

International Law and Economics

Angelica Rutherford

Energy Security and Green Energy

National Policies and the Law of the WTO

International Law and Economics

Series Editors

Stefan Voigt, University of Hamburg, Hamburg, Germany

Anne van Aaken, University of St. Gallen, St. Gallen, Switzerland

Andrew T. Guzman, University of California at Berkley, Los Angeles, USA

Stefan Oeter, University of Hamburg, Hamburg, Germany

Joel P. Trachtman, Tufts University, Medford, USA

Naigen Zhang, Fudan University, Shanghai, China

The world has been experiencing a long period of globalization. At the same time, ever more international law has been created to deal with the many consequences of globalization such as problems of coordination, spillover effects across countries, the protection of foreign direct investment or the prosecution of crimes against humanity. To date, the economic analysis of international law has been lagging behind this development. This series aims at changing this by contributing to the understanding of international law. It strives to be a forum for contributions on all aspects of the economic analysis of international law ranging from the analysis of the genesis of international law, its ratification, its effects on government behavior, the means to monitor compliance to sanctions against actors not complying with the law.

More information about this series at <http://www.springer.com/series/13428>

Angelica Rutherford

Energy Security and Green Energy

National Policies and the Law of the WTO

Angelica Rutherford
The Law School
University of Huddersfield
Huddersfield, UK

ISSN 2364-1851 ISSN 2364-186X (electronic)
International Law and Economics
ISBN 978-3-030-45554-5 ISBN 978-3-030-45555-2 (eBook)
<https://doi.org/10.1007/978-3-030-45555-2>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

*To Monsignor Provost Peter Cookson
(in memoriam)
and
my beloved husband Marcus
with deep gratitude.*

Acknowledgements

The author would like to thank everyone who directly and indirectly contributed to this work. Special thanks go to the University of Huddersfield, the publisher, the editors, the energy experts in the UK and in Brazil who shared their views with me, the staff of the archives, Eddie Cawley and my dear family in Brazil and in the UK.

This work was supported by the Economic and Social Research Council [grant number ES/J500094/1].

Contents

1	Introduction	1
1	Introduction	1
1.1	Energy Security and Climate Change as Global Challenges	1
1.2	The Role of Green Energy in Tackling Climate Change	3
1.3	Green Energy and Energy Security Interplay in the Context of the Just Energy Transition	5
1.4	Understanding the Concept of Energy Security: Scholarly Views	6
2	The Point of Departure: Research Questions and Methodology	9
2.1	Research Questions	9
2.2	Methodology	11
3	The Task Being Tackled: Structure of the Monograph	17
	References	19
2	Energy Security and Green Energy in Great Britain: The Discourse of the Lights Going Out	25
1	Introduction	25
1.1	Aim and Contribution of the Chapter	25
1.2	Structure of the Chapter	26
1.3	Summary of Findings	26
2	Method	27
2.1	Sampling, Access and Recruitment of Participants	27
2.2	Data Collection	28
2.3	Data Analysis	30
2.4	Limitations and Caveats	31
3	“There Are All Sorts of Scales as to How We Define Green Energy”: Conceptualising Green Energy	32

4	The Empirical Definition of Energy Security in Great Britain	32
4.1	“We Can Get to a Lot of Places with Your Energy Security”	33
4.2	Contending Energy Security Indicators	37
4.3	The Emotive and Dynamic Nature of Energy Security	41
4.4	Complexity of Energy Security Construction: Summary and Importance of Findings	42
5	Energy Security and Energy Politicisation in GB	44
5.1	“It Is a Political Suicide for the Lights to Go Out”: Energy Politicisation in GB	44
5.2	Political Factors as Barriers for the Transition to a Green Energy System in GB	46
6	Analysing the Links Between Energy Security and Law and Policies on Green Energy Development	48
6.1	Analysing the Positive Frame	50
6.2	“Energy Security Is Being Used as a Stick to Beat Green Energy with”: Analysing the Negative Frame	51
6.3	Analysing the Emerging Frame: ‘Prosumers’ and Energy Security	53
7	Conclusion	56
	References	59
3	Energy Security and Green Energy in Brazil: The Discourse of Economic Development	65
1	Introduction	65
1.1	Aim and Contribution of the Chapter	65
1.2	Structure of the Chapter	66
1.3	Summary of Findings	67
2	Background to Energy Governance in Brazil	68
3	Method	69
3.1	Data Selection	69
3.2	Data Analysis	70
3.3	Translation	71
4	National Forces Influencing Green Energy Development	71
4.1	Energy Access	71
4.2	Economic Development	75
4.3	Environmental Matters	76
4.4	Climate Change	78
4.5	Social Issues	79
5	The Role Played by Energy Security in Green Energy Development	80
5.1	Energy Security and Green Energy During the 2001 Energy Crisis (2001–2002)	80
5.2	Energy Security and Green Energy in the Post-crisis Period (2003–2015)	86

6	Conclusions	95
	References	97
4	The Applicability of the Law of the WTO to Green Energy Security	103
1	Introduction	103
1.1	Aim and Contribution of the Chapter	103
1.2	Structure of the Chapter	105
1.3	Summary of Findings	105
2	The Nature of International Trade in Green Energy	105
3	Green Energy Trade and the Law of the WTO: An Overview	106
3.1	WTO Main Trade Obligations	107
3.2	Green Energy Trade and the Law of the WTO	107
4	Energy Security and Green Energy in the WTO Jurisprudence	109
4.1	Canada—Renewable Energy and Canada—Feed-In Tariff Programme	111
4.2	India—Solar Cells	113
5	Green Energy Security as a Justification for Trade Restrictive Measures	117
5.1	GATT Article III:8(a)	118
5.2	GATT Article XX	120
5.3	GATT Article XXI: National Security	126
5.4	Final Remarks on the Section	130
6	Proposal for Green Energy Security in the Law of the WTO	131
6.1	Proposal—The Way Forward	132
6.2	How to Implement the Proposal?	133
7	Conclusions	134
	References	137
5	Conclusion	141
1	Important Findings of the Study on Energy Security	141
2	Lessons from the Implications of Energy Security—Green Energy Links	143
3	Limitations and Future Avenues for Expanding This Research	147
	Appendix A	149
	Appendix B	151
	Appendix C	165

