operating results. Our success depends, at least in part, on our ability to protect our core technology and intellectual property. To accomplish this, we rely on a combination of patents, patent applications, trade secrets, including know-how, employee and third party nondisclosure agreements, copyright laws, trademarks, intellectual property licenses and other contractual rights to establish and protect our proprietary rights in our technology. We have also received from third parties patent licenses related to manufacturing our vehicles.¹⁰

The strategy of the company was to rely upon a combination of patent law, and other intellectual property rights, to protect the core technologies of the company.

On the 12th June 2014, Elon Musk, the chief executive officer of the electric car manufacturer, Tesla, announced in a blog that 'all our patents belong to you.'¹¹ He explained that the company would adopt an open source philosophy in respect of its intellectual property in order to encourage the development of the industry of electric cars, and address the carbon crisis. Elon Musk made the dramatic, landmark announcement:

Yesterday, there was a wall of Tesla patents in the lobby of our Palo Alto headquarters. That is no longer the case. They have been removed, in the spirit of the open source movement, for the advancement of electric vehicle technology.¹²

Elon Musk observed that 'Tesla Motors was created to accelerate the advent of sustainable transport.'¹³ He maintained: 'If we clear a path to the creation of compelling electric vehicles, but then lay intellectual property landmines behind us to inhibit others, we are acting in a manner contrary to that goal.'¹⁴ Elon Musk promised: 'Tesla will not initiate patent lawsuits against anyone who, in good faith,

⁷SolarCity, <http://www.solarcity.com/company/team>. Accessed 1 May 2018.

⁸Tesla Motors (2014).

⁹Tesla Motors (2012).

¹⁰Ibid.

¹¹Musk (2014).

¹²Ibid.

¹³Ibid.

¹⁴Ibid.

wants to use our technology.¹⁵ This statement has attracted a wide range of interest, because it raises important issues in respect of intellectual property; open source strategies; business; and innovation in clean technologies to address climate change.

This Chapter will consider Tesla, and evaluate its statements in respect of intellectual property, open innovation, and climate change. It is worth situating the story in the context of the growing literature on intellectual property and clean technologies. Professor Peter Menell from the University of California, Berkeley, and Sarah Tran reviewed the canon of key articles in the field in *Intellectual Property, Innovation, and the Environment*.¹⁶ Scottish scholar Abbe Brown has edited a number of contemporary papers on intellectual property and climate change.¹⁷ Professor Estelle Derclaye from the University of Nottingham has written widely on intellectual property and climate change in the European Union.¹⁸ Professor Tine Sommer from Aarhus University, Denmark, has explored the patenting of environmentally sound technologies.¹⁹ The International Centre for Trade and Sustainable Development—in collaboration with the European Patent Office and the United Nations Environment Programme—has focused upon patent landscapes and clean technologies.²⁰ Eric Lane has explored intellectual property management and commercialisation in his book, *Clean Tech Intellectual Property*, and the Green Patent Blog.²¹ A number of other North American writers have made important contributions to the study of international law, intellectual property, and climate change.²² Jorge Contreras and Meredith Jacob have led work in respect of patent pledges—including in respect of green, clean technologies.²³

This paper has a number of parts. Part 2 considers Tesla's shifting strategies in respect of patent law, policy, and practice. Part 3 explores Tesla's embrace of an open source philosophy. Part 4 analyses the larger issues about business development. Part 5 examines the efforts of competitors such as Toyota to emulate Tesla's open source philosophy. Part 6 of this paper concludes by considering Tesla in light of larger initiatives in respect of clean technologies, renewable energy and climate change. Of particular note is sustainable transportation; the development of a Gigafactory; Elon Musk's complementary work at SolarCity in promoting solar technologies; and the establishment of a big battery in South Australia.

¹⁵Ibid.

¹⁶Menell and Tran (2014).

¹⁷Brown (2013).

¹⁸Derclaye (2010).

¹⁹Sommer (2013).

²⁰Karachalios et al. (2010).

²¹Lane (2011).

²²Maskus and Okediji (2012), Sarnoff (2013), Reichman et al. (2014), Cimoli et al. (2014), Allan et al. (2014).

²³Contreras and Jacob (2017).

The conclusion considers the role of Elon Musk and Tesla in advocating for the ratification and the implementation of the Paris Agreement 2015.²⁴

2 Tesla's Changing Philosophy in Patent Law

Tesla has assembled a significant portfolio of patents. In its annual report for 2012, the company explained its intellectual property portfolio in respect of its technologies:

Our proprietary technology includes cooling systems, safety systems, charge balancing systems, battery engineering for vibration and environmental durability, customized motor design and the software and electronics management systems necessary to manage battery and vehicle performance under demanding real-life driving conditions. These technology innovations have resulted in an extensive intellectual property portfolio.²⁵

The company stressed: 'Our design and vehicle engineering capabilities, combined with the technical advancements of our powertrain system, have enabled us to design and develop zero tailpipe emission vehicles that we believe overcome the design, styling, and performance issues that we believe have historically limited broad consumer adoption of electric vehicles'.²⁶ Tesla insisted that its comparative advantages included long range and recharging flexibility; energy efficiency and cost of ownership; and high performance without compromised design or functionality.

Assessing its intellectual property portfolio, Tesla stressed in 2012:

Our success depends, at least in part, on our ability to protect our core technology and intellectual property. To accomplish this, we rely on a combination of patents, patent applications, trade secrets, including know-how, employee and third party nondisclosure agreements, copyright laws, trademarks, intellectual property licenses and other contractual rights to establish and protect our proprietary rights in our technology. As of December 31, 2012, we had 117 issued patents and more than 258 pending patent applications with the United States Patent and Trademark Office and internationally in a broad range of areas. Our issued patents start expiring in 2026. We intend to continue to file additional patent applications with respect to our technology. We do not know whether any of our pending patent applications will result in the issuance of patents or whether the examination process will require us to narrow our claims. Even if granted, there can be no assurance that these pending patent applications will provide us with protection.²⁷

²⁴Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

²⁵Tesla Motors (2012).

²⁶Ibid.

²⁷Ibid.

This approach certainly seems to be one that is focused the protection of intellectual property through patent law, and a combination of other supplementary forms of intellectual property.

Maulin Shah has provided a useful analysis of the patent portfolio of Tesla in terms of infographics.²⁸ Shah comments:

120 of Tesla's patents are related to battery and charging technologies, and not surprisingly, this technology makes up the vast majority of its patent portfolio. Tesla also owns 20 patents related to electric motor and drive control, 10 patents on vehicle frames and chassis, followed by a handful of patents related to doors/latches, air conditioning technology, sunroofs (note the signature panoramic roofs of the Model S), and user interfaces/displays.²⁹

Shah notes the competition in the area: 'However, while Tesla may not have much competition in the commercial marketplace for purely electric vehicles, automotive giants such as General Motors, Toyota, Honda, Ford, Nissan, and Daimler have all amassed significant patent portfolios related to electric vehicle technology.'³⁰

The company emphasized that 'the protection provided by the patent laws is and will be important to our future opportunities.'³¹ However, Tesla recognised that 'such patents and agreements and various other measures we take to protect our intellectual property from use by others may not be effective for various reasons.'³² The company was conscious that 'our patents, if issued, may not be broad enough to protect our proprietary rights.'³³ Tesla recognised that 'the patents we have been granted may be challenged, invalidated or circumvented because of the pre-existence of similar patented or unpatented intellectual property rights or for other reasons.'³⁴ The company also noted that 'the costs associated with enforcing patents, confidentiality and invention agreements or other intellectual property rights may make aggressive enforcement impracticable.'³⁵ Tesla was also aware that 'current and future competitors may independently develop similar technology, duplicate our vehicles or design new vehicles in a way that circumvents our patents.'³⁶ Tesla admitted that 'the status of patents involves complex legal and factual questions and the breadth of claims allowed is uncertain'.³⁷ The company was also conscious: 'In addition, patents issued to us may be infringed upon or designed around by others and others may obtain patents that we need to license or design around, either of which would increase costs and may adversely affect our

²⁸Shah (2014).

²⁹Ibid.

³⁰Ibid.

³¹Tesla Motors (2012).

³²Ibid.

³³Ibid.

³⁴Ibid.

³⁵Ibid.

³⁶Ibid.

³⁷Ibid.

business, prospects, financial condition and operating results.’³⁸ Such reservations are an important context for the announcement in 2014.

In his blog post in 2014, Elon Musk of Tesla discussed his growing disenchantment with the patent system:

When I started out with my first company, Zip2, I thought patents were a good thing and worked hard to obtain them. And maybe they were good long ago, but too often these days they serve merely to stifle progress, entrench the positions of giant corporations and enrich those in the legal profession, rather than the actual inventors. After Zip2, when I realized that receiving a patent really just meant that you bought a lottery ticket to a lawsuit, I avoided them whenever possible.³⁹

He showed a particular sensitivity to the problems of patent lawsuits.

Elon Musk noted that Tesla, at first, sought to build a significant patent portfolio: ‘At Tesla, however, we felt compelled to create patents out of concern that the big car companies would copy our technology and then use their massive manufacturing, sales and marketing power to overwhelm Tesla’.⁴⁰ The company developed a significant portfolio of patents in respect of electric cars and associated infrastructure. Elon Musk observed, though, that such an assumption was incorrect: ‘The unfortunate reality is the opposite: electric car programs (or programs for any vehicle that doesn’t burn hydrocarbons) at the major manufacturers are small to non-existent, constituting an average of far less than 1% of their total vehicle sales.’⁴¹ He lamented: ‘At best, the large automakers are producing electric cars with limited range in limited volume’.⁴² Musk observed that some automobile manufacturers produced ‘no zero emission cars at all’.⁴³

Tesla Motors has been involved in a number of legal skirmishes in respect of intellectual property. In a 2013 dispute, Tesla Motors was involved in a skirmish with pointSET.⁴⁴ The dispute involved a battle over the remote control of temperature in cars. As Eric Loveday noted:

The Tesla Model S features a system that allows owners to remotely access the climate control settings. This system essentially allows owner to pre-cool or pre-heat the cabin of a plugged-in Model S. Of course, this is a feature that we’re sure all Model S owners use on almost a daily basis. However, there may be an issue that could prevent Model S owners from accessing this feature in the future. It seems Tesla’s remote access system may infringe upon a patent held by pointSET.⁴⁵

³⁸Ibid.

³⁹Musk (2014).

⁴⁰Ibid.

⁴¹Ibid.

⁴²Ibid.

⁴³Ibid.

⁴⁴Jones (2013).

⁴⁵Loveday (2013).

On the 30th April 2013, an attorney for pointSET sent a letter to Tesla Motors, alleging that ‘Tesla induces infringement of claim 6 of United States Patent No. 7,379,541.’⁴⁶ The patent concerned a ‘method and apparatus for setting programmable features of a motor vehicle.’⁴⁷ The letter stated that ‘pointSET is offering a one-time, fully-paid licensing flat fee of \$500,000’ that ‘will cover both past and future use of the technology.’⁴⁸

In response, Tesla Motors sought a declaratory judgment of patent non-infringement in the United States District Court for the Northern District of California.⁴⁹ Tesla Motors requested a judgment that ‘Tesla does not infringe and has not infringed, directly or indirectly, the ‘541 patent.’⁵⁰ Tesla Motors also asked for a ruling that ‘the Model S Beta app does not infringe and has not infringed, directly or indirectly, the ‘541 patent.’⁵¹ Tesla Motors requested that ‘pointSET, and all persons acting on its behalf or in concert with it, be permanently enjoined and restrained from charging, orally or in writing, that the ‘514 patent is infringed, directly or indirectly, by Tesla or the Model S Beta app.’⁵² The company asked that ‘Tesla be awarded its costs, expenses and reasonable attorneys’ fees in this action’.⁵³ Moreover, the company asked that ‘Tesla be awarded such other and further relief as the Court may deem appropriate.’⁵⁴

In 2018, the Nikola Motor Company filed a lawsuit in Arizona, alleging that Tesla’s new heavy-duty semi-truck infringed its design patents.⁵⁵ Tesla responded that there was no merit in the lawsuit.

Such disputes are not uncommon. In my 2011 book *Intellectual Property and Climate Change: Inventing Clean Technologies*, I considered the significant patent litigation in respect of green cars and transportation.⁵⁶ There was an epic dispute between Paice LLC and Toyota Motors over patents regarding hybrid cars, such as the Toyota Prius. Toyota Motors was indignant at the litigation, calling its opponent a ‘patent shark’. However, the company fared poorly in the long-winded litigation. This conflict was eventually settled, with Toyota Motors paying royalties to Paice LLC. The dispute highlighted that there are major patent thickets surrounding green cars and green transportation.

⁴⁶Ibid.

⁴⁷Ibid.

⁴⁸Ibid.

⁴⁹*Tesla Motors Inc. v pointSET Corporation*, United States District Court for the Northern District of California (2013), <http://pdfserver.amlaw.com/ca/TESLASuit.pdf>.

⁵⁰Ibid.

⁵¹Ibid.

⁵²Ibid.

⁵³Ibid.

⁵⁴Ibid.

⁵⁵*Nikola Corporation v. Tesla Inc.*, United States District Court for the District of Arizona (2018), Case 2:18-cv-01344-GMS; O’Kane (2018), and Guess (2018).

⁵⁶Rimmer (2011).

The San Francisco civil society group, the Electronic Frontier Foundation (EFF), welcomed the decision of Tesla Motors to adopt an open source philosophy in respect of intellectual property. Adi Kamdar of the EFF commented: 'Patent trolls run rampage while some big companies spend more money on patent wars than research and development.'⁵⁷ He observed: 'This is why it is so encouraging when companies commit to openness, ensuring their patents do not obstruct future innovation.'⁵⁸ Adi Kamdar observed that the EFF had published a guide to alternative patent licensing.⁵⁹ He implored: 'We would love to see Tesla commit their patents explicitly under an agreement like the Defensive Patent License, which sets a clear standard that patents are to be both shared and used for good.'⁶⁰ Kamdar observed that Musk's stance on patent law was supported by a recent study by MIT's Catherine Tucker on 'The Effect of Patent Litigation and Patent Assertion Entities on Entrepreneurial Activity'.⁶¹ Kamdar hoped that the initiative of Tesla Motors would inspire others: 'We are encouraged by Tesla's announcement, and hope other companies—large and small—follow suit.'⁶²

Brad Greenberg wondered about the practicalities of enforcing Tesla Motors' promise not to sue for patent infringement.⁶³ He questioned: 'Just how legally enforceable would Tesla's declaration be? That is, if a technologist practiced one of Tesla's patents, would they really be free from liability?' Greenberg pondered whether the statements by Musk by themselves would be sufficient:

Sure, Tesla may be estopped from enforcing its patents—though estoppel requires reasonable reliance and this announcement is so vague that it's difficult to imagine the reliance that would be reasonable—and Tesla isn't in the patent trolling business anyway. (Sorry, patent-assertion-entity business). But what if Tesla sold its patents or went bankrupt. Could a third party not enforce the patents? If it could, patents promised to be open source would seem a rich market for PAEs.⁶⁴

There has been similar issues arising in the context of battles over gene patents—there has been much discussion as to whether Genetic Technologies Limited would be estopped from taking action, in light of its statements.⁶⁵

The decision of Tesla has been a fillip for the patent reform movement. Julie Samuels of the public policy think tank, Engine, commented: 'What you're looking at here is the beginning of a new culture with regard to patents.'⁶⁶ She observed: 'A lot of companies in the high tech space are dismayed with how the system is shaping up, so they're trying to come up with creative ways to navigating around

⁵⁷Kamdar (2014).

⁵⁸Ibid.

⁵⁹Ibid.

⁶⁰Defensive Patent License, <http://www.defensivepatentlicense.com/>.

⁶¹Tucker (2014).

⁶²Kamdar (2014).

⁶³Greenberg (2014).

⁶⁴Ibid.

⁶⁵See Rimmer (2006).

⁶⁶Julie Samuels quoted in Finley (2014).

that system and get back to the business of innovating and creating.’⁶⁷ The announcement of Tesla helped provide impetus for President Barack Obama’s efforts to address the problem of patent trolls and reduce patent litigation.

Some members of the intellectual property profession have defended the legitimacy of the patent regime in light of Elon Musk’s comments. Philip Totaro provided a thoughtful riposte.⁶⁸ He observed: ‘While this is a noble and well-intentioned move, unfortunately, this thought process represents a widely held misconception about intellectual property: that it is only a legal matter, rather than a commercial one.’⁶⁹ Totaro responded:

Patents are not just about hitting the ‘litigation lottery’ as Mr. Musk put it. Patents are the codification of innovation and they represent the investment of time and effort from the innovative and creative people who have their names on them. Making the investment in intellectual property protection in the first place presumes that you are willing and able to enforce your rights. In any market there will be those who are driven by greed, and we have seen the exploitation of intellectual property by so-called ‘patent trolls.’⁷⁰

Totaro maintained that one should not be cynical about the intellectual property regime. He wondered whether the move would undercut the value of Tesla Motors. Totaro argued that Musk could do more if he was truly committed to an open source model: ‘If Mr. Musk would be willing to redistribute his wealth to the employees and investors who made the commitment to create value for the company in the first place, then this move to open source their patents during the formative stages of the EV industry might make more sense.’⁷¹

It should also be noted that Tesla Motors has not abandoned its intellectual property entirely. The company has only offered access for ‘good faith’ uses of its patents—which still leaves open the prospect of the company taking action against ‘bad faith’ uses of its patents. Professor Orly Lobel from the University of San Diego commented: ‘There’s a lot of thinking in the research these days on the gap between the codified knowledge that is patentable and gets disclosed versus tacit knowledge that really exists in how you actually produce’.⁷² She noted: ‘That gap is probably relevant in this market.’⁷³ Her work has particularly highlighted the importance of the use of confidential information and non-disclosure agreements in Silicon Valley.⁷⁴

Mike Masnick has noted that Tesla’s unorthodox approach to intellectual property has startled some traditional investors.⁷⁵ He observed, though, that the company was committed to the approach: ‘Tesla opening up its patents seems like a move that shows

⁶⁷Ibid.

⁶⁸Totaro (2014).

⁶⁹Ibid.

⁷⁰Ibid.

⁷¹Ibid.

⁷²Frick (2014).

⁷³Ibid.

⁷⁴Lobel (2013).

⁷⁵Masnick (2015).

how confident it is in its execution abilities, and makes the company a lot less likely to rest on its laurels and become nothing but a “licensing” company down the road.⁷⁶

In its 2015 Annual Report, Tesla provided this summary of its approach to intellectual property rights:

As part of our business, we seek to protect our intellectual property rights in various ways, including through trademarks, copyrights, trade secrets, including know-how, patents, patent applications, employee and third party nondisclosure agreements, intellectual property licenses and other contractual rights. Additionally, consistent with our mission to accelerate the advent of sustainable transport, we announced a patent policy in which we irrevocably pledged that we will not initiate a lawsuit against any party for infringing our patents through activity relating to electric vehicles or related equipment for so long as such party is acting in good faith. We made this pledge in order to encourage the advancement of a common, rapidly-evolving platform for electric vehicles, thereby benefiting ourselves, other companies making electric vehicles, and the world.⁷⁷

Tesla was conscious that it could well need to defend itself against patent infringement claims and trademark infringement claims, which ‘may be time-consuming and would cause us to incur substantial costs.’⁷⁸

In its 2015 annual report, Tesla stressed the key focus of its intellectual property: ‘Our core intellectual property resides not only within our electric powertrain, but also within our ability to design a vehicle that utilizes the unique advantages of an electric powertrain and the latest advancements in consumer technologies.’⁷⁹ Tesla Motors have certainly not abandoned filing patents. For instance, in March 2017, Tesla had a published patent in respect of the Powerpack—a ‘Scalable and Flexible Cell-Based Energy Storage System’.⁸⁰

Tesla has jealously guarded its trade secrets. In 2018, Tesla brought a legal action against Martin Tripp, a former employee, for breach of trade secrets. Tripp, in turn, has alleged defamation by Tesla.⁸¹

3 An Open Source Philosophy

There was much excitement over Elon Musk's support for open innovation.⁸² In his address, Elon Musk commented: ‘We believe that applying the open source philosophy to our patents will strengthen rather than diminish Tesla's position in this regard.’⁸³

⁷⁶Ibid.

⁷⁷Tesla (2015).

⁷⁸Ibid.

⁷⁹Ibid.

⁸⁰Lambert (2017a, b), and M. Ozbek, B. Pierquet and A. Baglino (inventors) and Tesla Motors Inc. (applicant), ‘Scalable and Flexible Cell-Based Energy Storage System’, United States Patent Application Publication No. US 2017/0093156 A1, Publication Date: 30 March 2017.

⁸¹*Tesla, Inc. v Tripp* (2018) 3:18-cv-00296; and Wong (2018).

⁸²Martin (2014).

⁸³Musk (2014).

The use of open source strategies to encourage collaboration and disseminate new technologies has a long tradition. Richard Stallman was groundbreaking in his use of free software licences to ensure that computer code was accessible.⁸⁴ Open source developers used open source licensing to support their information technology products and services. Lawrence Lessig helped set up the Creative Commons in order to facilitate accessible licensing across a wide range of copyright works.⁸⁵ Open source strategies have also been adopted in other fields of endeavour. There has been open source tactics deployed in respect of plant breeding and agriculture. As documented by Glyn Moody, the biological sciences have used open source licensing in response to the proliferation of gene patents and commercial databases.⁸⁶ There has been experimentation with open source strategies in the field of medicine—such as in open drug discovery.

Elon Musk's decision to adopt an open source philosophy in respect of electric cars has precedents in the area of clean technologies. In his prescient 2006 article, Jason Wiener explores open source licensing as a legal and economic means for the dissemination of renewable energy technology.⁸⁷ He contended that open innovation would work well with clean technologies:

The open source software movement is coming of age and expanding into industries beyond its roots in the software field. Valuable innovations in the biotechnology, applied software, mechanics, and mechanical energy technology fields have been developed under the open source methodology. Within the international environmental treaty framework, states have obligations to promote the transfer and dissemination of renewable and environmentally-friendly technology. Governments should employ the panoply of legal and economic tools available under and sanctioned by international law to meet consensual multilateral obligations. Open source technology initiatives should be nurtured by public incentives, public sector procurement policies, and legal alternatives to traditional conceptions of intellectual property rights.⁸⁸

Such an option has contemporary resonance—with the announcement in 2014 by Tesla that it would make its portfolio of patents available under an open source licensing model.

In my book *Intellectual Property and Climate Change: Inventing Clean Technologies*, I explored a number of examples of co-operative strategies in respect of intellectual property and clean technologies.⁸⁹ There has been a great deal of interest in innovation networks, patent pools, technology clearing houses, and open source strategies. The UNFCCC Climate Technology Centre and Network has been established to encourage research, development, and diffusion of clean technologies.⁹⁰

⁸⁴Richard Stallman, <https://stallman.org/>.

⁸⁵Lessig (1999, 2001, 2004, 2008).

⁸⁶Moody (2004).

⁸⁷Wiener (2006).

⁸⁸Ibid., 302–303.

⁸⁹Rimmer (2011).

⁹⁰UNFCCC Climate Technology Centre and Network, http://unfccc.int/ttclear/templates/render cms_page?TEM_tcn and <http://www.unep.org/climatechange/ctcn/>. Accessed 1 May 2018.

The UNEP is hosting the centre, and co-ordinating a network of climate innovation centres. The Creative Commons movement, along with Nike and Best Buy, helped establish GreenXChange.⁹¹ However, this venture is no longer active. While at IBM, David Kappos was instrumental in establishing the Eco-Patent Commons.⁹² This initiative was designed 'to provide an avenue by which innovations and solutions may be easily shared to accelerate and facilitate implementation to protect the environment and perhaps lead to further innovation.' After Kappos left IBM to lead the United States Patent and Trademark Office, the Eco-Patent Commons has struggled to have an impact. In the end, the Eco-Patent Commons was disbanded, because of structural and organisational problems, and a failure to guarantee patent utilisation.⁹³ There have also been a number of open source initiatives in respect of individual clean technology projects. More recently, the World Intellectual Property Organization has established WIPO GREEN to promote the diffusion of green technology.⁹⁴

Eric Lane considered the strategy of Tesla Motors in the Green Patent Blog.⁹⁵ He considered the precedent of the Eco-Patent Commons, and its mixed success. Lane observed: 'So the Tesla-Patent Commons is very significant, and unlike any prior (small "e") eco-patent commons, but the commercial and legal realities of dealing with patents and positioning technological businesses to be free to operate are always extremely complex.'⁹⁶ He commented upon the gambit by Tesla Motors: 'Ultimately, the impact of Musk's decision may turn on to what extent other such players will be motivated to invest in manufacturing vehicles, batteries, etc. using Tesla's patented and patent-pending technology with the obvious upside being the proven innovation that technology brings and the down side being no exclusivity, instead of investing in their own R&D and patent protection where the upside may be exclusivity and the down side may be inferior or unproven technologies.'⁹⁷

Don Tapscott and Anthony Williams have argued for the use of open source strategies in respect of clean technologies. In their 2010 book *Macrowikinomics*, Tapscott and Williams called for the establishment of a green technology commons.⁹⁸ The pair recognised: 'It is quickly becoming clear that climate change will be the biggest issue that human civilisation has ever had to deal with.'⁹⁹ Tapscott and Williams were concerned about the limitations of existing responses to the problem of climate change. The writers promoted open and collaborative responses to climate change: 'Tackling climate change will not only require unprecedented

⁹¹Green XChange, <http://greenxchange.cc/>. Accessed 1 May 2018.

⁹²Eco-Patent Commons, <http://www.wbcsd.org/work-program/capacity-building/eco-patent-commons.aspx>. Accessed 1 May 2018.

⁹³Contreras et al. (2018).

⁹⁴WIPO GREEN, <https://www3.wipo.int/wipogreen/en/about/>. Accessed 1 May 2018.

⁹⁵Lane (2014).

⁹⁶Ibid.

⁹⁷Ibid.

⁹⁸Tapscott and Williams (2010).

⁹⁹Ibid.

transformations in our systems of commerce and industry, it will also require fundamental changes to our way of life.’¹⁰⁰ The pair concluded: ‘We need to take the sum of mankind’s knowledge about sustainable technologies and industries, and share it for the sake of the planet and the future generations that will inhabit it.’¹⁰¹

Similarly, the futurist Jeremy Rifkin considers the rise of collaborative commons in his recent book, *The Zero Marginal Cost Society*.¹⁰² He has observed that ‘a powerful new technology revolution is emerging that is going to fundamentally alter our economic life.’¹⁰³ Rifkin predicts: ‘The plummeting of marginal costs is spawning a hybrid economy—part capitalist market and part Collaborative Commons—with far reaching implications for society.’¹⁰⁴ Rifkin envisages: ‘Hundreds of millions of people are already transferring parts of their economic lives to the global Collaborative Commons.’¹⁰⁵ He observes: ‘Prosumers are plugging into the fledgling Internet of Things (IoT) and making and sharing their own information, entertainment, green energy, and 3D-printed products at near zero marginal cost.’¹⁰⁶ Rifkin’s thesis is that monopoly capitalism will be displaced by a collaborative commons.¹⁰⁷ He contends that the car is a particularly acute metaphor for the transformation from ownership to access. Rifkin observes: ‘If ever proof were needed that the capitalist era, wedded to the exchange of property in markets, is ceding ground to the access of services in the Collaborative Commons, the changing relationship to the automobile is prima facie evidence of the great transformation at hand.’¹⁰⁸

4 Technology Leadership

The announcement by Tesla Motors also promoted a wider discussion about economics, business, and innovation in respect of the automobile industry. Professor Joshua Gans, an economist from the University of Toronto, commented, ‘It is 448 words that I believe (despite its length) may well become the Gettysburg Address for entrepreneurship and innovation.’¹⁰⁹

¹⁰⁰Ibid.

¹⁰¹Ibid.

¹⁰²Rifkin (2014).

¹⁰³Ibid.

¹⁰⁴Ibid.

¹⁰⁵Ibid., 24.

¹⁰⁶Ibid., 24.

¹⁰⁷Ibid., 226–231.

¹⁰⁸Ibid., 231.

¹⁰⁹Gans (2014).

In his address, Elon Musk emphasized: 'Technology leadership is not defined by patents, which history has repeatedly shown to be small protection indeed against a determined competitor, but rather by the ability of a company to attract and motivate the world's most talented engineers.'¹¹⁰ He hopes that his open source stratagem will enable him to compete with the big automobile manufacturers.¹¹¹ Elon Musk has long desired to turn Tesla into the car company of the future.¹¹²

In its annual report, Tesla Motors identifies a wide range of risks and challenges in terms of its business model.¹¹³

Elon Musk's embrace of an open source philosophy will also be powerful in terms of marketing and public relations—both within the industry, and with the wider community. Associated Press noted: 'The open-source movement has long appealed to the egalitarian mindset of most technologists, so the patent decision could help recruit talent.'¹¹⁴

In his book *Clean Disruption of Energy and Transportation*, Tony Seba has considered the electric vehicle as a disruptive technology.¹¹⁵ He was enthusiastic about the rise of Tesla Motors, and its rapid growth in the automobile marketplace: 'Tesla fashions itself a Silicon Valley computer company, closer in spirit and thinking to Apple and Google than to its Detroit forebears'.¹¹⁶ Seba maintained that 'the electric vehicle will disrupt the gasoline car industry (and with it the oil industry) swiftly and permanently.'¹¹⁷ He observed that 'even worse from the standpoint of gasoline and diesel cars, the EV is not just a disruptive technology; the whole business model that the auto industry has built over the past century will be obliterated.'¹¹⁸

Seba suggested that there are nine reasons why the electric vehicle industry will be disruptive. He noted that the electric motor is more energy efficient; the electric vehicle is cheaper to charge; and it is cheaper to maintain. Seba noted that the electric vehicle will disrupt the gasoline car aftermarket. He wondered about the potential for wireless charging. Seba was impressed by the modular design architecture of electric vehicles. He has also emphasized the combination of big data and fast product development:

A car company that collects data about its cars can understand customer usage patterns and technology stresses and failures. It can quickly fix mistakes, download new software to the cars, and develop new products and services. The electric vehicle product development

¹¹⁰Musk (2014).

¹¹¹McGrath (2014).

¹¹²Davis (2010).

¹¹³Tesla Motors (2012).

¹¹⁴Associated Press (2014).

¹¹⁵Seba (2014).

¹¹⁶Ibid., 102.

¹¹⁷Ibid., 103.

¹¹⁸Ibid., 104.

process is shortened; it resembles the computer industry's ultra-fast development cycles. Tesla and the other electric vehicle companies will be on a product development cycle at the exponential speeds of Moore's Law; Detroit will be on conventional linear speeds.¹¹⁹

Seba also makes the point that solar and electric vehicles are more land efficient. Moreover, electric vehicles can contribute to grid storage and other services. Seba concludes that the 'electric vehicle changes the basis of competition in the transportation industry.'¹²⁰ He predicts that 'neither the high-end or low-end gasoline car stands a chance against electric vehicles once electric vehicles are in the same price range.'¹²¹

Seba also makes the interesting argument that electric cars will be enhanced by technology convergence in respect of clean technologies. He commented: 'In the clean energy field, the disruptors (solar, electric vehicles, and autonomous cars), complement and accelerate one another's adoption'.¹²² He maintained that 'solar, the electric vehicle, and the autonomous vehicle started out as different sets of products and markets, but their symbiosis will complement and accelerate one another's technological development and adoption in the marketplace.'¹²³ Seba envisaged:

The increasing demand for electric vehicles and solar will attract even more investment in these technologies. Innovative companies that can invent new ways to push costs down and push quality up will thrive... Electric vehicles can be charged at work and become a source as well as a user of energy for the home. The result will be a swift transition from liquid-energy transportation to electric transportation.¹²⁴

Seba admits that 'an electric vehicle is still more expensive to purchase upfront, mainly due to battery costs'.¹²⁵ He predicts that 'like other technology products, the technology cost curve of electric vehicles points to a disruption soon; innovative business models will only accelerate the transition from gasoline to electric vehicles.'¹²⁶ It is certainly notable that Elon Musk has investments in both electric cars and solar energy. The entrepreneur obviously sees synergies in respect of his ventures.

Silicon Valley entrepreneur Aaron Levie, the CEO of Box Inc observed: 'By opening its patents, Tesla rightly realises it's better to be the best product in a large industry than the only product in a niche one.'¹²⁷

Tesla Motors has been in discussions with BMW about standardizing electric cars. A BMW spokesman said: 'Both companies are strongly committed to the

¹¹⁹Ibid., 111.

¹²⁰Ibid., 126.

¹²¹Ibid., 127.

¹²²Ibid., 7.

¹²³Ibid., 9.

¹²⁴Ibid., 9.

¹²⁵Ibid., 8.

¹²⁶Ibid., 8.

¹²⁷Associated Press (2014).

success of electro-mobility and discussed how to further strengthen the development of electro-mobility on an international level.'¹²⁸ There has been speculation about the development of a long-term deal between the two companies.¹²⁹

Writing in *Slate*, Will Oremus considered the announcement of Tesla Motors from a business perspective. He recognised: 'This might seem like a rash move for a company that still faces big hurdles on its path to long-term, mainstream success.'¹³⁰ Oremus anticipated a polarised reaction to the address of Elon Musk: 'Some will hail Musk as a hero, while others might dismiss him as a naïve idealist when he says that his ultimate goal is fighting climate change.'¹³¹ He stressed, though, that 'Musk isn't naïve, and Tesla isn't a charity.'¹³² Oremus observed that Tesla Motors was concerned about 'the much greater struggle between electric cars and their gas-powered counterparts.'¹³³ He commented: 'Viewed in that context, the obstacles to Tesla's success aren't the Nissan Leaf and the BMW i3—they're the constraints of technology, cost, infrastructure, and customer expectations.'¹³⁴ Oremus concluded: 'Best of all, if Musk's gambit works, it could pave the way for forward-thinking CEOs in other fields to take similar steps.'¹³⁵

There was recognition that Musk's position was not an entirely altruistic one.¹³⁶ Jacob Sherkow from New York Law School noted: 'Even if other competitors copy Tesla's design, Tesla still gets to sell them batteries, and that's pretty awesome.'¹³⁷

Timothy B. Lee considered the business strategy of Tesla Motors.¹³⁸ He observed: 'In practice, the biggest challenge many inventors face isn't fending off copycats, it's developing a market for the product in the first place.'¹³⁹ He noted: 'In a new industry, competitors can actually help with this by helping spread news about the invention, pioneering better sales techniques, and developing improvements that make the product more attractive.'¹⁴⁰

Virgin.Com entrepreneur, Richard Branson, was admiring of Elon Musk's gambit in respect of patent law: 'I hope many more entrepreneurs follow his spirit of ingenuity and initiative'.¹⁴¹ He reflected upon the initiative:

¹²⁸Taylor (2014).

¹²⁹Winton (2014).

¹³⁰Oremus (2014).

¹³¹Ibid.

¹³²Ibid.

¹³³Ibid.

¹³⁴Ibid.

¹³⁵Ibid.

¹³⁶Moyer (2014).

¹³⁷Ibid.

¹³⁸Lee (2014).

¹³⁹Ibid.

¹⁴⁰Ibid.

¹⁴¹Branson (2014).

Patents have often been seen as a necessary evil required to protect innovators from having their ideas stolen. However, they can also limit the development of a new industry, keep innovation at bay, and smother technological advancement. If we are to use business as a force for good, then we should welcome competition and relax fixation on intellectual property.¹⁴²

Branson provides a somewhat scrambled account of the nature and the role of patent law. Branson cited former The B Team CEO, Derek Handley who said: ‘By holding on tightly to the knowledge and protection of ideas and intellectual property that is enabling this race to gain momentum, they are holding the world back from getting to where we all want it to be.’¹⁴³ He commented: ‘At Virgin, we welcome competition—it challenges us to constantly innovative and improve.’¹⁴⁴ Branson was of the view: ‘We have never sought to monopolise a market, but instead to disrupt, improve and reimagine the current state of play to the benefit of customers.’¹⁴⁵ He affirmed the announcement by Tesla Motors: ‘This latest Tesla announcement is a win for innovation, technology and customers, and great step in the right direction for business.’¹⁴⁶ Branson sounds a little envious of the marketing success of Elon Musk’s announcement in respect of open innovation.

Branson has also been a supporter of Musk’s efforts.¹⁴⁷ He has commented: ‘My good friend Elon Musk is in the fast lane of electric vehicle development as Tesla power ahead with sales and growth’.¹⁴⁸ Branson noted: ‘However some Virgin staff notified me that Tesla are facing some opposition from industry incumbents who want to prevent Tesla from selling directly to customers.’¹⁴⁹ He observed: ‘Whilst nobody wants to undermine peoples livelihoods, if we are to conduct our businesses and industries in ways that profitably help people and the planet some things will have to change.’¹⁵⁰ Branson argued: ‘In this instance, I think that, by shaking up the United States automaker industry, Tesla are doing a very good thing, and I would greatly encourage you to sign this White House petition (organised by the public) to allow Tesla Motors to sell directly to consumers in all 50 states.’¹⁵¹

There has been pessimism amongst some critics that the automobile industry will squander the present offered by Tesla Motors. Jason Perlow wrote an incisive piece entitled, ‘Why Detroit will Squander Tesla’s Patent Present.’¹⁵² He suggested: ‘I suspect that one of the reasons behind Elon Musk’s open source motivations is

¹⁴²Ibid.

¹⁴³Ibid.

¹⁴⁴Ibid.

¹⁴⁵Ibid.

¹⁴⁶Ibid.

¹⁴⁷Branson (2013).

¹⁴⁸Ibid.

¹⁴⁹Ibid.

¹⁵⁰Ibid.

¹⁵¹Ibid.

¹⁵²Perlow (2014).

that he is looking for large partners to finance and build the many “gigafactories” needed to mass-produce the batteries at scale, which is the single largest component cost of his cars, and the patent portfolio of Tesla is the “carrot.”¹⁵³ Perlow wondered whether traditional manufacturers would invest in electric cars: ‘In order for the Big Three and the rest to make that leap, even with the patents, they will need to make substantial investments, on the order of many billions of dollars.’¹⁵⁴ He observed that there were longstanding relationships between the automobile manufacturers and the oil industry. Perlow concluded: ‘Unless our world governments step in and give them huge incentives to do otherwise, I don’t see the big auto manufacturers taking advantage of Musk’s gifts and breaking up a century-old romance with Big Oil.’¹⁵⁵

James Bessen, an economist from the Boston University School of Law, provided a thoughtful historical analysis of Tesla’s patent-sharing in the *Harvard Business Review*.¹⁵⁶ He suggested that ‘the conditions that make knowledge sharing advantageous today won’t last forever.’¹⁵⁷ Bessen predicted: ‘Eventually electric vehicles will replace much of the market for gasoline-powered cars.’¹⁵⁸ He observed that at that stage, ‘competition from other electric vehicle makers will affect Tesla’s profits and such extensive sharing might no longer be beneficial.’¹⁵⁹

5 Patent Pledges and Open Source Licensing

There has been an increasing trend by patent holders in a range of fields to make pledges to limit the enforcement of patents.¹⁶⁰ Patent pledges have appeared in the fields of information technology, biotechnology, and clean technology. Patent pledges have been in part a response to concerns about patent over-enforcement. Some, though, have questioned whether patent pledges come with hidden costs.¹⁶¹

There has been much concern about the rise of patent trolls, the expenses of patent litigation, and the costs of patent transactions in the United States. The scholar James Bessen and his colleagues Jennifer Laurissa Ford and Michael Meurer has been concerned that aggressive patent litigation has undermined innovation and entrepreneurship.¹⁶² The Supreme Court of the United States has

¹⁵³Ibid.

¹⁵⁴Ibid.

¹⁵⁵Ibid.

¹⁵⁶Bessen (2014).

¹⁵⁷Ibid.

¹⁵⁸Ibid.

¹⁵⁹Ibid.

¹⁶⁰Contreras and Jacob (2017).

¹⁶¹Vertinsky (2017).

¹⁶²Bessen et al. (2011–2012).

responded to the perceived problems in respect of patent law with a string of significant patent rulings. However, the patent law reform process has been stalled in the United States Congress.

In January 2015, at Las Vegas at the CES 2015 technology conference, Toyota made a significant announcement in respect of intellectual property, clean technologies, and open innovation.¹⁶³ Toyota has long been an innovator in respect of green vehicles and transportation—most notably, with the development of hybrid vehicles, like the Toyota Prius. The company has assiduously developed a large portfolio of patents in respect of clean technologies, across a wide range of sectors.

As part of its research and development program, Toyota has been developing the Toyota Mirai, a hydrogen fuel-cell vehicle. At CES 2015, Toyota announced that it would make 5680 hydrogen fuel-cell patents held globally, available for use royalty free.¹⁶⁴ The portfolio of patents included 1970 patents related to fuel-cell stacks; 290 patents associated with hydrogen tanks, 3350 patents related to fuel-cell system software control; and 70 patents related to hydrogen production and supply.