Chapter 1

Introduction



1 Introduction

1.1 Energy Security and Climate Change as Global Challenges

Energy is a multi-disciplinary research theme of pressing social relevance. Energy is an essential enabler of human wellbeing. It enables us to fulfil our basic human needs and is an indispensable catalyst of economic activity. Energy exists in various forms, such as heat, light and electricity, and is an essential part of maintaining our current, post-industrial revolution era, modern lifestyle. By waking up with a smartphone alarm clock, which is left charging overnight, turning the lights on and then the kettle to make a cup of coffee or tea in the morning, by using computers, tablets, microwave, refrigerators, cookers, toasters, dishwashers and a variety of available appliances throughout the day, by driving a car or taking a bus, train or aeroplane, for example, one cannot fail to notice that most of the objects we rely on in modern life are driven by energy. Being fundamental to the smooth running of contemporary societies, it is, therefore, of no surprise that energy is often said to be the lifeblood of modern society.

The fast pace of the present world involves the sizeable and continuous consumption of energy (Rüdiger 2008). According to the International Energy Agency (2018), in 2017 the world energy demand increased at twice the 2016 growth rate. Energy demand has greatly increased with the rise of emerging economies which have become major energy consumers, with China, India and other Asian economies now accounting for around two-thirds of the growth in energy consumption (BP 2018).

Population growth adds an additional stress on energy demand. According to the United Nations, the world population grows approximately by an additional 83 million people annually and is projected to increase by more than one billion people within the next 15 years, reaching 8.5 billion in 2030, and to increase further to

9.7 billion by 2050 (UN 2015). Furthermore, world GDP is forecasted to more than double by 2040, as more than 2.5 billion people are lifted from low incomes (BP 2018). Access to modern technological equipment by billions of new users will increase energy demand. The emergence of a large and growing middle class in the developing world is also an increasingly important force shaping energy trends (BP 2019). Thus, both population growth and increasing standards of living for many people in developing countries will substantially increase energy demand. BP's Energy Outlook (2018) reveals that energy demand will increase by around one third over the next 25 years, which is the equivalent of taking all of today's demand and adding another China and European Union to it (Dudley 2018).

While the world's energy needs continue to grow, almost one billion people—roughly one in seven, which represents more than the population of the whole of Europe—still live without electricity. The United Nations outlook for electrification (2018) shows that the world is not yet on track to achieve universal access by 2030, making affordable and clean energy one of the United Nations Sustainable Development goals.

Against this background of an overpopulated world avidly consuming energy which, at the same time, leaves almost one billion in energy poverty, fossil fuels continue to exert a stranglehold on the global economy, despite two oil crises in 1973 and 1979. The overall share of fossil fuels in the global energy demand in 2017 remained at 81%, a level that has remained constant for more than three decades despite growth in renewables (IEA 2018). Fossil fuels, nevertheless, are an exhaustible energy resource and the world is not in a position to maintain abundant fossil energy supplies. This means that sooner or later the world will face a global energy crisis, if non-fossil fuels energy sources are not widely deployed. All of these factors have amplified concerns about security of energy supply and have challenged the world's capacity to deal with the risks of global fuel shortages and interruptions in energy supply.

In tandem with energy security challenges are climate change—driven by global warming—and other environmental challenges. Global climate change as well as air pollution, water availability and quality, land-use change and biodiversity loss are strongly associated with energy security. For instance, water is used for energy and energy is used for water. Thermal power generation and hydropower generally require large quantities of water (UN World Water Assessment Programme 2015). Hydroelectric power, for example, is a form of energy generated through the use of the gravitational force of falling or flowing water (Manglik and Ram 2015). Shrinking water supplies, therefore, can cause serious energy security concerns. In 2015, drought in Brazil depleted reserves at its hydroelectric plants, leaving power generation at precariously low levels (Watts 2015). Conversely, energy is required for the collection, treatment and delivery of water (UN World Water Assessment Programme 2015). In Texas, for instance, energy production consumes enough water to provide for the needs of approximately 3 million people, while the energy used for water treatment could provide enough power for about 100,000 people (Stillwell et al. 2011). Energy is also the largest source of air pollution in many countries,

especially in emerging countries, and this is the reason for several millions of deaths in developing countries (IEA 2016a, b).

Effects of climate change can itself disrupt energy systems as in 2016, when interconnectors between France and Britain were partially severed during Storm Angus (Gosden 2016). Moreover, climate change can have a negative effect on biofuel feeder crop production. For instance, the record storms and floods in the Midwest of the United States in June 2008 struck at the heart of America's grain belt at a time when the United States had become more reliant on corn-based ethanol for its fuel supply (Umbach 2012).

Climate change is also likely to exacerbate resource scarcity, amplifying water scarcities and loss of agricultural production (NIC 2008) whilst aggravating food insecurity as a result. The effects of climate change on crop and food production are already being felt in several regions of the world (IPCC 2014). In 2008, 21 countries with a combined population of about 600 million were considered to be either cropland or freshwater scarce (NIC 2008). The combined effects of climate change and the increased demand for food production are likely to alter the productivity and distribution of the world's 'bread-basket' regions and accelerate soil degradation in previously fertile areas (DCDC 2010). In this context, climate-induced weather patterns could play a greater role in food prices (NIC 2008). In 2018, the heatwave across Europe, considered the driest summer in Britain, for example, pushed up food prices in the United Kingdom (UK), as a result of farmers struggling to raise crops (Wood and Butler 2018).

The current forecasts for rising sea levels due to climate change will severely impact territories, such as Tuvalu, Kiribati, and the Marshall Islands in which the current predicted sea level rise of 2 m by 2100 would mean the submersion of these States by the Pacific Ocean (Marra et al. 2015). Moreover, the spread of infectious disease, stimulation of mass migration and extreme weather events are all acknowledged as consequences of climate change. The potential for disaster is well recognised. According to scientists, in order to lower the risk of impacts on natural and human systems from global warming, current emissions of greenhouse gasses need to be reduced by 80% by the year 2050 and lowered to zero sometime after that. In recognition of this situation, 195 countries adopted the Paris Agreement in December 2015 with the aim of strengthening the global response to climate change by 'holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels'.