As part of the press conference, the futurist and theoretical physicist Dr Michio Kaku¹⁶⁵ discussed the possibilities of the hydrogen future for the automobile industry: ‘Usually hydrogen cars are priced at hundreds of thousands of dollars, way beyond the pocketbook of the average person.’¹⁶⁶ He observed: ‘But this car, we’re talking about the neighborhood of \$50,000.’¹⁶⁷ He commented: ‘As mass production, competition, and economies of scale begin to kick in—and as governments begin to subsidise the creation of refueling stations—you’re going to see that cost drop even further.’¹⁶⁸

Bob Carter, the senior president of Automotive Operations at Toyota USA, deployed the rhetoric of sharing in his speech: ‘At Toyota, we believe that when good ideas are shared, great things can happen.’¹⁶⁹ Carter stressed: ‘The first generation hydrogen fuel-cell vehicles, launched between 2015 and 2020, will be critical, requiring a concerted effort and unconventional collaboration between automakers, government regulators, academia and energy providers.’¹⁷⁰ He commented: ‘By eliminating traditional corporate boundaries, we can speed the development of new technologies and move into the future of mobility more quickly, effectively and economically’.¹⁷¹ He noted that ‘traditionally intellectual

¹⁶³Rimmer (2015).

¹⁶⁴Toyota (2015b). For coverage, see BBC News (2015).

¹⁶⁵Michio Kaku is a futurist perhaps best known for his popular science books—such as Kaku (1998), and Kaku (2012).

¹⁶⁶Kaku (2015).

¹⁶⁷Ibid.

¹⁶⁸Ibid.

¹⁶⁹Carter (2015).

¹⁷⁰Ibid.

¹⁷¹Ibid.

properties are fiercely guarded because they have great monetary value.¹⁷² However, he stressed that 'with ... our patent announcement today it's obvious that there can be a higher societal value in openly sharing IP.'¹⁷³

The announcement is striking—given that Toyota has previously had some unhappy experiences in respect of patent litigation. In relation to the Toyota Prius, Toyota was embroiled in patent litigation with Paice. After initially accusing Paice of being a predatory patent troll, Toyota was unable to defeat Paice in long-running litigation over patent validity and infringement. In the end, Toyota settled with Paice, agreeing to pay royalties for the use of its patents related to hybrid cars.

Through its response at CES 2015, Toyota perceives Tesla as a genuine threat and competitor in respect of the development of green vehicles and transportation. The car manufacturer is perhaps more worried about Tesla's electric vehicles than its traditional Detroit Motown rivals. Toyota is keen to ensure that the Toyota Prius and the Toyota Mirai are not left behind by Tesla's Open Source Revolution.

Despite the grand rhetoric at CES 2015, Toyota's announcement falls short of truly open innovation. The company emphasised that licensing will be limited to automakers, fuel-cell parts suppliers and energy companies who establish and operate fuelling stations. Toyota will consider requests from parts suppliers and companies outside of the transportation sector on a case by case basis. Toyota has indicated, 'Patents related to fuel cell vehicles will be available for royalty-free licenses until the end of 2020'.¹⁷⁴ Moreover, 'Patents for hydrogen production and supply will remain open for an unlimited duration'.¹⁷⁵ There also seems to be a quid pro quo: 'As part of licensing agreements, Toyota will request, but will not require, that other companies share their fuel cell-related patents with Toyota for similar royalty-free use.'¹⁷⁶ It is significant that Toyota retains the ownership of the key patents, which have been offered in the deal.

The announcement by Toyota marks a significant shift in the company's approach to the management and exploitation of intellectual property. The decision shows an engagement with intellectual property, the collaborative common, and the sharing economy.

There have been a number of early experiments with open innovation in respect of clean technologies. Notably, there were early collaborative endeavours, such as the Eco-Patent Commons, the Green XChange, and open source projects focused on clean technologies. At an international level, the UNFCCC Climate Technology Centre and Network (CTCN) and WIPO GREEN have since been established to promote the diffusion and dissemination of green technologies. Toyota and Tesla Motors have shown that individual companies are willing to engage in

¹⁷²Ibid.

¹⁷³Ibid.

¹⁷⁴Toyota (2015a).

¹⁷⁵Ibid.

¹⁷⁶Ibid.

patent-sharing in order to boost the research, development, and adoption of emerging technologies.

Eric Lane is somewhat more cynical about the announcement by Toyota Motors.¹⁷⁷ He notes: ‘While there appear to be no restrictions on hydrogen production and supply technologies (“patents for hydrogen production and supply will remain open for an unlimited duration”), the fuel cell patents are subject to an important caveat: Patents related to fuel cell vehicles will be available for royalty-free licenses until the end of 2020.’¹⁷⁸ Lane emphasizes that ‘this is a significant limitation for putative car makers that might elect to manufacture fuel cell vehicles based on Toyota’s patented technologies’.¹⁷⁹ He suggests: ‘they would get six years of free use, but come January 1, 2021 it seems these automakers would become licensees obligated to pay royalties to Toyota.’¹⁸⁰ Lane stressed that ‘the licensee would be in a terrible negotiating position because it would have already invested substantial resources in developing, manufacturing, and marketing the licensed vehicles and might now be facing a patent infringement lawsuit if it doesn’t reach a deal with Toyota’.¹⁸¹ He fears: ‘With this leverage, Toyota might be able to impose a higher royalty rate than would otherwise be justified.’¹⁸² Lane wonders: ‘This uncertainty around the eventual royalty rate could make even a putative royalty-free (for now) licensee think twice about using the patented technologies on offer.’¹⁸³ Lane notes, though, that ‘this concern doesn’t apply to potential licensees of Toyota’s patented hydrogen production and supply technologies, which are royalty-free in perpetuity, and thus truly constitute a Toyota Hydrogen-Patent Commons.’¹⁸⁴ He concluded: ‘But with respect to the fuel cell vehicle patents, you might get a free trial now, but you’ll eventually have to pay the piper.’¹⁸⁵

For his part, Elon Musk has been scathing about the challenge of hydrogen cars, calling his competition ‘bullshit’, and suggesting that fuel cells were ‘fool cells’.¹⁸⁶ Toyota has fought back against such suggestions.¹⁸⁷

It should be noted that not all automobile companies are willing to engage in patent-sharing. For its part, General Motors said that it had no intention of using

¹⁷⁷Lane (2015).

¹⁷⁸Ibid.

¹⁷⁹Ibid.

¹⁸⁰Ibid.

¹⁸¹Ibid.

¹⁸²Ibid.

¹⁸³Ibid.

¹⁸⁴Ibid.

¹⁸⁵Ibid.

¹⁸⁶Yoney (2013).

¹⁸⁷Debord (2015).

Tesla's openly licensed patents.¹⁸⁸ General Motors was of the view that it could rely upon its own portfolio of green technology patents.

It remains to be seen whether such an approach to sharing intellectual property in respect of green vehicles will be taken up in other fields of renewable energy and clean technologies—particularly with the Paris Agreement 2015 coming into force.

6 Sustainable Transportation, Clean Technology, and Climate Change

In his address, Elon Musk emphasized the need to build clean technologies to address the problem of climate change. He observed that the market for electric vehicles is enormous: 'Given that annual new vehicle production is approaching 100 million per year and the global fleet is approximately 2 billion cars, it is impossible for Tesla to build electric cars fast enough to address the carbon crisis.'¹⁸⁹ He maintained: 'Our true competition is not the small trickle of non-Tesla electric cars being produced, but rather the enormous flood of gasoline cars pouring out of the world's factories every day.'¹⁹⁰ Musk commented that there was a need to develop the innovation ecology in respect of electric cars: 'We believe that Tesla, other companies making electric cars, and the world would all benefit from a common, rapidly-evolving technology platform.'¹⁹¹

6.1 Sustainable Transportation

The then Governor of California, Arnold Schwarzenegger, observed in 2009 that transportation posed particular problems in respect of climate change.¹⁹² He lamented:

The world is speeding toward two billion vehicles, and there can be no denying that cars and trucks are integral to our lifestyle and our economy. Cars provide mobility and personal freedom while trucks carry the goods that keep our economy humming. But all these vehicles and our near-total dependence on gasoline to fuel them contribute to global warming, deplete our natural resources, and undermine our national security.¹⁹³

¹⁸⁸GM Authority (2015).

¹⁸⁹Musk (2014).

¹⁹⁰Ibid.

¹⁹¹Ibid.

¹⁹²Schwarzenegger (2009), Sperling and Gordon (2009).

¹⁹³Ibid. vii.

The Governor insisted that ‘America must commit itself to ending its dependence on costly, polluting oil and other fuels with higher greenhouse gas emissions.’¹⁹⁴ In his view, ‘Government must work with businesses and consumers to transform the transportation sector.’¹⁹⁵

The decision to open source electric cars was praised by environmental leaders—such as the Sierra Club and the Climate Council in Australia. Jeff Tittel of the New Jersey Sierra Club has maintained: ‘We need zero-emission vehicles, which means we also need to educate consumers and inform them about the benefits of owning an electric car.’¹⁹⁶ Mark Ruffalo—the actor famous for playing the Incredible Hulk in the Avengers—was also admiring of Elon Musk’s elan, commenting: ‘Bravo Elon Musk you are a real super hero! So proud to know you. Such a cool thing to do!’¹⁹⁷

In its 2014 report upon mitigation, the Intergovernmental Panel on Climate Change devoted a chapter to the topic of Transportation.¹⁹⁸ The executive summary noted that ‘Reducing global transport greenhouse gas (GHG) emissions will be challenging since the continuing growth in passenger and freight activity could outweigh all mitigation measures unless transport emissions can be strongly decoupled from GDP growth.’¹⁹⁹ The report warned: ‘Without aggressive and sustained mitigation policies being implemented, transport emissions could increase at a faster rate than emissions from the other energy end-use sector and reach around 12 Gt CO₂ eq/yr by 2050.’²⁰⁰ The report recommended: ‘Avoided journeys and modal shifts due to behavioural change, uptake of improved vehicle and engine performance technologies, low-carbon fuels, investments in related infrastructure, and changes in the built environment, together offer high mitigation potential (high confidence).’²⁰¹ Amongst other things, the report considered the use of electric vehicles.

President Barack Obama was keen to make electric cars more affordable and accessible to the American public.²⁰² In his 2011 State of the Union address, he observed: ‘With more research and incentives, we can break our dependence on oil with biofuels, and become the first country to have a million electric vehicles on the road by 2015.’²⁰³ He has sought to encourage United States innovators and entrepreneurs in the field of clean technology. Tesla has been supported by the

¹⁹⁴Ibid., vii.

¹⁹⁵Ibid., vii.

¹⁹⁶Tittel (2014).

¹⁹⁷Ruffalo (2014).

¹⁹⁸Intergovernmental Panel on Climate Change (2014).

¹⁹⁹Ibid.

²⁰⁰Ibid.

²⁰¹Ibid.

²⁰²The White House, Fact Sheet: President Obama’s Plan to Make the U.S. the First Country to Put One Million Advanced Vehicles on the Road <http://www.whitehouse.gov/sites/default/files/other/fact-sheet-one-million-advanced-technology-vehicles.pdf> (Website available in the Obama presidency).

²⁰³Obama (2011).

United States Government through a US. Energy Department Vehicle Loan. Tesla was able to repay the loan to the government in 2013.²⁰⁴

As part of his agenda to act on climate change, President Barack Obama sought to promote United States innovation in respect of clean technologies—such as electric vehicles and other advanced green automobiles. On the 14th June 2014, President Barack Obama gave a commencement address to the University of California, Irvine. He told his audience:

We need scientists to design new fuels. We need farmers to help grow them. We need engineers to invent new technologies. We need entrepreneurs to sell those technologies. We need workers to operate assembly lines that hum with high-tech, zero-carbon components. We need builders to hammer into place the foundations for a clean energy age. We need diplomats and businessmen and women, and Peace Corps volunteers to help developing nations skip past the dirty phase of development and transition to sustainable sources of energy.²⁰⁵

Obama recommended greater investment in renewable energy, and divestment from fossil fuels: 'You need to invest in what helps, and divest from what harms.'²⁰⁶ He observed: 'You've got to remind everyone who represents you, at every level of government, that doing something about climate change is a prerequisite for your vote.'²⁰⁷

It remains to be seen whether Elon Musk's gift of patents will help realise this larger ambition of reducing greenhouse gas emissions in the transportation sector.

6.2 *Supercharger Network*

Tesla Motors has also been expanding its supercharger network in North America, the European Union, and South East Asia:

Tesla Superchargers allow Model S owners to travel for free between cities along well-traveled highways in North America, Europe and Asia. Superchargers provide half a charge in as little as 20 min and are strategically placed to allow owners to drive from station to station with minimal stops.²⁰⁸

Just as the Australian car industry falls into decline, Tesla is also entering into the Australian marketplace.²⁰⁹

²⁰⁴Keane (2013).

²⁰⁵Obama (2014).

²⁰⁶Ibid.

²⁰⁷Ibid.

²⁰⁸Tesla Motors, Supercharger Network, <http://www.teslamotors.com/supercharger>. Accessed 1 May 2018.

²⁰⁹Huntley (2014).

Some national governments like China are considering government investment in electric vehicle chargers.²¹⁰

6.3 Gigafactory

In February 2014, Tesla announced its ambition to establish a Gigafactory:

In cooperation with strategic battery manufacturing partners, we're planning to build a large scale factory that will allow us to achieve economies of scale and minimize costs through innovative manufacturing, reduction of logistics waste, optimization of co-located processes and reduced overhead. The Gigafactory is designed to reduce cell costs much faster than the status quo and, by 2020, produce more lithium ion batteries annually than were produced worldwide in 2013.²¹¹

The company has provided a vision of its proposed centre.²¹² There was intense competition between a number of states to be home to the Gigafactory.²¹³ Californian business leaders made an intense pitch for Californian legislators and voters to have the Gigafactory in California.²¹⁴ In the end, though, Nevada was selected as the official site for the Tesla Battery Gigafactory.²¹⁵

Tesla plans to build further factories in the future to meet global demand.²¹⁶

6.4 SolarCity

In addition to electric vehicles and batteries, Elon Musk has also shown a strong commitment to solar energy, chairing the SolarCity venture. Elon Musk is of the firm view that the United States can and should switch to solar energy.²¹⁷ He believes that SolarCity can compete with China in the manufacturing of solar panels.

In its annual report for 2013, SolarCity emphasizes the importance of intellectual property:

Our intellectual property is an essential element of our business, and our success depends, at least in part, on our ability to protect our core technology and intellectual property.

²¹⁰Ying and Yang (2014).

²¹¹Tesla Motors (2014).

²¹²Tesla Motors, Gigafactory, http://www.teslamotors.com/sites/default/files/blog_attachments/gigafactory.pdf.

²¹³Hull (2014).

²¹⁴Wunderman (2014).

²¹⁵Tesla (2014).

²¹⁶Lambert (2017a, b).

²¹⁷McKay (2014).

To accomplish this, we rely on a combination of patent, trade secret, trademark, copyright and other intellectual property laws, confidentiality agreements and license agreements to establish and protect our intellectual property rights.²¹⁸

The company noted: 'As of December 31, 2013, we had 9 patents issued and 48 pending applications with the U.S. Patent and Trademark Office'.²¹⁹ SolarCity explained: 'These patents and applications relate to our installation and mounting hardware, our finance products, our monitoring solutions and our software platforms'.²²⁰ The company emphasized: 'Our issued patents start expiring in 2025'.²²¹ The company stressed: 'We intend to continue to file additional patent applications'.²²² SolarCity is also very much dependent upon trade mark protection.

SolarCity also takes a strict approach to trade secrets: 'All of our employees and independent contractors are required to sign agreements acknowledging that all inventions, trade secrets, works of authorship, developments and other processes generated by them on our behalf are our property and assigning to us any ownership that they may claim in those works'.²²³

In June 2014, Elon Musk, Peter Rive, and Lyndon Rive wrote a piece called, 'Solar at Scale'.²²⁴ The operators of SolarCity expressed a desire to acquire Silevo:

Our intent is to combine what we believe is fundamentally the best photovoltaic technology with massive economies of scale to achieve a breakthrough in the cost of solar power. Although no other acquisitions are currently being contemplated, SolarCity may acquire additional photovoltaics companies as needed to ensure clear technology leadership and we plan to grow internal engineering significantly.²²⁵

Musk, Rive, and Rive noted: 'We are in discussions with the state of New York to build the initial manufacturing plant, continuing a relationship developed by the Silevo team'.²²⁶ The team had grand ambitions for the project: 'At a targeted capacity greater than 1 GW within the next two years, it will be one of the single largest solar panel production plants in the world'.²²⁷

The leaders of SolarCity explained why the company was keen to adopt solar panel technology and manufacturing company:

SolarCity was founded to accelerate mass adoption of sustainable energy... Even if the solar industry were only to generate 40 percent of the world's electricity with photovoltaics by 2040, that would mean installing more than 400 GW of solar capacity per year for the

²¹⁸SolarCity Corporation (2013).

²¹⁹Ibid.

²²⁰Ibid.

²²¹Ibid.

²²²Ibid.

²²³Ibid.

²²⁴Musk et al. (2014).

²²⁵Ibid.

²²⁶Ibid.

²²⁷Ibid.

next 25 years. We absolutely believe that solar power can and will become the world's predominant source of energy within our lifetimes, but there are obviously a **lot** of panels that have to be manufactured and installed in order for that to happen.²²⁸

There has been much debate about whether this strategy of SolarCity will be successful.

More generally, there has been a great optimism about the widespread adoption and diffusion of solar photovoltaics. Tony Seba has highlighted that solar energy—coupled with innovative financial models—will disrupt traditional business models in respect of energy.²²⁹ In his book on *Sustainable Energy Solutions for Climate Change*, Mark Diesendorf highlights the significance of solar photovoltaics.²³⁰ He emphasized: 'PV's low and decreasing prices, huge resource, low environmental and health impacts, low land use compared with agriculture and widely available materials (at least for silicon crystal technologies) gives confidence that, with geographic diversity of collectors, it can make a substantial contribution to future electricity demand.'²³¹

In his essay, 'The New Turning Point', Al Gore has emphasized that the key question in addressing climate change is how 'quickly we can accelerate and complete the transition to a low-carbon civilization'.²³² He has been particularly enthusiastic about solar photovoltaics:

There is surprising – even shocking – good news: Our ability to convert sunshine into usable energy has become much cheaper far more rapidly than anyone had predicted. The cost of electricity from photovoltaic, or PV, solar cells is now equal to or less than the cost of electricity from other sources powering electric grids in at least 79 countries. By 2020 – as the scale of deployments grows and the costs continue to decline – more than 80 percent of the world's people will live in regions where solar will be competitive with electricity from other sources.²³³

He envisaged that countries like the United States would be transformed by solar energy: 'We are witnessing the beginning of a massive shift to a new energy-distribution model—from the "central station" utility-grid model that goes back to the 1880s to a "widely distributed" model with rooftop solar cells, on-site and grid battery storage, and microgrids.'²³⁴ Gore has been particularly impressed by the adoption of solar in India and Bangladesh: 'In poorer countries, where most of the world's people live and most of the growth in energy use is occurring, photovoltaic electricity is not so much displacing carbon-based energy as leapfrogging it altogether.'²³⁵ Gore stressed that 'each of the trends described above

²²⁸Ibid.

²²⁹Seba (2014).

²³⁰Diesendorf (2014).

²³¹Ibid., 44.

²³²Gore (2014).

²³³Ibid.

²³⁴Ibid.

²³⁵Ibid.

—in technology, business, economics and politics—represents a break from the past'.²³⁶ He was hopeful: 'Taken together, they add up to genuine and realistic hope that we are finally putting ourselves on a path to solve the climate crisis.'²³⁷

6.5 *The Big Battery in South Australia*

Tesla, the French renewable energy company Neoen, and the Government of South Australia collaborated upon energy storage systems.

In December 2017, Tesla's lithium ion battery was turned on in South Australia.²³⁸ South Australia's Premier at the time, Jay Weatherill, hailed the development:

South Australia is now leading the world in dispatchable renewable energy, delivered to homes and businesses 24/7. While others are just talking, we are delivering our energy plan, making South Australia more self-sufficient, and providing back up power and more affordable energy for South Australians this summer. The world's largest lithium ion battery will be an important part of our energy mix, and it sends the clearest message that South Australia will be a leader in renewable energy with battery storage.²³⁹

Jay Weatherill promised to further expand the use of renewable energy in South Australia.²⁴⁰ However, he lost the South Australian election, and his successor Steve Marshall does not seem as positive about the promise of renewable energy.²⁴¹

Atlassian co-founder Mike Cannon-Brookes has lamented that Australia has not made the most of the Elon Musk opportunity.²⁴² He commented: 'It is crazy how much renewable resource we have that we're not leveraging as a whole country to turn into IP and jobs.'²⁴³

7 Conclusion

The case study of Tesla Motors is illuminating in respect of intellectual property, open innovation, and climate change. Elon Musk has been hailed as a 'Future-Smart leader'—one of the 'inventors of tomorrow, pioneers of the

²³⁶Ibid.

²³⁷Ibid.

²³⁸Australian Associated Press (2017).

²³⁹Ibid.

²⁴⁰Slezak (2018).

²⁴¹Carey (2018).

²⁴²Smith (2017).

²⁴³Ibid.

future.’²⁴⁴ In terms of intellectual property law, Elon Musk has challenged the conventional wisdom in respect of his approach to patents and clean technologies. He has been willing to share his technologies under an open licensing approach. Nonetheless, it should also be noted that Elon Musk remains wary of the threat of patent infringement lawsuits as well.

In the debate over the Paris Agreement 2015, the approach of Elon Musk was useful in mediating between the geopolitical battles between the United States and India. As noted by Al Gore in *An Inconvenient Sequel*, Musk helped resolve conflicts in approaches in respect of access to clean technologies.²⁴⁵

Elon Musk has lobbied the new United States President Donald Trump to remain in the Paris Agreement 2015 (but no avail). He was a co-signatory to a letter to Trump, warning of the strong potential for negative trade implications if the United States departed from the Paris Agreement 2015.²⁴⁶ The letter pleaded: ‘We are writing to express our strong support for the United States remaining in the Paris Climate Agreement.’²⁴⁷ The letter stressed: ‘Based on our experience doing business all over the world, we believe there is strong potential for negative trade implications if the United States exits from the Paris Agreement.’²⁴⁸ The business leaders commented: ‘Our business interests are best served by a stable and practical framework facilitating an effective and balanced response to reducing global GHG emissions’.²⁴⁹ Elon Musk and his colleagues reiterated: ‘The Paris Agreement gives us that flexible framework to manage climate change while providing a smooth transition for business.’²⁵⁰ The business leaders argued that United States participation in the Paris Agreement 2015 would have a number of benefits—including strengthening competitiveness in global markets; enabling American manufacturing to modernize to new, efficient technologies; supporting investment by setting clear goals; expanding global and domestic markets for clean, energy-efficient technologies; and encouraging market-based solutions and innovation to achieve emissions reductions at low cost. Elon Musk and his fellow business leaders stressed that participation in the Paris Agreement 2015 was essential ‘to maintain the United States’ status as the world’s biggest champion of economic growth and innovation’.²⁵¹ As a result of Trump’s decision for the United States to withdraw for the Paris Agreement 2015, Elon Musk left Trump’s presidential advisory

²⁴⁴Canton (2015, 47).

²⁴⁵Gore, Cohen, Shenk, Actual Films, Participant Media, Paramount Pictures (2017), and Gore (2017).

²⁴⁶Musk and others (2017).

²⁴⁷Ibid.

²⁴⁸Ibid.

²⁴⁹Ibid.

²⁵⁰Ibid.

²⁵¹Ibid.

council.²⁵² He noted: 'Climate change is real. Leaving Paris is not good for America or the world.'²⁵³ Elon Musk remains hopeful that the Paris Agreement 2015 will send a market signal to encourage greater investment in clean technologies and renewable energy.

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²⁵²ABC News (2017)

²⁵³Ibid.

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Part VI
Plant Breeders' Rights, Food Security,
Access to Genetic Resources,
and Indigenous Knowledge

Chapter 20

Path-Breaking or History-Repeating? Analysing the Paris Agreement's Research and Development Paradigm for Climate-Smart Agriculture



Hope Johnson

Abstract This chapter provides an initial exploration and analysis of agricultural research and development paradigms under the Paris Agreement for climate-smart agriculture. Drawing on diverse bodies of literature, this chapter provides an examination of agricultural socio-technical regimes with a focus on how problems, means and solutions are constructed by three broad archetypes: the intensive agricultural paradigm, the Life-Sciences Integrated paradigm, and the Ecological-Integrated paradigm. Re-conceptualisation of climate-smart agriculture in line with the Ecological-Integrated Paradigm is positioned as a critical step towards climate justice. Through an examination of the Paris Agreement and related documents, this chapter argues that the Paris Agreement creates an enabling environment for the development of an agricultural socio-technical regime more consistent with the existing intensive agricultural model than with genuine climate-smart agriculture.

Keywords Research and development • Technological trajectories
Climate-smart agriculture • Agroecology • Climate ready seeds
Plant genetic resources • Paris Agreement

1 Introduction

Agriculture is a critical sector for enabling climate mitigation and a key sector requiring adaptation to changing climatic conditions. It also underscores poverty alleviation and food security efforts, due to its primary role in the economies of low-income countries.¹ To achieve climate change mitigation and adaptation in this

¹Binswanger-Mkhize and McCalla (2010).

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sector and more broadly, stakeholders generally agree that the dominant model for agriculture will need to change.

The dominant socio-technical regime for agriculture is typified by large land holdings, high external in-put use, comparatively low labour needs and high mechanisation.² This paradigm for agriculture is dominant in terms of land use, environmental impacts and cultural influence.³ Such intensive agricultural practices are supported by a socio-technical regime made up of relevant agricultural knowledges, sciences and technologies, which are continuously developed and diffused by market actors or related institutions, such as state governments and universities. Interactions and outcomes within the regime are shaped and maintained by regulatory frameworks such as intellectual property rights and food standards, as well as external factors such as consumer demand.

In reflection of the dominant socio-technical regime for agriculture, most agricultural research and development (Ag R&D) investment, has been, and continues to be, directed towards synthetic fertilisers and pesticides, and increasingly improved seed varieties including biotech varieties.⁴ Broadly, these technologies act to reduce labour while increasing productivity, which in turn allows farmers to remain competitive against each other and to meet the demands of food retailers and processors. As demand for standardised products for retail has increased and dietary trends have converged, Ag R&D is increasingly being directed towards food preservation and processing technologies.⁵

Typically, agricultural research and development has been centred in the United States and the European Union, and has focused on in-puts for agriculture to reduce labour, increased yields and, correspondingly, mass production of standardised food products. Under this model, agricultural knowledges, sciences and technologies were largely developed in international research centres, passed down to national research systems (either through markets or public sector arrangements), and transferred through extension agents to farmers.⁶

With the need for a new paradigm to replace the intensive agricultural model, the concept of climate-smart agriculture has been proposed by the FAO to guide the development of new (or renewed) farming models and the activities of related institutions. Principally, climate-smart agriculture aims to leverage the co-benefits for food security that arise from on-farm climate mitigation and adaptation activities and vice versa. Like the debates and varying interpretations surrounding the broader concept of sustainable development, divergent paradigms exist in scholarship and in policy about the optimal way to foster Ag R&D that can enable climate-smart agriculture. These contestations play out in background of the Paris Agreement with 94% of all nationally determined commitments (NDCs) including agriculture in

²Würtenberger et al. (2006), Uriarte et al. (2010), Wirsenius et al. (2010).

³Possas et al. (1996).

⁴Fischer et al. (2014, p. 522).

⁵Pardey et al. (2016).

⁶Bozeman (2000).

mitigation or/and adaptation contributions.⁷ As a result, agriculture, and specifically Ag R&D, now has at least a somewhat more prominent position in the international climate change regime than it had previously.

This chapter evaluates the agricultural research and development paradigm promoted by the Paris Agreement. It begins by briefly outlining the interconnections between climate justice, agriculture and food security, and considers how the Paris Agreement and the concept of climate-smart agriculture incorporates these dimensions. The chapter then contextualises current agricultural research and development trends by drawing on theories and paradigms of historical sociology, critical rural sociology, and evolutionary economics to explore the socio-technical regime for intensive agriculture. Contextualisation of Ag R&D is important for critically considering how Ag R&D should be formulated to deal with new challenges, and overcome entrenched issues, at the intersection of agriculture, food security and climate change. Following this, the chapter maps two key paradigms that operate under the surface of climate smart agriculture: life-sciences integrated paradigm and ecological-integrated paradigm. It argues that life-sciences integrated paradigm largely aligns with socio-technical regime underpinning intensive agriculture, and lacks the transformative potential to enable climate-smart agriculture most effectively. Ultimately, this chapter considers the Ag R&D paradigm evident under the Paris Agreement and related instruments, as well as the implications for the integrated goals of climate-smart agriculture.

2 Food Insecurity, Climate Justice and Climate-Smart Agriculture

Agriculture is central to food systems that underpin food security, yet it is a key contributor of GHGs. Emissions from on-farm activities contribute an estimated 11% of total anthropogenic GHG emissions excluding land-use change.⁸ Agriculture, forestry and land-use change contribute approximately quarter of net anthropogenic GHG emissions. Deforestation (of which agriculture is the main driver), and emissions from livestock and an over-use of soils and nutrients are the main causes.⁹ Moreover, projections are that agricultural and agriculture-related emissions will be the largest emitting sector in the future, as the energy and transport sectors reduce their emissions.¹⁰

At the same time, climate change has already reduced the yields of major crops since 1961,¹¹ and adverse impacts are expected to scale-up with projections of

⁷FAO (2016, p. xii).

⁸Smith et al. (2014, p. 816).

⁹IPCC (2014, p. 24).

¹⁰Gernaat et al. (2015), Bajželj et al. (2014).

¹¹Porter et al. (2014, pp. 491–493).

increases and changes in pests and diseases, extreme temperatures and precipitation, and increase occurrence of extreme weather events.¹² Although climate change will have positive impacts on agriculture in some regions, overall the negative impacts are expected to be more prevalent.¹³ The threats to agriculture are playing out while an estimated 815 million people are undernourished, 1.9 billion are obese or overweight, and approximately one-third of food produced is wasted.¹⁴ Consequently, agri-food systems are being carried out in ways that contribute to not only climate change, and system vulnerability to climate change, but also seismic food systems failures and severe violations of the human right to adequate food.¹⁵

Climate justice is, therefore, strongly implicated at the intersections of food security and climate change, as the countries that are most food insecure tend to be the most likely to be adversely affected by climate change, and the least likely to have contributed to climate change. The tropical and sub-tropical farming areas in developing countries are expected to be the most affected by the impacts of climate change such as warming, precipitation decreases and extreme weather events.¹⁶ In sub-Saharan African countries, which has especially high levels of food insecurity, it is projected that wheat yields will decrease by 72% while soybean, maize and rice production will each decline by an estimated 45% by the end of the 21st century.¹⁷ These dynamics show that climate justice based responses, which are broadly human-rights based approaches, must be central to regulatory responses to climate change especially where they intersect with food systems.

The international climate change regime has generally treated the projected impacts of climate change on food security as a central justification for responding to climate change. This was illustrated in the UNFCCC's objective to stabilise GHG emissions 'to ensure that food production is not threatened',¹⁸ and more recently in the preamble of the Paris Agreement, which recognises the 'fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change'.¹⁹ Besides providing food security as a central rationale, neither agreement expressly engages further with agriculture or more generally food systems. Given the strong connections between both climate justice and food security, the lack of attention to both these dimensions in key governing documents is concerning, and requires further attention.

¹²Nelson et al. (2014).

¹³Porter et al. (2014, p. 488).

¹⁴WHO (2017) Obesity and overweight. <http://www.who.int/mediacentre/factsheets/fs311/en/>. Accessed 16 December 2017, FAO (2016).

¹⁵Committee on Economic, Social and Cultural Rights (1999) General Comment No. 12: The Right to Adequate Food (Art. 11 of the Covenant).

¹⁶Kang et al. (2009).

¹⁷Adhikari et al. (2015).

¹⁸United Nations Framework Convention on Climate Change, concluded 9 May 2009, A/RES/48/189 (entered into force 20 January 1994) ('UNFCCC') art 2.

¹⁹Adoption of the Paris Agreement, 21st sess, Agenda item 4(b), UN Doc FCCC/CP/2015/L.9 (12 December 2015) annex ('Paris Agreement') Preamble.

In the implementation of mitigation and adaptation commitments though, agriculture will be vital. Several provisions regarding finance and technology transfer recognise the specific needs of developing countries.²⁰ In light of the reliance on agriculture in developing countries, and the significant contributions intensive agriculture makes to climate change, realising commitments under the Paris Agreement will largely depend on interventions and changes in agricultural systems.

Climate-smart agriculture is at the intersection of food security, agriculture and climate change, but it does not directly engage with climate justice related discourses. Rather, climate-smart agriculture (CSA) is a policy concept developed by the FAO in 2010 with the aim of encapsulating the ‘triple-wins’ for production, food security and climate change mitigation and adaptation that can result from facilitating sustainable farming practices. Hence, the FAO describes the aims of CSA as: ‘to tackle three objectives: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing/or removing greenhouse gas emissions, where possible’.²¹

Besides the FAO, international organisations, states, philanthropic organisations, private actors and global research institutions rapidly adopted CSA, which speaks to the concepts broad acceptability and potential to mobilise funding. In fact, over 30 states refer to CSA in their NCDs.²² The Global Alliance for Climate-Smart Agriculture is a further reflection of the increasing interest and funding streams for CSA. This alliance is comprised of different stakeholders in the agricultural and aims to further catalyse partnerships and funding for CSA projects.²³ Therefore, CSA has excelled at drawing attention to agriculture’s mitigation potential and adaptation requirements, and the synergistic connections between low-carbon farming techniques and farm productivity, which in turn improves outcomes for climate justice and related human rights. Future development of the concept would benefit from express engagement with climate justice and related human rights, given the interconnections between these goals and agriculture.

However, CSA owes its widespread acceptability to the fact that it does not provide precise boundaries around the kinds of farming interventions it supports or does not.²⁴ Neither does CSA critically engage with the inequitable distribution of food and resources required for agriculture nor the funding of agricultural research and development.²⁵ As Clapp, Newell and Brent observed:

²⁰See, eg, Paris Agreement art 4(5), 6(6), 7(7)(d).

²¹FAO (2017)

²²FAO (2016, p. 14).

²³Global Alliance for Climate Smart Agriculture (2016)

²⁴See, eg, Neufeldt et al. (2013).

²⁵Karlsson et al. (2017).

CSA is not a ‘triple win’ for everyone. Nor is it about the value-neutral sharing of science, best practices and best available technologies. It is characterised by a politically contested terrain that actors and institutions use to protect and advance their preferred rendition of CSA.²⁶

The contestation close to the surface of CSA, and to which these authors were referring, are conflicting paradigms about how agricultural research and development should be conducted and enabled (and by whom). The first paradigm is the current socio-technical regime for agriculture which, as will be discussed in the next section, centres on intensive, industrial agricultural models. Other paradigms have emerged that offer differing paths forward to CSA. These paradigms can be grouped into two broad archetypes, which have been termed ‘official’ and ‘alternative’,²⁷ ‘reductionist’ and ‘holistic’,²⁸ or ‘life-sciences integrated paradigm’ and the ‘ecologically-integrated paradigm’.²⁹ Regardless of the terminology used, the broad archetypes remain the same. For the purposes of this chapter, the terms life-sciences paradigm and ecologically-integrated paradigm will be adopted, as the use of the phrase paradigm aligns with the literature being drawn upon.

3 Lock-In Effects Within the Intensive Agricultural Paradigm

3.1 *Socio-technical Regimes*

The concept of socio-technical regimes draws heavily on evolutionary economics, and in particular techno-scientific paradigms and trajectories. In relation to the underlying theoretical base for socio-technical regimes, Dosi and others observed how a certain perspective, contoured by physical, economic, institutional and social factors, will regard something as a problem, follow a set pattern of inquiry and procedures, and then frame a solution.³⁰ What actors consider scientific and technological progress to be, and the means to such progress, is determined by this underlying paradigm.³¹

This area of literature further set the groundwork on path-dependencies, which are key features of socio-technical regimes.³² If the prevailing route taken to future innovations is set by an underlying technological paradigm, then it follows that

²⁶Clapp et al. (2017, p. 7).

²⁷Rivera-Ferre (2012).

²⁸Thompson and Scoones (2009).

²⁹Lang and Heasman (2004, pp. 31–32).

³⁰Kuhn (1970, pp. 23–24), Nelson and Winter (1977), Freeman et al. (1982, p. 112), Dosi (1982), Pavitt (1984). Based on the earlier work of Schumpeter (1939).

³¹Murray and O’Mahony (2007).

³²Dosi (1982), Castellacci (2008).

technological innovation is limited to a set of possibilities.³³ Path-dependency refers to the notion that certain technological trajectories will gain more momentum over time and self-reinforce.³⁴ Partly, the self-reinforcing nature of technological trajectories results because innovation tends to cumulatively develop. Increasing returns, that is, decreases in production costs per unit produced, tend to serve as a key reinforcing mechanism for a particular path, which returns in the case of intensive agriculture are initially remarkable.³⁵ Because of these self-reinforcing dynamics, among others, the term lock-in is used to describe an innovation trajectory that self-reinforces, even though alternative innovation trajectories exist that may be more efficient in the long-term.³⁶

In applying this approach to agriculture, Possas et al. observed a general techno-scientific paradigm in agriculture had emerged and was 'characterised by the intensification of output per area and per worker'. They explain that:

In search of production intensification, several techniques to control living organisms and environmental conditions were developed. Pest and disease control methods...the control of soil conditions etc., were 'problem areas' for which several solutions have been proposed. Some examples of prevailing solutions are: chemical pesticides, ...genetic breeding to improve plant and animal productivity, the employment of high powered agriculture machines and the large use of chemical fertilizers.³⁷

In other words, a problem was, for instance, framed as a need to increase yields, a means was to reduce the impact of pests on crop yields, and the solution that became dominant was the use of synthetic pesticides.

Socio-technical regimes refers to institutional, technical, legal and physical arrangements that are stable over a period and which collectively reinforce a paradigm and its trajectories.³⁸ In other words, it is the configuration of, and interactions between practices, lifestyle norms, culture, technologies, knowledge systems, infrastructure and governance and regulatory frameworks, which mutually lock-in particular pathways to 'progress'.

The difficulties of radically altering an existing socio-technical regime are inordinate, even where the dominant socio-technical regime is highly inefficient. The existing regime acts to lock itself into particular paths, which necessarily excludes others.³⁹ Levi explained the difficulties of fundamentally changing a socio-technical regime with its particular paths towards progress as follows:

[O]nce a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice. Perhaps the metaphor is a tree, rather

³³Liebowitz and Margolis (1995), Cowan and Gunby (1996).

³⁴David (1985), Arthur (1989), North (1990).

³⁵Schwartz et al. (2004, p. 365).

³⁶Liebowitz and Margolis (1995, pp. 207–208).

³⁷Possas et al. (1996, p. 940).

³⁸Geels (2004).

³⁹Seyfang and Smith (2007, p. 588).

than a path. From the same trunk, there are many different branches and smaller branches. Although it is possible to turn around or to clamber from one to the other- essential if the chosen branch dies- the branch on which a climber begins is the one she tends to follow.⁴⁰

The next sub-section explores various agricultural socio-technical regimes that provided the ‘trunk’, which led to societies generally becoming ‘locked into’ intensive agricultural trajectories.

3.2 *Intensive Agriculture as a Socio-technical Regime*

The focus of the discussion in this section is how agricultural socio-technical regimes over time fed into a lock-in of intensive agricultural trajectories with a specific focus on agricultural knowledge systems. Identifying historical patterns is an important part of bringing to light the lock-in of intensive agriculture (also termed industrial or conventional), while acknowledging the potential for new agri-food paradigms.

Colonisation significantly influenced the innovation trajectories of agriculture. During this period, and in terms of global trends, research and development was limited to the top-down transfer of knowledge and technologies for the purposes of producing larger amounts of food (predominantly wheat and meat) for export that satisfied the European diets.⁴¹ The privileging of Euro-centric knowledges, the development of colonial infrastructure suited to particular food systems (e.g. export), and the enforcement of European property laws are key aspects of this period that have imprinted upon existing agri-food systems.⁴²

It was not until the 1960s onwards that the socio-technical regime for intensive agriculture began to expand across countries and stabilise in regions. As the US became the eminent world power, it mobilised research and development resources to increase yields and create standardised food products with larger shelf-lives. To address food insecurity in developing countries, the US led the Green Revolution (1946–1956). Facilitated by international institutions, the US government, and other organisations such as the Ford and the Rockefeller Foundation, the Green Revolution refers to a series of technology transfer programmes designed to alleviate hunger in particular countries, including India, Mexico, Pakistan, Thailand and the Philippines.⁴³

Generally, the projects that made up the Green Revolution entailed the transfer of high-yielding varieties developed through hybrid breeding techniques, large-scale irrigation systems, synthetic fertilisers and pesticides. These projects were successful in phenomenally increasing food production, and in proving that

⁴⁰Levi (1997, p. 28).

⁴¹Friedmann and McMichael (1989).

⁴²Jedwab et al. (2017).

⁴³Pinstrup-Andersen and Hazell (1985), Perkins (1990).

agricultural technology could be transferred, where previously it was thought to be too climate-specific. Agricultural productivity more than doubled between 1960 and 2000 at a global level.⁴⁴ The fact that the Green Revolution led to such significant spillovers is thought to be due to the publicly funded nature of the research, among other factors, as spillovers are quantitatively more significant when the research and technology is publicly funded.⁴⁵ However, the Green Revolution did not address inequities between regions or groups (e.g. male and female farmers) and, like industrial agricultural methods more generally, adverse environmental impacts have followed with subsequent impacts on public health.⁴⁶

Because of the significant increases in production, economic returns from the Green Revolution created powerful, positive feedback loops, which have significantly incentivised the continuation of intensive agriculture. For instance, the US remains a home state for many of the world's largest agricultural in-put companies, and is still the third biggest exporter of pesticides (based on dollar value).⁴⁷ It was in this period that intensive agriculture as the dominant paradigm for agriculture began to stabilise, as facilitated by US public and private institutions and their converging interest on research and development of synthetic in-puts to reduce labour and increase food production.⁴⁸

Cowan and Gunby provide a useful case study on how agricultural research and development systems lock-into a particular trajectory while sidelining other viable alternative. Namely, they questioned why pesticides remain the dominant technology despite being inferior to integrated pest management (IPM).⁴⁹ IPM involves farmers monitoring pests and deploying a range of techniques to prevent and mitigate pests, which may include for instance companion and buffer planting, biopesticides, and crop rotation. Supported by a significant body of evidence, it is widely agreed that the adoption of IPM helps protect crops and reduce pesticide use while either increasing yields or not affecting yields.⁵⁰ IPM, therefore, is not only a way to reduce pesticide use, but is also a viable alternative to pesticides. Because IPM requires farmers to increase biodiversity on their farms, it also improves the resilience of farms to the impacts of climate change and may improve the carbon sequestration function of soils not to mention reduce the carbon emissions associated with pesticide manufacturing.⁵¹

⁴⁴Alston (2002).

⁴⁵James et al. (2008), Huffman and Evenson (2008), Alston et al. (2009).

⁴⁶See, eg, Pearce (1980), Freebairn (1995).

⁴⁷Workman D (2015) Top Pesticides Exporters. In: Worlds Top Exports. <http://www.worldstopexports.com/top-pesticides-exporters/5160>. Accessed 12 March 2015.

⁴⁸Altieri (1998), Horrigan et al. (2002), Steinfeld et al. (2006), Moss (2008), Kissinger et al. (2012).

⁴⁹Cowan and Gunby (1996).

⁵⁰See, eg, Heong and Escalada (1998). Mangan and Mangan (1998), Barzman and Desilles (2013), Hurd (1994).

⁵¹Gurr et al. (2003), Lal (2010).

According to Cowan and Gunby, the various factors inhibiting a switch to IPM in the US included: a lack of necessary knowledge for a range of crops, difficulties in convincing finance institutions about the feasibility of IPM, the need for a significant amount of farmer-led, farm-level learning. These factors suggest that switching to IPM is likely to result in a decrease in profits during transition. Subsequently, Cowan and Gunby point out that a large number of farmers would have to switch to IPM, otherwise a few farmers will experience both a decrease in costs during implementation and the negative impacts of pesticide drift. They observe 'If every farmer in a region were to adopt the technology, all would be better off, assuming the problems [with IPM] were solved or mitigated'.⁵² Public funding is critical for filling such knowledge gaps and enabling regions of farmers to incrementally adopt farming practices that do not require carbon-intensive external-inputs. The background role IPM plays to pesticides could, in part, be explained by declining role of states in Ag R&D and the market pressures to increase the scale of operations.

Well-established, logical interconnections exist across intensive farming practices (e.g. fertilisation, chemical use, varieties or species used), work organisation and equipment on-farms, the increasing role of private Ag R&D and government extension services, which broadly tend to focus on top-down knowledge and technology transfer relevant to intensive farming systems.⁵³ As adverse environmental, social and public health harms are realised because of intensive agriculture, demand for incremental changes has increased, but so has the prevalence of niches entirely inconsistent with the dominant agricultural socio-technical regime.⁵⁴ Among many other spaces, the competing trajectories play out within CSA discourses and related regulatory responses.

Against this background, two interconnected developments have emerged in more recent decades as powerful lock-in mechanisms for the intensive agricultural paradigm.⁵⁵ Firstly, the expansion of intellectual property rights to novel plant varieties and the coevolution of new biotechnologies for modifying plant genes set the groundwork for incentivising private agricultural research investment. Pingali and Raney put it as follows:

The break between public and private sector plant improvement efforts came with the advent of biotechnology, especially genetic engineering. The proprietary protection provided for artificially constructed genes and for genetically modified plants provided the incentives for private sector entry.⁵⁶

⁵²Cowan and Gunby (1996, p. 538).

⁵³Darnhofer et al. (2012), Byerlee and Echeverri (2002).

⁵⁴Levidow (2015).

⁵⁵Based on Pingali and Traxler (2002) who identified three drivers, but this chapter combines the biotechnological developments with the expansion of intellectual property rights to plant genetic material.

⁵⁶Pingali and Raney (2005, p. 4).

Secondly, the inclusion of agriculture in the World Trade regime, and the requirement that member states establish intellectual property rights for plant varieties, strengthened the shift towards private investment. Not only did this enhance the ability for private actors to recoup from investments, but it also increased incentives for specialised farms where a region was especially suited to exporting a particular commodity crop.⁵⁷

Other, interrelated feedback loops reinforcing intensive agricultural models include: sunk investments, consolidation of land ownership, demand of markets for particular, standardised food products, as well as a low level of competition in the food processing and retail sectors.⁵⁸ In a similar vein, the International Panel of Experts on Sustainable Food Systems, identified further reinforcing mechanisms including the expectations of cheap food due to the long period of intensive, industrial agriculture aimed at providing large quantities of food at lower costs, and the way in which public and private actors compartmentalise complex, inter-connected challenges.⁵⁹

Yet, the impact of current practices on the natural resources it relies, the threats of climate change, and persistent food and nutrition related issues, has placed enough pressure on the existing regime that alternatives are being developed.

4 Contending Paradigms for Transitioning to Climate-Smart Agriculture

The following sub-sections explore the two contending trajectories for agricultural knowledge systems within CSA discourses. The emphasis here is on whether they have the potential to ‘unlock’ from the dependency on resource intensive agriculture that has led to the need for CSA. As discussed, this chapter will adopt the terminology of Lang and Heasman to refer to the two broad archetypes as: the Life-Sciences Integrated paradigm and the Ecological-Integrated paradigm.⁶⁰

4.1 *Life-Sciences Integrated Paradigm*

The Life-Sciences Integrated paradigm has been taken up by most international research organisations as a paradigm to guide their interventions including the FAO

⁵⁷Gonzalez (2006).

⁵⁸See, eg, Howard (2009).

⁵⁹International Panel of Experts on Sustainable Food Systems (2016)

⁶⁰Lang and Heasman (2004).

and the CGIAR.⁶¹ The approach is widely used by industry, major international donor organisations, and governments including the US Government and the European Commission.⁶²

The Life-Sciences Integrated paradigm could be considered as promoting a reductionist view of the issues facing agriculture, as it tends to centre on the development of knowledge, science, technologies that alter, but do not systematically change, the underlying socio-technical regime for agriculture.⁶³ The problem facing agricultural systems in light of climate change focus on the need to produce more food with less resources in changing climates, as otherwise a food supplies will be inadequate and hunger will increase.⁶⁴ The means to solve this problem are largely based on natural and informational sciences, as well as increasing farmer participation to improve their adoption of the technologies. In these ways, the Life-Sciences Integrated paradigm is not counter to the dominant socio-technical regime for intensive agriculture, because it only seeks to mix up the in-puts and management but not the social or economic context in which farming is carried out.

A key trajectory of the Life-Sciences Integrated paradigm is the development of ‘climate ready’ or ‘climate-resilient’ crops using biotechnologies to genetically modify traits (‘GM crop varieties’). Scheben et al. described GM varieties as ‘laying the foundations for life-sciences integrated paradigm of agriculture and heightened resilience of crops to climate change’.⁶⁵ The five main corporations conducting research and development into agricultural biotechnologies have been developing varieties that purportedly have a higher tolerance for drought, heat, cold and salinity, as well as to pests.⁶⁶

Two paradoxical issues necessarily stem from the emphasis on high-tech, top-down solutions in the Life-Sciences Integrated paradigm: the perceived need for strong IPRs in crop genetic materials such as patents and the need for regions most affected by climate change to benefit from technology transfer and positive spill overs. A key reason that restrictions on access to improved varieties is required via IPRs is, as discussed, the increasing role of the private sector in Ag R&D. With the requirements under TRIPs for WTO member states to recognise IPRs in plant genetics, combined with TRIPs-plus clauses in regional trade agreements, patents in “climate-ready” crops are enforceable in most developing countries. In contrast to the largely publicly funded transfer of technology under the green revolution, international markets are the main technology-transfer mechanism, and such transfers generally occur through a handful of transnational biotechnology

⁶¹European Commission (2017) Sustainable Intensification in Africa. <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/sfs-35-2019-2020.html>. Accessed 26 November 2017.

⁶²See, eg, USDA (2013), European Commission (2015).

⁶³See, eg, Thompson and Scoones (2009).

⁶⁴Tomlinson (2013).

⁶⁵Scheben et al. (2016).

⁶⁶Cook S et al. (2015) Sustainable intensification revisited. International Institute for Environment and Development, London, UK, Riccroch et al. (2014).

companies who develop the varieties which nationally-based companies then retail and distribute.⁶⁷

Overall, the impacts of biotechnology applications to crops so far have been significantly unequal across countries and adopters, and mixed in terms of whether adoption led to reductions in pesticides and increases in yields. Given that climate-ready seeds are GM varieties, the impacts of GM varieties to date are more than indicative. Generally, biotechnology companies do not capture all profits generated by their research investments; several empirical studies illustrate that farmers in middle-income countries who adopted BT cotton, a GM variety, have captured majority of the benefits even more than a decade after their adoption of the variety.⁶⁸ Likewise, a meta-analysis of the impacts of GM varieties, which examined over 147 studies, found that pesticide use had decreased by 37%, crop yields had increased by 22% and farmer profits by 68%. This is significant in the context of climate change, as it suggests a reduction in emissions from reduced pesticides, and generally fuels the notion the use of GM varieties could increase incomes and yields perhaps in spite of climate change.⁶⁹ In fact, another study indicates that the adoption of GM varieties that are insect resistant reduces emissions from farming equivalent to removing 12.4 million cars from the roads in 2013.⁷⁰

However, private investment in improved varieties, including GM varieties, has significant limitations in terms of contributing to climate-smart agriculture on a worldwide level. These limitations can be divided into three key points.

Firstly, climate-ready seeds tend to be developed to meet demands of industrial farms integrated in commodity supply chains. By narrowing research and development to a few varieties, climate-ready seed developments do not address the need for biologically diverse farming systems, which in turn is essential for dietary diversity (an element of food security) and building resilience to the impacts of climate change.⁷¹ Generally, markets do not incentivise investment in the broad range of crops that exist and are nutritious, but instead centre on crops suitable for long-distant transport and standardised food products.⁷²

Partly as a result of dependence on market mechanisms, on-farm and dietary diversity has broadly and substantially decreased to the point that farms are increasingly vulnerable to diseases, pests and extreme weather events.⁷³ Of the approximately 50,000 plant species that are suitable for human consumption, only 15 crop varieties provide 90% of food energy intake worldwide, and three crops provide up to two-thirds (wheat, maize and rice).⁷⁴ Entering into this context, GM

⁶⁷Bonny (2017).

⁶⁸Krishna and Qaim (2012), Qiao (2015).

⁶⁹Klümper and Qaim (2014).

⁷⁰There are approximately a billion cars in use worldwide. Brookes and Barfoot (2015, 2017).

⁷¹See, eg, Jackson et al. (2007).

⁷²See, eg, Jones (2016).

⁷³Rotz and Fraser (2015).

⁷⁴Loftkas (1995, p. 21).

varieties only exist in the main commodity crops (namely, cotton, maize, soybean, canola and sugar beet). In relation to 'climate-ready' varieties specifically, evidence suggests that these developments, for instance in drought-resistant genes, will continue to be employed on a handful of varieties for commodity production.⁷⁵

Although GM does not necessarily increase biodiversity loss, and may in fact increase diversity in some circumstances,⁷⁶ it does not challenge the lack of diversity both on-farms and in diets. The issue of on-farm and dietary diversity loss, however, could be alleviated by targeted public sector programs and incentives to improve on-farm biodiversity, and increase dietary diversity. Regardless, the lack of diversity in the GM varieties being created indicates that climate-ready seeds are likely to positively feedback into the dominance of monoculture cropping and not significantly contribute to a new way of farming.

A second reason why climate-ready seeds has significant limitations in terms of contributing to climate-smart agriculture relates to access. As the IAASTD observed, 'Adoption of commercially available GM commodity crops has primarily occurred in chemical intensive agricultural systems in North and South America'.⁷⁷ Because companies need to recoup on their investments, the products they develop must be priced for and targeted to higher-income farmers and in jurisdictions where 'free-riders' are limited. The restricted market potential and concern of IPR breaches act as significant disincentives for private actors in making their varieties widely available and accessible in developing countries.⁷⁸ A study by Tambo and Abdoulaye is illustrative of this point. They examined the adoption of drought tolerant maize technology by small-scale maize farmers in Nigeria, and concluded that adoption was most likely where the household could afford the technology; hence, Tambo and Abdoulaye observed 'it can be difficult for resource-poor farmers to adopt the technology'.⁷⁹

Issues of access could, theoretically, be resolved by changes to IPRs for plant varieties. The length and risk of the investment in a new plant variety could be incentivised by stronger IP protections like patents, whereas flexible plant breeder rights could be available for less resource-intensive varieties.⁸⁰ Such systems could, and sometimes do, have research exemptions or experimental use defences to better promote cumulative innovation. This suggestion creates issues in terms of verification of the level and risk and does not address other issues such as the suitability of the crops being diffused for small-scale farmers and market concentration in the seed sector.

⁷⁵ETC Group (2010).

⁷⁶van de Wouw et al. (2010).

⁷⁷IAASTD (2009) p. 166.

⁷⁸Pray and Naseem (2007, p. 193).

⁷⁹Tambo and Abdoulaye (2012, p. 277).

⁸⁰Lence et al. (2016), Smith et al. (2016).

Public-private partnerships can, and in some cases have,⁸¹ addressed the gap in public goods research into crop varieties, but a number of barriers and complications exist that prevent such partnerships or prevent them from fulfilling public and private good research. For instance, public-private partnerships are, arguably, likely to converge the interests of the private and public actors and entrench the dominant technological paradigm benefiting the private actor.⁸² Furthermore, each cumulative innovation in relation to a particular plant genetic material has the potential to be subject to IPRs, which leads fragmented IPRs across actors, IP regimes, and innovations.⁸³ Adding to this complexity is the likelihood of multiple licensing agreements, which may also be confidential.

Golden Rice is the typical example of the complexity and fragmentation of IPRs. This variety was modified to contain improved levels of vitamin A with the aim of alleviating this micro-nutrient deficiency in particular developing countries. De Silva and Vance observed ‘Depending on the country where it will be used, 0–44 patents associated with Golden Rice have been identified’.⁸⁴ These complex arrangements can impose significant transaction costs, and illustrate an example of one barrier to public-private partnerships that originates from IP laws. This suggests that public-private partnerships is one avenue to addressing the reduction in public access to ‘climate-ready’ seeds, but is unlikely to be appropriate or possible broadly.

A third reason that ‘climate-ready’ seeds are limited in their contributions to CSA is because they are not being predominately developed by the public sector, as public sector Ag R&D plays a special role in improving agricultural systems. A prominent body of work draws attention to the distinctly powerful contributions of publicly-funded agricultural research and development work, including how these investments have higher rates of positive spillovers over countries.⁸⁵ Recognising property rights in new varieties inevitably hinders the public sector from positively benefiting in terms of accessing a variety to enhance future research and arguably distracts the calls for vastly increased public sector spending on Ag R&D.⁸⁶

Other kinds of technologies, such as automation, sensors and 3D-printed food, are employed as trajectories of the Life-Sciences Paradigm because they are high-tech, capital-intensive and tend to be depicted as ubiquitous solutions to food insecurity and the contributions to agriculture makes to climate change.⁸⁷ Similar

⁸¹See, eg, Gonsalves et al. (2007).

⁸²See, eg, Brooks (2014), Spielman and von Grebmer (2004).

⁸³See, eg, Atkinson et al. (2003).

⁸⁴Silva and Vance (2017, p. 66).

⁸⁵See, eg, Alston (2002), Alston et al. (2009), James et al. (2008), Pardey et al. (2006).

⁸⁶James et al. (2008).

⁸⁷Chiles (2013), Ojha et al. (2015), Smith (2017, p. 178); See also, Nicol (2017), Fraser and Charlebois (2016).

issues are raised in relation to these technologies regarding access, suitability, and potential to address structural causes of climate change and food insecurity.

4.2 *Ecological-Integrated Paradigm*

Ecological-Integrated paradigm centres on the manipulation of farm habitats to meet various social (increase yields) and environmental (restoration of soils). The practices vary depending on the ecological and social context.⁸⁸ Commonly, though, practices stemming from this paradigm centre on recycling biomass, agroforestry and diversification of varieties and/or species.⁸⁹ Perhaps the most well-known farming models from the Ecological-Integrated paradigm are organic agriculture and agroecology. Although the FAO has a long history of promoting ecological farming practices, it is increasingly engaging with agroecology and ecological approaches to agriculture more broadly, which is notable given its role in world Ag R&D.⁹⁰

The Ecological-Integrated paradigm requires a reduction in, and particular selections of, external inputs, and especially synthetic fertilisers and pesticides. The reason being that these in-puts are either not required because the farming practices manage nutrients in the soil or because the use of such inputs would undermine another aspect of the overall system. Instead, practices such as agroforestry, crop rotations, cover crops, mulching, and crop-animal integration are supported. In terms of key sources of knowledge, the Ecological-Integrated paradigm tends to synergistically employ lived-experiences of the farmers, other local, traditional or indigenous knowledges, and formal scientific disciplines (e.g. chemistry, botany, ecology).⁹¹ Thus, it is a knowledge- and, at least initially, labour-intensive model that is significantly context-determined.

A large body of empirical works corroborates the ability of Ecological-Integrated paradigm models to increase, or at least not affect, yields, while fundamentally reducing the environmental impact of the farm across a range of measures.⁹² A commonly cited study comes from Pretty et al., and involved an analysis of 286 agricultural projects in 57 developing.⁹³ These projects adopted agroecological practices such as integrated pest management. At the end of the projects' periods, crop yields had increased by 79%, and soil carbon levels were higher. Correspondingly, reviews of ecological-based farming practices illustrate ranging

⁸⁸Reijntjes et al. (1992), Altieri et al. (2005), Gliessman (2007).

⁸⁹FAO (2014).

⁹⁰FAO (2014, 2015).

⁹¹Monsen (2010, p. 23).

⁹²Bommarco et al. (2013), Gurr et al. (2004), Holland (2004), Hurd (1994), Jose (2009).

⁹³Pretty et al. (2006).

potential for climate mitigation adaptation,⁹⁴ and significant potential for climate change adaptation.⁹⁵

Another feature of the Ecological-Integrated paradigm is its incorporation of political and social dimensions.⁹⁶ Thus, in framing the problems facing food and agriculture, this paradigm frames the problem as existing social and economic systems (specifically unregulated capitalist processes and entrenched inequities between and within states),⁹⁷ while the solution is to bring about radical structural changes to food systems that entail, for instance, resource re-distribution, reduced IPRs and the development of comparatively smaller-scale food systems. Some proponents position trajectories stemming from Ecological-Integrated paradigm, namely agroecology, as inconsistent with the adoption of high-tech, capital-intensive practices promoted under life-sciences integrated paradigm, such as the adoption of 'climate-ready' seeds.⁹⁸

Conceptually, Ecological-Integrated paradigm is highly consistent with the integrated CSA concept. Ecological-based farming practices are supported by a large body of work on its contributions to food security and climate change adaptation, and more directly addresses issues of access and inequality that underscore food insecurity and climate change. In a review of the concepts, Thomas and Twyman argued that the adoption of agroecology, a key trajectory of the Ecological-Integrated Paradigm 'represents an unavoidable condition if CSA is to reach its goals effectively while participating to joint efforts to fight against current and future climate change threats to the agricultural socioecosystems'.⁹⁹

Although some are against the idea that ecological-based farming practices can be adopted by high-external in-put, intensive farms alongside more intensive, conventional approaches, the adoption of ecological-based practices would, nevertheless, contribute to climate mitigation and adaptation. Socio-technical regime theorists explore how transitions occur incrementally and to different extents across space and time. This framework, therefore, is not counter to gradually increasing the adoption of practices that align best with the Ecological-Integrated paradigm.¹⁰⁰

Practically, though, persistent uncertainties remain. These include whether transitioning the sociotechnical regime for agriculture towards Ecological-Integrated paradigm will provide adequate food, whether infrastructure and networks can be adapted to suit less standardised and less long-lasting foods, and whether populations will be willing to reduce their meat consumption and eat a more diverse, plant-based diets.¹⁰¹ Such uncertainties aligns with the fact that Ecological-Integrated paradigm is

⁹⁴Lal (2010), Powlson et al. (2016), Wilson et al. (2017).

⁹⁵Bommarco et al. (2013), Cassman (1999), Crowder et al. (2010), Gabriel et al. (2013).

⁹⁶Wezel et al. (2011).

⁹⁷Holt-Giménez and Altieri (2013), Hornborg et al. (2013).

⁹⁸Holt-Giménez and Altieri (2013), Jaffee and Howard (2010).

⁹⁹Thomas and Twyman (2005).

¹⁰⁰Smith (2006).

¹⁰¹Seufert and Ramankutty (2017).

less consistent with the dominant agricultural socio-technical regime. From this perspective, the Ecological-Integrated paradigm is a ‘niche’ comprise of not only an alternative view of progress, but also an expanding number of actors, networks and projects that challenges the status-quo. Nevertheless, scaling up trajectories associated with the Ecological-Integrated paradigm remain important for easing lock-into intensive agricultural systems counter to CSA.

4.3 Agricultural Research and Development Trends Lock-In Mechanism Intensive Agriculture Trajectory

As argued in the previous sub-sections, Life-Sciences Integrated paradigm is relatively closely aligned with the dominant socio-technical regime for agriculture and this could account for its widespread acceptance by key actors in Ag R&D. While the Life-Sciences Integrated paradigm tends to emphasis high-tech interventions provided by corporate actors external to the farm, the Ecological-Integrated Paradigm seeks to reduce reliance on in-put providers, and requires more direct relationships between farmers and consumers. Hence, it is less reliant on the many private actors that exist between the farmer and the consumer in globalised food supply chains.

The upward trend in private investment lends further support to the Life-Sciences Integrated paradigm, and aligns with the emphasis on commercialisable research and the privatisation of research institutes. A general decline in spending on public agriculture research and development has been observed since the 1970s in most countries.¹⁰² In developed countries, for instance, private sector investment accounted for 52.5% in 2011 of total agricultural research and development spending, and public spending grew by just 0.8% between 2000 and 2011; in middle-income countries private sector investment has approximately doubled from 1980 to 2011.¹⁰³

Against the context of these trends, the increased commercialisation pressures on and related policies in universities can both directly and indirectly influence research outcomes towards, very broadly, more market-oriented, proprietary-based outputs.¹⁰⁴ In the context of scientist involved in plant and animal biotechnology, some studies indicate that the influence of private sector investment on research direction is especially strong where scientists are either funded by a biotechnology company or otherwise engaged in research that may be suited to supporting

¹⁰²Pardey et al. (2006).

¹⁰³Pardey et al. (2016).

¹⁰⁴Henderson R et al. (1995) National Bureau of Economic Research, Wu et al. (2015), Smith and Bagchi-Sen (2006), Huggins et al. (2008).

intellectual property rights.¹⁰⁵ Regardless, much depends on the context, the institutional structure and the individual researchers.¹⁰⁶

Taking these broad trends together, agricultural innovations derived from public-private or private innovations, are being developed and disseminated in a significantly different environment than the Green Revolution. While public institutional support and investment largely formed the Green Revolution, the diffusion of technologies consistent with the Life-Sciences Integrated paradigm is taking place against increasingly liberalised agricultural markets and public policies more generally.

The shift in investment has ramifications for scaling up trajectories stemming from the Ecological-Integrated paradigm, and more generally transitioning from the intensive agricultural paradigm. This is because the Ecological-Integrated paradigm is far less lucrative for private actors. Its minimal use of external in-puts and emphasis on bottom-up development of and open access to knowledges does not lend itself to funding by private funders of Ag R&D. In reflection of its low profitability for corporations, agroecology, unlike for instance climate-ready seeds, lacks equally resourced research institutes and lobbying groups worldwide.¹⁰⁷ Hence, trajectories of the Ecological-Integrated Paradigm are relatively unsupported by key actors in the existing sociotechnical regime for agriculture, which presents a significant challenge for CSA.

In a similar vein, knowledge and technologies developed under the Life-Sciences Integrated paradigm are more likely to lend themselves to privatisation. With the expansion of IPRs into genetic resources, sweeping patents already exist in relation to climate-ready seeds not to mention pesticide and fertiliser formulations and brands. The ETC Group found that from June 2008 to June 2010 at least 261 patent families were claimed in the US over traits associated with stress tolerance in plants.¹⁰⁸ Innovations in ecological-integrated paradigm are not as capable of supporting private property rights. For instance, integrated crops and livestock systems, crop rotations and IPM are not practices or systems that are patentable or otherwise capable of excluding others from their adoption in the same way that, for instance, climate-ready seeds may be or sensors for increasing the precision of pesticide application. In fact, privatising knowledge is antithetical to the sharing of knowledge and practices, and the co-evolution of these aspects, that Ecological-Integrated paradigm relies upon.

Assumptions about existing, past and future agricultural systems, as well as common understandings about what innovation is, aggravate the imbalance between the paradigms.

¹⁰⁵See Glenna et al. (2011), Smith and Bagchi-Sen (2006). See also, Baldini et al. (2007). Cf Boardman (2008).

¹⁰⁶Craig Boardman and Ponomarev (2009).

¹⁰⁷See generally, Fischer et al. (2014), Howard (2015).

¹⁰⁸ETC Group (2010) Capturing "Climate Genes": Gene Giants Stockpile "Climate-Ready" Patents. http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/pdf_file/Genegiants2011_0.pdf. Accessed 8 December 2017, Howard et al. (2016).

In one of the few papers employing empirical methods to examine “lock-in” to intensive agricultural paradigms, Vanloqueren and Baret explored, explained that generally scientists assumed a continuation of globalisation and demand for food based on existing dynamics, as opposed to the ideal future.¹⁰⁹ Hence, more radical socio-technical regimes, as opposed to incremental changes to the incumbent regime for agriculture, is seen as impractical and invalid. The fact that agroecology draws on practices and knowledges from ‘the past’, i.e. indigenous, local and traditional knowledges, is inconsistent with the conventional idea that progress (and time) is linear, and that ‘returning’ to previous practices is a step backwards.¹¹⁰

5 Agricultural Research and Development Trajectories Under the Paris Agreement

Based on the socio-technical regime literature, and the previous discussion, it seems likely that the Paris Agreement would support the Life-Sciences paradigm, given its closeness with the existing socio-technical regime for intensive agriculture. This section will test this hypothesis.

The texts of the UNFCCC and the Paris Agreement are both deliberately general. Nevertheless, both promote the development and transfer of technologies, and expressly frame these processes as vital to climate change mitigation and adaptation. The emphasis on technology development and transfer, therefore, positions technologies as means to addressing the impacts of climate change within supporting institutional frameworks.

For the purposes of this chapter, the problem with this emphasis on technologies is that it tends to play into the high-tech, reductionist approaches that form part of the Life-Sciences Integrated paradigm. Although the Ecological-Integrated paradigm also relies on hard and soft technologies, the emphasis on technologies and related knowledges in the climate regime is more closely associated with the Life-Sciences Integrated paradigm and related discourses (explored in Sect. 4.1). In fact, the Ecological-Integrated paradigm has been critiqued for being anti-technology.¹¹¹ More broadly, the emphasis on technological solutions is, arguably, a reductionist response not a genuine attempt to address the root and structural causes of climate change in a way that aligns with climate-smart agriculture towards climate justice.¹¹² Such critiques, in part, centre on the growth imperative of capitalist systems that continually require more resources, but do not internalise social or environmental impacts.

¹⁰⁹Vanloqueren and Baret (2009, p. 977).

¹¹⁰Davidson (1984), Vanloqueren and Baret (2009).

¹¹¹See, eg, Kuntz (2012).

¹¹²See, eg, Klein (2015, p. 263), Nerlich and Jaspal (2012), Hornborg et al. (2013).

The UNFCCC emphasises the need for redirecting resources towards ‘new technologies’ to combat climate change, and developed country parties agreed to promote and cooperate on the research, development and transferral of technologies, practices and processes.¹¹³ Technology transfer is positioned as an essential means of climate change mitigation, along with the related facet of financial support. Thus, article 4(7) states: ‘The extent to which developing country Parties will effectively implement their commitments... will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology’.¹¹⁴ The emphasis on technology was further carried over to the establishment of IPCC, which was charged with identifying ‘innovative, efficient and state-of-the-art technologies and know-how’ related to climate change mitigation.¹¹⁵ ‘Innovative’ and ‘state-of-the-art’ have similar meaning associated with unprecedented ideas or methods.

The Paris Agreement contains similar provisions expressing the importance of technology development and transfer, and draws attention to technology development and transfer as one aspect of capacity-building along with education, training and access to finance.¹¹⁶ Thus, the Paris Agreement frames technology transfer in a somewhat more holistic fashion than the UNFCCC, which may enable the Ecological-Integrated paradigm; but technology transfer remains a focal point along with finance. As discussed, discourses on technological development broadly tend to bolster trajectories originated in the Life-Sciences paradigm and undermine trajectories stemming from the Ecological-Integrated paradigm that requires less “start of the art” technologies and more collaborative, context-specific and knowledge-intensive practices.

Although these agreements can only be agreed to and carried out by state governments, private sector actors are given an important role in technology transfer discussions under the UNFCCC and the Paris Agreement. The UNFCCC, after encouraging technology transfer, suggested that ‘Other...organizations in a position to do so many also assist in facilitating the transfer of such technologies’.¹¹⁷ The Paris Agreement establishes the aims of the Technology Mechanism to, inter alia, ‘incentivize and facilitate participation in the mitigation of greenhouse gas emissions by public and private entities’.¹¹⁸ Although the Paris Agreement emphasises the ‘importance of integrated, holistic and balanced non-market approaches’ more so than the UNFCCC, it also requires enhancement of ‘private sector participation in the implementation of nationally determined contributions’.¹¹⁹

¹¹³UNFCCC Preamble, art 4(c), (g).

¹¹⁴UNFCCC art 4(7).

¹¹⁵UNFCCC art 9(2)(c).

¹¹⁶Paris Agreement Preamble, art 10.

¹¹⁷UNFCCC art 4(5).

¹¹⁸Paris Agreement art 6 (4)(b).

¹¹⁹Paris Agreement art 6 (8)(b).

This discussion supports the argument that the UNFCCC and the Paris Agreement are more likely to enable the Life-Sciences Integrated paradigm, despite the significant alignment between the Ecological-Integrated model and CSA. The broad support for private sector actors provides incidental endorsement for the Life-Science-Integrated paradigm, in which private actors are dominant.

A review of the NDCs reveals, however, a mixture of both paradigms and related trajectories. Despite projections that countries would avoid reducing emissions from agriculture,¹²⁰ at least 119 countries pledged to reduce agricultural greenhouse gas emissions in the 2015 Paris Agreement.¹²¹ Of these, 103 countries included mitigation measures related to agriculture and 94 included measures that they would take for agricultural adaptation.¹²² According to the data-set provided by the CGIAR, around 24 parties mentioned agroecology in their NDCs as part of their adaptation plans and correspondingly 19 mentioned indigenous knowledges related to agriculture.¹²³ The great majority were low-income countries, while China and Argentina also mentioned agroecology. Generally, agroecology was mentioned in reference to reducing the use of external in-puts and increasing the use of ecological approaches including agroforestry, nutrient recycling and diversification of varieties and species.

Contrastingly, mitigation commitments under the NDCs tended to focus more on broad emission reduction commitments from namely livestock, croplands and grasslands, as opposed to specific farming practices. Around 9 countries mentioned agricultural intensification as a strategy for mitigating climate change, and methods to do this were mixed.¹²⁴ Several NDCs made references to climate-tolerant crops, generally drought-tolerant varieties, but these references did not specify the kinds of technologies or arrangements they would employ to scale up such varieties.¹²⁵

Although the NDCs are generally vague, and subject to change, they broadly indicate that ecologically-based farming trajectories are niche, but not completely marginalised. Certainly, the number of NDCs including agriculture, and practices and models consistent with the Ecological-Integrated paradigm, are hopeful signs for progress at the intersection of climate justice and CSA. Consistent with these observations, significant alignment has been shown to exist between NDCs and the Sustainable Development Goals, all of which are implicated in agriculture and food

¹²⁰Blandford and Hassapoyannes (2015).

¹²¹Wollenberg et al. (2016).

¹²²Richards (2015).

¹²³CGIAR Research Program on Climate Change, Agriculture and Food Security (2016) Dataset in Excel. These were: Angola, Argentina, Burundi, Cambodia, Central African Federation, Chad, China, Cote d'Ivoire, Democratic Republic of Congo, Ehtioppia, Guinea, Guinea-Bissau, Honduras, India, Lebanon, Lesotho, Mali, Nepal, Nigeria, Rwanda, Saint Vincent and Grendaines, Togo, Tonga, Uruguay, Venezuela, Boliva and Zimbabwe.

¹²⁴Such as Bolivia, Brazil, Cameroon, Chad, Coloumbia, Côte d'Ivoire, Madagascar, Malawi, Mali.

¹²⁵Such as Bangladesh, Bolivia, Namibia, and Vietnam, Vanuatu.

systems, but particularly ‘Zero Hunger’, ‘Responsible Consumption and Production’ and ‘Life on Land’.¹²⁶

6 Conclusion

The Paris Agreement creates an enabling environment for the development of an agricultural socio-technical regime more consistent with the existing intensive agricultural model. This outcome is predicted by socio-technical regime theory and related concepts. Re-conceptualisation of CSA to be more expressly consistent with Ecological-Integrated paradigm would benefit the concept in terms of legitimacy and clarity. Furthermore, it would better position CSA, and the resources supporting institutions mobilise, to make a distinct contribution to Ag R&D better in line with climate justice. Increased public Ag R&D in ecological-based farming practices is critical to fostering alternatives to business-as-usual, and should be strongly enabled by the international climate change regime in line with climate justice ideals. The gap in public spending generally is greatly concerning for future efforts at the intersection of climate change, agriculture and food security.

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¹²⁶Northrop (2016).

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- UN Sustainable Development Goals 2015 <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Chapter 21

Conserving Genetic Resources, Access and Benefit-Sharing, Intellectual Property and Climate Change



Charles Lawson

Abstract Climate change threatens the survival of important genetic resources across the globe. This means that conservation is an imperative to maintain the diversity of genetic resources and avoid the permanent losses of these valuable results of evolution. The regulation of genetic resources is presently addressed through a patchwork of international and domestic regulations, with the key agreement being the United Nation's Convention on Biological Diversity. This agreement and its protocols expressly recognise intellectual property claims in the context of conserving and exploiting genetic resources. This paper reviews the role and place of intellectual property and seeks to answer the question: is intellectual property actually helping to promote conservation? The paper concludes that existing regulations may be overly complex, and that the evolving regulatory schemes have now moved on to address complex issues of development, sovereignty, customary law and human rights.

Keywords Intellectual property • Access • Benefit sharing • Genetic resources
Convention on biological diversity • Plant Treaty • PIP Framework

1 Introduction

Genetic resources are a resource frontier of this century and their exploitation is critical for economic development and our sustainable futures. These resources potentially hold some of the solutions to the challenges of adapting to climate change, and other future challenges such as food security, lifesaving medicines, alleviation of poverty, and so on. But they are also a fragile resource that needs to be properly conserved across the globe because once extinguished they will be incredibly difficult, if not impossible, to recreate or re-conceive (without even considering their non-utilitarian values). That conserving and exploiting these

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valuable resources is important in the context of climate change is not disputed and will not be rehearsed here. What this chapter does is to examine the underlying regulation about accessing these valuable resources (including the role and place of intellectual property) and the link between conservation and the regulated access to these resources. In this context intellectual property is a part of the price of access and a negotiated term and condition of that access and benefit sharing arrangement. If that regulated access is promoting conservation, then intellectual property is almost certainly playing a positive role in promoting conservation. If, however, that regulated access is *not* delivering benefits that promote conservation then intellectual property can be said to be either undermining conservation or having no effect.

The international regulation of access and benefit sharing genetic resources might now be summarized as: the resource frontiers of outer space (the Outer Space Treaty system), the seas and oceans (the United Nations Convention on the Law of the Sea (UNCLOS)), general biological diversity (the United Nations Convention on Biological Diversity (CBD) and its subsidiary agreements), some plants for food and agriculture (the Food and Agriculture Organization of the United Nations International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty)), and human pandemic influenza viruses (the World Health Organization (WHO) International Pandemic Influenza Preparedness Framework (PIP Framework)). Both the Plant Treaty and PIP Framework are consistent with the CBD and might be considered as schemes within the broader CBD jurisdiction. Figure 1 illustrates the jurisdictional reach of these various agreements. Each of these schemes provides a frame of regulation for genetic resources (even if there are no genetic resources there).

The purpose of this chapter is to demonstrate that conservation is no longer, if it ever really was, the focus of access and benefit sharing obligations in the CBD, Plant Treaty and PIP Framework, and that intellectual property has retained a special place in these agreements. The next parts of this chapter outline the access and benefit sharing arrangements under the CBD (and subsidiary agreements), Plant Treaty and PIP Framework and highlight the place on intellectual property. After this there is an analysis of the implicit access and benefit sharing contract model embodied by these schemes together with a critique of its theoretical operation. The chapter then concludes that the focus on benefit sharing and its link to conservation have been lost, undermining the potential incentives to conserve biodiversity through access and benefit sharing regulation. This may be changing, however, with the adoption of a 'partnership contribution' under the PIP Framework. This is real, tangible money linking benefits to conservation and attracting the attention of the parties to the CBD (and Nagoya Protocol) and the Plant Treaty. This, the chapter surmises, will likely reignite the interest in dealing with benefit sharing as an incentive for conservation because there will be financial resources to pay for the basic and ordinary requirements of conservation, like fences, eradicating weeds, controlling feral animals, establishing protected areas, and so on. In this account, however, intellectual property is merely a part of the discussions about access and with the advent of 'partnership contribution' the focus is not on the kinds of intellectual property claims that might be made in exploiting genetic resources, but rather, the quantum of the 'partnership contribution'.