1.2 The Role of Green Energy in Tackling Climate Change

Current energy systems are considered the largest single source of greenhouse gas emissions from human activities and the latest report from the Intergovernmental Panel on Climate Change (IPCC) now projects that by mid-century the majority of primary energy must come from non-fossil fuels if we are to keep warming below

1.5 or even 2° (IPCC 2018). The need for a fundamental transformation of the global energy system via the scaled-up deployment of non-fossil fuels technologies is widely accepted. However, how the decarbonisation of the energy system will take effect is uncertain. While some scholars advance studies of the feasibility of 100% renewable technologies (Jacobson et al. 2017), others argue that it is extremely difficult to achieve complete decarbonisation of the energy system, even when using every current technology and tool available, including energy efficiency, wind, hydroelectric, bioenergy, nuclear and solar energy as well as carbon capture and storage (Clack et al. 2017).

Also, competing with a scenario of high renewable energy share (Creutzig et al. 2017), there are scholarly analyses proposing a large role for nuclear energy in the mitigation of greenhouse gas emissions (Berger et al. 2017). Nonetheless, the global energy market at the moment is still monopolised to a great extent by the production, trade, and consumption of oil and gas (IEA 2016a, b) and the International Energy Agency (2018) estimates show that global energy-related CO₂ emissions reached a historic high in 2017.

Nonetheless, the mitigation of global warming produced by emissions from burning fossil fuels has become a significant issue in many parts of the world with a focus on limiting humanity's carbon footprint. Green energy promotion worldwide has been driven in great part as a necessary measure to mitigate climate change, and formed part of countries broader strategies to cut carbon emissions. The Climate Change Act 2008 in the UK, for example, established a legally binding target to reduce the UK's greenhouse gases emissions to at least 80% lower than the 1990 baseline by 2050, and the decrease in emissions since 2017 has been largely attributed to a change in the fuel mix for electricity generation, with less use of coal and gas and increased use of renewables (BEIS 2019).

Commitments were also adopted by Brazil with the enactment of the National Policy on Climate Change in 2009 when Brazil voluntarily committed to adopt actions to mitigate greenhouse gas emissions with the purpose of reducing between 36.1 and 38.9% of projected emissions by 2020. Increasing the share of green energy sources, such as wind, solar and biomass, in the power supply to 23% was one of the intended strategies to meet this target (Brazil 2015). China committed to increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030, including from wind, solar, geothermal energy, bio-energy and maritime energy (Department of Climate Change, China 2015). By 2014, China had scaled up installed capacity of on-grid wind power and solar power (Department of Climate Change, China 2015). Australia adopted the Renewable Energy Target's schemes to reduce emissions of greenhouse gases in the electricity sector and deliver its 2020 target of having over 20% of Australia's electricity coming from renewable energy sources (Australian Government 2018a, b). The role of green energy in tackling climate change is, therefore, widely accepted.

1.3 Green Energy and Energy Security Interplay in the Context of the Just Energy Transition

Effects of climate change and the necessary measures to mitigate it brought to the fore the need for transformative changes in the global energy sector and turned public policy and energy studies attention to the energy transition. In the energy transition, energy systems move away from fossil fuels and towards the adoption of energy technologies that leave a much smaller carbon footprint. Transitioning away from our current global energy system is considered ‘of paramount importance’ (Sovacool 2016) and ‘widely apparent’ (Arnulf 2012). More energy efficiency and cleaner use of energy are considered central pre-requisites to the energy transition. These are not, however, the only issues in debate. The concept of a just energy transition has also emerged which promotes the transition to a low carbon economy with the inclusion of social justice, by bringing everyone in society along with that transition (Heffron 2018).

The concept of a just transition was originally proposed by global trade unions in the 1980s, and one of the key aspects is related to the need to move workers in a high carbon economy into areas that will support the transition away from fossil fuels (McCauley and Heffron 2018). Just transition as a new framework of analysis is promoting the unification of climate, energy and environmental justice scholarships which all seek justice—albeit conceptualised in distinct ways—in the transition to a low carbon economy (Heffron and McCauley 2018). The just energy transition, therefore, does not involve only the shift from fossil fuels to forms of low carbon energy, but also the need to include strategies that promote social justice across the globe.

Against this background, one can observe that energy production and use today create a dilemma. On the one hand, energy brings economic growth and well-being to humankind which permanently requires more and more availability of energy supply to meet the needs of a growing world. On the other hand, energy is the largest source of greenhouse gas emissions, considered to be causing climate change and other environmental concerns, particularly air pollution, which can impede humanity’s progress and appear to be leading the planet to the verge of collapse.

Humanity, therefore, needs to address this dilemma and the complicated situation it is rooted in: how can we ensure energy security without environmental and climate change imbalances and with social justice worldwide? These are competing priorities that need to be untangled across the energy sector. It is in attempting to contribute to the answer to this question that this monograph has been written. Green energy’s role in tackling climate change and environmental concerns is widely debated, but less so is its links with energy security. The objective of this monograph is, therefore, to address the interplay between energy security and green energy development.

By doing so, this study seeks to contribute to the literature on energy security and green energy within the sphere of national and international energy law and policy. Notwithstanding the growing number of studies of energy security and green energy taken separately, there is seemingly no legal analysis into the link between

these two phenomena. In particular, there are no comprehensive studies that bring together the issues of the multifaceted concept of energy security and its connections and implications to national and international law and policies on green energy development.

Instead, the literature on the subject is fragmented and does not provide a coherent analysis and an overarching critique of the interplay between energy security concerns and green energy development. Traditionally, the debate on energy security has centred on conventional energy sources, while the debate on green energy has focused on climate change and environmental concerns. However, as we move from a fossil fuel dominated energy system to one that utilises more green energy, an analysis of these two isolated themes has to be unified. Therefore, the unification of these two separate themes is a central contribution of this research. By looking at green energy from the energy security angle, this study provides new knowledge and insights into critical global issues, thereby seeking to foster changes in the perceptions of the interlinked dimensions of energy security and green energy development. By doing so, it also seeks to influence the processes of creating new laws, regulations and policies.