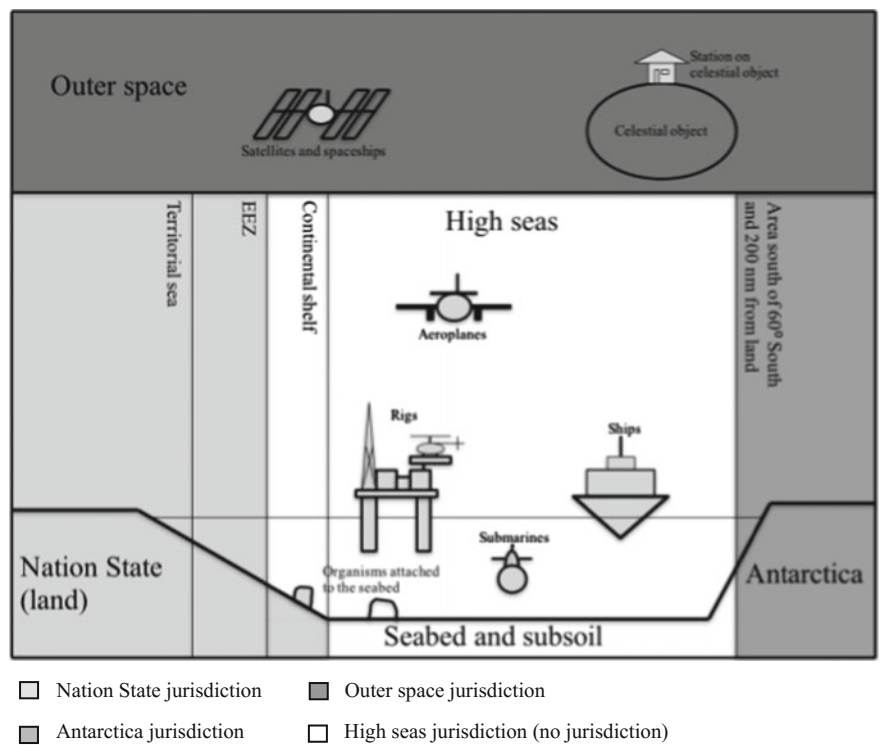


Fig. 1 Jurisdictional map. This figure shows the distinct jurisdiction over the reach of the nation state (under the CBD, including the plant treaty and the PIP framework, and UNCLOS) and the areas beyond national jurisdiction (the high seas under UNCLOS and outer space under the *outer space treaty*). Notably a nation state’s jurisdiction extends to objects of their nationals on the high seas (such as aeroplanes, ships, submarines and rigs) and in outer space (such as stations on celestial objects, satellites and spaceships)

2 United Nations Convention on Biological Diversity

A general objective of the CBD is the fair and equitable sharing of the benefits arising from using genetic resources with the CBD setting out a framework for its implementation.¹ Access to genetic resources is according to the authority of the Nation State ‘[r]ecognizing the sovereign rights of States over their natural resources’² with an obligation to facilitate access for ‘environmental sound uses’ without imposing restrictions that are counter to the CBD’s objectives.³ Access

¹Article 1 of the Convention on Biological Diversity (1992) 1760 U.N.T.S. 79 (CBD).
²Article 15 (1) of the CBD.
³Article 15 (2) of the CBD.

must also be from countries of origin or countries that have acquired the genetic resources according to the CBD,⁴ on mutually agreed terms,⁵ and with prior informed consent.⁶ The obligation on Contracting Parties is to take:

legislative, administrative or policy measures, as appropriate, and in accordance with Arts 16 [access to, and transfer of technology] and 19 [handling of biotechnology and distribution of its benefits] and where necessary through the financial mechanism established by Arts 20 [financial resources] and 21 [financial mechanism] with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources.⁷

In dealing with the access to, and transfer of technology, the CBD recognizes that access to technology and the transfer of technology are 'essential elements' for the achieving the CBD's objectives.⁸ To achieve this the CBD expressly provides that Contracting Parties 'undertake' to provide and facilitate access to conservation technologies.⁹ Where access to, and transfer of technology is made and the technology is 'subject to patents and other intellectual property', then 'access and transfer shall be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights'.¹⁰ Significantly, the CBD expressly provides that access to, and transfer of technology to developing countries 'shall be provided and/or facilitated under fair and most favorable terms, including on concessional and preferential terms where mutually agreed, and where necessary in accordance with the financial mechanism'.¹¹ For all countries, the access to, and transfer of technology 'protected by patents and other intellectual property' must be on 'mutually agreed terms' and 'in accordance with international law'.¹² Further, the Contracting Parties are recorded as accepting that 'patents and other intellectual property rights' can influence the implementation of the CBD and are required to 'cooperate in this regard subject to national legislation and international law in order to ensure that such rights are supportive of and do not run counter to its objectives'.¹³

A key element in the access to, and transfer of technology in exchange for access to genetic resources contemplated by the text of the CBD is that Contracting Parties take 'legislative, administrative or policy measures' to require the private sector to facilitate 'access to, joint development and transfer of technology' for the benefit of

⁴Article 15 (3) of the CBD.

⁵Article 15 (4) of the CBD.

⁶Article 15 (5) of the CBD.

⁷Article 15 (7) of the CBD.

⁸Article 16 (1) of the CBD.

⁹Article 16 (1) of the CBD.

¹⁰Article 16 (2) of the CBD.

¹¹Article 16 (2) of the CBD.

¹²Article 16 (3) of the CBD.

¹³Article 16 (5) of the CBD.

‘both governmental institutions and the private sector of developing countries’.¹⁴ In respect of biotechnology, the measures include the ‘effective participation in biotechnological research activities’¹⁵ and ‘the results and benefits arising from biotechnologies based upon genetic resources’.¹⁶ Other measures include the exchange of information¹⁷ and technical and scientific cooperation.¹⁸

The CBD text also recognized the special place of traditional and community knowledge, practices and innovations, requiring Contracting Parties, ‘as far as possible and as appropriate’, to:

respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.¹⁹

Of particular significance to intellectual property, the CBD text also provides that Contracting Parties ‘shall, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity’.²⁰ Further, the CBD is not intended to affect the ‘existing’ rights and obligations of Contracting Parties ‘except where the exercise of those rights and obligations would cause serious damage or a threat to biological diversity’.²¹

The challenge for Contracting Parties was to develop and implement legislative, administrative or policy measures within the framework set out in the text of the CBD so as to share in a fair and equitable way both the ‘results of research and development’ and the ‘benefits arising from the commercial and other utilization of genetic resources’.²² Importantly, Contracting Parties’ obligations are to *both* genetic resources accessed in their jurisdiction and genetic resources accessed in other countries and exploited in their jurisdiction.

To implement the CBD’s obligations the Contracting Parties, as ‘merely the first step on a long and complex process to secure access and benefit-sharing’ under the CBD,²³ adopted the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization

¹⁴Article 16 (4) of the CBD.

¹⁵Article 19 (1) of the CBD.

¹⁶Article 19 (2) of the CBD.

¹⁷Article 17 of the CBD.

¹⁸Article 18 of the CBD.

¹⁹Article 8(j) of the CBD.

²⁰Article 11 of the CBD.

²¹Article 22 (1) of the CBD.

²²Article 15 (7) of the CBD.

²³UNEP/CBD/COP/6/20, [42].

(Bonn Guidelines).²⁴ These are voluntary guidelines that apply to *all* genetic resources covered by the CBD except human genetic resources²⁵ and address the legislative, administrative or policy measures implementing the access and benefit sharing obligations (such as mutually agreed terms).²⁶ They apply in a manner that is ‘coherent and mutually supportive of the work of relevant international agreements and institutions’²⁷ and ‘without prejudice’ to the Plant Treaty.²⁸

The Bonn Guidelines propose the establishment of a ‘competent national authority’,²⁹ identify the responsibilities of Contracting Parties that are the origin of genetic resources and the implementation of mutually agreed terms,³⁰ and set out the steps in the access and benefit-sharing process.³¹ While the Bonn Guidelines do not appear to favor a specific approach to intellectual property, they contemplate private contracts addressing intellectual property and other matters between the resource holder and the exploiter dealing with the access and benefit-sharing arrangements.³² However, the Bonn Guidelines do deal at some length with the various methods by which benefits might be shared identifying those involved in the resource management, scientific and commercial process³³ and the various kinds of monetary and non-monetary benefits including intellectual property.³⁴

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol) is a supplementary agreement to the CBD³⁵ and only binding those parties adopting the Nagoya Protocol.³⁶ It provides a framework for the implementation of equitable benefits sharing and was intended to apply broadly ‘to genetic resources within the scope of Art 15 of the CBD and to the benefits arising from the utilization of such resources’ and ‘to traditional knowledge associated with genetic resources within the scope of the [CBD] and to the benefits arising from the utilization of such knowledge’.³⁷ The Nagoya Protocol expressly recognizes that other rights and obligations arising from international agreements and specialized access and benefit-sharing agreements (such as the Plant Treaty and PIP Framework) are not affected unless there is likely to be serious damage or threat to biological diversity

²⁴UNEP/CBD/COP/6/20, [342] and Annex I (Decision VI/24A) (Bonn Guidelines).

²⁵Bonn Guidelines, [9].

²⁶Bonn Guidelines, [4].

²⁷Bonn Guidelines, [10].

²⁸Bonn Guidelines, [10].

²⁹Bonn Guidelines, Annex, [14].

³⁰Bonn Guidelines, Annex, [16].

³¹Bonn Guidelines, Annex, [22]-[50].

³²See Bonn Guidelines, Annex, [41]-[50] and Decision VI/24C, [1].

³³Bonn Guidelines, [45]-[50].

³⁴Bonn Guidelines, [46] and Appendix II.

³⁵UNEP/CBD/COP/10/27, [103] and Annex (Decision X/1, Annex 1) (Nagoya Protocol).

³⁶Article 33 of the Nagoya Protocol.

³⁷Article 3 of the Nagoya Protocol.

inconsistent with the CBD's objectives.³⁸ The obligations imposed by the Nagoya Protocol are essentially that Members will establish appropriate legislative, administrative or policy measures to ensure that any benefits (monetary and non-monetary) are shared with the originating holder of the resource.³⁹ Where these are indigenous and local communities, any benefits (monetary and non-monetary) are to be shared with the indigenous and local communities concerned.⁴⁰ And further, where 'traditional knowledge associated with genetic resources' are used then there must be appropriate legislative, administrative or policy measures to ensure that any benefits (monetary and non-monetary) are shared with the 'indigenous and local communities holding such knowledge'.⁴¹ The Nagoya Protocol restates the CBD's requirements of mutually agreeable terms and prior informed consent and extends this to include the relevant 'indigenous and local communities' and 'approval and involvement of indigenous and local communities' respectively.⁴² Significantly, the Nagoya Protocol sets out necessary procedural standards for establishing prior informed consent⁴³ and requires the establishment of a 'national focal point on access and benefit-sharing',⁴⁴ and an 'Access and Benefit-sharing Clearing-House'.⁴⁵ A clearing-house is anticipated to provide access to 'model contractual clauses', 'methods and tools developed to monitor genetic resources', 'codes of conduct and best practices', and so on,⁴⁶ and de facto certificates of provenance ('internationally recognized certificate of compliance') required for accessed genetic resources and traditional knowledge.⁴⁷

For intellectual property, the Nagoya Protocol marked a significant recognition of the existing intellectual property standards by accepting that other international agreements (and while not explicitly mentioned, clearly the World Trade Organization's Agreement on Trade-related Aspects of Intellectual Property Rights was in mind) continued to have force.⁴⁸ By way of summary, the Nagoya Protocol has, using the clustering of issues that have crystallized in the World Intellectual Property Organisation's negotiations for genetic resources, traditional knowledge and traditional cultural expressions/expressions of folklore,⁴⁹ addressed:

³⁸Article 4 of the Nagoya Protocol.

³⁹Article 5 (1) of the Nagoya Protocol.

⁴⁰Article 5 (2) of the Nagoya Protocol.

⁴¹Article 5 (5) of the Nagoya Protocol.

⁴²Articles 5 (1) and (2), 6 (1), (2), and (7) of the Nagoya Protocol.

⁴³Article 6 (3) of the Nagoya Protocol.

⁴⁴Article 13 of the Nagoya Protocol.

⁴⁵Article 14 of the Nagoya Protocol.

⁴⁶Articles 14 (3), 19 and 20 of the Nagoya Protocol.

⁴⁷Article 17 of the Nagoya Protocol.

⁴⁸Article 4 of the Nagoya Protocol.

⁴⁹Lawson (2012, pp. 56–59).

- (a) *Defensive protection of genetic resources to prevent the grant of a patent where there is a misappropriation (or misuse) of genetic resources ('bio-piracy')* – The Nagoya Protocol requires Parties to:
- (i) 'establish mechanisms' to inform potential users of traditional knowledge about their obligations, including the Access and Benefit-sharing Clearing-House.⁵⁰
 - (ii) 'endeavor to support' the development of 'community protocols' about traditional knowledge, minimum requirements for mutually agreed terms and model contract clauses.⁵¹
 - (iii) designate a 'national focal point' for information about accessing genetic resources and associated traditional knowledge.⁵²
 - (iv) establish an 'Access and Benefit-sharing Clearing-House' to provide information about relevant 'legislative, administrative and policy measures', 'permits or their equivalent' as evidence of 'prior informed consent' and 'mutually agreed terms', and information about 'model contract clauses', 'methods and tools' and 'codes of conduct and best practice'.⁵³
 - (v) establish 'checkpoints' to 'monitor and to enhance transparency about the utilization of traditional knowledge' such as collecting relevant information, requiring certificates of compliance, and so on.⁵⁴
 - (vi) encourage the 'development, update and use of voluntary codes of conduct, guidelines and best practices and/or standards' for access and benefit-sharing genetic resources and associated traditional knowledge.⁵⁵
 - (vii) take measures to promote awareness of genetic resources and their associated traditional knowledge, including education and training, information dissemination, and so on.⁵⁶
 - (viii) cooperate in general 'capacity-building, capacity development and strengthening of human resources and institutional capacities' to implement the agreed obligations.⁵⁷
- (b) *Disclosure requirements in patent applications* – The Nagoya Protocol requires Parties to:
- (i) 'take appropriate, effective and proportionate legislative, administrative or policy measures' to regulate meeting standards of 'prior informed consent' and 'mutually agreed terms',⁵⁸ including establish an 'Access and Benefit-sharing Clearing-House' to provide information about relevant 'legislative, administrative and policy measures', 'permits or their equivalent' as evidence of 'prior informed consent' and 'mutually agreed terms'.⁵⁹
 - (ii) establish 'checkpoints' to 'monitor and to enhance transparency about the utilization of traditional knowledge' such as collecting relevant information, requiring certificates of compliance, and so on.⁶⁰

⁵⁰Article 12 (2) of the Nagoya Protocol.

⁵¹Articles 12 (3), 15 and 19 of the Nagoya Protocol.

⁵²Article 13 (1) of the Nagoya Protocol.

⁵³Article 14 of the Nagoya Protocol.

⁵⁴Article 17 of the Nagoya Protocol.

⁵⁵Article 19 of the Nagoya Protocol.

⁵⁶Article 21 of the Nagoya Protocol.

⁵⁷Article 22 of the Nagoya Protocol.

⁵⁸Article 15 (1) of the Nagoya Protocol.

⁵⁹Article 14 of the Nagoya Protocol.

⁶⁰Article 17 of the Nagoya Protocol.

(c) *Mutually agreed terms for fair and equitable benefit-sharing* – The Nagoya Protocol requires Parties to:

- (i) 'take legislative, administrative and policy measures, as appropriate' to share the benefits from exploiting genetic resources and their associated traditional knowledge 'with indigenous and local communities holding such knowledge'.⁶¹
- (ii) 'take measures, as appropriate' to ensure the 'prior informed consent' of 'indigenous and local communities' when granting access where the 'prior informed consent' requires 'legislative, administrative and policy measures, as appropriate' that are certain, clear (including rules and appeals), transparent, fair, non-arbitrary, disclosed, determined by a 'competent national authority' in writing, and notify the Access and Benefit-sharing Clearing House.⁶²
- (iii) consider a need for a 'global multilateral benefit-sharing mechanism' to 'support the conservation of biological diversity and the sustainable use of its components globally'.⁶³
- (iv) 'endeavor to support' the development of 'community protocols' about traditional knowledge, minimum requirements for mutually agreed terms and model contract clauses.⁶⁴
- (v) establish 'checkpoints' to 'monitor and to enhance transparency about the utilization of traditional knowledge' such as collecting relevant information, requiring certificates of compliance, and so on.⁶⁵
- (vi) encourage the 'development, update and use of voluntary codes of conduct, guidelines and best practices and/or standards' for access and benefit-sharing genetic resources and associated traditional knowledge.⁶⁶
- (vii) take measures to promote awareness of genetic resources and their associated traditional knowledge, including education and training, information dissemination, and so on.
- (viii) cooperate in general 'capacity-building, capacity development and strengthening of human resources and institutional capacities' to implement the agreed obligations.⁶⁷

This analysis of the CBD and Nagoya Protocol shows that accessing genetic resources requires a contract to be negotiated between the resources holder and the party accessing the resources (bio-prospector). For Contracting Parties to the CBD that *have not adopted* the Nagoya Protocol, this is a contract compliant with domestic laws implementing the CBD (if any) and requiring prior informed consent, mutually agreed terms and benefit sharing (if any). The voluntary Bonn Guidelines address the legislative, administrative or policy measures implementing the access and benefit sharing obligations. For Contracting Parties to the CBD that *have adopted* the Nagoya Protocol, the Nagoya Protocol requires more certain legislative, administrative or policy measures and specifically addresses indigenous and local communities. In every instance the CBD and Nagoya Protocol require the

⁶¹Article 15 (5) of the Nagoya Protocol.

⁶²Article 6 of the Nagoya Protocol.

⁶³Article 10 of the Nagoya Protocol.

⁶⁴Article 12 (3) of the Nagoya Protocol.

⁶⁵Article 20 (1) of the Nagoya Protocol.

⁶⁶Article 21 of the Nagoya Protocol.

⁶⁷Article 22 (1) of the Nagoya Protocol.

parties to address intellectual property as a matter between the resource holder and bio-pro prospector and how intellectual property configures with benefit sharing.

3 Food and Agriculture Organization of the United Nations International Treaty on Plant Genetic Resources for Food and Agriculture

The Plant Treaty establishes a Multilateral System for access to the plant genetic resources for food and agriculture,⁶⁸ subject to benefit-sharing arrangements,⁶⁹ and expressly recognizing the ‘sovereign rights of States over their own plant genetic resources for food and agriculture’.⁷⁰ The objective of the Plant Treaty is ‘the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the [CBD], for sustainable agriculture and food security’.⁷¹ The term ‘plant genetic resources for food and agriculture’ is broadly defined to mean ‘any genetic material of plant origin of actual or potential value for food and agriculture’ with the term ‘genetic material’ defined to mean ‘any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity’.⁷² Although the Plant Treaty is really confined to in situ and ex situ materials included in the Multilateral System that are the list of food crops and forages set out in Annex 1 to the Plant Treaty.⁷³ This is further limited as these materials must also be ‘under the management and control of the Contracting Parties and in the public domain’.⁷⁴ The ex situ collections of the international agricultural research centers and contributions by other resource holders also form part of the Multilateral System.⁷⁵ Contracting Parties also agreed to ‘take appropriate measures to encourage natural and legal persons within their jurisdiction who hold plant genetic resources for food and agriculture listed in Annex 1’ to include such materials in the Multilateral System,⁷⁶ subject to possibly excluding these persons from future access to the Multilateral System.⁷⁷

⁶⁸Article 10 (1) of the International Treaty on Plant Genetic Resources for Food and Agriculture (2001) 2400 U.N.T.S. 303 (Plant Treaty).

⁶⁹Article 10 (2) Plant Treaty.

⁷⁰Article 10 (1) of the Plant Treaty.

⁷¹Article 1 (1) of the Plant Treaty.

⁷²Article 2 of the Plant Treaty.

⁷³Article 11 (1) of the Plant Treaty.

⁷⁴Article 11 (2) of the Plant Treaty.

⁷⁵Article 11 (2) of the Plant Treaty.

⁷⁶Article 11 (3) of the Plant Treaty.

⁷⁷Article 11 (4) of the Plant Treaty.

The materials forming the Multilateral System are then accessible to Contracting Parties and others⁷⁸ under a SMTA between the Governing Body and the accessing party.⁷⁹ In effect the Multilateral System *comprises* the materials made available by Contracting Parties under the Plant Treaty,⁸⁰ and any other materials made available by others under the Plant Treaty arrangements,⁸¹ that require a SMTA to be accessed. In situ and ex situ plant genetic resources for food and agriculture will be *put into* the Multilateral System when information about the material placed in the Multilateral System is available so that the Material can be requested and accessed and there is a commitment to make the material available with the SMTA when request, or alternatively, material has been provided to an institution that holds material within the Multilateral System for the Multilateral System.⁸² A further limitation is that the Plant Treaty (and the SMTA) accessible from the Multilateral System applies only to research, breeding and training use and conservation, and expressly excludes ‘chemical, pharmaceutical and/or other non-food/feed industrial uses’.⁸³

At the same time as establishing a Multilateral System the Plant Treaty also established a ‘funding strategy’⁸⁴ to ‘to enhance the availability, transparency, efficiency and effectiveness of the provision of financial resources to implement activities under this [Plant Treaty]’.⁸⁵ Under the arrangements financial resources are to be directed to implementing the Plant Treaty and the conservation and sustainable use of plant genetic resources for food and agriculture.⁸⁶ In particular:

The Contracting Parties agree that priority will be given to the implementation of agreed plans and programmes for farmers in developing countries, especially in least developed countries, and in countries with economies in transition, who conserve and sustainably utilize plant genetic resources for food and agriculture.⁸⁷

Perhaps significantly, the Plant Treaty also provides that the financial resources under the ‘funding strategy’ be the ‘necessary and appropriate measures ... to ensure due priority and attention to the effective allocation of predictable and agreed resources for the implementation of plans and programmes under this [Plant Treaty]’.⁸⁸

The Plant Treaty imposes a number of mandatory conditions in the SMTA that was to be ‘adopted’ by the Plant Treaty’s Governing Body.⁸⁹ The key limitations

⁷⁸Article 12 (2) of the Plant Treaty.

⁷⁹Article 12 (4) of the Plant Treaty.

⁸⁰Article 12 (3)(g) of the Plant Treaty.

⁸¹Articles 11 (1)–(5) of the Plant Treaty.

⁸²See IT/GB-4/11/Inf.8, [30]–[35]; IT/GB-4/11/Inf.7, [15] and Appendix 5.

⁸³Article 12 (3)(a) of the Plant Treaty.

⁸⁴Article 18 (1) of the Plant Treaty.

⁸⁵Article 18 (2) of the Plant Treaty.

⁸⁶Article 18 (4) of the Plant Treaty.

⁸⁷Article 18 (5) of the Plant Treaty.

⁸⁸Article 18 (4)(a) of the Plant Treaty.

⁸⁹Article 12 (4) of the Plant Treaty.

and obligations imposed by the Plant Treaty are that the SMTA apply only to research, breeding and training use and conservation (excluding ‘chemical, pharmaceutical and/or other non-food/feed industrial uses’⁹⁰ and some ‘emergency disaster situations’),⁹¹ that recipients should not claim intellectual property or other restrictive rights ‘that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, *in the form received* from the Multilateral System’ (emphasis added),⁹² that the materials in the Multilateral System continue to be made available to others (non exclusivity),⁹³ and that there be benefit-sharing.⁹⁴

The restrictions on claiming intellectual property are significant. The Plant Treaty provides:

Recipients shall not claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, *in the form received* from the Multilateral System (emphasis added).⁹⁵

The meaning of this provision and its effect remain uncertain, particularly the meaning of the terms ‘in the form received from the Multilateral System’. This ambiguity was reflected in the draft text,⁹⁶ and remained despite the reservations expressed during negotiations.⁹⁷ The key intellectual property issue that remains unresolved is to what extent intellectual property may be claimed for plant genetic resources that have been originally accessed from the Multilateral System and the quantum of change necessary for materials accessed from the Multilateral System to cease to be ‘in the form received from the Multilateral System’. This will be influenced by the interaction between the Plant Treaty and the CBD, the likely application to the Plant Treaty of minimum international intellectual property standards (such as the World Trade Organization’s agreement on Trade-related Aspects of Intellectual Property, and the domestic intellectual property laws affecting facilitated access to the Multilateral System). Where intellectual property has been claimed and this does not limit facilitated access then that material can form part of the Multilateral System available to others.⁹⁸ Presumably where intellectual property is claimed over materials then this material ceases to be a part of the ‘public domain’ and can no longer form part of the Multilateral System. How this is going to be managed will be interesting as some patents effectively claim particular parental crosses that have the effect of appropriating those parental

⁹⁰Article 12 (3)(a) of the Plant Treaty.

⁹¹Article 12 (6) of the Plant Treaty.

⁹²Article 12 (3)(d) of the Plant Treaty.

⁹³Article 12 (3)(g) of the Plant Treaty.

⁹⁴Article 12 (d)(ii) of the Plant Treaty.

⁹⁵Article 12 (3)(d) of the Plant Treaty.

⁹⁶CGRFA-Ex6/01/REP, Appendix B(B9).

⁹⁷CL 121/5-Sup.1, p 7.

⁹⁸IT/GB-4/11/Inf.8, p 33.

varieties from being crossed.⁹⁹ It may also be that intellectual property can be claimed over any materials received from the Multilateral System so long as that intellectual property does not limit facilitated access to the Multilateral System.¹⁰⁰ In other words, the intellectual property restrictions apply to the facilitated access and not to the materials per se.¹⁰¹

The SMTA is a contractual ‘agreement’ between ‘a Provider’ of ‘Material’ ([t]he plant genetic resources for food and agriculture specified in Annex 1 [of the SMTA]) being ‘a list of the Material provided under this [SMTA]’¹⁰² and ‘a Recipient’ of that Material.¹⁰³ In addition the SMTA provides for a ‘Third Party Beneficiary’ role, where the FAO acts on behalf of the Governing Body and may initiate dispute settlement.¹⁰⁴ The term ‘plant genetic resources for food and agriculture’ is defined to mean ‘any genetic material of plant origin of actual or potential value for food and agriculture’ where ‘genetic material’ means ‘any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity’.¹⁰⁵ The intellectual property related rights and obligations include:

- (a) The Provider undertakes to make ‘available’ the ‘passport data’ and ‘any other associated available non-confidential descriptive information’ associated with the Material.¹⁰⁶
- (b) The Provider undertakes that the access to the Material that is protected ‘by intellectual and other property rights’ will be ‘consistent with relevant international agreements’ and ‘relevant national laws’.¹⁰⁷
- (c) The Recipient undertakes not to claim ‘any intellectual property or other rights’ that might limit the Material ‘in the form received’, including ‘its genetic parts or components’.¹⁰⁸
- (d) The Recipient undertakes to transfer any benefit-sharing obligations together with any assignment of intellectual property over ‘any Products developed from the Material or its components, obtained from the Multilateral System’.¹⁰⁹

The following terms are defined limiting the scope of the SMTA:

- (a) ‘Product’ means ‘plant genetic resources for food and agriculture that incorporate the Material or any of its genetic parts or components that are ready for commercialization, excluding commodities and other products used for food, feed and processing’.¹¹⁰

⁹⁹Lawson (2004a).

¹⁰⁰Moore and Tymowski (2005, p. 92), Lawson (2004b, p 117).

¹⁰¹Moore and Tymowski (2005, p. 92).

¹⁰²IT/GB-1/06/Report, Appendix G (cl 2 and Annex 1).

¹⁰³Cl 1 of SMTA.

¹⁰⁴See IT/GB-3/09/14, [4]-[6].

¹⁰⁵IT/GB-1/06/Report, Appendix G (cl 2) (SMTA).

¹⁰⁶Clause 5b of SMTA.

¹⁰⁷Clause 5d of SMTA.

¹⁰⁸Clause 6.2 of SMTA.

¹⁰⁹Clause 6.10 of SMTA.

¹¹⁰Clause 2 of SMTA.

- (b) '[C]ommercialize' means 'to sell a Product or Products for monetary consideration on the open market ... Commercialization shall not include any form of transfer of plant genetic resources for food and agriculture under Development'.¹¹¹
- (c) 'Sales' means 'the gross income resulting from the commercialization of a Product or Products, by the Recipient, its affiliates, contractors, licensees and lessees'.¹¹²

The terms of the SMTA appears to envisage plant genetic resources for food and agriculture in three forms:

- (a) Plant genetic resources for food and agriculture 'in the form received' from the Multilateral System—meaning the Material, and including 'all available passport data and, subject to applicable law, any other associated, available, non-confidential descriptive information'.¹¹³
- (b) Plant genetic resources for food and agriculture 'under Development'—meaning 'material derived from the Material, and hence distinct from it, that is not yet ready for commercialization and which the developer intends to further develop or to transfer to another person or entity for further development. The period of development for the plant genetic resources for food and agriculture under Development shall be deemed to have ceased when those resources are commercialized as a Product'.¹¹⁴
- (c) 'Product' from the plant genetic resources for food and agriculture received from the Multilateral System—meaning 'plant genetic resources for food and agriculture that incorporate the Material or any of its genetic parts or components that are ready for commercialization, excluding commodities and other products used for food, feed and processing'.¹¹⁵

Provision is made to ensure that any transfers of Material supplied under the SMTA are undertaken according to the same rights and obligations, albeit in a separate agreement.¹¹⁶ Where the Material supplied under a SMTA is 'under Development', special provision is made to ensure that it continues to be subject to a SMTA¹¹⁷ with the prospect of additional provisions applying, including 'the payment of [additional] monetary consideration'.¹¹⁸ This additional provision might be expected to include limiting the further transfers of that Material to a third party and other conditions that might remain confidential.¹¹⁹ There remain some uncertainties about how these third parties are bound by the alternative payment arrangements for materials that are commercialised.

The monetary benefit-sharing required by the SMTA depends on whether the Recipient restricts the further 'research and breeding' uses of the Product being commercialized:

¹¹¹Clause 2 of SMTA.

¹¹²Clause 2 of SMTA.

¹¹³Clause 3 and Annex 1 of SMTA.

¹¹⁴Clause 2 of SMTA.

¹¹⁵Clause 2 of SMTA.

¹¹⁶Clause 6.4 of SMTA.

¹¹⁷Clause 6.5 of SMTA.

¹¹⁸Clause 6.6 of SMTA.

¹¹⁹See IT/GB-4/11/Inf.8, [19] and Appendix 2, [1]-[9].

- (a) Where the Product that incorporates Material is available *with* restrictions¹²⁰ —‘the Recipient shall pay a fixed percentage of the Sales of the commercialized Product into the mechanism established by the Governing Body’ being ‘one point-one percent (1.1%) of the Sales of the Product or Products less thirty percent (30%)’¹²¹ or an alternative discount rate ‘based on the Sales of any Products and of the sales of any other products that are plant genetic resources for food and agriculture belonging to the same crop’ of ‘zero point five percent (0.5%) of the Sales of any Products and of the sales of any other products that are plant genetic resources for food and agriculture belonging to the same crop’.¹²²
- (b) Where the Product that incorporates Material is available *without* restrictions¹²³ —‘the Recipient is encouraged to make voluntary payments into the mechanism established by the Governing Body’.¹²⁴ This alternative will not apply where the alternative discount rate has been chosen.¹²⁵

Where a Product comprises Materials from two or more SMTAs only one payment per Product is required.¹²⁶

4 World Health Organization International Pandemic Influenza Preparedness Framework

The PIP Framework¹²⁷ provides for Member States to provide samples (‘PIP biological materials’)¹²⁸ from ‘all cases of H5N1 and other influenza viruses with human pandemic potential’ to the WHO Collaborating Centres or the WHO H5 Reference Laboratories¹²⁹ with the option to also provide samples to others.¹³⁰ That sample can then be transferred to others subject to the standard material transfer agreement (SMTA)¹³¹ with sequence data and analyses being shared with the WHO Global Influenza Surveillance and Response System (GISRS)¹³² and the sample being tracked into, within and out of the WHO GISRS.¹³³ The Standard Material Transfer Agreement 1 (SMTA 1) being used for samples transferred *within* the

¹²⁰Clause 6.1 of SMTA.

¹²¹Clause 6.7 and Annex 2 of SMTA.

¹²²Clause 6.11 and Annexes 3 and 4 of SMTA.

¹²³Clause 6.8 of SMTA.

¹²⁴Clause 6.8 of SMTA.

¹²⁵Clause 6.11 and Annexes 3 and 4 of SMTA.

¹²⁶[T/GB-4/11/Inf.7, [22]-[24].

¹²⁷A64/8, Attachment 2 (PIP Framework).

¹²⁸Article 4 (4.1) of the PIP Framework.

¹²⁹Article 5 (5.1.1) of the PIP Framework.

¹³⁰Article 5 (5.1.4) of the PIP Framework.

¹³¹Article 5 (5.1.2) of the PIP Framework.

¹³²Article 5 (5.2.1) of the PIP Framework.

¹³³Article 5 (5.3.1) of the PIP Framework.

WHO GISRS¹³⁴ and Standard Material Transfer Agreement 2 being used for samples transferred *outside* the WHO GISRS.¹³⁵ The PIP Framework then details the benefits according to the ‘PIP Benefit-sharing System’ that operates to:

- (i) provide pandemic surveillance and risk assessment and early warning information and services to all countries.
- (ii) provide benefits, including, where appropriate, capacity building in pandemic surveillance, risk assessment, and early warning information and services to Member States.
- (iii) prioritize important benefits, such as and including antiviral medicines and vaccines against H5N1 and other influenza viruses with human pandemic potential as high priorities, to developing countries, particularly affected countries, according to public health risk and needs and particularly where those countries do not have their own capacity to produce or access influenza vaccines, diagnostics and pharmaceuticals. Prioritization will be based on assessment of public health risk and need, by experts with transparent guidelines.
- (iv) build capacity in receiving countries over time for and through technical assistance and transfer of technology, skills and know-how and expanded influenza vaccine production, tailored to their public health risk and needs.¹³⁶

The other elements of benefits are: coordinating preparedness and response,^{137,138} risk assessment and response,¹³⁹ candidate vaccines,¹⁴⁰ diagnostic reagents and test kits,¹⁴¹ reference reagents,¹⁴² laboratory and surveillance capacity building,¹⁴³ regulatory capacity building,¹⁴⁴ antiviral stockpiles,¹⁴⁵ vaccine stockpiles,¹⁴⁶ inter-pandemic period vaccines,¹⁴⁷ tiered pricing,¹⁴⁸ technology transfer,¹⁴⁹ and finance to assist preparedness and response.¹⁵⁰ While these appear to be considerable, the problem is that the capacity to make vaccines is not with either the WHO or Member States but rather with manufacturers within Member States. As such, the benefits from the PIP Benefit-sharing System merely ‘calls upon’/‘urges’

¹³⁴ Article 5 (5.4.1) of the PIP Framework.

¹³⁵ Article 5 (5.4.2) of the PIP Framework.

¹³⁶ Article 6 (6.1.2) of the PIP Framework. Later renumbered as 6.0.2 of the PIP Framework.

¹³⁷ Article 6 (6.1*bis*) of the PIP Framework.

¹³⁸ Article 6 (6.2) of the PIP Framework.

¹³⁹ Later renumbered as 6.1 of the PIP Framework.

¹⁴⁰ Article 6 (6.3) of the PIP Framework.

¹⁴¹ Article 6 (6.4) of the PIP Framework.

¹⁴² Article 6 (6.5) of the PIP Framework.

¹⁴³ Article 6 (6.6) of the PIP Framework.

¹⁴⁴ Article 6 (6.7) of the PIP Framework.

¹⁴⁵ Article 6 (6.8) of the PIP Framework.

¹⁴⁶ Article 6 (6.9) of the PIP Framework.

¹⁴⁷ Article 6 (6.10) of the PIP Framework.

¹⁴⁸ Article 6 (6.12) of the PIP Framework.

¹⁴⁹ Article 6 (6.13) of the PIP Framework.

¹⁵⁰ Article 6 (6.14) of the PIP Framework.

manufacturers to contribute and share, and relies on manufacturers setting aside a portion of their products,¹⁵¹ charging lower prices,¹⁵² transferring technology,¹⁵³ sharing intellectual property, know-how and products,¹⁵⁴ and so on.

The only actual benefit sharing commitment appears to be a requirement that influenza vaccine, diagnostic and pharmaceutical manufacturers using the GISRS are required to make ‘an annual partnership contribution to [the] WHO for improving global [PIP] and response’.¹⁵⁵ The contribution by each manufacturer is determined by the Director-General (in consultation with an ‘Advisory Group’ comprising Member States)¹⁵⁶ and the sum of contribution is intended to be 50% of the running costs of the WHO GISRS.¹⁵⁷

The SMTA 1¹⁵⁸ for samples transferred *within* the WHO GISRS requires the provider and recipient to ‘consider support to the strengthening of the laboratory and surveillance capacity of the networks of developing countries’, retain the same SMTA 1 terms and condition for any onward transfer or use of the sample *within* the WHO GISRS or the different SMTA 2 terms and condition for transfer or use of the sample *outside* the WHO GISRS.¹⁵⁹ The SMTA 1 also provides that the recipient should actively seek the participation of scientists and especially those from developing countries,¹⁶⁰ and appropriately acknowledge sources and collaboration in publications and presentations.¹⁶¹ Importantly, the SMTA 1 applies automatically to WHO GISRS samples transferred,¹⁶² neither the provider nor recipient ‘should seek to obtain any intellectual property’, and both must respect and intellectual property in any technology used to generate or modify the sample.¹⁶³ Further, dispute resolution is confined to seeking negotiation with the other party, and failing this, asking the Director-General (who can seek advice from the ‘Advisory Group’) to make recommendations to the parties that are then reported to the World Health Assembly.¹⁶⁴

The SMTA 2¹⁶⁵ for samples transferred *outside* the WHO GISRS is a more complex agreement than SMTA 1 and requires the ‘recipient’ and provider to

¹⁵¹ Article 6 (6.11) of the PIP Framework.

¹⁵² Article 6 (6.12) of the PIP Framework.

¹⁵³ Article 6 (6.13) of the PIP Framework.

¹⁵⁴ Article 6 (6.13.4) of the PIP Framework.

¹⁵⁵ Article 6 (6.14.3) of the PIP Framework.

¹⁵⁶ Article 7 (7.2) of the PIP Framework.

¹⁵⁷ Article 6 (6.14.3) of the PIP Framework.

¹⁵⁸ A64/8, Attachment 2 (Annex 1).

¹⁵⁹ Article 4 (4.2) of the PIP Framework.

¹⁶⁰ Article 5 (5.2) of the PIP Framework.

¹⁶¹ Article 5 (5.3) of the PIP Framework.

¹⁶² Articles 10 and 11 of the PIP Framework.

¹⁶³ Article 6 (6.1 and 6.3) of the PIP Framework.

¹⁶⁴ Article 7 (7.1 and 7.2) of the PIP Framework.

¹⁶⁵ A64/8, Attachment 2 (Annex 2).

negotiate various obligations according to their needs and circumstances.¹⁶⁶ For the recipient, however, further obligations are mandatory according to a timetable determined by the WHO in consultation with the ‘Advisory Group’.¹⁶⁷ Recipients of samples that are ‘manufacturers of vaccines and/or antivirals’ *must* ‘commit to at least two of the following options’:

- A1. Donate at least [5-20 per cent] of real time pandemic vaccine production to WHO.
- A2. Reserve at least [5-20 per cent] of real time pandemic vaccine production at affordable prices to WHO.
- A3. Donate at least [a negotiated amount] treatment courses of needed antiviral medicine for the pandemic to WHO.
- A4. Reserve at least [a negotiated amount] treatment courses of needed antiviral medicine for the pandemic at affordable prices.
- A5. Grant to manufacturers in developing countries licenses on mutually agreed terms that should be fair and reasonable including in respect of affordable royalties, taking into account development levels in the country of end use of the products, on technology, know-how, products and processes for which it holds [intellectual property] for the production of (i) influenza vaccines, (ii) adjuvants, (iii) antivirals and/or (iv) diagnostics.
- A6. Grant royalty free licenses to manufacturers in developing countries or grant to WHO royalty-free, non-exclusive licenses on [intellectual property], which can be sublicensed, for the production of pandemic influenza vaccines, adjuvants, antivirals products and diagnostics needed in a pandemic. WHO may sublicense these licenses to manufacturers in developing countries on appropriate terms and conditions and in accordance with sound public health principles.¹⁶⁸

Recipients of samples that are ‘[m]anufacturers of products relevant to [PIP] and response, that are not manufacturing vaccines or antivirals’ *must* ‘commit to at least one of the following options’:

- A5. Grant to manufacturers in developing countries licenses on mutually agreed terms that should be fair and reasonable including in respect of affordable royalties, taking into account development levels in the country of end use of the products, on technology, know-how, products and processes for which it holds [intellectual property] for the production of (i) influenza vaccines, (ii) adjuvants, (iii) antivirals and/or (iv) diagnostics.
- A6. Grant royalty free licenses to manufacturers in developing countries or grant to WHO royalty-free, non-exclusive licenses on [intellectual property], which can be sublicensed, for the production of pandemic influenza vaccines, adjuvants, antivirals products and diagnostics needed in a pandemic. WHO may sublicense these licenses to manufacturers in developing countries on appropriate terms and conditions and in accordance with sound public health principles.
- B1. Donate to WHO at least [a negotiated amount] diagnostic kits needed for pandemics.
- B2. Reserve for WHO at least [a negotiated amount] diagnostic kits needed for pandemics, at affordable prices.
- B3. Support, in coordination with WHO, the strengthening of influenza specific laboratory and surveillance capacity in developing countries.
- B4. Support, in coordination with WHO, transfer of technology, know-how and/or processes for [PIP] and response in developing countries.¹⁶⁹

¹⁶⁶Articles 3 and 4 of the PIP Framework.