1.4 Understanding the Concept of Energy Security: Scholarly Views

The notion of “energy security” is widely discussed within academic literature and debates around the concept have given rise to a multitude of definitions and interpretations. One review, for instance, identified 83 specific definitions of energy security (Ang et al. 2015). However, an agreed definition has not yet been reached, apart from the recognition that the concept of energy security is polysemic, multi-dimensional, contextual and dynamic in nature (Chester 2010). Although there has been debate surrounding security of demand (Bahgat 2013), most of the literature uses energy security, security of energy supply or security of supply as synonyms. This study proceeds in similar fashion, focusing on energy security in the sense of security of energy supply.

Ciută (2010) has already highlighted the terminological profusion and ambiguity of the concept of energy security. While some scholars advocate that a broader array of criteria needs to be considered as a key component of energy security concepts (Vivoda 2010; Sovacool 2011), others argue for a narrow notion of energy security and a clear separation between energy security and other policy objectives, leading to the definition of energy security as the continuity of energy supplies relative to demand (Winzer 2012).

Against this backdrop of disagreement, however, the International Energy Agency (IEA)’s (2014) mainstream definition of energy security as “the uninterrupted availability of energy sources at an affordable price” has been generally repeated in the literature. Barton (2004) defines energy security as “a condition in which a nation and

all, or most, of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk of major disruption of service". In Asif and Muneer's (2007) words, energy security means "consistent availability of sufficient energy in various forms at affordable prices." In line with these definitions, the common elements for energy security are availability, reliability and affordability.

However, availability, reliability and affordability are only part of the story. In the later decades of the twentieth century, energy security came to be discursively reconfigured to include the environment. Cherp and Jewell (2011) describe this change in the framing of energy security as 'robustness perspective' which was influenced by the idea of globally limited resources. Thus, by 1999, energy security became associated with efforts to "minimize vulnerability to resource supply disruptions, access reliable energy at reasonable or market driven prices, and consume resources that least damage the environment and promote sustainable development" (Song 1999).

A similar emphasis on the environmental dimension can be discerned in definitions adopted in academic research on energy security. For instance, Omorogbe (2004) adopts the concept of energy security as "the provision of adequate, affordable, efficient, and reliable energy services with minimal adverse impacts on the environment". Müller-Kraenner (2008) refers to "the provision of reasonably priced, reliable and environmentally friendly energy". Hernandez (2008) defines energy security as "access to reliable, affordable and environmentally sustainable energy supplies". In the view of Costantini et al. (2007), energy security has physical, economic, social, and environmental dimensions, as well as long and short-term dimensions. For Elkind (2010), a contemporary understanding of energy security must include not only availability, reliability, and affordability, but also environmental sustainability. The 4 A's of energy security—availability (geological), accessibility (geopolitical), acceptability (environmental and social) and affordability (economic) introduced by the Asia Pacific Energy Research Centre (APEREC)—has also gained traction in recent literature (Cherpa and Jewell 2014). Therefore, scholarly definitions also encompass social and environmental sustainability as core components of energy security, making these aspects a condition for energy security to be met. This approach endorses, as such, the idea that energy security and social and environmental sustainability are inseparable and indivisible and thus cannot be treated as distinct.

Various factors contributed to this discursive shift. Environmental disasters demonstrated that energy and the environment impact one another with real-world consequences, with the pursuit of energy security causing growing threats to the environment and disaster disrupting access to energy. For instance, the unprecedented Gulf War oil spill in 1991 caused extensive contamination of the natural habitat and long-term effects on aquatic ecosystems (Bejarano and Michel 2010). In August and September 2005, the hurricanes Katrina and Rita shut down 27% of US oil production and 21% of US refining capacity in the Gulf of Mexico with worldwide implications for global oil prices, climate change, strategic oil stocks and perceptions of supply security (Umbach 2010). The oil spill in the Gulf of Mexico in May 2010, to take another example, brought to the fore the negative impact on the environment as a result of pursuit of energy security.

Beyond disasters and increased understanding of the risk of disasters, the problem of greenhouse gas emissions and the international commitments of governments under the Kyoto Protocol also prompted some countries to emphasise the environmental aspects of their energy policies (Röpke 2013). I also brought about the Post-Kyoto emission targets as well as actions and debates regarding low carbon energy transition and geopolitics of climate change. This latter factor, in turn, helped drive a further reframing of the concept of energy security to include climate change. The European Commission (2010), for example, substituted references to “environmental concerns” in its energy security definition in the year 2000 with references to climate change: “the uninterrupted physical availability of energy products and services on the market, at a price which is affordable for all consumers (private and industrial), while contributing to the EU’s wider social and climate goals.”

Nevertheless, the global energy landscape changes over time. As a result, changes in the emphasis of energy security dimensions are also seen. As such, although some scholars have included the environment and climate change within the concept of energy security, this is not uniform. Just as pronounced is the tendency to frame the environment, climate change and energy as independent issues, a process which generates tension and conflict around the concept of energy security and its implications for environmental protection and/or climate change policies. Many energy developments that negatively impact the environment have been controversially promoted in the name of energy security, such as the drill for oil in the Arctic National Wildlife Refuge (Collins 2018), the exploration of oil sands in Alberta, Canada (Vidal 2008), and the grating of licences for shale gas exploration in the UK (Cronin 2016).

The competing dimensions of energy security have been a focus in the literature with one recent literature review, for instance, identifying 15 dimensions (Azzuni and Breyer 2018). Due to its multidimensional characteristics, a growing number of studies present a set of metrics for energy security in order to measure and track progress on energy security, including future energy security performance (Watcharejyothin and Shrestha 2009). These studies present large variations in the choice of indicators and in the way energy security indexes are framed and constructed. The logic of measurement and quantification of energy security seek to transform a vague and weakly defined notion into a “practical decision space” and so bring energy security into the domain of management, modelling and scenario analysis (Kruyt et al. 2011), making it commensurable with other concerns for decision makers (Bridge 2015).

According to another recent literature review, 53 studies have dealt with energy security indicators (Ang et al. 2015). As an illustration, Sovacool and Brown (2010), recognising each dimension—availability, affordability, energy and economic efficiency, environmental stewardship—to be of comparable importance, developed 10 indicators that constitute an Energy Security Index. Their index included oil import dependency, natural gas import dependency, dependence on petroleum transport fuels, retail electricity prices, retail gasoline/petrol prices, energy intensity, per capita electricity use, on-road fuel intensity of passenger vehicles, SO₂ and CO₂ emissions. The higher the value of each indicator, the lower energy security is. However, a pitfall of this index is that, for the environmental criteria, only gases emissions are relevant in the equation, not including, as such, other environmental impacts.

Sovacool and Mukherjee (2011) provide a broader framework for analysing national energy security policies and performance, demonstrating its complexity by suggesting a total of 372 indicators. They have proposed five dimensions for energy security: availability, affordability, technology development, sustainability, and regulation. These five dimensions are broken down into 20 components related to security of supply and production, dependency, and diversification for availability; price stability, access and equity, decentralization, and low prices for affordability; innovation and research, safety and reliability, resilience, energy efficiency, and investment for technology development; land use, water, climate change, and air pollution for sustainability; and governance, trade, competition, and knowledge for sound regulation. These 20 components then corresponded to 320 simple and 52 complex indicators that can be used to measure and track performance on energy security.

Heffron et al. (2015) put forward the Energy Justice Metric as a way to try to achieve a just and equitable balance between the competing demands of the energy trilemma (economics, politics and the environment). Economics, politics and the environment are used as parameters of the Energy Justice Metric with energy security being included within politics, in which the cost of fluctuation and instability in energy supplies and the cost (benefit) of import/export of energy supplies are measured. In this way, energy security is a concept independent from the environment and economics.

The existing literature, therefore, presents a wide variety of conceptualisations, interpretations and measurements of energy security, adding to the uncertainty surrounding its definition. They either advance a narrow interpretation of energy security in the sense of energy supply only or they advance an understanding based on a mixture of economic, social, political, technological and environmental indicators.

For Winzer (2012), this lack of clarity makes energy security ‘hard to measure and difficult to balance against other policy objectives’. Despite this variety of energy security definitions, Cherpa and Jewell (2014) suggest that attempts should still be made to find a useful universal definition. Meanwhile, others have argued that the complex and contested nature of energy security means that a universal definition is probably not a practical goal (Chester 2010). This study does not aim to generate an agreed-upon definition of energy security, but rather to shed more light on the diversity of perspectives around it, something which will be shown in the following chapters.

2 The Point of Departure: Research Questions and Methodology

2.1 Research Questions

Simply put, the purpose of this study is to examine the interplay between energy security and law and policies promoting green energy. Its central argument is that if we want to have a just energy transition we ought to pay closer attention to the relationship between energy security and law and policies on green energy development.

The energy system is in a state of change, particularly as a result of the development, commercialisation and deployment of green energy technologies. Thus, in attempting to foster a better understanding of the role played by energy security in constructing and deconstructing green energy policy initiatives in the context of the just energy transition, this study initially seeks to answer the following three research questions:

1. How has energy security been discursively constructed?
2. What are the discursive links between energy security and law and policies promoting green energy?
3. What are the implications of energy security construction to law and policy on green energy development?

The answer to these three research questions are sought in the context of two very different country case studies: Great Britain and Brazil. Previous studies have demonstrated that energy security concerns are shaped by contextual and national concerns (Kruyt et al. 2009; Sovacool et al. 2012; Knox-Hayes et al. 2013; Blumer et al. 2015). Therefore, it made sense for the study to focus on specific country case studies.

The multifaceted dimensions of energy security and its complex relationship with green energy initiatives worldwide as well as the global nature of green energy technologies deployment and energy system transformations mean that there would need to be variation in the case studies selected. Any focus on only one specific and localised area would not provide the multiplicity of perceptions and range of understandings required to answer the research questions.

The just energy transition is also an opportunity to widen access to emerging green energy technologies globally. Today, there is disparity between different countries worldwide, with some getting ahead with green energy technologies while others are being left behind. It is also acknowledged that we must accelerate progress toward energy technologies and trading patterns to transition to a low carbon energy system (Pascual and Elkind 2010). In connection with that, the challenge of energy security is also impacted by trade relationships around the globe. With that in mind, understanding the law on energy security and international green energy trade is paramount. Developing a proper global response to energy security and green energy development concerns in the context of a just energy transition may require paying close attention to the global trade regime. As such, as a third case study, this study analyses the interplay between energy security and green energy development in the law of the World Trade Organisation (WTO).

The WTO is an international trade organisation, which sets international trade obligations through its agreements that Member States have to comply with and these influence their own national law and policies on energy security and green energy development. The WTO system also adjudicates between Member States competing claims via its dispute settlement body and has been acting as a forum for green energy trade-related disputes. Therefore, it is important to show the multiplicity of views on the case studies on Great Britain and Brazil, because these different perspectives will likely be at stake in legal disputes within the WTO dispute settlement body. As

such, the findings of the country case studies on Great Britain and Brazil will inform the analyses on the intersection of trade, energy security and green energy.

The law of the WTO can offer opportunities for countries to transition to a green energy system and to ensure energy security. With a view of increasing the participation of green energy in the energy mix to ensure energy security, countries may adopt trade restrictive measures to support the development of the national green energy sector. However, these measures may be incompatible with the law of the WTO. Thus, the case study on the WTO explores whether there is any flexibility within the current WTO rules and the interpretations given to them that permit trade restrictive measures that support national green energy development with a view of ensuring energy security, i.e. green energy security. This third case study, therefore, aims at answering the fourth research question of this thesis:

4. Is there policy space for national green energy security in the law of the WTO?

Understanding the diversity of views on and the complexities of the interplay between energy security and green energy development not only in national laws and policies but also in international law is at the heart of this thesis.