¹⁶⁷Article 4 (4.1.1) of the PIP Framework.

¹⁶⁸Article 4 (4.1.1A) of the PIP Framework.

¹⁶⁹Article 4 (4.1.1A and 4.1.1B) of the PIP Framework.

Recipients are also obliged to consider donations of vaccines, pre-pandemic vaccines, antivirals, medical devices and diagnostic kits, affordable pricing, the transfer of technology and processes, the granting of sublicenses to the WHO and laboratory and surveillance capacity building.¹⁷⁰

The other terms and conditions of SMTA 2 are that subsequent recipients also have negotiated a SMTA 2 with the WHO,¹⁷¹ appropriately acknowledge sources and collaboration in publications and presentations,¹⁷² and that disputes be resolved by the parties, and failing this, by 'binding arbitration on conditions that are mutually agreed by the parties'.¹⁷³ Noticeably there are no limits on claiming intellectual property. The remaining provisions are left to the parties to negotiate: liability and indemnity, privileges and immunity, warranties, duration, termination, force majeure, governing law, and an 'Annex' that is '[t]o be agreed by the parties'.¹⁷⁴

5 Access and Benefit Sharing Models

As a generalisation, market based economies have addressed biological diversity conservation as a market failure¹⁷⁵ and sought to deal with the market failure, at least in part, by establishing a property regime controlling access to the biological diversity and then imposing obligations on the subsequent users of any accessed biological resources to share the benefits.¹⁷⁶ This approach reflects the theory that the benefits of biological diversity conservation accrue to society and cannot be sufficiently captured by those likely to undertake the conservation—the marginal private returns from conservation activities do not correspond with their marginal social returns favouring biological diversity destruction and decline.¹⁷⁷ Establishing exclusive property rights over the biological resources appropriates part of the social value for individual economic activities thus compensating those likely to undertake the conservation activity, and providing an incentive to undertake future conservation activities.¹⁷⁸ Essentially:

¹⁷⁰Article 4 (4.1.1C) of the PIP Framework.

¹⁷¹Article 4 (4.4) of the PIP Framework.

¹⁷²Article 4 (4.3) of the PIP Framework.

¹⁷³Article 5 of the PIP Framework.

¹⁷⁴Articles 6-15 of the PIP Framework.

¹⁷⁵Secretariat of the Convention on Biological Diversity 2006, pp 13-19 and 39; OECD 1999.

¹⁷⁶OECD (2004), p 15-47; UNEP/CBD/WG-ABS/3/INF/1/Add.1; Productivity Commission (2004), p 189-197; Productivity Commission (2001), pp. 5-7.

¹⁷⁷For an overview of the issues see, egs., Swanson and Goeschl (2000, pp. 76-77), Janssen (1999, pp. 315-318). See also Rausser and Small (2000), Stone (1995), OECD (1994).

¹⁷⁸For an overview of the issues see Swanson (1994), Stone (1995). See also Productivity Commission (2001).

Exclusive property rights will induce economic agents, who are interested in the utilisation of genetic resources, to pay for the access to genetic resources. This entrance fee will compensate those agents who bear the cost of conserving and providing genetic resources, and hence create real economic incentives for engaging in protection and provision of diverse genetic resources.¹⁷⁹

The objective of controlling access and benefit sharing is therefore to establish a market for biological diversity conservation that internalises into a market transaction all the costs of the impacts of biological diversity destruction and decline.¹⁸⁰

The CBD (and Nagoya Protocol), Plant Treaty and PIP Framework appear to follow this contract model with an agreement between the resource holder and the entity accessing the materials (bio-pro prospector). The terms and conditions of the contract address the prior informed consent and the mutually agreed terms including the benefits to be shared. Under the CBD (and Nagoya Protocol) this is a unique contract between the resource holder and bio-pro prospector and the benefits are according to the negotiated agreement between the parties. Under the Plant Treaty and PIP Framework this is a standard form contract without the need for further negotiation and the benefit sharing is fixed. Table 1 provides a summary of the key elements of the relationships under the CBD (and Nagoya Protocol), Plant Treaty and PIP Framework. The unique contracts and standard contracts set a price for access that is either determined between the parties (the CBD and Nagoya Protocol approach) or set as a standard (the Plant Treaty and PIP Framework approach).

In terms of conservation, the contract model under the CBD (and Nagoya Protocol), Plant Treaty and PIP Framework theoretically supposes that any commercial or market value from the accessed resources will be reasonable, adequate, and sufficient as an incentive for biological diversity conservation.¹⁸¹ Figure 2 illustrates this contract model. Essentially, the biodiversity conservers as the holders of resources come together with the owners (or future owners) of technology and intellectual property protected creations and inventions accessing those resources to deliver a commercial product (or process). This produces benefits in the form of monetary benefits (such as cash) and non-monetary benefits (such as know-how, technology to transfer, training, capacity building, and so on) that can then be shared. These benefits are essentially private benefits (such as trade, investment, intellectual property and access to technologies) and public benefits (such as ecosystem services, and economic, social and cultural development, and so on). According to this account the benefits accruing to the conservers needs to be reasonable, adequate, and sufficient as an incentive for biological diversity conservation, otherwise biological diversity destruction and decline can be expected. The question is whether the shared benefits are reasonable, adequate, and sufficient?

¹⁷⁹Janssen (1999, p. 316).

¹⁸⁰See generally OECD (2004, pp 24–29), Department of the Environment and Heritage (2002, p 2); see also UNEP/CBD/COP/7/21, pp. 286–296; UNEP/CBD/COP/6/20, pp 179–185; OECD (2002, p. 23).

¹⁸¹See, eg., Oberthür and Rosendal (2016a, b, p. 1).

Table 1 A summary of the key elements of the relationships between the CBD (and Nagoya Protocol), plant treaty and PIP framework

	CBD (and Nagoya protocol)	Plant treaty	PIP framework
Materials	Genetic resources within jurisdiction	Materials in the multilateral system	Human pandemic influenza viruses
ABS agreement	Voluntary contract with prior informed consent and mutually agreed terms	SMTA	SMTA 1 and SMTA 2
ABS benefits	Whatever parties agree	Fixed price as proportion of commercialized product	Two from a list of options covering products and licenses AND partnership contribution

This table shows the elements of ‘materials’, ‘ABS agreement’ and ‘ABS benefits’ across the CBD (and Nagoya Protocol), plant treaty and PIP framework

Perhaps surprisingly, this does not appear to be a relevant question in assessing the efficiency and effectiveness of these schemes. The following analysis of the CBD, Plant Treaty and PIP Framework illustrates this contention.

Starting with the CBD there seems little doubt now that benefit sharing under the CBD (and Nagoya Protocol) are not delivering the kinds of benefits that might promote biodiversity conservation. The major threats to biodiversity are loss of habitat and invasive species that are managed primarily by establishing protected areas and limiting (or managing) invasive species (such as by building fences, eradicating weeds, controlling ferals, and so on). To be effective, the major benefits flowing from access and benefit-sharing contracts need to be private returns that are, in large part, money to pay for fences, eradicating weeds, controlling feral animals, establishing protected areas, and so on. Other non-monetary benefits, while undoubtedly significant, are unlikely to promote biodiversity conservation as effectively as they are more in the nature of social benefits. So, for example, the much lauded Queensland Biodiscovery Collaboration Partnership between Griffith University and AstraZeneca for Natural Product Discovery starting in 1993 and formally ending in 2007,¹⁸² and under Australia’s much lauded model access and benefit sharing regulation,¹⁸³ demonstrate that there are valuable and useful benefits flowing from these arrangements, although they are *just not* monetary benefits.¹⁸⁴ Thus the conclusions from a report about the Queensland Biodiscovery Collaboration Partnership about the reasonable, adequate, and sufficient benefits illustrates this contention:

¹⁸²See Laird et al. (2008, pp. 19–27).

¹⁸³Prip et al. (2014).

¹⁸⁴See Lawson (2011, pp. 143–145).

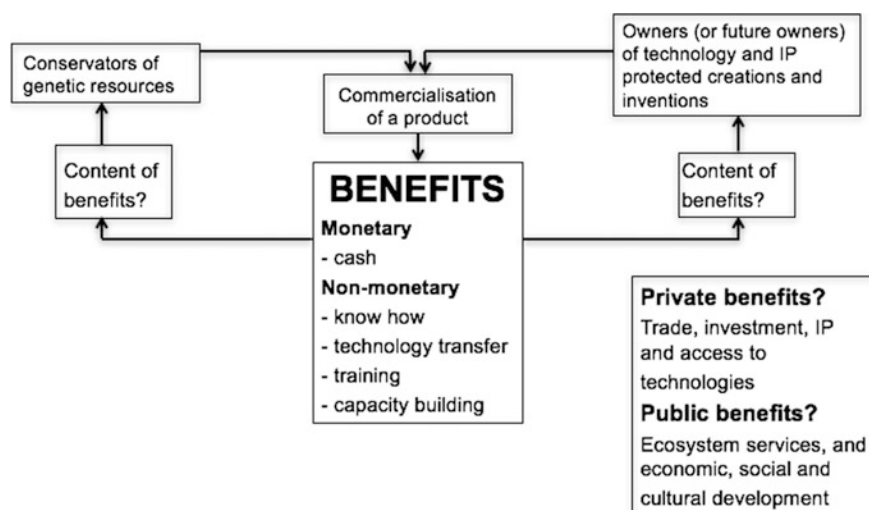


Fig. 2 The contract model of access and benefit sharing. The biodiversity conservers as the holders of resources come together with the owners (or future owners) of technology and intellectual property to deliver a commercial product. This commercialization delivers monetary and non-monetary benefits that can then be shared. When the benefits accruing to the conservers are reasonable, adequate, and sufficient then there is an incentive for biological diversity conservation

Monetary and non-monetary benefits in this case fall within the standard package for ‘best practice’, but it is in the accumulated and multi-faceted nature of the benefits that the real gains for the State and country are to be found. These include the collections and compound libraries, the advanced natural product discovery unit, and the enormous gains in taxonomic and ecological understanding that resulted from the collections. *This case demonstrates that these benefits can be of equal, or greater, importance to the potential monetary benefits from royalties should a product be commercialized* (emphasis added).¹⁸⁵

As set out above, ‘collections and compound libraries, the advanced natural product discovery unit, and the enormous gains in taxonomic and ecological understanding that resulted from the collections’, and the like are all welcome benefits. Whether these are reasonable, adequate, and sufficient as an incentive to biodiversity conservation seems doubtful. Put simple, someone has to pay for the fences and weed control, and the enormous gains in taxonomic and ecological understanding won’t pay for these. As the majority of biodiversity that requires conservation is in the poor, developing parts of the world, the need for benefits that are relevant for these parts of the world seem important (although this is a complex issue too).¹⁸⁶ With great respect, while taxonomic and ecological understandings are important, it is not clear that these are the kinds of incentives that are going to appeal to poor folks

¹⁸⁵Laird et al. (2008, p. 35).

¹⁸⁶See, eg., Adams et al. (2004).

choosing between biodiversity conservation or some other likely commercial uses of those resources (like clearing rainforests for oil palm plantations).

Turning now to the Plant Treaty. The central question under the Plant Treaty is whether the marginal private returns to the Provider of the plant materials from conservation and other sustainable activities (such as the running costs of maintaining a culture collection, planting low yield crops, and so on) can at least correspond with the marginal social returns (such as the benefit of conserved plant materials for food security and adaptation to an unpredictable climate).¹⁸⁷ If the private returns are less than the social returns, then a decline in conservation and other activity might be expected unless some other means is found to match the social and private returns (such as a grant to the Provider to cover the difference between the private and social returns). As the SMTA is currently drafted the social returns are well represented: the exchange of information, access to, and transfer of technology, capacity-building and other non-monetary benefits from commercialization¹⁸⁸ and the spill-overs from an exchange mechanism.¹⁸⁹ While some of these may also have private values, such as access to, and transfer of technology and capacity-building, the sharing of the monetary benefits arising from commercialization is likely to be the major form of private returns with positive conservation outcomes and they are much less certain.¹⁹⁰

Further, these monetary benefits are essential to maintaining the existing valuable *ex situ* and *in situ* germplasm collections that require continual storage, regeneration and testing (the characterization and evaluation data and information) to reveal or increase their potential values.¹⁹¹ Importantly, the monetary benefits arising from commercialization are likely to be vital in establishing and delivering on conservation even if that is to be achieved through, for example, institutional strengthening, research, training, communication and networking, community-based conservation programs, non-market and market incentives to farmers, and so on.¹⁹² The apparent inadequacy of monetary benefits is readily apparent in the moves to adopt some form of contribution payment by those using conserved biodiversity under the Plant Treaty.¹⁹³

If the SMTA is successful in delivering adequate monetary value, the question remains whether the Plant Treaty is configured in a way that will deliver that value to the conservers. The benefit-sharing arrangements presently require amounts paid under an SMTA to be paid to a financial mechanism established by the Governing Body¹⁹⁴ that the Treaty requires 'for receiving and utilizing financial resources that

¹⁸⁷See Swanson et al. (1994).

¹⁸⁸Article 13.2 of the Plant Treaty and clauses 6.7, 6.8 and 6.9.

¹⁸⁹See, eg., Alston et al. (2000).

¹⁹⁰Clauses 6.7 and 6.8. See, eg., Anderson (1998) (*ex situ*), Brush et al. (1992) (*in situ*).

¹⁹¹See, eg., Day Rubenstein et al. (2006) (*ex situ*), Fowler and Hodgkin (2004) (*in situ*).

¹⁹²See, eg., Brush (1994).

¹⁹³See, eg., IT/GB-6/15/Report, [28] and Appendix A.1, [3].

¹⁹⁴Clauses 6.7 and 6.8 of SMTA, and Annex 2 and Arts 13.2d and 18.4e of the Plant Treaty.

will accrue to it for purposes of implementing this Treaty'.¹⁹⁵ Other amounts may also be voluntarily paid to the financial mechanism established by the Governing Body.¹⁹⁶ These 'financial resources' are then to be expended according to a 'funding strategy'.¹⁹⁷ that is 'to enhance the availability, transparency, efficiency and effectiveness of the provision of financial resources to implement activities under this Treaty'.¹⁹⁸ The Governing Body is responsible for expending these funds under its control to implement the Treaty.¹⁹⁹ Perhaps in recognition that the benefit-sharing arrangements may not be adequate, the Treaty also provides for Contracting Parties to 'provide financial resources for national activities for the conservation and sustainable use of plant genetic resources for food and agriculture in accordance with its national capabilities and financial resources'²⁰⁰ and various other voluntary contributions.²⁰¹

A significant limitation of the Governing Body in implementing its 'funding strategy' is that:

- (a) 'benefits arising from the use of [plant genetic resources for food and agriculture] that are shared under the Multilateral System should flow primarily, directly and indirectly, to farmers in all countries, especially in developing countries, and countries with economies in transition, who conserve and sustainably utilize [plant genetic resources for food and agriculture]'.²⁰²
- (b) 'specific assistance ... for the conservation of plant genetic resources for food and agriculture in developing countries, and countries with economies in transition whose contribution to the diversity of plant genetic resources for food and agriculture in the Multilateral System is significant and/or which have special needs'.²⁰³
- (c) 'the ability to fully implement the *Global Plan of Action*, in particular of developing countries and countries with economies in transition, will depend largely upon the effective implementation of [benefit-sharing the Multilateral System] and of the funding strategy'.²⁰⁴

The challenge for the Governing Body in developing and implementing a 'funding strategy' has been to ensure that the private values necessary to promote the conservation and sustainable use of plant genetic resources for food and agriculture are addressed. Significantly these might be expected to include activities addressed in the *Global Plan of Action* that specifically deal with 'priority' conservation activities: in situ conservation and development and ex situ conservation.²⁰⁵

¹⁹⁵ Article 19.3f of the Plant Treaty.

¹⁹⁶ Articles 13.6 and 18.4 of the Plant Treaty.

¹⁹⁷ Article 18.1 of the Plant Treaty.

¹⁹⁸ Article 18.2 of the Plant Treaty. See Visser and Louwaars (2006).

¹⁹⁹ Article 18.1 of the Plant Treaty.

²⁰⁰ Article 18.4d of the Plant Treaty.

²⁰¹ Articles 13.6, 18.4c and f of the Plant Treaty.

²⁰² Article 13.3 of the Plant Treaty.

²⁰³ Article 13.4 of the Plant Treaty.

²⁰⁴ Article 13.5 of the Plant Treaty.

²⁰⁵ Fourth International Technical Conference (1996, pp. 17–26 (in situ) and 27–35 (ex situ)).

The final question is whether intellectual property as a central element of the benefit-sharing arrangements can deliver adequate monetary benefits. The SMTA attempts to take advantage of intellectual property by seeking to appropriate some of the benefits generated from commercializing a Product that incorporates some of the Material accessed from the Multilateral System²⁰⁶ meanwhile limiting its potential adverse effects on ‘facilitated access’ to Material in the Multilateral System.²⁰⁷ This creates a quandary—too much intellectual property may limit the usefulness of the Multilateral System and too little intellectual property may deliver inadequate benefits. Whether adequate private values are being delivered—whether commercialization (including the intellectual property contribution) is actually delivering benefits and that they are being shared in a way that promotes conservation and sustainable use is presently unclear and needs to be monitored carefully by the Governing Body.

The failure and lack of relevance of the conservation imperative, and the contract model of addressing that market failure, is apparent from some of the commentators. For example, some commentators addressing the Plant Treaty noted:

Most people would agree that the major benefit expected from the Treaty is not the money that will come back to the [Multilateral System] as a result of the application of the benefit sharing provisions, but the access to as wide a range of [plant genetic resources for food and agriculture] as possible for breeding and research and conservation-related activities. Through the system of facilitated access, the conservers (providers of material) are, for most of the time, also users (recipients) of materials out of the common pool of [plant genetic resources for food and agriculture]. They benefit from the facilitated access at multiple entry levels. *Other non-monetary benefits associated with the Treaty may also eventually outweigh the importance of mandatory financial benefit sharing, for examples, information sharing, capacity building and technology transfer* (emphasis added).²⁰⁸

Perhaps unsurprisingly the parties to the Plant Treaty are concerned about the quantum of monetary benefits being delivered. They have proposed a review of the benefit sharing arrangements, including the adoption of a subscription model to increase the level of benefits delivered.²⁰⁹ It seems that non-monetary benefits flowing from the SMTA may not be enough!

Finally, under the PIP Framework the only benefit sharing considered by the SMTA 1²¹⁰ for samples transferred *within* the WHO GISRS is that the provider and recipient to ‘consider support to the strengthening of the laboratory and surveillance capacity of the networks of developing countries’.²¹¹ Under the SMTA 2²¹² for samples transferred *outside* the WHO GISRS the ‘recipient’ and provider negotiate

²⁰⁶Clauses 6.7 and 6.8 of the SMTA.

²⁰⁷Clause 6. 2 of SMTA.

²⁰⁸Frison et al. (2010, p. 4).

²⁰⁹See IT/GB-6/15/Report, [28] and Appendix A.1, [3].

²¹⁰A64/8, Attachment 2 (Annex 1).

²¹¹Article 3 of the PIP Framework.

²¹²A64/8, Attachment 2 (Annex 2).

various obligations according to their needs and circumstances²¹³ with the recipient agreeing to a minimum of selected commitments²¹⁴ and contributions.²¹⁵ In addition to these benefits, influenza vaccine, diagnostic and pharmaceutical manufacturers using the GISRS are required to make ‘an annual partnership contribution to [the] WHO for improving global [PIP] and response’.²¹⁶ The most successful and innovative aspect of this benefit sharing scheme compared to the CBD (and Nagoya Protocol) and Plant Treaty arrangements²¹⁷ has been the ‘partnership contribution’. The ‘partnership contribution’ is set at 50% of the costs of running the WHO GISRS (so US\$28 million of the estimated US\$56 million running costs) and apportioned according to a formula according to average annual influenza product sales.²¹⁸ These amounts are then used by the WHO to improve pandemic preparedness and response.²¹⁹ As yet there has not been a test of the preparedness and responses to properly gauge the likely success of this benefit sharing. The quantum of amounts collected has, however, directly addressed the actual costs of developing and running the GISRS that would not otherwise have been possible (including the costs of consumables, packaging, storage, shipments, testing, and so on).

6 Conclusions

The analysis in this chapter demonstrates that the CBD (and Nagoya Protocol), Plant Treaty and PIP Framework have benefit sharing schemes based on contracts, either as unique contracts (the CBD and Nagoya Protocol) or standard form contracts (see Table 1). The essence of the contract model is that access to the genetic resources to exploit those resources to deliver a commercial product can be garnered to deliver benefits that in turn act as an incentive to promote conservation. This conservation includes preserving habitat, ex situ seed collections and maintaining resources, including collecting the pandemic influenza and passing this to one of the WHO centers. The shared benefits, however, need to be reasonable, adequate, and sufficient so that there is an incentive for biological diversity conservation. According to this account, if the shared benefits are not reasonable, adequate, and sufficient, then biodiversity destruction and decline can be expected.

²¹³Articles 3 and 4 of the PIP Framework.

²¹⁴Article 4A and B of the PIP Framework.

²¹⁵Article 4C of the PIP Framework.

²¹⁶A64/8, Art 6 (6.14.3) of the PIP Framework.

²¹⁷Although now under consideration: see, eg., IT/GB-6/15/Report, [28] and Appendix A.1, [3].

²¹⁸See PIP Framework Distribution of Partnership Contribution (2013), pp. 1 and 5.

²¹⁹Article 6 (6.14.4) of the PIP Framework.

The argument in this chapter is that the quantum of benefits under the CBD (and Nagoya Protocol) and Plant Treaty are unlikely to be sufficient. The much lauded Queensland Biodiscovery Collaboration Partnership was shown to deliver predominantly non-monetary benefits such as taxonomic and ecological understandings. While these are useful they are not the kinds of benefits that are likely to be necessary to deliver conservation. Similarly, under the Plant Treaty the same kind of non-monetary benefits appear to be the expected outcomes. And again this is unlikely to pay for the seed banking refrigeration costs, growing out of samples, and so on. In short, these non-monetary benefits are unlikely to be the kinds of benefits that will promote biodiversity conservation because these are benefits no doubt, but not the kinds of benefits that will incentivize conservation.

The PIP Framework provides a tantalizing alternative. While it does include benefit sharing obligations like those in the CBD (and Nagoya Protocol) and Plant Treaty, it is the 'partnership contribution' that is delivering monetary benefits to the WHO that are then available to deliver to improve pandemic preparedness and response. These are tangible benefits that will be readily apparent when a pandemic threatens and they will undoubtedly be a real incentive to preserve through collection pandemic influenzas (and other viruses). That there is real, tangible money involved has very obviously attracted the attention of the parties to the CBD (and Nagoya Protocol) and the Plant Treaty and will likely reignite the interest in dealing with benefit sharing as an incentive to conservation.

In the CBD (and Nagoya Protocol) and Plant Treaty schemes intellectual property is merely a part of the discussions about benefit sharing. As the analysis in this chapter demonstrates, the CBD (and Nagoya Protocol), Plant Treaty and PIP Framework adopt language that maintains the place of intellectual property and does not undermine the possible operation of intellectual property. In short, intellectual property is a part of the negotiated price of access in the CBD (and Nagoya Protocol) and a standard term and condition under the Plant Treaty and PIP Framework standard contracts. As such there has been an ongoing concern that intellectual property may undermine or limit benefit sharing. With the advent of the 'partnership contribution' in the PIP Framework (and likely adoption by the Plant Treaty), however, the focus is not on the kinds of intellectual property claims that might be made in exploiting genetic resources, but rather, the quantum of the 'partnership contribution'. In effect, the focus on intellectual property as a divisive issue has shifted to the contribution (or subscription) because under the PIP Framework there is an expectation that those paying the 'partnership contribution' will use intellectual property and that use is factored into the quantum of the 'partnership contribution'. Viewed this way, if regulating access is promoting conservation by delivering reasonable, adequate, and sufficient benefits, then intellectual property is almost certainly playing a positive role in promoting conservation. And this might mean that intellectual property is playing its part in addressing climate change through regulating access and benefit sharing.

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Chapter 22

Benefit Sharing Under the REDD+ Mechanism: Implications for Women



Rowena Maguire

Abstract This paper examines benefit-sharing under the REDD+ Mechanism, focusing upon implications for women. In particular it will focus upon the competing motivations and constraints that are at play amongst the different networks and stakeholders involved (government, community and international institutions) and how these may manifest themselves in decisions about benefit-sharing claims. It also examines the importance of gender equity in ensuring socially effective REDD+ investments through a discussion of property rights, participation rights and accountability.

Keywords REDD+ • Benefit-sharing • Women • Land tenure • Participation Gender • Climate Change • Forestry • Deforestation

1 Introduction

This chapter explores the Reduced Emissions from Deforestation and Degradation (REDD +) Mechanism operating under the United Nations Framework Convention on Climate Change (UNFCCC) and the benefit sharing provisions of this mechanism. REDD+ requires developing countries to implement activities and strategies to increase carbon storage within forest estates and in return receive results-based finance to carry out these activities. Climate justice advocates have warned of the potential unintended consequences of REDD+ on the property rights and livelihood rights of those communities living in, or bordering forest estates where REDD+ activities are carried out. The concept of benefit-sharing is used within the REDD+ discourse to refer to ‘benefits’ that will flow to communities, land holders, governments and industry who change their forestry practices to comply with REDD+ policies. These benefits typically compromise financial and non-financial components dependent upon the conditions at the REDD+ site. One of the key equity

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challenges surrounding REDD+ is ensuring that these benefits flow to those at the local level who are directly impacted by REDD+ activities. This chapter explores particular issues that may arise for women in accessing benefits flowing from REDD+ investment and argues that existing REDD+ instruments at the international and national level need to specifically refer to the gendered dimensions of forest management to prevent REDD+ initiatives from negatively impacting on women.

2 The Emergence of REDD+ : Implications for Women

The fifth report of the Intergovernmental Panel on Climate Change (IPCC) states that emissions from agriculture, forestry and other land use activities account for 24% of anthropogenic greenhouse gas emissions.¹ As such, the UNFCCC has a significant interest in the development of policies to mitigate emissions from this sector. The negotiation of international rules concerning forestry, land and agricultural practices has been controversial. Many states view forest and land resources as sovereign resources and have resisted signing international agreements committing them to manage their forest resources according to certain standards or meeting prescribed targets.² At the Earth Summit negotiations in 1992, states agreed to legally binding conventions on Climate Change³ and Biological Diversity,⁴ however, the North/South divide concerning international forestry regulation meant that only a Non-Legally Binding set of Principles⁵ concerning forest use could be agreed upon. At the heart of this North/South conflict lay concerns by Southern countries that Northern countries had destroyed their own forests for monetary gain and were now seeking to prevent Southern countries from growing by locking up their forests as conserved estates.⁶ These unresolved issues of sovereignty and economic development meant that the UNFCCC and Kyoto Protocol did not require states to manage their forest resources in accordance with legally binding obligations.⁷ This global impasse on forestry meant that international finance to encourage forest conservation in developing countries was limited and significant deforestation and forest degradation continued to occur.⁸

¹Pachauri and Meyer (2014, p. 47).

²Humphreys (2009, p. 171).

³UNFCCC.

⁴Convention on Biological Diversity.

⁵Forest Convention.

⁶Mickelson (1996, p. 239).

⁷Article 3 of the Kyoto Protocol allows parties to take into account the effect of land-use policies and measures into their emission reduction calculations. During the first Kyoto commitment period, Parties were not obliged to report upon the sink and or source emission from land-use change practices, but Parties are required to report upon such activities under the second commitment period of Kyoto.

⁸Maguire (2013, p. 125).

In 2005, two Southern countries (Papua New Guinea and Costa Rica) along with support from seven other Southern countries (Bolivia, Central African Republic, Chile, Congo, Democratic Republic of Congo, Dominican Republic and Nicaragua) put forward a proposal within the UNFCCC COP negotiations to develop policy which provided financial incentives to developing countries to conserve forest areas. This proposal, entitled 'Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action',⁹ was monumental in changing the international debate about forest management in developing countries, as it managed to avoid dealing with issues concerning sovereignty by instead incentivizing countries to implement improved forest management practices voluntarily in return for financial reward. The REDD+ proposal was therefore an unprecedented first step by Southern countries to create an international instrument on forest conservation and protection.¹⁰ The development of this policy within the UNFCCC arena also meant the initiative captured political attention, which many previous forest initiatives had failed to do, by linking forest conservation with the broader goal of mitigating climate change.

The submission made a compelling case as to why emissions from deforestation should be included within the international carbon framework. It highlighted that land use emissions accounted for 10–25% of all global human induced emissions and that developing nations currently had no way of engaging with the Kyoto Protocol for emission reductions generated from reduced deforestation rates. The submission argued that the ultimate goal of the UNFCCC, found in article 2 and requiring 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system', will be made more difficult and expensive unless both industrial and developing countries actively contribute to emission reductions from all sources. The submission received broad support and the REDD+ regulatory regime has been incrementally built by COP decisions.

In order to understand the key components of the REDD+ mechanism, it is necessary to look at a number of COP decisions which cumulatively outline the steps involved in implementing the mechanism. Article 7(2) of the UNFCCC gives the COP general authority to examine the obligations of the parties in light of the objectives of the Convention and to make decisions necessary to promote its effective implementation of the Convention. Chapman et al. summarize that the COP REDD+ process requires the creation of: a national REDD+ strategy or action plan; the establishment of a national forest reference emissions level and forest reference level; the development of a forest monitoring system; and the creation of a system to report upon the Cancun safeguards.¹¹ The UNFCCC defines REDD+ activities as: (1) reducing emissions from deforestation, (2) reducing emissions from forest

⁹Reducing Emissions from Deforestation and Degradation in Developing Countries: Approaches to Stimulate Action, FCCC/CP/2005/MISC.1, 11 November 2005.

¹⁰McDermott (2014, pp. 14–16).

¹¹Chapman et al. (2015, pp. 103–104).

degradation, (3) forest conservation, (4) sustainable forest management, and (5) enhancement of forest carbon stocks.¹² The various COP decisions on REDD+¹³ were formally recognized by the Paris Agreement which endorses the existing COP REDD+ framework.¹⁴

REDD+ safeguards were developed with the objective of preventing REDD+ from negatively impacting upon forest communities. In addition, safeguards seek to ensure that other social and environmental benefits are achieved during REDD+ implementation beyond carbon sequestration.¹⁵ For example, if a forest area is conserved and local forest users are no longer able to gather firewood from the forest site, another source of energy or firewood must be provided. Such provisions are crucial from a climate justice perspective as the poor and vulnerable should not be responsible for bearing the costs of mitigating climate change. The Cancun safeguards require:

- a. That actions complement or be consistent with National Forest Programmes and relevant international conventions and agreements;
- b. Transparent and effective national governance structures, taking into account national legislation and sovereignty;
- c. Respect for the knowledge and rights of Indigenous peoples and members of local communities noting the adoption of the United Nations Declaration on the Rights of Indigenous Peoples;
- d. Full and effective participation by relevant stakeholders, in particular Indigenous people and local communities;
- e. That actions are consistent with the conservation of natural forests and biological diversity and enhance other social and environmental benefits;
- f. Actions to address the risk of reversals; and
- g. Actions to reduce displacement of emissions.¹⁶

While a number of these safeguards are consistent with ensuring that the rights of women are protected during REDD+ investment, there is no specific mention of the requirement to design and implement the projects in a gender responsive manner. As these safeguard provisions provide the framework for protecting those vulnerable persons in REDD+ projects, this is the most logical place to include a gender responsive requirement. Amendment of the safeguards to include a gender

¹²Report of the Conference of the Parties on its sixteenth session, FCCC/CP/2010/Add.1.

¹³The UNFCCC has created a booklet on all relevant COP decisions: UNFCCC Secretariat (2016) Key decisions relevant for reducing emissions from deforestation and forest degradation in developing countries (REDD +).

¹⁴Paris Agreement, art. 5.

¹⁵Savaresi (2016, p. 129).

¹⁶Decision 1/CP.16- Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, Appendix 1, paragraph 2.

responsive approach will be essential in order to see changes in REDD+ financing, project design and implementation.

Existing literature demonstrates that women and men use forest resources in different ways,¹⁷ meaning that changes to forest practices brought about by REDD+ interventions will have different impacts for women and men. Sunderland et al. summarise that while roles and responsibilities of men and women vary across regions and culture, there are some broad division of labour along gender lines:

[M]en are typically reported to manage and use natural resources for cash-crop based agriculture, hunting, logging, construction and the harvest of smaller portfolio of high value forest products for sale... In contrast women are said to focus more on subsistence agriculture and to be primarily responsible for collecting wild resources for household use, with a particular focus on those products that contribute to immediate household-level food security.¹⁸

Women are therefore more dependent upon forest areas for subsistence purposes and men for economic purposes. Conserving forest areas on the basis that some benefit may flow in the future does not mitigate the pressing daily obligation—held mainly by women—to cook and feed their families. Establishing strict forest use and access rules without consulting women means that women have to either travel further to gather firewood and food resources, or violate the forest access rules and risk prosecution in order to feed their families. Such decisions and/or impacts are socially unacceptable and inefficient.¹⁹ In order to prevent such situations, women must be educated about REDD+ and then empowered to actively participate in the consultation and design process, so that their forest uses are articulated and accommodated.

Alarming, early studies indicate that women are not as involved as men in REDD+ project planning and implementation activities. A study by the Centre of International Forestry Research examined 77 villages in 20 REDD+ sites across six countries and found that women have been less involved in project level design, decisions, and processes compared to men.²⁰ Overall they found that women's participation in REDD+ was mainly passive—receiving information and training, compared with more substantial participation such as participatory mapping and clarification of tenure rights. Another study carried out by the Rights and Resource initiative in the Asian region similarly found that institutions implementing and supporting REDD+ are not systemically incorporating gender considerations within their REDD+ policies, plans, and projects.²¹ This emerging research seems to suggest that women will face barriers in 'benefiting' from REDD+ as their forest uses are being overlooked in the planning phase, which in turn suggests that women

¹⁷Agarwal (2009a), Coleman and Mwangi (2013), Hecht (2007), Peach Brown et al. (2011).

¹⁸Sunderland et al. (2014, p. 56).

¹⁹Agarwal (2000, p. 288).

²⁰Larson et al. (2015).

²¹Gurung and Billah Setyowati (2012).

will face barriers in gaining access to carbon and non-carbon benefits during the implementation phase.

3 What Is a REDD+ Benefit?

The term ‘benefit sharing’ is used within REDD+ discourses when referring to processes and mechanisms for distributing funds from various sources at the international level to national governments, subnational governments, and communities involved in implementing REDD+ projects. The COP is yet to provide guidance as to what constitutes a REDD+ benefit or the requirements of a benefit sharing mechanism. The *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity* provides some guidance on the meaning of benefit sharing.²² Article 5(4) of the Nagoya Protocol states that benefit sharing may include monetary and/or non-monetary benefits, while the Annex to the agreement lists a number of forms that benefits might take (Table 1).

This table shows that there are a number of possibilities for distributing monetary and non-monetary benefits, however the form of benefit must be equitable and offer suitable incentives to change practices in order to be effective. REDD+ financing comes from a wide breath of sources, including: international funding mechanisms (Carbon Fund of the Forest Carbon Partnership, the Forest Investment Program, The Green Climate Fund); multilateral arrangements (UN-REDD); bilateral arrangements directing between donor countries; and developing countries and investments made under the Voluntary Carbon market. As such, a benefit-sharing system and supporting finance structure will involve a multitude of objectives, stakeholders, and interest groups.²³ In addition to considering the form of the benefit, REDD+ legal scholarship has discussed the importance of determining the following:

- How will the benefit be allocated between stakeholders: will the legal basis for benefit access be based on existing tenure arrangements or other arrangements?
- How will the benefit be distributed among the beneficiaries—government, land-holders and communities?
- What mechanism will be used to distribute the benefit: such as a fund structure or contractual agreement?
- What accountability and or grievances mechanism will be put in place to evaluate benefit sharing provisions?²⁴

²²Nagoya Protocol.

²³Eggerts (2015).

²⁴Chapman et al. (2015).

Table 1 Annex to Nagoya Protocol on access and benefit sharing

Monetary benefits: <i>may include but not limited to</i>	Non-monetary benefits: <i>may include but not limited to</i>
Access fees/fee per sample collected or otherwise acquired	Sharing of research and development results
Up-front payments	Collaboration, cooperation and contribution in scientific research and development Programmes, particularly biotechnological research activities, where possible in the Party providing genetic resources
Milestone payments	Participation in product development
Payment of royalties	Collaboration, cooperation and contribution in education and training
License fee in case of commercialization	Admittance to ex situ facilities of genetic resources and to databases
Special fees to be paid to trust funds supporting conservation and sustainable use of biodiversity	Transfer to the provider of the genetic resource of knowledge and technology under fair and most favorable terms
Salaries and preferential terms where mutually agreed	Strengthening capacities for technology transfer
Research funding	Institutional capacity building
Joint ventures	Human and material resources to strengthen the capacities for the administration and enforcement of access regulations
Joint ownership of relevant intellectual property rights	Training related to genetic resources with the full participation of countries providing genetic resources and where possible in such countries
	Access to scientific information relevant to conservation and sustainable use of biological diversity, including biological inventories and taxonomic studies
	Contributions to the local economy
	Research directed towards priority needs such as health and food security, taking into account
	Institutional and professional relationships that can arise from an access and benefit sharing agreement and subsequent collaborative activities
	Food and livelihood security benefits
	Social recognition
	Joint ownership of relevant intellectual property rights

In order for benefit sharing mechanisms to be effective, consultation with existing forest stakeholders must be carried out, not only to determine existing uses and regulatory responsibility for the forest, but also importantly to determine what types

of incentives are wanted by those changing forest practices and the form of incentive required to change behavior.²⁵ Globally, the leading driver of deforestation in developing countries is commercial and subsistence agriculture, accounting for more than 70% of deforestation.²⁶ The leading drivers of forest degradation are logging and fuelwood extraction.²⁷ REDD+ initiatives are thus interrupting a number of forgone opportunity costs: land use and access rights, food production, income generated from the sale of crops, and timber and energy sources, suggesting that the direct opportunity costs of REDD+ may be higher than anticipated.

REDD+ costs include not only forgone opportunity costs but also include implementation costs and transaction costs.²⁸ Implementation costs refer to the upfront and ongoing expenses of running a REDD+ scheme including administration, management, infrastructure, human labor and equipment needed to maintain and conserve forests.²⁹ Transaction costs refer to expenses associated with ensuring transparency and creditability of the scheme, including costs associated with the negotiation and enforcement of contracts, measurement, monitoring, reporting, and verification of outcomes.³⁰ Few studies have reported upon the breakdown of REDD+ costs, but a study of the Kasigau project in Kenya operating on finance from the voluntary carbon market showed that money was planned to be split three ways: 1/3 for landholders (largely absent landholders whose title was dubiously acquired in post-colonial period), 1/3 for transaction costs, and 1/3 for the local community. The distribution in practice resulted in 33% for land owners, 53% for project costs and 14% for communities, as price fluctuations for carbon on the voluntary carbon market meant that the initiative secured less money than anticipated.³¹ This particular project has been certified as achieving GOLD status (the highest level of certification available) on the Climate, Community and Biodiversity Alliance Standard, an international REDD+ certifying body, suggesting that even less benefits are flowing to communities in projects not reaching gold status—which includes the majority of projects certified to-date. Equitable benefit sharing with communities lacking legal title to land will continue to be a challenge in practice, and demonstrates the importance of consulting with women and other vulnerable groups in REDD+ when designing a benefit distribution mechanism.

Ensuring equitable benefit sharing with women who change forestry practices is a long-standing problem. Work carried out by Bina Agarwal in 2001 explored community forest groups and the participation of women in such groups.³² Concern over forest degradation in the 1990s across South East Asia led to the creation of

²⁵Weatherley-Sing and Gupta (2015).

²⁶Hosonuma (2012).

²⁷Ibid.

²⁸Rakatama et al. (2017, p. 104).

²⁹Ibid.

³⁰Ibid.

³¹Chomba et al. (2016, p. 203).

³²Agarwal (2001).

Joint Forestry Management (JFM), a system of regulation where states handed over the management of forest estates to community forest groups who were then responsible for the management of community forests in return for small management fees. Under such schemes, forest regeneration is usually carried out by closing the forest and restricting access, which may include a complete ban on entry of people and animals, or may allow limited extraction of selected items at prescribed times.³³ Agarwal's study, which examined 29 community forest groups, found that benefits were not equitably shared with women. Of the 29 groups, only 3 distributed a cash benefit to group members, with the majority of funds instead being used in ways that did not benefit women (youth club repair, purchasing community utensils such as rugs and drums which the men leased out, travel by powerful members, and spending on religious festivals). Even in the member households where a cash benefit was distributed, women did not automatically gain access to this money and men were more likely to spend the money on gambling, liquor and personal items.³⁴ When asked about their preferences for benefit sharing, women asked for equal and individual shares for each spouse.³⁵ This suggests that REDD+ benefit sharing mechanism needs to be conceived not only at the community level but also at the household level in order for gender conditions to be addressed.

4 Elite Capture and Corruption in the Forestry Sector

Another barrier that will prevent women from gaining an equitable share in REDD+ benefits is the high level of corruption present within the forestry sector. From a climate justice perspective, REDD+ financial benefits must flow from the global to the grassroots level, and elite capture of benefits by government officials and powerful individuals must be prevented. Forestry as a sector has a long history of corruption as forest estates are commonly in geographically remote locations, which presents challenges for transparent monitoring and enforcement.³⁶ Forest corruption has many manifestations ranging from fraudulent logging concessions to log smuggling, illegal logging, laundering of illicit proceeds, fraud, tax evasion and illegal trade.³⁷

Developments in remote satellite tracking and other technologies are improving forest monitoring capabilities, however cultural corruption within forestry

³³ Agarwal (2009a, p. 2786).

³⁴ Ibid.

³⁵ Ibid.

³⁶ Tacconi et al. (2009).

³⁷ Gupta and Siebert (2004, p. 339).

institutions will not be solved by technological advances alone, and will require higher level systemic reforms. A study examining Cameroon, Indonesia, Nepal, Papua New Guinea, Peru, Tanzania and Vietnam found that all of these national governments planned for REDD+ financial payments to be distributed at the national or district level through existing forestry departments and networks.³⁸ This finding raised concerns about elite capture as most of the countries did not have transparent processes explaining how the REDD+ funds would be distributed.³⁹ Similarly, another study considering the development of benefit sharing mechanisms in Vietnam, Indonesia, Democratic Republic of Congo, Nepal and Peru⁴⁰ found that the design of the benefit sharing mechanism was generally limited to a few powerful groups (e.g. government agencies and donors) with limited participation from vulnerable and marginalized groups.⁴¹

The majority of REDD+ funds distributed to-date have been in the form of REDD+ readiness funds (finance provided to build capacity of national governments to host REDD+) and as such has been distributed at the national level.⁴² REDD+ as currently conceived presents a number of corruption risks at each phase of the process (design and implementation phases). During the readiness phase of funding, the United Nations Development Programme (UNDP) expects that 'state capture effected through grand corruption and political corruption in which powerful individuals and groups, such as politicians, logging companies, agribusiness and possibly the military might seek to influence the design of a country's national REDD+ framework in order to benefit their private interests or to entrench their political power'.⁴³ While during the implementation phase, the risks of grand and political corruption continue alongside the additional risks of embezzlement of funds meant for local stakeholders and petty corruption 'in which low level public officials who are responsible for implementing REDD+ are bribed to ignore routine breaches of REDD+ laws (e.g. illegal logging), or are bribed to create fraudulent titles or carbon rights'.⁴⁴ Debate still exists over how finance will flow from global to local levels to support individual REDD+ projects, but these early studies suggest that payments at the project level may produce more equitable sharing of benefits if appropriate transparency and accountability mechanisms exist.

The UNDP is coordinating anti-corruption measures for REDD+ globally on the basis of its mandate to reduce poverty, meet the Millennium Development Goals and promote sustainable development.⁴⁵ Corruption is defined by the UNDP as the

³⁸Vijge et al. (2016).

³⁹Ibid, p. 63.

⁴⁰Dunlop and Corbera (2016).

⁴¹Ibid, p. 49.

⁴²Davies and Daviet (2015).

⁴³Fach and Timilsina (eds) (2011, p. 31).

⁴⁴Ibid.

⁴⁵Ibid, p.11.

‘misuse of entrusted power for private gain’.⁴⁶ There are many different forms of corruption, including bribery, cronyism, embezzlement, extortion, fraud, grand corruption, nepotism, patronage and petty corruption.⁴⁷ In addition, there is potential for all of these forms of corruption to be present within REDD+ initiatives. The UNDP defines each of these forms as follows:

- Bribery refers to the act of offering someone money, services or other inducement to persuade him or her to do something in return. Bribes can also be referred to as kickbacks, hush money or protection money.
- Cronyism refers to the favourable treatment of friends and associates in the distribution of resources and positions, regardless of their qualification or experience.
- Embezzlement is the misappropriation of property of funds legally entrusted to someone in their formal position as an agent or guardian.
- Extortion is the unlawful demand or receipt of property, money or sensitive information to induce cooperation through the use of force or threat.
- Fraud refers to an intentional misrepresentation which is made to obtain an unfair advantage by giving false or misleading information.
- Grand corruption involves bribery or the embezzlement of huge sums of money by those at the highest levels of government.
- Nepotism is a form of favouritism that involves family relationships. Its most usual form is when a person exploits his or her own power and authority to procure jobs or other favours for relatives.
- Patronage, similarly to nepotism, refers to the support or sponsorship by a patron (a wealthy or influential guardian) to make appointments to government, jobs or to distribute contracts for work.
- Petty corruption, also called bureaucratic corruption, involves low-level contracts between citizens, businesses and officials and generally takes place where public policies are being implemented. It is common in service delivery, such as in health care, where people use public services.
- Political corruption is the misuse of political power for private gain for preserving or strengthening power for personal enrichment, or both.
- State capture is where the state is held captive to the actions of individuals, groups, or firms who influence the formation of laws, rules and regulations to serve their own private interests. This is a way of ‘legalising’ corruption.

A history of corruption in many of the forestry sectors receiving REDD+ investment presents a number of challenges for equitable benefit sharing. Nearly half of the globe’s forests are in nations racked by rampant corruption,⁴⁸ making forest governance reform a priority activity for REDD+ readiness investments. Lessons from forest certification reforms suggest that initiatives which enhance

⁴⁶Ibid, p. 27.

⁴⁷Ibid.

⁴⁸Irland (2008, pp. 189–223).

inclusivity in policy networks, along with ensuring that public and private forest policy within a country are aligned, tend to be pre-conditions for improved forest governance.⁴⁹ Reforms required to implement REDD+ projects will require multi-sectoral and multi-level governance reform, suggesting that REDD+ readiness funds must be spent in ways to address integrity issues and to incentivize changes in the political economy of forest resource management. Women must be active participants in forest management integrity reform processes as a way of enhancing transparency and accountability of the sector, and must be informed about the processes supporting the financial flow of money from global to local levels.

5 Links Between Land Tenure and Benefit Sharing

As forests grow upon the land, existing property rights associated with the land and any other use or access rights associated with the forest area will play a role in determining benefit distribution under REDD+ schemes. The rights and duties associated with property law underpin all forest regulation in non-customary legal systems.⁵⁰ Property rights to forest areas are often contested, overlapping or unenforceable and a significant proportion of the global forest estate is plagued by tenure confusion and insecurity.⁵¹ This insecurity acts to undermine sustainable forest management initiatives for without secure rights, forest holders have few incentives and often lack the legal status to invest in managing and protecting their forest resources. While secure property rights alone cannot ensure sustainable protection and investment in an asset, they are often a necessary condition.⁵²

The existence of property rights over natural resources is often justified in reference to Hardin's tragedy of the commons theory. This theory suggests that when things are left open to the public they are wasted by overuse or underuse. No one wishes to invest in something that may be taken from them tomorrow, and no one knows whom to approach to make exchanges. All resort to snatching up what is available for 'capture' today, leaving behind a wasteland.⁵³ Therefore, it is believed that private property rights provide an incentive for better management of natural resources areas. The incentive comes in the form of long-term secure and transferable rights in forest property. Where rights to the environment are secure and transferable, they provide holders of such rights with the certainty that their rights will be valuable in the future. Such certainty provides an incentive to rights holders to manage rights so as to increase their economic value.

⁴⁹Kanowski et al. (2011).

⁵⁰Maguire (2013).

⁵¹White and Martin (2002).

⁵²Sayer et al. (2008).

⁵³Rose (1986, p. 712).

Given that forest tenure rights in many developing countries are often informal and contested⁵⁴ this presents huge barriers for disempowered groups such as women or Indigenous communities to benefitting from REDD+ initiatives. Forestry governance scholars have thus warned that REDD+ initiatives present serious risks for forest communities and raise questions such as: what will be the implications if the community's tenure rights are not secure? What if they are secure in print but not in practice? And, what if they are secure for forests but not for carbon?⁵⁵ Part of the REDD+ readiness phases have involved processes to clarify and secure land tenure, however history suggests that these reforms must move beyond recognizing tenure on paper and must be accompanied with institutions to recognize and enforce such rights along with initiatives to spark cultural change and understanding about the consequences of these reformed rights. As Larson writes:

Once rights are won on paper, the real work begins. Implementation processes are often fraught with opposition and competing claims, as well as logistical and governance challenges. Competing claims for forests and forest lands may involve land invasions by poor peasants, wealthy farmers and businesses interested in ranching, large-scale agriculture, biofuels or logging, mining or petroleum concessions or; the expansion of protected areas for conservation and tourism. How these conflicts play out depends, at least in part, on the effectiveness of community organizations and alliances, and on the role played by the state.⁵⁶

As such land rights can be defined to be complete when the following three conditions are met: they are legally recognizable, socially recognizable, and enforceable by external authorities.⁵⁷ A study by the Center for International Forestry Research examined the impact of REDD+ projects upon tenure reform across six countries (Brazil, Indonesia, Vietnam, Cameroon, Tanzania and Peru).⁵⁸ The study found that REDD+ investments were unlikely to be a catalyst for broad national level forest tenure reforms, but did find that REDD+ brought prominent attention to issues of forest tenure reform in ways not previously seen.⁵⁹ REDD+ project proponents across the six countries had invested significant time, expertise and capital into seeking tenure for local communities, but progress has been limited by existing government bureaucracies and constraints of current policies.⁶⁰ This study confirms that tenure reform is a long and ongoing process which requires support from government institutions at all levels and monitoring by empowered community groups. Rights to land are often the most valuable rights that individuals receive during a lifetime, and accordingly any reforms interrupting existing rights will be controversial. Nonetheless, REDD+ initiatives must still ensure that adequate tenure

⁵⁴Torpey-Saboe et al. (2015).

⁵⁵Larson (2011, p. 541).

⁵⁶Ibid, p. 544.

⁵⁷Duncan and Ping (2001).

⁵⁸Larson et al. (2013).

⁵⁹Ibid, p. 679.

⁶⁰Ibid, p. 687.

arrangements are in place for projects in order for them to be viewed as socially credible, and for benefits to flow to those with genuine interests in the forest area.

6 Improving Women's Rights to Benefit Sharing: Property and Participation Rights

In order to improve women's rights to benefits flowing from REDD+ initiatives, there are two areas of law requiring reform. Firstly, attention must be directed toward enhancing women's property rights, as the starting point for determining REDD+ benefit distribution will be tenure considerations. Many women lack formal rights to forest areas and often hold only informal access and use rights—which, if not considered, will act as barriers to equitable benefit distribution to women. Secondly, action must be taken to improve the participation rate and the quality of women's participation within REDD+ planning processes at the international, national and project levels. Increasing the meaningful participation of women will improve both the legitimacy and effectiveness of REDD+ projects. Specifically, increased meaningful participation of women in REDD+ planning and implementation processes is essential to ensuring that women's uses of forests are factored in when designing benefit distribution schemes.

6.1 *Property Rights*

A study carried out by the Rights and Resource Initiative across 30 low and middle income countries confirms that most property laws concerning Indigenous groups and local communities are gender blind.⁶¹ Such laws are gender blind in the sense that they do not provide guidance on how rights should be interpreted in customary or community settings and do not recognize the practical challenges that women must overcome in order for their rights to be recognized. Existing studies demonstrate that community practices often limit Indigenous and rural women's tenure rights solely to land access and use rather than providing a fuller bundle of property rights that would enable powers of control over the land and resources.⁶² The security of Indigenous and rural women's property rights is often defined by and dependent upon their marital status and or relationship with men. As such the ability of Indigenous and rural women to equitably benefit from forest land is often limited in practice by 'the pervasiveness of patriarchal, discriminatory community norms that impinge upon their inherent tenure rights'.⁶³

⁶¹Keene and Ginsburg (2017, p. 13).

⁶²Ibid.

⁶³Ibid.

The Rights and Resource Initiative established a conceptual framework to assess women's tenure rights and rights to community forests.⁶⁴ The framework involves three components: legal protections to hold property rights afforded to women under national law; an assessment of the types of property rights held, and indicators to examine women's community-based tenure rights to forest areas. When assessing the national framework, three legal indicators are considered: (1) constitutional equal protection (does the constitution contain gender-specific provisions or prohibit gender-based discrimination and, where relevant, does the constitution recognize that customary laws might operate in conformity with other constitutional provisions); (2) affirmation of women's property rights (do national laws recognize women's property rights); and (3) inheritance laws (do inheritance laws provide rights for daughters, widows and women in consensual unions?)⁶⁵ The second step of the analysis then looks at the types of rights held over forest areas. In forest areas where Indigenous people and local communities hold ownership rights, a full bundle of rights will include access rights, withdrawal rights, management rights, exclusion rights, unlimited duration of rights, and rights to due process and compensation. The third step examines six indicators regarding the participation of women in community-based forest institutions by examining membership rights, inheritance provisions, voting rights, women leadership quotas, and dispute resolution provisions, which contain specific considerations for women.⁶⁶ Overall the study found that the 30 countries examined 'were riddled with weak legal protections, crippling legal omissions, and discriminatory inheritance provisions that fail to protect the rights of Indigenous and rural women to community forests.'⁶⁷ Of further concern, the study found that REDD+ readiness efforts appeared to have little or no impact on the statutory rights of Indigenous and rural women to-date.⁶⁸ This affirms the importance of amending the REDD+ safeguards to include specific protections for women.

Tenure reform is a complicated, highly political, and lengthy process, so what role should REDD+ play in this process? It is overly ambitious to expect REDD+ to be the silver bullet that results in nationwide equitable land right reforms as land reforms are required in forest and non-forested areas. Despite this, REDD+ readiness activities can exert influence over national forest tenure policies and can advocate for changes that are consistent with protecting rights of Indigenous communities and rural women. At the outset there must be realistic expectations about what REDD+ can achieve in areas where there is serious conflict among user groups. Research suggest that project proponents are often aware of the challenges of tenure reform as compared with forest users, so steps must be taken to educate forest users about the processes and realistic timeframe for implementing such

⁶⁴Ibid, pp. 18–19.

⁶⁵Ibid, p. 19.

⁶⁶Ibid.

⁶⁷Ibid, p. 47.

⁶⁸Ibid, p. 52.

changes.⁶⁹ Approaches that have been used by project proponents to address tenure reform include: identifying the sources of tenure insecurity and conflict and addressing the causes where possible; clarifying village and forest boundaries; identifying and delimiting forests to be set aside and protected; collaboration with national and sub-national governments; property registration; extending community tenure from 5 to 30 years; clarifying or securing legal ownership of forest carbon; and undertaking community mapping and spatial planning. Once tenure arrangements are resolved, it cannot be assumed that formalization of tenure rights will automatically lead to equitable benefit-sharing,⁷⁰ and the design of any benefit sharing mechanism based on tenure must still be designed in a way that benefits women.

6.2 *Participation Rights*

One of the key strategies that has been used to improve outcomes for women has been the introduction of gender reporting and representation targets across a range of institutions. Generally, such initiatives open up new employment opportunities for women and ensure that women's perspectives are factored into policy and planning processes. Women's effectiveness in public forums is dependent upon their proportional representation in the forum, with higher levels of women participating having a greater ability to influence policy design and institutional behavior.⁷¹ Terminology that has been used to describe proportional representation includes the concept of 'threshold representation' or 'critical mass' but there is no globally agreed participation target or percentage.⁷² The UN Climate regime has adopted the goal of 'gender balance' in bodies established pursuant to the Convention and Protocol,⁷³ which is defined as being achieved when there are approximately an equal number of men and women present or participating.⁷⁴ The REDD+ framework has been developed through a series of COP decisions, made pursuant to the Convention, and as such it is argued that the goal of gender balance should result in equal levels of women participating in the development of REDD+ policy at all levels.

⁶⁹Sunderlin et al. (2013, p. 43).

⁷⁰Torpey-Saboe et al. (2015, p. 416).

⁷¹Agarwal (2010).

⁷²Ibid.

⁷³The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (Decision 1/CP.16) FCCC/CP/2010/7/Add.1.

⁷⁴Subsidiary Body for Implementation (2015) Report on the in-session workshop on gender-responsive climate policy with a focus on mitigation action and technology development and transfer FCCC/SBI/2015/12; Subsidiary Body for Implementation (2016) In-session workshop on gender-responsive climate policy with a focus on adaptation, capacity-building and training for delegates on gender issues' FCCC/SBI/2016/10, Annex.

The existing REDD+ framework does not provide specific guidance on the importance of ensuring the active participation of women during the design and implementation of REDD+ projects. More concerted effort has been directed towards increasing the representation and participation of women at international climate negotiations at the international level, with issues of gender balance being taken more seriously by the COP since the adoption of the Lima Work Program on Gender.⁷⁵ This decision highlighted that ‘additional efforts’ were needed to ensure participation of women within the UN climate regime and requested the Secretariat to publish data on gender representation in forthcoming annual reports.⁷⁶ The Subsidiary Body for Implementation developed a Gender Action Plan Report⁷⁷ for consideration at COP 23. This report called for the establishment of a target requiring 50% representation of women in all Party delegations and constituted bodies under the Convention by 2019. The Gender Action Plan⁷⁸ adopted by the parties was worded more weakly, instead stating that the plan ‘seeks to achieve and sustain the full, equal and meaningful participation of women in the UNFCCC processes’.

While the establishment of targets serves an important function in acting as a catalyst for changing institutional culture, Bina Agarwal rightly identifies the importance of looking beyond participation rates to examine the quality of women’s participation in public forums. The participation conceptual framework (outlined in the table below) was developed to explore the participation rights of women in community forest initiatives in Nepal and India, but has been adopted and used to explore women’s participation activities in a range of other countries (Table 2).⁷⁹

The UN Climate terminology of ‘full, equal and meaningful participation’ seems to accord with the participation types in the second half of the table and more active participation of women should be encouraged. It is also important for institutions to understand the heterogeneity of women’s lived experiences and perspectives on forest use. These experiences and perspectives may be influenced by socio-economic factors, ethnicity, and cultural practices.⁸⁰ As such, women may have some common issues in respect of forest use, but may also have different forest needs that need consideration in REDD+ planning and implementation processes.

As this chapter is concerned with REDD+ and distribution of benefits to women, it is important to focus upon the factors that may act as barriers to the meaningful participation of women at the REDD+ project level. Coleman and Mwangi’s global study⁸¹ hypothesized six variables which affect women’s participation in

⁷⁵Decision 18/CP.20, Lima work Programme on gender, FCCC/CP/2014/10/Add.3. For an overview of women and representation in the UNFCCC, also see Maguire and Lewis (2018).

⁷⁶Decision 18/CP.20, Lima work Programme on gender, [2] and [4].

⁷⁷Subsidiary Body for Implementation (2017) Informal summary report on the Subsidiary Body for Implementation in-session workshop to develop possible elements of the gender action plan under the UNFCCC ‘Forty-sixth session, Bonn, Germany, 8–18 May 2017.

⁷⁸Decision CP.23, Establishment of a gender action plan (2017).

⁷⁹Coleman and Mwangi (2013, pp. 193–194).

⁸⁰Agarwal (2015, pp. 3–4).

⁸¹Coleman and Mwangi (2013, pp. 193–194).

Table 2 Agarwal's participation conceptual framework^a

Form/level of participation	Characteristic features
Nominal participation	Membership in the group.
Passive participation	Being informed of decisions ex post facto; or Attending meeting and listening in on decision-making without speaking up
Consultative participation	Being asked an opinion on specific matters without guarantee of influencing decisions
Activity-specific participation	Being asked to (or volunteering) to undertake specific tasks
Active participation	Expressing opinions, whether or not solicited or taking initiatives of other sorts
Interactive (empowering) participation	Having voice and influence in the group's decisions, holding positions as office bearers

^aAgarwal (2001)

community forest governance institutions: (1) rules that exclude entry of women into participatory processes; (2) social norms such as segregation, division of labor, or gendered biases; (3) social preferences that give more weight to men's participation than women's; (4) entrenched claims by men who are hesitant to give power to women; (5) few personal endowments of property or social networks that would allow effective participation from women; (6) household endowments or attributes that prevent effective participation. The study found that the strongest predictor of women's engagement in forestry governance processes related to the level of education of the head of the household (the more years of schooling the household head held, the more likely women were to participate in forest governance activities on behalf of the household).⁸² Secondly, the study found that forest governance institutions which required membership fees or in-kind contributions were more likely to have higher rates of participation by men, suggesting that restrictions on memberships disproportionately affect women. REDD+ project proponents must identify barriers preventing the engagement of women and then devise solutions to address these barriers and open up participation opportunities for women.

6.3 *Impact of Participation Rights*

Bina Agarwal has also carried out research examining the types of forest use rules developed when women are involved in the process.⁸³ This analysis was carried out using data from 65 community forestry initiatives in West India and Nepal each with varying levels of women present on the executive committee. It was

⁸²Ibid, p. 201.⁸³Agarwal (2009b).

hypothesized that women's greater dependence on local forests for firewood and fodder would result in Executive Committees with higher levels of women's participation adopting more lenient forest extraction rules.⁸⁴ The study found, however, that Executive Committees with more women made stricter rules (except in one case-study that had other factors at play).⁸⁵ The study found that landless women (women with no formal land rights to the forest area) and younger women were more likely to want lenient rules at they had more at stake when forest areas were closed off. As such it was found that 'forest use rules is tempered by class, age, the product extracted'.⁸⁶ It was suggested that the inclusion of women in the decision-making process meant the rules developed were more socially acceptable, which resulted in higher compliance levels. The inclusion of women in REDD+ rule development is therefore also important from an effectiveness perspective, as REDD+ rule compliance will be improved when the rules are socially appropriate.

7 The Way Forward

The gendered implications of climate mitigation and adaptation strategies such as REDD+, and the need to take action to address gender injustice arising from climate change, has been recognized by the UNFCCC. COP 23 saw the introduction of a Gender Action Plan (GAP)⁸⁷ which acknowledges that 'gender-responsive climate policy requires further strengthening in all activities concerning adaptation, mitigation and related means of implementation as well as decision-making on the implementation of climate policies'. The GAP contains no specific mention of REDD+, but 'Priority Area D: Gender Responsive Implementation' aims to start the process of ensuring that gender considerations are factored into UNFCCC project activities. It does so by requiring a dialogue within the Standing Committee for Finance on Gender; inviting parties to make submissions on gender and technology; and strengthening capacity for gender-responsive approaches to budgeting in climate finance, training sessions, expert workshops, and the development of technical papers and tools.

Tools are currently available which outline the requirements for gender-responsive REDD+ activities. Elizabeth Eggerts, the Gender and REDD+ specialist of UN-REDD, summarizes the steps required to implement a gender-responsive approach to REDD+ benefit sharing in the table below:⁸⁸ (Table 3).

While such tools exist, their influence will remain limited until the COP takes specific action obliging parties to implement gender-responsive REDD+ initiatives.

⁸⁴Ibid, p. 2301.

⁸⁵Ibid, p. 2306.

⁸⁶Ibid.

⁸⁷Decision CP.23, Establishment of a gender action plan.

⁸⁸Eggerts (2015, p. 278).

Table 3 Tools for promoting gender responsive REDD+ benefit sharing and finance structures

Analyse	• Consider collective and individual women's benefits in formulation • Access opportunities for rewarding direct and indirect benefits to women's and men's land use rights instead of only through formal land tenure rights • Perform participatory assessments of direct and indirect costs and benefits for women's participation in REDD+
Engage	• Design benefit-sharing consultations with respect to time, location and child care arrangements to encourage women's and men's equitable involvement • In monitoring financial management, promote participation of government ministries responsible for gender issues • Disseminate information on REDD+ benefit sharing in a transparent and accessible manner (local languages, radio, TV, theatre)
Coordinate	• Promote involvement and mobilization of women's and Indigenous groups and networks, including gender experts who can bring in their expertise to support inclusive REDD+ processes • Coordinate with government ministries responsible for women's empowerment, youth and gender issues
Support	• Develop gender-sensitive benefit sharing investment plans • Ensure benefits reach women and men equitably and those who participate in forest conservation and REDD+ activities are rewarded • Ensure benefit-sharing mechanisms utilize sex-disaggregated data • Integrate gender aspects into any Terms of Reference supporting benefit sharing work and analysis • Provision of leases or forest titles in women's names, when forest areas are distributed amongst community members for protection

Climate finance should be dependent upon the adoption of gender-responsive climate policies in all areas of REDD+ implementation to prevent REDD+ from causing harm to women. The GAP acknowledges the link between finance and the implementation of gender-responsiveness policy in priority area D, but further action developed under this goal must require that climate finance be tied to and dependent upon gender considerations.

8 Conclusion

As women and men use forest resources differently, REDD+ will have different ramifications for women and men. Women commonly access forests to satisfy daily subsistence needs through the collection of firewood and food, while men commonly access forest areas on a more periodical basis to collect products for economic gain. Lessons from forestry governance show that is more efficient and equitable to include women in forest governance rule setting processes, as the rules adopted will be socially acceptable and more likely to be complied with.⁸⁹

⁸⁹Coleman and Mwangi (2013), Agarwal (2001).

This chapter has examined the implications of REDD+ and the barriers preventing women from gaining access to REDD+ benefits. As REDD+ finance is flowing from a number of international funds, including multilateral, bilateral, and market sources, and is being invested at national, sub-national and project levels, benefit sharing mechanisms will be diverse in nature. In such conditions, it is important that the benefits are sufficient to motivate change in forest practices, and that distribution be equitable in order to prevent elite capture. Forest communities, women and Indigenous groups in particular, must be active participants in the design of benefit sharing mechanisms, as it is these mechanisms that will incentivize improved forest management.

REDD+ projects should be implemented with the UNFCCC goals of gender balance (equal number of women participating in program development and roll-out) and be gender-responsive in design (address barriers to women's participation and design policies with women's forest uses in mind). REDD+ investments have the potential to significantly undermine women's forest use and access rights due to histories of corruption and patriarchal practices in the forestry sector. The adoption of the Gender Action Plan at COP 23 is an important UNFCCC milestone and the plan must be used to push for amendment of the REDD+ framework developed by the COP. Specifically, the plan should be used to push for a gender safeguard to be added to the Cancun safeguards requiring gender balance on all REDD+ bodies at all levels, and a requirement for REDD+ activities to be implemented in a gender-responsive manner. Furthermore, climate finance should be dependent upon a gender-responsive approach being followed and monitoring of this approach be accounted for and verified. REDD+ was conceived by Southern countries and widely supported by Northern nations as a means to address deforestation and degradation, and has led to unprecedented levels of action and financing for forest conservation. Climate justice requires that REDD+ be implemented in a way that reduces emissions while protecting the interests of those vulnerable in communities, including rural, Indigenous, and landless women.

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Chapter 23

Northern Exposure: Alaska, Climate Change, Indigenous Rights, and Atmospheric Trust Litigation



Matthew Rimmer

Abstract This chapter considers the atmospheric trust litigation in the case of *Nelson Kanuk v. State of Alaska* over the climate inaction of the State of the Alaska. The dispute is a compelling case study in respect of constitutional law, the public trust doctrine, climate change, intergenerational justice, Indigenous rights, and Indigenous intellectual property. The new litigation between Esau Sinnok and the State of Alaska promises to further refine and clarify issues in respect of climate change, human rights, and Indigenous interests. Such climate litigation highlights larger international legal issues in respect of Indigenous peoples and climate change. There has been debate over Indigenous rights and climate change during the discussions in respect of the United Nations Declaration on the Rights of Indigenous Peoples 2007, the Anchorage Declaration 2009, the Paris Agreement 2015, and the Bonn climate talks in 2017. In the future, no doubt Indigenous communities will seek to engage in climate litigation against governments and corporations in order to seek redress for climate injustice, as well as loss and damage.

Keywords Alaska • Constitutional law • Intergenerational justice
Indigenous intellectual property • Public trust • Climate change
Climate litigation • Climate justice • Indigenous rights • The Paris Agreement 2015
The United Nations Declaration on the Rights of Indigenous Peoples 2007
The Anchorage Declaration 2009

1 Introduction

In the United States, there has been much black letter creativity and innovation in the use of climate litigation to address government inaction in respect of tackling climate change. In her influential work, *Nature's Trust*, Professor Mary Christina

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Wood from the University of Oregon has argued that the public trust doctrine can be deployed to address climate change.¹ Applying her theoretical work, the non-profit organisation, Our Children's Trust, has co-ordinated atmospheric trust litigation against both the Federal United States Government, and fifty states of the United States. The litigation has had quite mixed results in terms of the outcomes.

The atmospheric trust litigation in Alaska—first by Nelson Kanuk and other youth, and then by Esau Sinnk, and others—have been one of the most striking examples of climate litigation.² The disputes raise questions about public trust, inter-generational justice, Indigenous rights, and climate change. Nelson Kanuk—an Alaskan Native and a member of the Yup'ik Eskimo Tribe; and a resident of Kipnuk, Alaska—brought climate litigation against the state of Alaska under the public trust doctrine and the Alaskan Constitution. The atmospheric trust litigation in Alaska, though, has been somewhat indecisive.³

The litigation has been followed by a petition by youth petitioners and the Alaska Youth for Environmental Action to the Alaska Department of Environmental Conservation in 2017. The rejection of this petition has prompted a new piece of climate litigation—the matter of *Esau Sinnok v. The State of Alaska*.⁴

There are larger issues at stake in the dispute over atmospheric trust litigation in Alaska. The United Nations Declaration on the Rights of Indigenous Peoples 2007 sought to consider the rights of Indigenous peoples, particularly in respect of the environment and sustainable development.⁵ The United Nations Permanent Forum on Indigenous Issues has been concerned about the impact of climate change upon Indigenous rights and justice. Notably, the Indigenous Peoples' Global Summit developed the Anchorage Declaration 2009 in Alaska. The Anchorage Declaration 2009 emphasized: 'We call upon the Parties to the UNFCCC to recognize the importance of our Traditional Knowledge and practices shared by Indigenous Peoples in developing strategies to address climate change'.⁶ The Anchorage Declaration 2009 commented: 'To address climate change we also call on the UNFCCC to recognize the historical and ecological debt of the Annex 1 countries in contributing to greenhouse gas emissions'.⁷ The Anchorage Declaration 2009 asked: 'We call on these countries to pay this historical debt.'⁸ Moreover, the question of Indigenous rights was prominent during the negotiations over the Paris

¹Wood (2014a).

²Ronco (2013).

³*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

⁴Complaint in *Sinnok v. The State of Alaska* (2017), Superior Court for the State of Alaska, Third Judicial District at Anchorage, Case No. 3AN-17 <https://www.courthousenews.com/wp-content/uploads/2017/10/Alaska-Youth-Climate-COMPLAINT.pdf>.

⁵United Nations Declaration on the Rights of Indigenous Peoples 2007, http://www.un.org/esa/socdev/unpfi/documents/DRIPS_en.pdf.

⁶The Anchorage Declaration 2009, <http://unfccc.int/resource/docs/2009/smsn/ngo/168.pdf>.

⁷Ibid.

⁸Ibid.

Agreement 2015.⁹ There has been concerns that the international climate law framework is inadequate and insufficient to address Indigenous rights.

This chapter is part of a larger body of research upon Indigenous intellectual property.¹⁰ This paper specifically builds upon my past work on intellectual property, Indigenous Knowledge, and climate change.¹¹ It also adds to previous research upon the World Indigenous Network, intellectual property, and sustainable development.¹² In particular, the atmospheric trust litigation by Nelson Kanuk in Alaska provides an important test case on the protection of Indigenous rights—including traditional knowledge—from the impact of climate change. This chapter has several parts. Part 2 provides an overview of the theory and practice climate litigation. In particular, it examines the theoretical work of leading scholars on the topic—such as the work of Mary Christina Wood on the public trust doctrine, and David R. Boyd on the right to a health environment. It also considers the mapping of global climate litigation by the Sabin Center for Climate Change Law at Columbia Law School. Part 3 examines the atmospheric trust litigation taken by Nelson Kanuk and others against the State of Alaska. This work has been reinforced by an interview with Nelson Kanuk’s lawyer, Brad De Noble.¹³ Part 4 considers the 2017 petition by youth petitioners and the Alaska Youth for Environmental Action to the Alaska Department of Environmental Conservation. It explores how this evolved into a new piece of climate litigation—the matter of *Esau Sinnok v. The State of Alaska*.¹⁴ Part 5 focuses upon international legal debates over Indigenous rights and climate change. The conclusion considers the future of climate litigation by Indigenous communities to protect their lands, resources, and culture.

2 The Theoretical Framework Behind Climate Litigation

At the outset, it is useful to understand the theoretical frameworks, underlying climate litigation. This overview considers the expansion of the public trust doctrine to address climate change—looking at the work of Mary Christina Wood from the University of Oregon. It explores the work of Hari Osofsky and Jacqueline Peel in terms of examining climate litigation as a means of encouraging climate regulation.

⁹Paris Agreement to the United Nations Framework Convention on Climate Change, opened for signature 12 December 2015 (entered into force 4 November 2016) (in UNFCCC, Report of the Conference of the Parties on its Twenty-First Session, Addendum, UN Doc FCCC/CP/2015/10/Add.1, 29 Jan 2016).

¹⁰Rimmer (ed.) (2015b).

¹¹Rimmer (2015c).

¹²Rimmer (2015e).

¹³Rimmer (2014).

¹⁴Complaint in *Sinnok v. The State of Alaska* (2017), Superior Court for the State of Alaska, Third Judicial District at Anchorage, Case No. 3AN-17 <https://www.courthousenews.com/wp-content/uploads/2017/10/Alaska-Youth-Climate-COMPLAINT.pdf>.

It also considers the use of constitutional law to protect the right to a healthy environment—drawing upon the work of David R. Boyd. This section also looks at the use of human rights to underpin climate change. Finally, this introductory part considers the patterns of global climate litigation—looking at the work of the United Nations Environment Programme and the Sabin Center for Climate Change Law at Columbia Law School.

2.1 Atmospheric Trust Litigation

Atmospheric trust litigation seeks to build upon legal doctrines relating to the public trust doctrine.

In the work on *Green Governance*, Burns Weston and David Bollier explore the use and expansion of the public trust doctrine.¹⁵ The theorists observed: ‘The public trust doctrine formalizes the idea that a society’s governing bodies have an affirmative duty to protect natural resources for the health and well-being of present and future generations’.¹⁶ There has been a push for the courts to apply the public trust doctrine to a broader array of natural resources, including the protection of the Earth’s atmosphere. The philosophers observed: ‘Despite its relative underuse in recent decades, the public trust doctrine offers a powerful, venerable legal tool to uphold the principle that the State must act as a conscientious trustee of ecological commons.’¹⁷

In her book, *Nature’s Trust: Environmental Law for a New Ecological Age*, Mary Christina Wood from the University of Oregon contends that the public trust doctrine can be deployed to create an international obligation to take action in respect of climate change.¹⁸ She considers the historical origins of the public trust doctrine:

Dating back to Roman law, this doctrine stands as a pillar of order civilization to compel sovereign stewardship of crucial natural wealth. It characterizes the ecological endowment as a trust for present and future generations of citizens. Government, deriving its authority from the people as a whole, must act as a fiduciary to protect the natural resources held in trust from damage, as well as dangerous privatization.¹⁹

She has been interested in the adaptation of the public trust doctrine to protect not only land, water, and oceans—but also the atmosphere and the climate.

Wood commented: ‘Urgency drives the atmospheric trust litigation campaign to protect the planet’s climate because “the concentration of CO₂ in the atmosphere has reached a level not seen on Earth for at least 3 million years”’.²⁰ Wood

¹⁵Weston and Bollier (2013).

¹⁶Ibid., p. 239.

¹⁷Ibid., p. 242.

¹⁸Wood (2014a).

¹⁹Ibid., xviii.

²⁰Ibid., pp. 220–221.

recognises that the climate crisis demands broad system changing solutions. She suggests that ‘atmospheric trust litigation presents a macro-scope litigation approach to climate crisis focused on the atmosphere as a single asset in its entirety.’²¹ Under such an approach, atmospheric trust litigation ‘characterizes all nations on Earth as co-tenant sovereign trustees of that atmosphere, bound together in a property-based framework of corollary and mutual responsibilities.’²² Wood suggests: ‘As trustees, all nations owe a primary fiduciary obligation toward their citizen beneficiaries to restore atmospheric health’.²³ She observes: ‘Atmospheric trust litigation seeks to accomplish through decentralized domestic litigation, in countries across the globe, what has thus far eluded the international diplomatic treaty-making process: concrete requirements for emissions reduction.’²⁴

Wood considers the role of the judiciary in examining questions about atmospheric trust litigation: ‘Though climate crisis invokes complex science and policy concerns, the urgency in carbon reductions requires a decisive and straightforward approach that can be accomplished through atmospheric trust decrees emanating from courts worldwide.’²⁵ She commented:

Atmospheric trust litigation seeks a remedy that provides the macro relief necessary to effectuate the sovereign’s share of global emissions reduction. The remedy finds its side-walls in a declaratory judgment iterating the principles of law – which alone can greatly clarify government climate responsibility worldwide. Injunctive relief, however, remains necessary to force government action. Atmospheric trust litigation cases call for government trustees to develop an enforceable plan for reducing carbon emissions in accordance with the 6 percent prescription.²⁶

Wood suggests that atmospheric trust litigation is particularly helpful in addressing inter-generational justice. She reflects: ‘Worldwide, young people might feel as if they are locked in a heating greenhouse, their leaders poised to throw out the keys.’²⁷ She observes: ‘Courts stand as a last resort—but a resort nonetheless.’²⁸

Recognising resistance to climate litigation, Wood worries that ‘many of today’s judges show distaste and fatigue at the prospect of managing the complex details of a meaningful remedy.’²⁹ She comments: ‘When judges suggest that the task of carbon regulation should be left to the agencies or legislature, they remind everyone but themselves that, of course these branches vested with duty and expertise should act—but they have not, and their indolence will surely continue absent judicial

²¹*Ibid.*, p. 221.

²²*Ibid.*, p. 221.

²³*Ibid.*, p. 221.

²⁴*Ibid.*, p. 221.

²⁵*Ibid.*, p. 226.

²⁶*Ibid.*, pp. 226–227.

²⁷*Ibid.*, p. 229.

²⁸*Ibid.*, p. 229.

²⁹*Ibid.*, p. 256.

enforcement.³⁰ Wood is hopeful of a shift in the approach of the judiciary: ‘If there remains a habitable planet at the end of the century, it may be because extraordinary jurists across the world rose to their constitutional duties and vindicated the rights of the people as beneficiaries of Nature’s Trust—in solidarity with great legal thinkers that came before them, and in heroism to the ages.’³¹

Mary Christina Wood has considered the adaptation of her theories in respect of public trust to the context of Indigenous communities and climate change.³² She has told *Indian Country Today* that tribes are ‘co-tenants’ of natural resources under the Public Trust Doctrine and that the ‘climate crisis represents a realm in which a trust approach is most needed, because the states and federal government treat this as a political issue that they are free, in their discretion, to ignore.’³³ The atmospheric trust litigation in Alaska provides a useful case study of the application of the public trust doctrine to Indigenous rights and climate change.

Mary Christina Wood and Charles Woodward IV have also considered the inter-relationship between atmospheric trust litigation and the constitutional right to a healthy climate system.³⁴ The writers observed that courts were well situated to address environmental agencies ignoring the impact of carbon emissions: ‘If there remains a habitable planet at the end of the century, it may well be because extraordinary jurists across the world rose to their constitutional role and vindicated the rights of young people as beneficiaries of the public trust at a time when action could still be taken before climate tipping points rendered such efforts moot.’³⁵

It should be noted that, while the public trust doctrine is well entrenched in the United States jurisprudence, it has not necessarily taken root in some other jurisdictions. Notably, Australia has not recognised the public trust doctrine.³⁶ As a result, environmental defenders have had to rely upon alternative legal disciplines, when pursuing climate litigation in Australia.³⁷ Justice Rachel Pepper notes: ‘In Australia success in climate change litigation has largely been limited to challenging executive decision-making, primarily in administrative law proceedings by way of judicial review.’³⁸ That may well of course change and shift with legal innovation and creativity. Robert Cunningham has imagined a future in which climate litigation is commonplace, and the public trust doctrine has been reinvigorated in other jurisdictions, such as Australia.³⁹

³⁰*Ibid.*, p. 257.