2.2 *Methodology*

2.2.1 **The Constructionist Orientation**

This study operates within a broadly constructionist frame. Constructionism is often defined in philosophical terms as a commitment to the idea that participants actively make or construct the worlds of everyday life and their constituent elements (Gubrium and Holstein 2008). Rather than offering a metaphysical position as such (i.e., ‘reality is a social construction’), constructionist studies are perhaps better thought of as fostering an open orientation to the kinds of activities and practices social actors engage in and seek to learn about them in their own terms. Thus, the main point in this monograph is to treat the law and the category of ‘energy security’ within it as a construction in this sense, i.e., as a product built up out of, and which gains relevance through, the activities and practices of people all working to shape it (often against one another) in various ways.

According to constructionists, one does not commit to any particular view of the nature of what is being studied prior to going out and studying it. Instead of operating with a pre-established theoretical view, a constructionist orientation analytically examines the work people themselves do and the resources they employ (including, for example, language, institutions and technologies) in order to shape things themselves. Given this, no grand theory was adopted before the study commenced. Instead, the point of the study was to explore how understandings of energy security and their relation to law and policies on green energy development were being shaped by people in real situations in the energy field, by letting them tell us how things are and show us how they seek to (re)shape reality according to that.

2.2.2 Discourse Analysis

Alongside the constructionist element, the additional methodological approach employed for the two country case studies is discourse analysis. The third case study is based on a doctrinal analysis of the law of the WTO. A review of the literature shows that discourse analyses of the links between energy security and law and policies on green energy development remain rare. This thesis attempts to address this gap by examining how links between energy security and green energy are being established (or denied) in and through discursive practices.

There is a great variety of definitions of discourse. Following Parker, this work treats discourse as “an interrelated set of texts, and the practices of their production, dissemination, and reception, which bring an object into being” (Parker 1992). Discourse analysis, then, investigates discourse in terms of the way phenomena like energy security are defined and given meaning and significance through the articulation and production of ‘texts’ of many kinds, from speeches to policy statements to legal rulings, and the practices those texts are part and parcel of. Particular emphasis is placed on discourse’s practical role in constructing and reconstructing social, political and economic realities (Hodges 2015). In the present case, that translates into an examination of the construction and reconstruction of energy security over time based on an investigation of specific kinds of discursive ‘moves’ in terms of their connection to law and policies on green energy development and implications for social, political and economic life.

In order to do this, this study analyses the discourses of particular texts in the wider contexts which they are presented and made sense of within. From a discourse analytic perspective, texts are seen as ‘intertextual’ in that they are not produced or interpreted in isolation from one another (Hodges 2015). The analysis seeks, therefore, to go ‘beyond the text’ in order to show the specific ways in which texts speak to other texts. By proceeding in this way, it is possible to arrive at a more nuanced understanding of the role that energy security discourse plays in law and policies on green energy development in those wider contexts.

This study attempts to identify the discursive complexes which define the contexts examined through the country case studies. More specifically, this study examines the discursive frames which dominate energy security discourse in different contexts. A discursive frame is a means of structuring understandings (Reese 2001). As a concept, it is closely related to the idea of a ‘frame of reference’, i.e. a set of understandings about the world and what it contains that makes it possible to make judgements, draw distinctions and establish connections.

According to Goodman (1978), competing interpretations present the world in different ways—within them actors do different things in different ways in a different order for different reasons at different times because they are driven by different reasons and different forces. If one interpretation wins out and others are rejected, things change and that process carries often serious implications. Understanding the discursive framing of energy security is, therefore, important, because when one

frame is selected from among a range of competing frames that has consequences for how things are subsequently seen and acted on, particularly how green energy development is seen and acted on, as this study will demonstrate.

2.2.3 Why Case Studies?

In order to unveil the contextual specificity of ways of discursively framing energy security as well as the different ways that energy security and green energy are discursively linked, this monograph adopts case studies as a research design.

Several arguments can be made in favour of a case study approach for this thesis. First, the research questions of this thesis focus mainly on exploratory ‘how’ and ‘what’ questions, and more explanatory questions are likely to lead to the use of case studies as one of the preferred research methods (Yin 2018). Second, a case study approach allows the particularities and complexities of local meanings associated with different cases to be more fully explored, without losing the meaningful characteristics of the wider context (Stake 2008). Third, case studies are ideal for exploring interactions between people and their understanding of a situation where the richness of the data obtained by multiple means from multiple perspectives provides a real insight into the main issues at play (Dalcher 2004). Fourth, the use of case studies enables a certain amount of analytical generalisation (Gomm et al. 2000) by providing insights into recurring themes, issues and discursive practices across the cases analysed; thereby avoiding purely idiosyncratic conclusions and contributing to wider understandings of the role played by energy security discourse in constructing and deconstructing green energy policies.

Case studies, however, also have drawbacks. Case studies have been frequently criticised because they provide little basis for generalising conclusions (Yin 2018). Nonetheless, case studies do not represent ‘samples’ and the goal in the research is to provide analytic generalisation and not statistical generalisations. This study adopts a multiple-case design where three case studies are presented that together form a body of evidence for the different ways of discursively framing energy security as well as its link with green energy development.

Another drawback is in relation to concerns over the lack of rigor of case study research, particularly in cases where the investigator has not followed systematic procedures or has allowed biased views to influence the direction of the findings and conclusions. However, the method adopted for each case study has followed a systematic procedure and, as a strategy for interpreting the study’s findings, the author has identified rival explanations or alternative perspectives for the findings in order to avoid bias.

2.2.4 Selection of Case Studies

Great Britain¹ and Brazil were selected as country case studies to show the diversity in their national context rather than a direct replication. The selection of these two cases is based on a desire to ensure the greatest difference or maximum variation between the cases. Given the differences in their economic and geography characteristics as well as energy policies, energy systems, energy governance and regulatory frameworks, areas where they diverge systematically provide a rich basis for analysing how the discursive frames surrounding energy security and law and policies on green energy development are being practically construed.

Great Britain is a developed economy with an energy system dominated by fossil fuels (BEIS 2019), but which is in a major period of transition (Geels et al. 2016). Brazil is an emerging economy with one of the highest shares of energy generated from renewable sources (MME 2018) and, according to the International Energy Agency, it has the greenest energy mix worldwide (Birol 2018). Energy policies are also demonstrably different in each country, i.e., GB has been active in grid modernisation efforts, including the shift to smart grid with, for instance, the integration of green energy sources into the system, vehicle-to-grid and vehicle-to-home technologies (Crispim et al. 2014; Jenkins et al. 2015; Xenias et al. 2015; Connor et al. 2018), and it is pushing nuclear energy (which is a grey area for its categorisation of 'green' energy), while Brazil has focused on biofuels as a policy for its transport sector and has been slow in including the shift to smart grid in its national energy policy.

In terms of legal systems/framework and energy governance, there are distinct differences here, too. England and Wales are common law countries and the UK has a more decentralised system for responsibility of the energy sector when compared to Brazil. The principle of devolution in the UK has transferred energy-related powers to be exercised by the Northern Ireland Executive, Scottish Government and Welsh Government (Cowell 2017). The devolution, however, did not affect the fact that, formally, the UK central government retained overall responsibility for key energy policy agendas, where the Department for Business, Energy & Industrial Strategy is the main ministry with energy responsibilities. In contrast, Brazil is a civil law country with a much more centralised system for responsibility in the energy sector centred in the hands of the President of the Republic who ultimately defines the country's energy policy, as per Law 9,478 of 6 August 1997, article 2, and Law 13,844 of 18 June 2019, article 14.

There are also differences in the drive for their green energy policies. Green energy promotion in GB has risen to the forefront of energy policies mainly as a result of the transition to a low carbon energy system, where an increase of renewable energy consumption in electricity, transport, and the heating sectors was proposed as a way to help keep the UK on track to hit the targets set in the Climate Change Act 2008 (DECC 2011). In Brazil, energy security initially appeared as a major force driving green

¹Great Britain was selected rather than the United Kingdom because the electricity systems in Great Britain and Northern Ireland are governed and regulated independently of one another.

energy policies. Demonstrating this diversity here contributes to the scholarly debate as legal academic literature on green energy development, in particular, focuses mainly on environmental and climate change concerns (Leal-Arcas 2018; Karim et al. 2018; Farah and Ôtvös 2018). However, growing academic literature and media worldwide are increasingly acknowledging the role of green energy in ensuring energy security (World Bank 2018; Hamed and Bressler 2019; Rathore et al. 2019). The case of Brazil, therefore, contributes to the literature on energy security by bringing empirical data which supports the latter growing scholarly studies.

Revealing these differences in the country case studies is also relevant because this divergence of views and approaches, learnt in each country case study, may be at stake in legal disputes. In particular, legal disputes between countries concerning energy security and green energy development have already taken place within international trade law as encapsulated in the law of the World Trade Organisation (WTO), an international trade organisation which adjudicates between competing discursive claims and pronounces on their legal status. As previously stated, GB developed green energy as a result of climate change, while Brazil primarily developed it, particularly wind and biofuels, to ensure energy security. A legal dispute involving the driving force behind the promotion of national policies to develop green energy has recently been seen in the WTO Dispute Settlement Body on the case of *India—Certain Measures Relating to Solar Cells and Solar Modules*, WT/DS456 between India and the United States (US). As will be demonstrated in Chap. 4, India raised energy security as the main argument for developing their domestic solar energy policies, while the US did not even acknowledge energy security as an argument and focused only on environmental issues.

The WTO, therefore, was selected as a third case study because it shows how this diversity of views raised in national contexts leads to legal disputes in international forums when attempts are made to address the issue of the interplay between energy security and green energy development. In particular, the WTO acts as the primary global trade governance body and plays a key role in settling interstate trade disputes through panels and the Appellate Body of its Dispute Settlement Body, which has come to act as a significant international forum to channel complaints related to international green energy trade. It is acknowledged that the world is currently going through a period of legal, economic and political quarrelling around the evolution of green energy technologies (Hufbauer et al. 2016), particularly with respect to trade. In the last nine years, for instance, fifteen cases involving green energy trade have been initiated under the WTO Dispute Settlement Body. It is therefore relevant to explore the diversity of views being raised by countries in connection with the interplay between energy security and law and policies on green energy development in the WTO legal disputes.

Another reason as to the choice of the WTO as a case study lies in the fact that trade, green energy and energy security are intrinsically connected. The green energy sector of today is highly international with vast amounts of green energy technologies trade across the globe. Green energy technologies are made up of packages of goods, services and embedded intangibles (such as software) that come together as a result of multiple transactions involving the providers of supply chains operating

across several jurisdictions. There has also been an increasing number of examples internationally of green electricity grid transnationalisation and regionalisation via the installation of interconnectors, spurring green electricity trade amongst countries (Moore 2017; Nance and Boettcher 2017; Ralph and Hancock 2019). As will be seen in the case study on GB in Chap. 4, participants highlighted this green electricity grid regionalisation in the context of the European Energy Community. Green energy, therefore, must be viewed through the lens of trade amongst countries.

International green energy trade interdependence then also raises energy security issues. On the one hand, some scholars propose enhancing openness to trade through liberalisation of the trade barriers to result in green energy technological diffusion (Leal-Arcas 2018; Murshed 2018). In this sense, for countries with a high level of green energy in their energy mix, energy security is enhanced by having access to tradeable green energy technologies. On the other hand, it is acknowledged that public policies and government economic incentives are key drivers for the stimulation of national green energy markets (Jha 2009; Fay et al. 2015; Farah and Ôtvös 2018) and relaxing trade barriers does not effectively relieve the dependence of importing countries on green energy technologies. Asymmetric green energy trade interdependence may be a source of power to be used as an ‘energy weapon’ (Lilliestam and Ellenbeck 2011) and it may potentially cause major disruption in green energy supply. If, for example, a country is dependent on green energy equipment and most of its energy mix is based on green energy sources, a green energy technology embargo due to political considerations would negatively impact the importing country’s energy security.