³¹*Ibid.*, p. 257.

³²Wood (2014b).

³³Hansen (2014).

³⁴Wood and Woodward (2016).

³⁵*Ibid.*, p. 684.

³⁶See Coghill et al. (eds.) (2012).

³⁷Preston (2011).

³⁸Pepper (2016).

³⁹Cunningham (2017). See also Rogers and Maloney (2017).

2.2 *Climate Litigation as Regulation*

Another perspective approaches climate litigation as a means of encouraging climate regulation.

In her work on adjudicating climate change,⁴⁰ Hari Osofsky commented: ‘How quickly climate change creates impacts people care about and how different levels of governance around the world respond will determine what suits people are motivated to bring and their likelihood of success.’⁴¹ She suggested: ‘The less effective we are in addressing the issue of climate change, the more salient these actions will become.’⁴²

In a recent comprehensive study, Jacqueline Peel and Hari Osofsky consider the role of climate litigation in Australia and the United States.⁴³ The pair observed that ‘courtrooms have become a key battleground in the public debate over climate change around the world.’⁴⁴ Peel and Osofsky commented that ‘these lawsuits—brought by both those supporting climate change regulation and those fighting it—and the media attention surrounding them have shaped regulation in these countries directly through mandate and indirectly through influencing corporate behaviour and social norms.’⁴⁵ The pair provided an overview of the mixed results of the atmospheric trust litigation in the United States taken under the auspices of Our Children’s Trust:

In the United States, this doctrine varies from state to state, based on their common law traditions, and in some states is also viewed as part of constitutional or statutory law. Although a number of these lawsuits have already been dismissed, state courts in both Texas and New Mexico held in 2012 that the public trust protections could extend to the atmosphere. The ultimate resolution of these and other countries, and their regulatory influence, will become clearer as they continue through the courts.⁴⁶

Peel and Osofsky conclude that ‘climate change litigation in the United States and Australia has played a significant role in mainstreaming climate issues in regulatory and decision-making processes but a more limited one in transforming the underlying social, political, and economic structures that support a carbon intensive-system.’⁴⁷ The academics suggest: ‘Perhaps the most important role that climate change litigation can serve in this context is continuing to raise the difficult

⁴⁰Osofsky (2009).

⁴¹*Ibid.*, p. 384.

⁴²*Ibid.*, p. 384.

⁴³Peel and Osofsky (2015).

⁴⁴*Ibid.*, p. 15.

⁴⁵*Ibid.*, p. 15.

⁴⁶*Ibid.*, p. 82.

⁴⁷*Ibid.*, p. 354.

questions that governments and societies would seemingly prefer not to confront head-on.⁴⁸

Peel and Osofsky has also written about climate litigation in respect of climate adaptation.⁴⁹

The work of these authors is focused upon how climate litigation can result in a transition to a clean, green economy.

2.3 *The Right to a Healthy Environment*

There has also been significant work undertaken by David R. Boyd on constitutional law and the right to a healthy environment.⁵⁰ It is notable that a number of instances of climate litigation have raised larger questions about the relationship between constitutional law, the environment, and climate change. The case study of this very paper—atmospheric trust litigation in Alaska—certainly has a significant constitutional dimension, as well as a public trust line of argument.

In his introduction to the right to a healthy environment, David R. Boyd outlines the nature of the right: ‘The right to a healthy environment is intended to ensure that everyone has access to clean air, safe water, fertile soil, and nutritious food, as well as the conservation of biological diversity and ecosystem functions.’⁵¹ Boyd discusses how the right would operate in practice:

In practice, the right to a healthy environment includes both a substantive right to environmental quality and a suite of procedural safeguards to ensure that it is fulfilled, including the rights to information, to participate in decision making, and to seek remedies for past, present, or anticipated violations. The right establishes a corresponding obligation on governments to respect, protect, and fulfil it. Respecting the right means that governments cannot take actions that violate the right. Protecting the right requires governments to take steps to prevent third parties from violating it. Fulfilling the right involves taking positive steps to ensure that it is fulfilled, such as ensuring the provision of safe drinking water. Like all human rights, the right to a healthy environment needs to be enforceable to be effective.⁵²

He recognises that ‘like all human rights, it is not absolute but must be balanced with competing rights.’⁵³ Boyd insists that it is important that the right to a healthy environment is entrenched in national constitutions.

In his 2017 work, *The Rights of Nature*, David Boyd also considers the question of climate litigation in light of the rights of nature.⁵⁴ His work is particularly

⁴⁸Ibid., p. 354.

⁴⁹Peel and Osofsky (2015).

⁵⁰Boyd (2012, 2014, 2015a, b).

⁵¹Boyd (2012).

⁵²Ibid., p. 2.

⁵³Ibid., p. 3.

⁵⁴Boyd (2017).

interested in the development of trusts to protect nature. Boyd discussed the larger concept of the rights of nature: ‘The precise meaning and effects of recognizing the rights of nature will be worked out through community conversations, scholarly dialogue, public and political debates, negotiation, and, where necessary, litigation, just as all novel legal concepts evolve’.⁵⁵ Boyd commented: ‘It should be obvious that nature’s rights cannot be reconciled with endless economic growth, consumerism, unconstrained globalization, or laissez-faire capitalism’.⁵⁶ Boyd also noted: ‘We cannot continue to prioritize property rights and corporate rights, burn fossil fuels at current rates, or perpetuate today’s linear economy that treats nature as a commodity rather than a community’.⁵⁷

There has been much concern about the impact of climate change upon public health.⁵⁸ The United Nations Environment Programme has also been exploring the question of a right to a healthy environment.⁵⁹ John Knox, the United Nations Special Rapporteur on Human Rights and the Environment, is hopeful that the Human Rights Council will support his proposal for the recognition of a right to a healthy environment.⁶⁰

This genre of literature is helpful for making sense of climate litigation—particularly in Alaska, given the constitutional basis of the action in that jurisdiction.

2.4 *Human Rights*

Another distinctive theoretical theme in respect of climate litigation is the need to protect human rights.

Mary Robinson has framed the debate over climate change in larger terms in respect of international law, human rights, and climate justice.⁶¹ She has noted the rise of climate change-related lawsuits: ‘Many more rise, because the more we can have innovative litigation, the better’.⁶² She argued that climate justice should play a key part in the Paris Agreement 2015.

In a 2005 petition to the Inter-American Commission on Human Rights, the Inuit peoples claimed that United States greenhouse gases have an adverse impact on the

⁵⁵Ibid., p. 230.

⁵⁶Ibid., p. 230.

⁵⁷Ibid., p. 230.

⁵⁸Figueres (2017), McMichael et al. (2017), Watts et al. (2018).

⁵⁹United Nations Environment Programme (2017).

⁶⁰Knox (2018a, b).

⁶¹Robinson and Robinson (2012), Rimmer (2015a).

⁶²Mary Robinson Foundation—Climate Justice (2015).

human rights of Indigenous people.⁶³ Notably, there was a complaint that both the property rights and the intellectual property rights of Inuit people had been affected:

The Inuit's fundamental right to enjoy their personal property is violated because climate change has reduced the value of the Inuit's personal effects, decreasing the quality of food and hides, and damaging snowmobiles, dog sleds and other tools. Their right to cultural intellectual property is also violated, because much of the Inuit's traditional knowledge, a formerly priceless asset, has become frequently unreliable or inaccurate as a result of climate change.⁶⁴

The Petition contended: 'While there are local characteristics and differences within the broad ethnic category of "Inuit," all Inuit share a common culture characterized by dependence on subsistence harvesting in both the terrestrial and marine environments, sharing of food, travel on snow and ice, a common base of traditional knowledge, and adaptation to similar Arctic conditions.'⁶⁵ This petition did not proceed much further in terms of formal climate litigation. Nonetheless, it is a striking example of a human rights based approach to climate change in terms of international law.

In his work on the ethical tragedy of climate change, Stephen Gardiner has highlighted how dominant theoretical constructs struggle to comprehend climate change and account for factors such as intergenerational justice.⁶⁶ He stressed the importance of the 'task of bearing witness to serious wrongs even when there is little hope of change'.⁶⁷ Gardiner speaks about the importance of developing an ethics of transition: 'Though we may not yet know either what a fully ethical approach to climate would look like, or how to get there in the long term, visions of what might count in the near term are still of some value in holding us accountable.'⁶⁸ Gardiner emphasized that 'this is so even if all they do is remind us that what we do now falls far short of any morally defensible goal'.⁶⁹ In this context, there is a need to contemplate how climate litigation will consider the impact of climate change upon climate justice—including intergenerational justice and Indigenous rights.

Peter Lawrence from the University of Tasmania also emphasizes the importance of tackling the issue of what ethical obligations current generations have towards future generations in addressing the threat of climate change.⁷⁰ In particular, he

⁶³Inuit Petition to the Inter-American Commission on Human Rights to Oppose Climate Change Caused by the United States of America <http://www.inuitcircumpolar.com/inuit-petition-inter-american-commission-on-human-rights-to-oppose-climate-change-caused-by-the-united-states-of-america.html> Full petition <http://www.inuitcircumpolar.com/uploads/3/0/5/4/30542564/finalpetitionicc.pdf> Accessed 1 April 2018.

⁶⁴*Ibid.*

⁶⁵*Ibid.*

⁶⁶Gardiner (2011).

⁶⁷*Ibid.*, p. 437.

⁶⁸*Ibid.*, p. 437.

⁶⁹*Ibid.*, p. 437.

⁷⁰Lawrence (2014).

explores theories of intergenerational equity based upon notions of trusteeship and stewardship.⁷¹ Lawrence discusses how atmospheric trust litigation brings together public trust doctrine, human rights, and international environmental law.⁷² Lawrence observes: ‘While extension of the public trust doctrine to the atmosphere is likely to have mixed success—with cases likely to be appealed—use of the public trust doctrine has the potential to at least put political pressure on governments to take action on climate change in a manner which highlights the impact on future generations’.⁷³ He notes that a significant obstacle to human rights litigation to protect future generations would be the procedural and substantive issues associated with causation.

2.5 *Climate Litigation*

The Sabin Center for Climate Change Law at Columbia University provides a global observatory on developments in climate law and justice. The Center provides a systematic overview of climate litigation in the United States and elsewhere. The Director of the Sabin Center for Climate Change Law at Columbia University, Professor Michael Gerrard, and Gregory Wannier have reflected upon climate litigation in the United States:

The prospect of carbon liability in the United States is a relatively recent phenomenon. It is only in the last decade that US environmental lawyers and policy-makers have begun to turn their attention to climate change, as climate-related litigation has surged, government action on several fronts has begun, and climate change has generally been recognised as a factor to consider in decision-making across the economy.⁷⁴

Gerrard and Wannier noted that ‘some scholars have suggested that public trust principles present an opportunity for judges to hold governments accountable for their emissions’.⁷⁵ They observed: ‘Under such a hypothetical “atmospheric trust” theory, the atmosphere could be characterized as a national asset, which would then impose upon the Government an obligation to prevent waste of that asset.’⁷⁶ Under such an approach, ‘citizens could bring a suit either as a beneficiary of that trust, based on harms (health impacts etc.) felt from the Government’s failure to preserve the property; or as co-tenants of the trust, for failure by the Government to pay to preserve the property.’⁷⁷ There has also been dramatic developments in the

⁷¹*Ibid.*, p. 58.

⁷²*Ibid.*, p. 133.

⁷³*Ibid.*, p. 140.

⁷⁴Gerrard and Wannier (2012).

⁷⁵*Ibid.*, pp. 594–595.

⁷⁶*Ibid.*, p. 595.

⁷⁷*Ibid.*, p. 595.

European Union—with the Urgenda case in the Netherlands, currently under appeal.⁷⁸

In 2017, the Sabin Center for Climate Change Law at Columbia University and the United Nations Environment Programme published a map of global climate litigation.⁷⁹ The report considers the environmental, diplomatic and political circumstances that are making climate change litigation efforts especially important at the present matter. The report also provides a survey of climate change litigation and a discussion of evident and emerging trends. The report concluded:

Litigation has emerged as an important feature of ongoing efforts to promote climate change mitigation and adaptation efforts. This owes in large part to the growing number of national laws that address climate change directly and so provide footholds for litigants seeking to hold governments and private actors to account for obligations to mitigate or adapt. It also owes to the cohering role played by the Paris Agreement, which puts national laws and policies into a global context and thereby enables litigants to construe governments' commitments and actions as being adequate or inadequate.⁸⁰

There is a striking connection here made between climate litigation and the international context of the development of the Paris Agreement 2015.

The Sabin Center for Climate Change Law at Columbia University and the United Nations Environment Programme also considered the diversification of climate litigation, both in terms of the legal disciplines and the activities focused upon:

As climate change litigation has proliferated, it has addressed a widening scope of activities, ranging from coastal development to infrastructure planning to resource extraction—in effect tracing through legal efforts the long and varied list of ways in which climate change affects ecosystems, societies, and individuals' rights and interests. It has also encountered a growing list of legal issues, such as the causal showing required to establish liability and the relevance of the public trust doctrine to governments' approaches to climate change mitigation and adaptation. In addition to proliferating, climate change litigation also seems to be growing in ambition and effectiveness: cases across the world provide examples of litigants holding governments to account for the actions or inactions that bear upon those litigants' rights amid changes to weather and coastlines.⁸¹

The report, in other words, looks to the rise of further climate litigation—as the impacts of climate change become more apparent. There has also been an increasing ability to determine and attribute which nations and companies are responsible for damaging the climate.⁸²

⁷⁸*Urgenda Foundation v. Kingdom of the Netherlands* C/09/456689/HA ZA 13-1396 (District Court of the Hague, 24 June 2015).

⁷⁹United Nations Environment Programme and Sabin Center for Climate Change Law at Columbia University (2017).

⁸⁰*Ibid.*, p. 40.

⁸¹*Ibid.*, p. 40.

⁸²Editorial (The Guardian) (2017).

Michael Burger—the executive director of the Sabin Center for Climate Change Law at Columbia University—provided a further gloss on the study.⁸³ He noted: ‘We haven’t seen any major wins filed in actions against fossil fuel companies but there have been successes in lawsuits against governments.’⁸⁴ Burger explained the high representation of the United States in the study: ‘A lot of this legal action is in the US because America is a litigious society but also because there is such a partisan divide over the fundamental reality of climate change, which doesn’t really exist elsewhere in the world.’⁸⁵ He said: ‘The role of litigation will be different in each country but we will continue to see an increase in climate lawsuits that make explicit reference to the Paris Agreement.’⁸⁶ Burger commented: ‘Legal action will be used to stave off the worst aspects of climate change.’⁸⁷ He observed: ‘Litigation has been absolutely essential in instigating action in the US and elsewhere, and it will continue to be so.’⁸⁸

Reflecting upon the study, Erik Solheim, head of UN Environment, commented: ‘It’s patently clear we need more concrete action on climate change, including addressing the root causes and helping communities adapt to the consequences’.⁸⁹ He observed: ‘The science can stand up in a court of law, and governments need to make sure their responses to the problem do too.’⁹⁰

In the wake of the report, there was discussion as to whether there could be further action against banks, financial institutions, and corporations in the future as well.⁹¹ Brendan Sydes at Environment Justice noted: ‘There’s a whole international effort—a lot of energy and intellect is being poured into developing new legal remedies.’⁹² He contends that banks and other financial institutions that loan money to fossil fuel projects may also find themselves the subject of legal action. There has been larger debate within corporations law as to whether directors who fail to consider climate risks could be liable for breaching their directors’ duties.⁹³

⁸³Milman (2017).

⁸⁴Ibid.

⁸⁵Ibid.

⁸⁶Ibid.

⁸⁷Ibid.

⁸⁸Ibid.

⁸⁹Milman (2017).

⁹⁰Ibid.

⁹¹Klein (2017).

⁹²Ibid.

⁹³In Australia, there was a short-lived action against the Commonwealth Bank of Australia for allegedly failing to adequately disclose the risk climate change poses to its financial position: Younger (2017). The action was withdrawn after the Commonwealth Bank of Australia published a new study on climate risks: Environmental Justice Australia (2017). There is a new action in 2018 by Mark McVeigh against the superfund REST for not having a plan to address climate risks: Slezak (2018).

There has been an experimentation with climate litigation in New Zealand as a means of pushing for government climate action.⁹⁴

From a Canadian perspective, there was also a strong interest in the rise in climate litigation.⁹⁵ Andrew Gage from West Coast Environmental Law observed: ‘I have no doubt that this type of litigation is going to happen, because as the climate costs more and more, people are going to be demanding that someone pays for the costs.’⁹⁶ Stepan Wood, a Professor at the Allard School of Law at the University of British Columbia, commented: ‘I don’t think there’s anybody in the legal community who would bet against some kind of litigation being launched in Canada, against either government or emitters, in the near future.’⁹⁷ The Bank of England’s Mark Carney has warned that ‘such claims could come decades in the future, but have the potential to hit carbon extractors and emitters — and, if they have liability coverage, their insurers — the hardest.’⁹⁸

There has been predictions that such climate litigation will become much more commonplace in the future.⁹⁹

3 *Nelson Kanuk v. State of Alaska*

In the case of *Kanuk v. State of Alaska*, Nelson Kanuk led a challenge to the Government of Alaska under the Constitution of the State of Alaska¹⁰⁰ and the public trust doctrine.¹⁰¹

The six plaintiffs were Nelson Kanuk of Kipnuk, who was 16 years old at the time suit was filed; Adi Davis and Katherine Dolma of Homer, both then 15; Ananda Rose Ahtahkee Lankard of Anchorage, then nearly one; and Avery Mozen and Owen Mozen of McCarthy and Anchorage, then 10 and 7, respectively.

On the 11 August 2011, Nelson Kanuk made a declaration as part of the atmospheric trust litigation.¹⁰² He testified that he was an Alaskan Native; a member of the Yup’ik Eskimo Tribe; and a resident of Kipnuk, Alaska. Nelson Kanuk observed that he was inspired to become a member of Kids vs. Global Warming, after hearing Alec Loorz speak at the Association of Alaska Student Governments in Cordova, Alaska.

⁹⁴*Thomson v Minister for Climate Change Issues* [2017] NZHC 733 (2 November 2017) <http://www.nzlii.org/nz/cases/NZHC/2017/733.html>; Cann (2017) and Greenpeace New Zealand (2017).

⁹⁵Ballingall (2017).

⁹⁶*Ibid.*

⁹⁷*Ibid.*

⁹⁸Carney (2015).

⁹⁹The Economist (2017).

¹⁰⁰For a history of the Alaska State Constitution, see McBeath (2011).

¹⁰¹*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁰²‘Our Children’s Declaration of Nelson Kanuk’, Appellants’ Supplemental Excerpts of Record, 11 August 2011, 275–280.

Nelson Kanuk declared: 'I am afraid that my family, village and culture will all be harmed by climate change.'¹⁰³ He explained his involvement in the atmospheric trust litigation: 'I am taking a stand against climate change because of the impacts to my village that I have already experienced and the future impacts that I know will happen if we do not do something about climate change now.'¹⁰⁴ Kanuk observed: 'I want to make a difference, I want to make a significant contribution to my village and Alaska, and I need help in doing so.'¹⁰⁵

Kanuk explained the personal impacts he faced in respect of climate change:

I have been personally affected by climate change due to warming temperatures, delayed onset of winter and sea ice formation, permafrost thaw, increased flooding and erosion. Climate change has adversely affected me and impacted my life by delaying the onset of winter. For example, in Kipnuk, the snow used to start falling earl[ier] than it does now. Also, the sea starts forming later than in the past and melts earlier in the spring. Although this might not seem to be too significant, it is critically important for me, my village and our way of life. One of the reasons the snow and ice are important is because sea ice protects us from storms. Without the ice, the storms pose more danger for us.¹⁰⁶

Moreover, Kanuk commented that 'climate change also adversely affects my Native Culture and way of life.'¹⁰⁷ He noted that 'we live a subsistence lifestyle, whereby my family and others in our village hunt and gather food from the land and sea.'¹⁰⁸ Kanuk explained that 'because the sea ice is forming later in the year and melting earlier the following spring, we have to change where and when we hunt.'¹⁰⁹ Nelson Kanuk concluded: 'I am doing this because when I am an elder, I hope that the generations that come next will get to enjoy the natural resources that we all share today, will be able to stay here in our Native villages and will be able to continue practicing our culture and traditions.'¹¹⁰ Nelson Kanuk has also appeared in a short documentary about the climate litigation.¹¹¹

There were also declarations by other members of the litigation. Adi Davis declared: 'I am taking a stand against climate change because of the impacts to me and my hometown'.¹¹² Adi Davis highlighted the personal impacts of erosion, retreating glaciers, and air pollution resulting from forest fires.

Katherine Dolma also expressed concerns about the impact of climate change upon her environment.¹¹³

¹⁰³Ibid.

¹⁰⁴Ibid.

¹⁰⁵Ibid.

¹⁰⁶Ibid.

¹⁰⁷Ibid.

¹⁰⁸Ibid.

¹⁰⁹Ibid.

¹¹⁰Ibid.

¹¹¹Witness (2011).

¹¹²'Our Children's Declaration of Adi Davis', Appellants' Supplemental Excerpts of Record, 11 August 2011, 281–282.

¹¹³'Our Children's Declaration of Katherine Dolma', Appellants' Supplemental Excerpts of Record, 11 August 2011, 283–286.

As parent and guardian of Ananda Lankard, Glen ‘Dune’ Lankard declared: ‘I am bringing the foregoing action on behalf of my daughter to protect her right to a clean and healthful environment, her future quality of life and opportunities in Alaska and because climate change is affecting Ananda and her family, traditions, culture and way of life.’¹¹⁴ He noted that Ananda is an Alaskan Native and a member of the Eyak Athabascan Tribe. Lankard observed: ‘Ananda’s village and traditional homelands are being subjected to increased flooding and storms in the Gulf due to climate change.’¹¹⁵

As parent and guardian of Avery and Owen Mozen, Howard Mozen also provided a declaration about the matter.¹¹⁶ He commented: ‘I am bringing the foregoing action on behalf of my children to protect their right to a clean and healthful environment and their future quality of life and opportunities in Alaska.’¹¹⁷ Mozen commented: ‘Due to their mother’s work as a ranger and the presentations that she regularly gives, Avery and Owen really understand the connection between atmospheric pollution and climate change so it makes them very upset that we are polluting the atmosphere.’¹¹⁸

3.1 *The Superior Court of Alaska*

The climate litigation in *Kanuk v. The State of Alaska* revolved around the public trust doctrine and the Alaska Constitution.¹¹⁹ Article VIII, Section 2 of the Alaska Constitution observed: ‘The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.’ Article VIII, Section 3 states ‘Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use.’ Article VIII, Section 6 provides: ‘Lands and interests therein, including submerged and tidal lands, possessed or acquired by the State, and not used or intended exclusively for governmental purposes, constitute the public domain.’

The plaintiffs asked the superior court for a declaratory judgment holding (1) that ‘the atmosphere is a public trust resource under [a]rticle VIII [of the Alaska Constitution],’ which (2) the State ‘has an affirmative fiduciary obligation to protect

¹¹⁴‘Our Children’s Declaration of Glen “Dune” Lankard’, Appellants’ Supplemental Excerpts of Record, 11 August 2011, 287–289.

¹¹⁵*Ibid.*

¹¹⁶‘Our Children’s Declaration of Glen “Dune” Lankard’, Appellants’ Supplemental Excerpts of Record, 11 August 2011, 290–292.

¹¹⁷*Ibid.*

¹¹⁸*Ibid.*

¹¹⁹Alaska Constitution, adopted by the Constitutional Convention, 5 February 1956, ratified by the People of Alaska, 24 April 1956, and Operative with the Formal Proclamation of Statehood, 3 January 1959 <http://ltgov.alaska.gov/services/alaskas-constitution/>.

and preserve,’ and (3) that the State ‘has failed to uphold its fiduciary obligations.’¹²⁰ They also asked the court to declare that the parameters of the State’s duty to protect the atmosphere are (4) ‘dictated by the best available science and that said science requires carbon dioxide emissions to peak in 2012 and be reduced by at least 6% each year until 2050,’ and (5) that the duty is ‘enforceable by citizen beneficiaries of the public trust.’¹²¹ Finally, the plaintiffs asked the court to order the State (6) ‘to reduce the carbon dioxide emissions from Alaska by at least 6% per year from 2013 through at least 2050,’ and (7) ‘to prepare a full and accurate accounting of Alaska’s current carbon dioxide emissions and to do so annually thereafter.’¹²²

In 2012, the Superior Court of Alaska—the third judicial district at Anchorage—dismissed the lawsuit.¹²³ The Superior Court Judge Sen. K. Tan noted that ‘this is a lawsuit about climate change’.¹²⁴ The judge summarized the arguments of the plaintiffs:

In the Amended Complaint, each Plaintiff alleges that he or she has been affected by climate change and/or global warming. For example, Nelson Kanuk from Kipnuk alleges that he has been personally affected by climate change in the form of erosion from ice melt and flooding from increased temperatures, because his village was flooded in 2008, causing his family and others to evacuate their homes. Mr Kanuk also alleges that he has been harmed because the decline of animal life and receding glaciers negatively impact his ability to enjoy and pass on his family’s history, traditions, and culture.¹²⁵

The judge concluded that the causes of action in the amended complaint were non-justiciable.

The judge considered the approach for identifying political questions adopted by the Supreme Court of the United States in *Baker v. Carr*,¹²⁶ and then applied in Alaskan courts.¹²⁷

The judge considered the precedent of *Native Village of Kivalina v. ExxonMobil Corporation*, which found that ‘certain questions are political as opposed to legal, and thus, must be resolved by the political branches rather than by the judiciary’.¹²⁸ In this matter, the federal district court dismissed a suit by the Native Alaskan Village of Kivalina against a large number of oil companies based on lack of standing. Randall Abate has considered the precedent of *Kivalina v. ExxonMobil Corporation*.¹²⁹ In this case, the plaintiffs were Inupiat Eskimos and residents of a

¹²⁰*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²¹*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²²*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²³*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²⁴*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²⁵*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹²⁶*Baker v. Carr* 369 US 186 (1962).

¹²⁷*Abod v. League of Women Voters of Alaska* 743 P. 2d 333 (1987).

¹²⁸*Native Village of Kivalina v. ExxonMobil Corporation* 663 F. Supp. 2d 863 (N.D. Ca. 2009).

¹²⁹Abate (2008).

village, which was being adversely affected by the melting of Arctic sea ice. The group sued to recover damages from the impacts of climate change, which had been caused by the petrochemical company's actions. The action was filed under public nuisance under federal common law and under state common law, and sought damages for the contributions of the companies to climate change, which had caused severe harm to the village.

In the *Kanuk* case, the judge said: 'This court finds the United States District Court's decision in '*Kivalina*' is instructive in that it specifically addresses the justiciability of a claim based on harm resulting from global warming'.¹³⁰ The judge commented:

In *Kivalina*, the Native Village of Kivalina ("the Village") brought suit against twenty-four defendants, all oil, energy, and utilities companies, seeking damages under the federal common law of nuisance for the defendants' alleged contributions to "excessive emission of carbon dioxide and other greenhouse gases" alleged to be causing global warming. In that case, the court dismissed the Village's claims, holding that the Village "lacked standing both on the basis of the political question doctrine and based on their inability to establish causation under Article III."¹³¹

The judge noted that in the *Kivalina* case the court held that the allocation of fault and cost of global warming was best left for determination by the executive or legislative branch.

The judge was unreceptive to arguments about the public trust doctrine. The judge noted: 'Historically, the public trust doctrine has applied to things that are corporeal, such as land, minerals, wildlife, and water.'¹³² The judge observed: 'Even assuming that the public trust doctrine applies, it is even less clear what legal standards would be applied'.¹³³ Judge Sen. K. Tan commented:

It is not the judiciary's role to determine whether the State of Alaska should reduce carbon dioxide emissions by 6% each year from 2013 till 2050. As recognized by other courts, the judiciary is ill-equipped to make such policy decisions, especially when plaintiffs urge this court to base its decision solely on the 'best available science,' rather than on a consideration of numerous competing factors.¹³⁴

The judge maintained that agencies were better placed to address such questions as climate action: 'Indeed, through the rulemaking process, agencies regularly solicit information and advice from experts in sectors of the community that may be potentially affected.'¹³⁵

¹³⁰*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹³¹*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹³²*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹³³*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹³⁴*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

¹³⁵*Kanuk v. State of Alaska* (2012), Case No. 3AN-11-07474CI.

3.2 Appellants

In the opening brief, the appellants argued that ‘humanity, and especially Our Children and future generations, face an atmospheric crisis of epic proportions.’¹³⁶ They maintained:

Our Children, whose ages range from an infant to teenagers, seek to change this through application of the public trust doctrine, as provided for in Article VIII of the Alaska Constitution, to the atmosphere. The public trust doctrine is a legal mandate establishing a sovereign obligation in states to hold critical natural resources in trust for the benefit of its citizens. The theory underlying the public trust doctrine can be traced to ancient times, where the things which are naturally everybody’s, such as ‘air, flowing water, the sea, and the sea-shore’ were codified in Roman law.¹³⁷

The appellants cited landmarks in the history of the public trust doctrine—from Roman law,¹³⁸ the Supreme Court of the United States,¹³⁹ and the Supreme Court of Alaska.¹⁴⁰

The appellants observed: ‘Our Children seek declaratory and equitable relief against the State for breach of its public trust obligations stemming from Article VIII’.¹⁴¹

The appellants argued that the Superior Court erred by failing to declare that the atmosphere is a public trust resource, which must be protected for present and future generations under Article VIII of the Alaska Constitution. The appellants maintained that determining whether the atmosphere is a public trust resource and must be protected are questions for the court. The appellants argued that the atmosphere is a public trust resource. Indeed, ‘the public trust doctrine is not static concept but instead must evolve to meet the changing conditions and needs of the public it was created to benefit and protect.’¹⁴² The appellants insisted: ‘It is also in the best interest of the sovereign and the citizens to apply the public trust doctrine to the atmosphere.’¹⁴³ The appellants insisted that the state has an affirmative fiduciary obligation to preserve and protect the atmosphere. In any case, the appellants contended that the superior court must consider the children’s complaint, irrespective of whether the atmosphere is a public trust resource.

The appellants also maintained that the Superior Court erred by determining that the children’s claims were non-justiciable. The appellants regarded the Superior

¹³⁶Appellant opening brief in *Kanuk et al. v. State of Alaska* (2014), 1, <http://www.courtrecords.alaska.gov/webdocs/outreach/docs/scf2013-barrow-appellant-brief.pdf>.

¹³⁷*Ibid.*, 3–4.

¹³⁸Caesar Flavius Justinian.

¹³⁹*Illinois Central R.R. Co. v. Illinois*, 146 U.S. 387 (1892).

¹⁴⁰*CWC Fisheries, Inc. v. Bunker*, 755 P.2d 11 15 (Alaska 1988).

¹⁴¹Appellant opening brief in *Kanuk et al. v. State of Alaska* (2014), 4, <http://www.courtrecords.alaska.gov/webdocs/outreach/docs/scf2013-barrow-appellant-brief.pdf>.

¹⁴²*Ibid.*, pp. 18–19.

¹⁴³*Ibid.*, p. 20.

Court's reliance on *Kivalina* as misplaced. The decision was distinguishable both factually and legally from the present case: 'Legally speaking, a claim brought pursuant to the public trust doctrine is fundamentally different from a nuisance claim.'¹⁴⁴ The appellants also maintained that judicially discoverable and manageable standards existed for determining Our Children's Public Trust claims. The appellants commented:

[T]he superior court's responsibility is that it must uphold the law, which in this case is the State's fiduciary duty to protect and preserve the trust asset. That duty is a judicial decision different from any policy decision that would need to be made by a political branch.¹⁴⁵

The appealed concluded: 'Given Our Children's assertion in their complaint that the best available science dictates that CO₂ in the atmosphere must be reduced below 350 ppm in order to protect and preserve the atmosphere and that the State is doing nothing to control GHG emissions, the answer to the superior court's inquiry is obvious—the State has breached its fiduciary duty.'¹⁴⁶

3.3 *Amicus Curiae Briefs*

After Mary Christina Wood responded to his article, 'The Threat to the Planet',¹⁴⁷ climate Scientist James Hansen has played an active part in atmospheric trust litigation.¹⁴⁸

James Hansen also made an amicus curiae brief to support the appeal of Nelson Kanuk:

Our Children's requested relief in this case seeks to ensure that the State of Alaska Department of Natural Resources ("the State") in this matter reduces CO₂ emissions at levels consistent with returning to 350 ppm by 2100. That prescription is consistent with scientific understanding of what is minimally needed to avert truly dangerous climate change and preserve the physical status quo of a habitable climate system. In light of the fact that further delay vastly increases the risk of irretrievable damage to the climate system, action now is essential.¹⁴⁹

The amicus brief concluded: 'Systematic reductions in CO₂ emissions, for the reasons provided by Dr. Hansen in his work cited throughout this amicus brief, must be undertaken in conjunction with reforestation so as to return the

¹⁴⁴Ibid., p. 32.

¹⁴⁵Ibid., p. 41.

¹⁴⁶Ibid., p. 42.

¹⁴⁷Hansen (2006).

¹⁴⁸Wallace-Wells (2017).

¹⁴⁹James Hansen, 'Brief of Amicus Curiae in Support of Appellants in *Nelson Kanuk v. State of Alaska*', 14 November 2012.

concentration of CO₂ in the atmospheric to a level no higher than 350 ppm by the end of the century, if not sooner.¹⁵⁰ This brief stressed that ‘the failure to commence CO₂ reductions without further delay, and to undertake other measures consistent with the prescription developed by Dr. Hansen and others, and advanced in these proceedings by Our Children, would consign our children and their progeny to a very different planet, one far less conducive to their survival.’¹⁵¹ The brief generally discusses the science of climate change. The brief of James Hansen was not particularly focused on climate change in Alaska.

James Hansen has been an enthusiastic supporter of climate litigation.¹⁵² He is of the firm conviction that climate litigation in the courts is an important means of action in the democratic process. Hansen has maintained that ‘Climate change is a human rights issue.’¹⁵³ He noted: ‘We are seeing injustice against the young’.¹⁵⁴ In his view, ‘The present generation has a responsibility to future generations.’¹⁵⁵

The Alaska Inter-Tribal Council made an amicus curiae brief. The group emphasized:

AITC is greatly concerned about the impacts of global warming on their members. Living in the Arctic and sub-Arctic regions of Alaska, their members experience daily the effects of global warming, including thinning sea ice, increased coastal erosion, melting permafrost, and changes in plant and animal distributions. Global warming *is* depleting the subsistence resources of the members of AITC and threatening their health and safety. As a result, the members of AITC have an interest in ensuring that the State of Alaska takes the urgent action needed to reduce carbon dioxide (CO₂) emissions to the greatest degree possible.¹⁵⁶

The Council contended that global warming threatened the physical and cultural survival of Alaskan natives. The Council noted that ‘this case involves the State of Alaska’s duty to reduce CO₂ emissions, the greenhouse gas that is the primary contributor to anthropogenic global warming’.¹⁵⁷ The Council emphasized: ‘Nowhere are the effects of those emissions more severe than in the Arctic.’¹⁵⁸ The Council stressed that ‘Alaska has been characterized as the “canary in the coalmine” for global warming-polar sea ice is melting, glaciers are receding, and permafrost is melting’.¹⁵⁹ The Council noted: ‘At stake is the physical and cultural survival of

¹⁵⁰Ibid.

¹⁵¹Ibid.

¹⁵²Watts (2017b).

¹⁵³Ibid.

¹⁵⁴Ibid.

¹⁵⁵Ibid.

¹⁵⁶The Alaska Inter-Tribal Council, ‘Brief of Amicus Curiae Alaska Inter-Tribal Council in Support of Appellants in *Nelson Kanuk v. State of Alaska*’, 5 December 2012, <http://www.courtrecords.alaska.gov/webdocs/outreach/docs/sc12013-barrow-amicus-brief-aitc.pdf>.

¹⁵⁷Ibid.

¹⁵⁸Ibid.

¹⁵⁹Ibid.

Alaska's Native people and communities'.¹⁶⁰ The Council observed: 'Reducing the greenhouse gas emissions in Alaska is a critical step in ensuring the survival of Alaska's Native communities.'¹⁶¹

A group of law professors—including Mary Christina Wood, Maxine Burkett, Joseph Sax, Gerald Toress, Burns Weston and others—made an amicus brief submission in the dispute between Nelson Kanuk and the Government of Alaska.¹⁶² The scholars and academics argued that state governments have a fundamental duty to 'protect the public's crucial assets from irrevocable damage' and that the atmosphere is a 'quintessentially public resource subject to government stewardship.'¹⁶³ The academics stressed that the court had a role under the public trust doctrine to require agencies to protect nature's trust:

The public trust doctrine is an inalienable attribute of sovereignty that requires government to act to prevent irrevocable harm to crucial natural resources owned in trust on behalf of the people. State governments are sovereign co-trustees of the nation's atmosphere and bear the fiduciary obligation to take expedient action to protect the atmosphere from dangerous greenhouse gas pollution so that it will continue to support the survival and welfare of present and future generations of citizens.¹⁶⁴

The professors concluded: 'The public trust doctrine plainly applies to protect the nation's air and atmosphere, both of which are crucial resources needed for the survival and welfare of present and future generations.'¹⁶⁵ The professors insisted: 'Government co-trustees thus owe a fiduciary obligation under the public trust doctrine to take immediate action to abate dangerous greenhouse gas pollution that threatens the air, atmosphere, and climate system.'¹⁶⁶ The law professors warned that 'by sitting idle in the face of a calamitous planetary ecological crisis,' state governments are 'abdicating their constitutional responsibilities as sovereign trustees to protect the climate for today's citizens and for future generations.'¹⁶⁷

3.4 *The State of Alaska*

In response to the lawsuit, Seth Beausang, a lawyer for the state of Alaska, told the National Public Radio: 'But the state has almost no control over the concentration

¹⁶⁰Ibid.

¹⁶¹Ibid.

¹⁶²Brief of Amici Curiae Law Professors in Support of the Appellants in *Nelson Kanuk v. Alaska*, 14 December 2012, <http://www.courtrecords.alaska.gov/webdocs/outreach/docs/sci2013-barrow-amicus-brief-lp.pdf>.

¹⁶³Ibid.

¹⁶⁴Ibid.

¹⁶⁵Ibid.

¹⁶⁶Ibid.

¹⁶⁷Ibid.

of greenhouse gases in the atmosphere because that is determined by global emissions of greenhouse gases.’¹⁶⁸ He insisted: ‘We say it is more consistent with democratic principles for Alaska’s elected representatives to be making policy in this area.’¹⁶⁹ Beausang foreshadowed the argument of the State of Alaska: ‘We think the Legislature and the governor should be making policy, not a single superior court judge.’¹⁷⁰

Assistant Attorney General Seth Beausang argued the case for the state:

My argument is not that that nothing can be done to stop global warming. It’s just that it shouldn’t happen in the context of a lawsuit. Where I think it should happen is at the political level, so if people are concerned about climate change, you know, they should get involved. And, you know, we live in a democracy and you should get as involved as you possibly can.¹⁷¹

In the brief of the appellee, the State of Alaska defended itself against the arguments of Nelson Kanuk and others.¹⁷² In the statement of its class, the State of Alaska maintained that climate policy was a matter for the legislature:

Reducing greenhouse gas emissions is one of the most complex and consequential policy issues now before the country, requiring the balancing of competing environmental, economic, and other interests. Plaintiffs believe the solution to this complex problem is for the State to mandate a six percent reduction in greenhouse gas emissions every year until 2050. And they believe that of the three branches of government it is the judiciary that should establish that policy. The Superior Court was correct to dismiss Plaintiffs’ complaint because it raises political questions.¹⁷³

The State of Alaska, though, is somewhat reticent as to whether it has taken sufficient action in respect of greenhouse gas emissions in order to tackle the impacts of climate change. The ‘balancing’ metaphor is also a curious in terms of addressing climate policy action.

First, the State of Alaska argued that the Supreme Court was correct in its finding that the complaint was barred by the political question decision.

Second, the State of Alaska said that the court should affirm dismissal of the complaint because the plaintiffs’ claims are barred by sovereign immunity.

Third, the State of Alaska emphasized that the court should also affirm the dismissal of the complaint because the plaintiffs’ public trust doctrine claim was meritless in its view.

Finally, the State of Alaska also maintained that the court should affirm the dismissal of the plaintiffs’ complaint because in its view the plaintiffs’ lack standing.

¹⁶⁸Ronco (2013).

¹⁶⁹Ibid.

¹⁷⁰Ibid.

¹⁷¹Hsieh (2013).

¹⁷²‘Brief of Appellee in *Kanuk v State of Alaska*’, 12 March 2013, <http://www.courtrecords.alaska.gov/webdocs/outreach/docs/scl2013-barrow-appellee-brief.pdf>.

¹⁷³Ibid., p. 2.

3.5 Decision

In September 2014, the Supreme Court of Alaska affirmed the lower court's dismissal of the action, but found that it had erred in its interpretation of the public trust doctrine.¹⁷⁴ The presiding judge was the Hon. Peter Maassen—who had been appointed to the bench in August 2012. Originally from Michigan, Maassen spent most of his career in private practice in Anchorage.

In the Supreme Court of Alaska, Maassen J summarized the case in these terms:

The appellants in this case are minors from communities across Alaska who claim that the State has violated its duties under the Alaska Constitution and the public trust doctrine by failing to take steps to protect the atmosphere in the face of significant and potentially disastrous climate change. The minors argue that the superior court erred when it dismissed their complaint on grounds that their claims were not justiciable — specifically, that the claims involved political questions best answered by other branches of state government. On that basis we affirm the dismissal of the claims asking the court to set specific standards for carbon dioxide emissions and to order the State to implement reductions in accordance with those standards.¹⁷⁵

Moreover, Maassen J found:

The minors also sought a declaratory judgment on the nature of the State's duty to protect the atmosphere; the claims for declaratory relief do not present political questions. We nonetheless affirm their dismissal, because in the absence of justiciable claims for specific relief, a declaratory judgment will not settle the parties' controversy or otherwise provide them with clear guidance about the consequences of their future conduct.¹⁷⁶

First, on the question of standing, the court held: 'Under our well-established doctrine of interest-injury standing, the plaintiffs have standing to bring suit against the State on the claims alleged in their complaint.'¹⁷⁷

Second, addressing the question of sovereign immunity, the court found that the plaintiffs' claims were not barred: 'In this case, the plaintiffs' public trust claims requested only declaratory and equitable relief—not damages—and *Brady* does not control. *Brady* cannot reasonably be read as holding that violations of the public trust doctrine are without remedy, as the State would have it.'¹⁷⁸

Third, the court held that some of the plaintiff's claims were justiciable under the political question doctrine but some were not. The judge observed: 'The limited institutional role of the judiciary supports a conclusion that the science- and policy-based inquiry here is better reserved for executive-branch agencies or the legislature, just as in *AEP* the inquiry was better reserved for the EPA'.¹⁷⁹ Thus it found: 'The superior court thus did not err when it concluded that three of the

¹⁷⁴*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁷⁵*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁷⁶*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁷⁷*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁷⁸*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

¹⁷⁹*Kanuk v. State of Alaska, Department of Natural Resources* 335 P. 3d 1088 (2014).

plaintiffs' claims—(1) that the State's duty to protect the atmosphere is "dictated by best available science," (2) that "best available science" requires annual reductions of 6% in the State's carbon dioxide emissions until 2050, and (3) that the State must annually account for carbon dioxide emissions statewide—should be dismissed as non-justiciable'.¹⁸⁰

Fourth, the court recognised that it was within the judicial competence of the court to consider claims in respect of the public trust: 'Our case law traces the public trust doctrine to "historic common law principles governing the sovereign's authority over management of fish, wildlife and water resources," principles our framers "constitutionalized" in Alaska's common use clause, article VIII, Section 3: "Whenever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use."' ¹⁸¹

Finally, the court declined to provide declaratory relief to Nelson Kanuk and the others, observing:

Their request for a judgment that the State "has failed to uphold its fiduciary obligations" with regard to the atmosphere cannot be granted once the court has declined, on political question grounds, to determine precisely what those obligations entail. As for the remaining claims — that the atmosphere is an asset of the public trust, with the State as trustee and the public as beneficiaries — the plaintiffs do make a good case. The Alaska Legislature has already intimated that the State acts as trustee with regard to the air just as it does with regard to other natural resources. We note, however, that our past application of public trust principles has been as a restraint on the State's ability to restrict public access to public resources, not as a theory for compelling regulation of those resources, as the plaintiffs seek to use it here.¹⁸²

The judge commented: 'Although declaring the atmosphere to be subject to the public trust doctrine could serve to clarify the legal relations at issue, it would certainly not "settle" them'.¹⁸³ The judge observed: 'It would have no immediate impact on greenhouse gas emissions in Alaska, it would not compel the State to take any particular action, nor would it protect the plaintiffs from the injuries they allege in their complaint'.¹⁸⁴ Maassen J found: 'Declaratory relief would not tell the State what it needs to do in order to satisfy its trust duties and thus avoid future litigation; conversely it would not provide the plaintiffs any certain basis on which to determine in the future whether the State has breached its duties as trustee'.¹⁸⁵ 'In short, the declaratory judgment sought by the plaintiffs would not significantly advance the goals of "terminat[ing] and afford[ing] relief from the uncertainty, insecurity, and controversy giving rise to the proceeding" and would thus fail to serve the principal prudential goals of declaratory relief.'¹⁸⁶

¹⁸⁰Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸¹Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸²Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸³Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸⁴Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸⁵Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸⁶Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

The judge also found that there could be the potential for a future challenge:

We also observe that if the plaintiffs are able to allege claims for affirmative relief in the future that are justiciable under the political question doctrine, they appear to have a basis on which to proceed even absent a declaration that the atmosphere is subject to the public trust doctrine. In their complaint they allege that the atmosphere is inextricably linked to the entire ecosystem, and that climate change is having a detrimental impact on already-recognized public trust resources such as water, shorelines, wildlife, and fish.¹⁸⁷

Those statements do leave the way open for the reformulation of the case.

3.6 Responses to the Decision

In response to the ruling, Our Children's Trust issued a declaration about the ruling of the Supreme Court of Alaska.¹⁸⁸ The group observed: 'While falling short of granting the relief sought by the youth, the Court wrote that the youth "make a good case... that the atmosphere is an asset of the public trust, with the State as trustee and the public as beneficiary"'.¹⁸⁹

Brad De Noble—an attorney—reflected: 'The Court did some really good things in this decision today by ruling that people have the right to be in court because of harms from climate disruption and by underscoring the importance of the constitutional public trust doctrine'.¹⁹⁰ He noted: 'We will ask the Court to reconsider their essential role in enforcing the public trust'.¹⁹¹ Brad De Noble commented: 'The Court agrees that the legislative and executive branches must protect all public trust resources, but when those branches fail to meet their fiduciary duty to do so, it has always been up to the courts to intervene'.¹⁹² He noted: 'That is why our founders created the judiciary in the first place, as a check on the other branches'.¹⁹³ Brad De Noble observed that there would be further consideration of such matters: 'So, we will ask the Court to reconsider its essential role in enforcing the state's public trust fiduciary responsibility as it relates to the atmosphere'.¹⁹⁴

The lead plaintiff, Nelson Kanuk, commented upon the outcome of the dispute:

When our legislature and executive aren't doing anything, where else can we turn? And how long must we wait and watch our ice melt and our food sources diminish? What if the political will comes when it's too late? The Court should not wait to be a check on the other

¹⁸⁷Kanuk v. State of Alaska, Department of Natural Resources 335 P. 3d 1088 (2014).

¹⁸⁸Our Children's Trust (2014).

¹⁸⁹Ibid.

¹⁹⁰Our Children's Trust (2014) and Rosen (2014).

¹⁹¹Ibid.

¹⁹²Ibid.

¹⁹³Ibid.

¹⁹⁴Ibid.

branches of government after it's too late to matter. This is their moment and we'll keep asking until someone answers with the help we need.¹⁹⁵

Julia Olson, the Executive Director and Chief Legal Counsel of Our Children's Trust, reflected upon the decision: 'In response to the Court's decision, Alaska youth will redouble their efforts to have the State of Alaska set meaningful standards to protect the atmosphere and stabilize the climate in accordance with the science of renowned climate scientist James Hansen.'¹⁹⁶ She commented: 'The Alaska decision is one important step forward, with much more work to be done to uphold these young people's rights.'¹⁹⁷ Olson observed that there would be a wave of other climate litigation across the United States: 'Youth around the country are asking their governments to protect their futures against climate disruption'.¹⁹⁸ In her view, 'It may take the U.S. Supreme Court to finally decide the fate of our children and grandchildren.'¹⁹⁹ The lawyers signalled that they would take future action in the matter.²⁰⁰

4 Petition 2017 and *Esau Sinnok v. the State of Alaska*

In the face of government inaction on climate change, there has been a tradition of citizen petitions in respect of climate change. There was previously an Inuit petition in the Inter-American Commission on Human Rights in respect of Indigenous rights and climate change.²⁰¹ In Australia, there was a Monster Climate Petition in 2014, which demanded immediate and effective action to significantly reduce carbon emissions and help secure a safe and healthy future for Australia.²⁰² There have been other examples of climate petitions. Following in this tradition, Our Children's Trust sought to develop a youth-based climate petition in Alaska.

In the summer of 2016, 'the Our Children's Trust team is currently drafting a petition for rulemaking asking the Alaska Department of Environmental Conservation (DEC) to adopt GHG emissions limits, in order to put Alaska on the

¹⁹⁵Rosen (2014).

¹⁹⁶Our Children's Trust (2014).

¹⁹⁷Ibid.

¹⁹⁸Ibid.

¹⁹⁹Ibid.

²⁰⁰Rosen (2014).

²⁰¹Inuit Petition to the Inter-American Commission on Human Rights to Oppose Climate Change Caused by the United States of America <http://www.inuitcircumpolar.com/inuit-petition-inter-american-commission-on-human-rights-to-oppose-climate-change-caused-by-the-united-states-of-america.html> Full petition <http://www.inuitcircumpolar.com/uploads/3/0/5/4/30542564/finalpetitionicc.pdf>.

²⁰²1 Million Women (2014).

global climate stabilization trajectory'.²⁰³ The team is arguing: 'Pursuant to Alaska statutes, the DEC has "primary responsibility" for the adoption and enforcement of regulations regarding Alaska's natural resources "to the end that the state may fulfill its responsibility as trustee of the environment for the present and future generations."'”²⁰⁴

4.1 *The Petition*

In 2017, Brad De Noble submitted a petition on behalf of Youth Petitioners and Alaska Youth for Environmental Action to the Alaska Department of Environmental Conservation in respect of Alaska's climate inaction.²⁰⁵ This petition was brought by '15 Alaskan youth who reside in 12 communities across the state, ranging in age from 5 to 21 years old'.²⁰⁶ The petition noted: 'Each petitioner is already experiencing the alarming and substantial impacts of a changing climate resulting from increasing levels of CO₂ in the atmosphere.'²⁰⁷ The petition highlighted the impact of climate change upon the petitioners: 'Between them, these 15 youth Petitioners are experiencing a host of alarming impacts, including, but not limited to, loss of important glacier ecosystems; changing availability of subsistence resources like shellfish, caribou, and seal; ocean acidification; increasing health impacts, including asthma; more frequent and severe heatwaves and wildfires; loss of traditional knowledge due to the rapid change from environmental conditions experienced by previous generations; and an urgent need to relocate entire communities due to sea level rise, storm surges, and permafrost melt.'²⁰⁸ Of particular note, from an intellectual property perspective, is the emphasis upon the impact of climate change upon traditional knowledge.

The petition asked 'the Alaska Department of Environmental Conservation ("the Department") for the adoption of a regulation under the Department's authority and pursuant to its obligations under the Constitution of the State of Alaska, the Public Trust Doctrine, and statutes and regulations, to protect the rights and common welfare of present and future generations of Alaskans by implementing an enforceable, effective carbon dioxide ("CO₂") and GHG reduction strategy that is based on the best climate science and is aimed at ensuring that Alaska does its part to restore the concentration of CO₂ in the atmosphere to 350 parts per million ("ppm") by 2100.'²⁰⁹ Brad De Noble contended: 'Such a rule is necessary in order

²⁰³Our Children's Trust, Alaska. <https://www.ourchildrenstrust.org/alaska/> Accessed 1 April 2018.

²⁰⁴Ibid.

²⁰⁵De Noble (2017).

²⁰⁶Ibid., p. 5.

²⁰⁷Ibid., p. 5.

²⁰⁸Ibid., p. 5.

²⁰⁹Ibid., p. 1.

to ensure that the worst impacts of climate change and ocean acidification are avoided and do not cause further catastrophic and irreversible harm to present and future generations of Alaskan youth.²¹⁰ The attorney stressed: ‘The goal of this rule is to protect the rights of present and future generations of all Alaskans, including Alaska Natives, to a healthy atmosphere and stable climate system, and to safeguard their inheritance of the legacy and heritage of the State of Alaska.’²¹¹

The petition observed that there would be five benefits arising for the development of such a rule. First, the rule would ‘fulfill the State’s Public Trust obligation to prevent waste and substantial impairment of trust resources.’²¹² Second, the rule would help ‘achieve Alaska’s constitutional “principles that all persons have a natural right to life, liberty, [and] the pursuit of happiness...[and] that all persons are equal and entitled to equal rights, opportunities, and protection under the law.”’²¹³ Third, the rule would ‘realize Alaska’s constitutional obligation “to secure and transmit to succeeding generations our heritage of political, civil and religious liberty”’.²¹⁴ Fourth, the rule would help ‘carry out the Department’s statutory duty “to conserve, improve, and protect [Alaska’s] natural resources and environment and control water, land, and air pollution, in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well-being”’.²¹⁵ Fifth, the rule would ‘fulfill the Department’s statutory duty to “manage the basic resources of water, land, and air to the end that the state may fulfill its responsibility as trustee of the environment for the present and future generations.”’²¹⁶

The petition demands that ‘the Department shall regulate stationary and mobile sources of CO₂ emissions and the extraction of fossil fuels within the State of Alaska.’²¹⁷ The petition asked that the Department engage in carbon accounting to Alaska citizens of its management of atmospheric trust assets. The petition asked that these reports include an accounting and inventory for each and every substantial source of greenhouse gas emissions within Alaska. The petition asked: ‘Within six months of adoption of these regulations, the Department, with input from stakeholders, shall adopt a Climate Action Plan to meet the reduction requirements specified herein.’²¹⁸ The petition also had provision for revision of the rule—two years after the effective date of the regulations, and every five years thereafter until 2050. Moreover, the petition called for recommendations to the Alaska Legislature: ‘Promptly after the adoption of these regulations, the

²¹⁰Ibid., p. 1.

²¹¹Ibid., p. 1.

²¹²Ibid., p. 1.

²¹³Ibid., pp. 1–2.

²¹⁴Ibid., p. 2.

²¹⁵Ibid., p. 2.

²¹⁶Ibid., p. 2.

²¹⁷Ibid., p. 3.

²¹⁸Ibid., p. 3.

Department shall recommend to the Legislature the adoption of a statute requiring the emissions reductions, interim benchmarks, carbon accounting and inventory, and Climate Action Plan required hereby.’²¹⁹

In terms of the public comments of the petitioners, there was a discussion of the legal framework; the factual background in respect of climate change and Alaska; and the failure of Alaska to address its equitable share of the climate crisis.

The submission highlights the impacts of climate change upon Alaska’s Native Communities. The petition discusses how vulnerable Indigenous communities are to climate change impacts:

Climate change impacts observed by Alaska Native communities, including thinning sea and river ice, thawing permafrost, changes in human, plant, and animal health and lives, and rising sea levels, ‘indicate a widespread awareness that climate is changing in ways that were not anticipated based on traditional knowledge.’ Changes in sea and river ice have affected the fishing and hunting of traditional animals, which is important both ‘nutritionally and culturally.’ ‘Changing sea ice patterns affect the animals themselves as well as access to them by hunters.’ Thinning sea and river ice has made fishing and hunting marine animals, like walrus and seals, more dangerous and difficult, while also changing migratory patterns.²²⁰

Moreover, the submission discusses how climate change is impacting the health and livelihoods of many Alaska native communities. Of the myriad of the impacts threatening Alaska, the displacement of Indigenous people and the village relocation issue is a striking problem.

The petition contends that the best climate science provides a prescription for restoring the atmosphere, stabilizing the climate system, and protecting the oceans from acidification and warming.

The petition documents the failure of Alaska to address its equitable share of the climate crisis. Indeed, the petition condemns the state of Alaska for exacerbating the climate crisis. The petition laments the long period of climate inaction:

Government-requested, Alaska-specific, climate change assessments have been conducted for over 15 years—all of which indicate that State GHG emissions must be reduced to mitigate against climate change—and ADEC, the state administrative agency tasked with promulgation of regulations for the protection and conservation of the environment and human health and welfare, long-ago went on record as having the authority and owing the duty to regulate Alaska’s GHG emissions. Still, Alaska does not have so much as a climate action plan. No more assessment is needed before action can begin. ADEC has the authority, wherewithal, support, and—most importantly—*duty* to protect Alaskans from further suffering and devastation caused by climate change. ADEC can and should adopt the proposed emissions reduction rule.²²¹

The petition emphasizes that Alaskan politicians have been repeatedly warned about climate change impacts. The petition stresses that the State of Alaska has a duty to prevent greenhouse gas caused damage. Moreover, it is discussed how

²¹⁹Ibid., p. 4.

²²⁰Ibid., p. 67.

²²¹Ibid., p. 93.

climate change regulation would be economically viable. Furthermore, Alaska has the resources and the structure to act.

DEC Commissioner Larry Hartig denied the request on legal and economic grounds, maintaining ‘The extent of emission reductions proposed in the petition would have significant consequences for employment, resource development, power generation, health, culture, and other economic and social interests within the state.’²²² The rejection of this youth petition has triggered another climate action.

Subsequently, in November 2017, Alaska Governor Bill Walker signed an administrative order that established the Alaska Climate Change Strategy and Climate Action for Alaska Leadership Team.²²³

4.2 Esau Sinnok v the State of Alaska

Building upon the petition, Brad De Noble has brought a new climate action against the State of Alaska.²²⁴

The lead plaintiff Qagǵigluilaq, given name Esau Sinnok, is an Iñupiaq Eskimo from the island of Shishmaref, Alaska. He is nineteen years old and has dedicated much of his life to climate advocacy. He has been an Arctic Youth Ambassador, attended national and international climate conferences including COP 21, and has worked closely with Alaska Youth for Environmental Action. Esau Sinnok attends the University of Alaska, Fairbanks, where he is pursuing degrees in tribal management and Alaska Native studies. Esau Sinnok told the media about the climate litigation:

Being involved with this case is one step to tell the Alaska state government that we need to act on climate change and stop the use of fossil fuels. The state is putting the short-term interest of the oil and gas industry above those of Alaskan youths’ future.²²⁵

Sinnok observed: ‘My home in the next few decades will be gone, the island will be underwater.’²²⁶ He pleaded: ‘I don’t want that for any other communities here in Alaska.’²²⁷

The complaint highlights how climate change is affecting Esau Sinnok’s homelands:

²²²Haecker (2017).

²²³Ibid.

²²⁴Complaint in *Sinnok v. The State of Alaska* (2017), Superior Court for the State of Alaska, Third Judicial District at Anchorage, Case No. 3AN-17 <https://www.courthousenews.com/wp-content/uploads/2017/10/Alaska-Youth-Climate-COMPLAINT.pdf>.

²²⁵Kahm (2017).

²²⁶Ibid.

²²⁷Ibid.

Climate change is already harming, and threatens the very existence of Esau's home village and native culture. Esau's people have inhabited the lands on and around the island of Shishmaref for over 4000 years. However, as a result of climate change the land on which Shishmaref sits is eroding into the ocean. Sea ice around Shishmaref has historically been a buffer against storms, storm surges, and flooding. However, climate change is resulting in loss of sea ice around Esau's village.²²⁸

The complaint notes: 'Combined with climate change induced sea level rise, more frequent and intense storm surges and floods are eroding the island of Shishmaref and contributing to the accelerating thaw of the permafrost underlying the community'.²²⁹ As a result, 'The village's homes and infrastructure are threatened by this erosion, which has taken as much as 15 meters of land overnight in a single storm'.²³⁰ The complaint commented: 'Already, 19 homes have had to be relocated away from the eroding coastline to other parts of the island'.²³¹

Andrew Welle, an attorney with Our Children's Trust, added: 'Native culture is such an important facet of life in Alaska'.²³² He commented: 'Some of their rights are fundamentally threatened by climate change. It does play into our constitutional argument. It fundamentally changes these plaintiffs' cultural identities'.²³³

The complaint stresses that the 'Youth Plaintiffs depend on vital natural resources to exercise their inherent rights; these vital natural resources are and will continue to be adversely impacted by excessive human-caused emissions of carbon dioxide ("CO₂")'.²³⁴

The complaint particularly highlights the relationship between place and culture. The submission notes: 'Alaska's climate system, land, water, fish, and wildlife has sustained Alaska Native communities and cultures for thousands of years'.²³⁵ The submission stressed: 'As a result of climate change, these lands, waters, fish, and wildlife, and the climate system are being disrupted and changing in ways that were not anticipated based on traditional knowledge'.²³⁶ The complaint notes that 'natural conditions increasingly no longer correspond with traditional knowledge'.²³⁷ The action observes: 'As a result, Native knowledge and traditions are increasingly at risk of being lost'.²³⁸ The complaint comments: 'Alaska Native subsistence lifestyles, traditions, and practices, and the species they depend on, are

²²⁸Ibid.

²²⁹Ibid.

²³⁰Ibid.

²³¹Ibid.

²³²Ibid.

²³³Ibid.

²³⁴Complaint in *Sinnok v. The State of Alaska* (2017), Superior Court for the State of Alaska, Third Judicial District at Anchorage, Case No. 3AN-17 <https://www.courthousenews.com/wp-content/uploads/2017/10/Alaska-Youth-Climate-COMPLAINT.pdf>.

²³⁵Ibid., p. 66.

²³⁶Ibid., p. 66.

²³⁷Ibid., p. 66.

²³⁸Ibid., p. 66.

important both nutritionally and culturally for Alaskan Native culture and wellbeing.²³⁹

The action has five causes of action. This action considers some other elements of the Alaska Constitution. First, the complaint alleges a Violation of the Youth Plaintiffs' Substantive Due Process Rights under the Alaska Constitution, Article I, Section 7. Second, the complaint alleges that State-created danger violates Youth Plaintiffs' Due Process Rights under the Alaska Constitution, Article I, Section 7. Third, there is an argument that there was a violation of the Equal Rights, Opportunities, and Protection under the Alaska Constitution, Article I, Section 7. Fourth, there was a complaint of a violation of the public trust doctrine. Fifth, it is argued that the DEC and Commissioner Hartig's denial of the youth plaintiffs' petition violated the Youth Petitioners' Constitutional Rights.

It will be interesting to see whether this next wave of climate litigation is successful in Alaska.

4.3 *Federal Discussion of Climate Change and Alaska*

In addition to the State discussions in respect of climate change, there has also been a lively debate at a Federal level about fossil fuels, climate change, and the State of Alaska.

In 2014, the time of the litigation by Nelson Kanuk, the United States Government under the leadership of President Barack Obama undertook a National Climate Assessment.²⁴⁰ Obama commented on the findings of the report:

What they found was unequivocally that climate change is not some far-off problem in the future. It's happening now. It's causing hardship now. It's affecting every sector of our economy and our society—more severe floods, more violent wildfires. It's already costing cities and states and families and businesses money.²⁴¹

The study provided a breakdown of climate impacts in particular sectors and regions in the United States.

The National Climate Assessment also highlights that climate change poses particular threats to Indigenous Peoples' health, well-beings, and ways of life.²⁴² The report noted that 'chronic stresses such as extreme poverty are being exacerbated by climate change impacts such as reduced access to traditional foods, decreased water quality, and increasing exposure to health and safety hazards.'²⁴³ Indeed, the National Climate Assessment warned: 'Particularly in Alaska, the rapid

²³⁹Ibid., p. 66.

²⁴⁰The National Climate Assessment, Alaska (2014); and Melillo et al. (eds) (2014).

²⁴¹Obama (2014).

²⁴²Melillo et al. (eds) (2014, p. 17).

²⁴³Ibid.

pace of temperature rise, ice and snow melt, and permafrost thaw are significantly affecting critical infrastructure and traditional livelihoods.²⁴⁴

For its part, the National Climate Assessment highlighted how Alaska was particularly vulnerable and exposed to the impacts of climate change.²⁴⁵ In its overview, the National Climate Assessment provided a stark portrait of the state of Alaska:

Alaska has warmed twice as fast as the rest of the nation, bringing widespread impacts. Sea ice is rapidly receding and glaciers are shrinking. Thawing permafrost is leading to more wildfire, and affecting infrastructure and wildlife habitat. Rising ocean temperatures and acidification will alter valuable marine fisheries.²⁴⁶

The report emphasized that ‘the cumulative effects of climate change in Alaska strongly affect Native communities, which are highly vulnerable to these rapid changes but have a deep cultural history of adapting to change.’²⁴⁷

The National Climate Assessment commented:

Alaska is home to 40% of the federally recognised tribes in the United States. The small number of jobs, high cost of living and rapid social change make rural, predominantly native, communities highly vulnerable to climate change through impacts on traditional hunting and fishing and cultural connection to the land and sea.²⁴⁸

The National Climate Assessment discussed the complexity of climate adaptation for Indigenous communities in Alaska:

Traditional knowledge now facilitates adaptation to climate change as a framework for linking new local observations with western science. The capacity of Alaska Natives to survive for centuries in the harshest of conditions reflects their resilience. Communities must rely not only on improved knowledge of changes that are occurring, but also on support from traditional and other institutions—and on strength from within—in order to face an uncertain future.²⁴⁹

The report noted: ‘Permanent infrastructure and specified property rights increasingly constrain people’s ability to safely use their environment for subsistence and other activities.’²⁵⁰

The National Climate Assessment on Alaska was highlighted in media, with reports that America’s Arctic Frontier looked particularly fragile and vulnerable.²⁵¹

Taking heed of this report, President Barack Obama visited Alaska during his Presidency to highlight the impact of climate change in 2015.²⁵² His Office of

²⁴⁴Ibid.

²⁴⁵The National Climate Assessment, Alaska (2014), and Chapin et al. (2014).

²⁴⁶The National Climate Assessment, Alaska (2014).

²⁴⁷Melillo et al. (eds) (2014).

²⁴⁸Ibid.

²⁴⁹Melillo, Richmond, and Yohe (eds) (2014), 514–536 at 523.

²⁵⁰Ibid.

²⁵¹Thorsson (2014).

²⁵²The Obama White House (2015).

Science and Technology Policy Director John Holdren reflected upon his visit to Alaska with the President, with a number of his colleagues.²⁵³ He reflected: ‘In support of the President’s trip, I spent the past weekend making my own stops in Alaska to learn more about how climate change is already affecting local communities and ecosystems, and to engage with Alaskans working to tackle climate-related challenges.’²⁵⁴ Holdren commented:

Alaska represents the frontlines of our fight against climate change. What my OSTP colleagues and I saw and heard over the weekend has powerfully augmented our understanding of the range of dramatic impacts that climate change is having on ecosystems and communities in the far North. I believe that the stops that President Obama is making in Alaska this week—including a historic visit to the Alaskan Arctic—will further underscore for the Nation the importance of taking strong action to combat climate change now.²⁵⁵

He noted that the team met with ‘the mayors of Anchorage, Fairbanks, the Northwest Arctic Borough, and other Alaskan municipalities, as well as with officials of Federal departments and agencies with office in Alaska, to talk about their efforts to prepare for and adapt to climate change, and the ways in which the Federal government can best support them.’²⁵⁶

In contrast, the new United States President Donald Trump has promoted fossil fuel exploitation in Alaska. For instance, in 2017, he issued the petroleum company Eni US a permit to explore for oil in the Beaufort Sea in Federal waters.²⁵⁷ President Donald Trump has also withdrawn the United States from the Paris Agreement 2015.

In August 2015, there was a new piece of atmospheric trust litigation against the Federal Government in the United States.²⁵⁸ Led by Kelsey Juliana, 21 young people from across the filed a constitutional climate change lawsuit against the federal government in the U.S. District Court for the District of Oregon.²⁵⁹ In addition, climate scientist James Hansen was a plaintiff, serving as guardian for future generations, Hansen’s granddaughter and Earth Guardians, representing young citizen beneficiaries of the public trust. The complaint asserted the federal government has violated the youth’s constitutional rights to life, liberty, property and has failed to protect essential public trust resources. The complaint laments that, despite its knowledge of climate change, the United States government has failed to take action: ‘Despite this knowledge, Defendants continued their policies and practices of

²⁵³Holdren (2015).

²⁵⁴Ibid.

²⁵⁵Ibid.

²⁵⁶Ibid.

²⁵⁷Gardner (2017).

²⁵⁸Our Children’s Trust, *Juliana v. U.S. Climate Lawsuit*, <https://www.ourchildrenstrust.org/us/federal-lawsuit/> Accessed 1 April 2018.

²⁵⁹*Juliana v. United States* (2016) Case No. 6:15-cv-01517-TC (D. Or), amended complaint <https://static1.squarespace.com/static/571d109b04426270152febe0/t/57a35ac5ebbd1ac03847eece/1470323398409/YouthAmendedComplaintAgainstUS.pdf>.

allowing the exploitation of fossil fuels.²⁶⁰ Oil companies sought to intervene in this dispute. However, they then tried to withdraw from the matter in 2017, at the stage of discovery. The Trump administration's procedural efforts to dismiss the action have been unsuccessful as of 2018. The matter can proceed to trial.

In addition to atmospheric trust litigation against state governments and the Federal Government in the United States, there has been a new interest in climate litigation against corporations in the United States. Notably, Naomi Klein has argued that, in spite of the *Kivalina* precedent, 'future plaintiffs may be more successful'.²⁶¹ She has contended: 'Just as tobacco companies have been obliged to pay the costs of helping people to quit smoking, and BP has had to pay for much of the cleanup of its oil spill in the Gulf of Mexico, it is high time for the industry to at least split the bill for the climate crisis.'²⁶²

This question has been brought into sharp focus by revelations by ExxonMobil had knowledge of climate change, but nonetheless sought to publicly cast doubt upon the existence of climate change, and thwart climate action. This scandal has been dubbed 'Exxon Knew'.²⁶³ Presidential Candidates Hillary Clinton and Bernie Sanders called for a Department of Justice investigation of ExxonMobil. Senator Sheldon Whitehouse from Rhode Island has contended that racketeering laws should be deployed against ExxonMobil. In 2017, New York Attorney General Eric Schneiderman threatened to bring an action against ExxonMobil over 'potentially false and misleading statements'.²⁶⁴ The new United States President Donald Trump is somewhat more sympathetic to the fossil fuel industry—having withdrawn from the Paris Agreement in 2017.

5 The Paris Agreement and Beyond

Climate litigation by Indigenous communities raises larger questions about the treatment of Indigenous rights under international law. There remains ongoing debate within the United Nations about the protection of Indigenous Intellectual Property and traditional knowledge.²⁶⁵ The United Nations Declaration on the Rights of Indigenous Peoples 2007 emphasized the importance of Indigenous self-determination and stewardship of the environment.²⁶⁶ The Anchorage Declaration 2009 sought to apply the declaration in the context of the struggle for

²⁶⁰Ibid.

²⁶¹Klein (2014, p. 112).

²⁶²Ibid., p. 112.

²⁶³Hall (2015).

²⁶⁴Flitter (2017).

²⁶⁵Rimmer (ed.) (2015b).

²⁶⁶United Nations Declaration on the Rights of Indigenous Peoples 2007, Adopted by General Assembly Resolution 61/295 on 13 September 2007.

Indigenous rights in an age of climate change.²⁶⁷ In this context, there has been a significant discussion of the need for greater protection and enforcement of Indigenous intellectual property, traditional cultural expressions, and traditional knowledge—including in respect of climate change and the environment.

Over a number of decades, there has been a discussion about the inter-relationship between intellectual property, traditional knowledge, access to genetic resources, and biodiversity, particularly in light of the Convention on Biological Diversity 1992 and the Nagoya Protocol 2010.²⁶⁸ There has been significant debate about the relationship between Indigenous Intellectual Property, Traditional Knowledge and Climate Change.²⁶⁹ There has also been significant discussion about Intellectual Property, Sustainable development, and Indigenous rights—particularly with the development of the UN Sustainable Development Goals 2015.²⁷⁰

The Paris Agreement 2015 touches upon the rights of Indigenous peoples and the protection of traditional knowledge, knowledge of Indigenous peoples, and local knowledge systems. There has been a debate about the implications of such text upon the treatment of traditional knowledge in the climate regime.²⁷¹

In the preamble, the Decision refers to ‘the rights of indigenous peoples’.²⁷² Clause 136 ‘recognizes the need to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change, and establishes a platform for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner.’²⁷³

Likewise, the Preamble to the Paris Agreement 2015 highlights the ‘rights of indigenous peoples’, amongst others:

Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.²⁷⁴

²⁶⁷Indigenous Peoples’ Global Summit on Climate Change, The Anchorage Declaration, 24 April 2009, <http://unfccc.int/resource/docs/2009/smsn/ngo/168.pdf>.

²⁶⁸Convention on Biological Diversity, opened for signature 5 June 1992, 1760 U.N.T.S. 79 (entered into force 29 December 1993); and Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity 2010, COP 10 Decision, (‘Nagoya Protocol’); and Lawson and Adhikari (ed.) (2018).

²⁶⁹Rimmer (2015c, d).

²⁷⁰UN Sustainable Development Goals 2015 <http://www.un.org/sustainabledevelopment/sustainable-development-goals/> Rimmer (2015e, 2018).

²⁷¹Savaresi (2018).

²⁷²The Paris Agreement 2015.

²⁷³Ibid.

²⁷⁴Ibid.

Paragraph 136 on Non-Party Stakeholders: ‘Recognizes the need to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change, and establishes a platform for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner.’²⁷⁵ The parties also agreed ‘to uphold and promote regional and international cooperation in order to mobilize stronger and more ambitious climate action by all Parties and non-Party stakeholders, including civil society, the private sector, financial institutions, cities and other subnational authorities, local communities and indigenous peoples.’²⁷⁶

Article 7.5 of the Paris Agreement 2015 makes a brief, passing reference to Indigenous Knowledge: ‘Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate’.²⁷⁷ However, there is no larger recognition here of Indigenous Intellectual Property, access to genetic resources, and benefit-sharing.

The approach to traditional knowledge and climate change in the Paris Agreement 2015 seems minimalist compared to the much more extensive contemplation of the issue—generally in the United Nations Declaration on the Rights of Indigenous Peoples 2007 and more specifically in the Anchorage Declaration 2009.

Indigenous communities and nations were frustrated and exasperated by the Paris Agreement 2015—both in procedural terms in respect of their participation in the negotiations, and substantive terms in relation to the final text of the international agreement.

There has been critical analysis of the treatment of Indigenous knowledge under the Paris Agreement 2015.²⁷⁸ Jean Foyer and David Dumoulin have observed that there is an ambiguous exchange in terms of traditional knowledge and the international climate negotiations: ‘If it can be interpreted as yet another example of the domination of the Western World over Indigenous cultures, it can also constitute an instrument of visibility and empowerment for Indigenous peoples that grants them better access to legitimacy, funding or rights.’²⁷⁹

Above and beyond climate litigation, there is a need to press for stronger protection of Indigenous rights in respect of climate change. There was certainly dismay from Indigenous communities in respect of the withdrawal of the United

²⁷⁵Ibid.

²⁷⁶Ibid.

²⁷⁷Ibid.

²⁷⁸Foyer and Dumoulin (2017); and Aykut et al. (2017).

²⁷⁹Foyer and Dumoulin (2017), p. 168.

States from the Paris Agreement 2015 in June 2017.²⁸⁰ While recognising that the Paris Agreement 2015 was imperfect, Indigenous leaders were nonetheless concerned about the consequences of the end of United States participation in the agreement. Tom BK Goldtooth, the executive director of the Indigenous Environmental Network, commented:

By abandoning the Paris Agreement, this administration will further perpetuate environmental racism and climate injustice against Indigenous peoples experiencing the worst effects of climate change across the globe. We've stated before that the Paris Agreement falls short of embracing the sort of climate solutions that lift up human rights and the rights of Indigenous peoples.²⁸¹

Lisa Deville, the President of the Protectors of Water and Earth Rights, added: 'We are living in a time that human rights are not equal to corporations, and those corporations are not responsible nor accountable to the people and communities they exploit.'²⁸²

At the climate talks in Bonn in 2017, there was greater recognition of Indigenous peoples.²⁸³ There was acknowledgment that countries 'should, when taking action to address climate change, respect, promote and consider their respective obligations on the rights of indigenous peoples and local communities.'²⁸⁴ Moreover, there was a recommendation for greater participation of indigenous communities in 'leadership roles' in climate policy.²⁸⁵

Another important context is the United Nations Declaration on the Rights of Indigenous Peoples 2007 and the Anchorage Declaration 2009. In October 2017, United Nations Rapporteur Victoria Tauli-Corpuz stressed that global leaders need to do more protect threats to Indigenous people, their land, and their way of life.²⁸⁶ She contended: 'Indigenous people's rights need to be protected in the best way possible, not just for them but because they are also able to provide solutions to many of the world's problems from climate change to biological diversity.'²⁸⁷ Tauli-Corpuz observed: 'It is in the self interest of states and even corporations in the medium and long term to protect and listen to these people—the question is, will they realise this in time?'²⁸⁸ She maintained:

²⁸⁰Indigenous Environmental Network (2017).

²⁸¹Ibid.

²⁸²Ibid.

²⁸³Watts (2017a); and Fiji Momentum for Implementation 2017, Decision 1/ CP.23, 18 November 2017, <http://unfccc.int/resource/docs/2017/cop23/eng/113.pdf>.

²⁸⁴Ibid.

²⁸⁵Ibid.

²⁸⁶Taylor (2017).

²⁸⁷Ibid.

²⁸⁸Ibid.

Indigenous peoples are the best guardians of world's biodiversity. They are the most effective stewards of these key areas. The needs of these indigenous people are converging with the wider environmental needs to protect these areas.²⁸⁹

Tauli-Corpuz has emphasized that the implementation of the United Nations Declaration on the Rights of Indigenous Peoples 2007 is an important means of protecting the human rights of Indigenous people and communities in an age of climate change and capitalism.²⁹⁰

In her work on climate justice and human rights, Tracey Skillington contends that there is a need for Indigenous communities to play a greater role in decision-making in international climate talks.²⁹¹ She observed: 'Consideration should be given to the possibility of establishing by way of an international deliberative forum, a fuller legal and political recognition of the entitlements of Indigenous communities to autonomy and self-determination, and tighter regulatory regime compelling states to respect such rights.'²⁹²

There is a need to better align biodiversity conservation efforts and climate action. The principles of access to genetic resources, informed consent, and benefit-sharing could certainly play a role in achieving better outcomes in this field. There is a need for better recognition of Indigenous Intellectual Property—including in respect of Indigenous environmental and climate knowledge. Increasingly, Indigenous communities will look to climate litigation in order to seek redress in respect of the harm sustained by climate change and global warming.

6 Conclusion

This Chapter has considered the emergence of climate litigation by Indigenous communities. The dispute between Nelson Kanuk and the State of Alaska is a striking case study in respect of climate change, intergenerational justice, and Indigenous rights. The new litigation between Esau Sinnok and the State of Alaska promises further refine and clarify issues in respect of climate change, human rights, and Indigenous interests. In the future, there is bound to be further climate litigation, especially as the Trump administration repeals and rescinds environmental regulations and climate protections instituted by the Obama administration. Sabina McCormick and her colleagues predict:

We suspect that climate change litigation is likely to increase if the Trump Administration continues to rescind protections adopted by the Obama Administration, particularly those based on EPA's regulatory authority under the CAA, or others such as the recent executive

²⁸⁹Ibid.

²⁹⁰Hill (2017).

²⁹¹Skillington (2017).

²⁹²Ibid., 136.

order that removed President Obama's mandate to consider climate change in infrastructure planning.²⁹³

In this context, the atmospheric trust litigation in Alaska and elsewhere is a useful precursor to a much more systematic pattern of climate litigation to address policy inaction by local, national, and federal governments. In other jurisdictions, Indigenous communities have also looked to litigation to address the impacts of climate change. In Australia, native title holders have challenged Adani's Carmichael coal project.²⁹⁴ Indigenous Pacific communities are also concerned about redress for the loss and damage wrought by climate change.²⁹⁵ The protection of Indigenous rights will remain an important outstanding issue in the wake of the Paris Agreement 2015. This will be a particularly important issue for Alaska and the Arctic region. The Inuk leader Sheila Watt-Cloutier from Kuujuaq, Quebec, has highlighted the linkages between climate change, human rights, and Indigenous peoples in the Arctic.²⁹⁶

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²⁹³McCormick et al. (2017).

²⁹⁴Robertson and Roe (2017) and Wahlquist (2017).

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