As will be seen in the country case studies in Chaps. 2 and 3, opposing arguments appeared in the data collected for analysis. In the case study of GB in Chap. 2, for instance, on the one side, there were participants who stressed that energy security is ensured via the ability to manage energy supply from around the world, a view which exposes a reliance on global trade networks and nondomestic actors for provisioning of energy supply. In this sense, sourcing and distribution diversification is a chief component of energy security (Gruenig and O’Donnell 2016). The literature on energy security also presents trade as an energy security indicator (Sovacool and Mukherjee 2011). On the other side, there were participants who expressed concerns over the country’s energy security due to import dependency, not only in relation to import dependency of green energy sources but also dependency on importation of green energy equipment, technology and energy expertise—particularly in the context of Brexit.

The relationship between the country case studies in Chaps. 2 and 3 and the case study on the WTO in Chap. 4 lies in the fact that different arguments concerning the interplay between energy security and green energy development may be raised by countries in international legal disputes under the WTO dispute settlement body. Two examples may illustrate this: (i) a dispute may arise between a country which promotes green energy to ensure energy security and a country which only links green energy with environmental/climate change concerns, such as the previously mentioned WTO case of *India—Solar Cells*; and (ii) a dispute may arise between two countries which promote green energy security, but in opposing ways, i.e. one country

may adopt a national policy on green energy security based on managing energy supply from around the world and, therefore, will advocate trade liberalisation in the area; the other country may adopt a domestic policy on green energy security based on reducing import dependency and, thus, may seek the adoption of trade restrictive measures to develop its national green energy industry. Generally speaking, WTO rules are aimed at liberalising global trade. However, due to these different approaches to national energy policies on green energy security, it is relevant to examine how the WTO jurisprudence perceives the interplay between energy security and green energy, and how the law of the WTO applies to countries that want to reduce green energy import dependency on the grounds of energy security.

Developing a proper global response to energy security and green energy development concerns in the context of a just energy transition requires, therefore, paying close attention to the global trade regime. As such, building on the findings of the two very different country case studies in Chaps. 2 and 3, the third case study in Chap. 4 analyses the interplay between energy security and green energy development in the law of the WTO.

2.2.5 Method of Data Collection

This work adopts multiple methods of data collection—i.e. semi-structured interviews, archival data and jurisprudence—in order to assemble a richer, stronger and diverse array of evidence related to the discursive construction and deconstruction of green energy policies in a variety of contexts. Accordingly, (i) the case study of Great Britain is based on empirical data collected from face-to-face semi-structured interviews with 24 leading energy experts; (ii) the case study of Brazil is based on data collected from three major archives in Brazil: the Brazilian National Archive, the President of the Republic Archive and the Federal Senate Archive, and (iii) the case study of the WTO is based on the WTO jurisprudence. The particularities of each method is further explained in each respective chapter. Both methods of data collection for the country case studies have the benefit of providing information not straightforwardly available in official published documents and, therefore, add novelty to this thesis. The findings of the country case studies then offer useful data that inform the legal analysis of the interplay between energy security and green energy in the law of the World Trade Organisation (WTO), which is largely unexplored.

3 The Task Being Tackled: Structure of the Monograph

The structure of this monograph is as follows. Chapter 2 contains the first case study. It examines the interplay between energy security and green energy in the context of Great Britain (GB) and focuses on the first three research questions of the study stated above. Based on semi-structured interviews with 24 leading energy experts, the chapter explores participants' views on green energy development. This is followed

by an analysis of the core themes identified from the interviews with a focus on energy security definitions and on the interplay between energy security and law and policy on green energy development. The chapter demonstrates the multiple framings employed by leading energy experts in GB as part of discursive contests that lead to divergent constructions of energy security. In summary, energy security not only means different things to different people in different contexts, but also to different sectors of the economy. Based on participants' discursive constructions, this chapter shows challenges posed to a transition to a green energy system in GB and the emergence of novel themes in relation to green energy and energy security.

Chapter 3 contains the second case study. It examines the interplay between energy security and green energy in the context of Brazil and also focuses on the first three research questions of the study. Based on documents obtained from the Brazilian National Archive, the President of the Republic Archive and the Federal Senate Archive, the chapter traces the way that energy security is construed and given meaning and significance through the articulation and production of 'texts' of many kinds, from speeches to policy statements and laws, with emphasis on the role the discursive frames surrounding energy security play in constructing or deconstructing green energy initiatives over a period of fifteen years (January 2001–December 2015). It demonstrates that energy security is discursively framed differently in different green energy law and policies within different energy sectors. Due to its importance to economic and social stability in Brazil, when a positive frame in relation to the links between energy security and green energy development is made, it has the implication of promoting green energy. On the contrary, when a negative framing of the connections between energy security and green energy development is deployed, it has the implication of hindering green energy development. In particular, this chapter reveals two main findings: (i) that a positive frame for energy security and green energy connection is advanced in the context of the transport sector, which, as a result, supported biofuels development; and (ii) that a dominant negative frame is advanced in the context of deployment of green energy, solar and wind in particular, in the electricity system in Brazil, which, as a result, hindered solar and wind energy technologies and promoted fossil fuels development. This negative frame coupled with the absence in the official discourse of reference to emerging innovative technologies with the potential to minimise green energy intermittency issues, such as energy storage and smart grids, have had the result of contributing to Brazil moving in the opposite direction to a low carbon energy transition.

Chapter 4 builds on the findings of the case studies on Great Britain and Brazil and focuses on the fourth research question of the study: is there policy space for national green energy security in the law of the WTO? It reveals how energy security has been raised within the WTO green energy jurisprudence so far and explores whether there is any flexibility within the current WTO rules and the interpretations given to them that permit trade restrictive measures that support national green energy development with a view of ensuring energy security. The chapter argues that an evenly distributed market share of green energy technologies and equipment around the world is the best solution to ensure green energy security in the context of the just energy transition.

It then proposes a way forward in creating the legal space in the law of the WTO for trade restrictive measures aimed at ensuring green energy security.

Finally, Chap. 5 summarises the main conclusions and contributions, discusses the main limitations of the study and makes recommendations for future research.

References

- Ang BW, Choong WL, Ng TS (2015) Energy security: definitions, dimensions and indexes. *Renew Sustain Energy Rev* 42(1):1077–1093
- Arnulf G (2012) Energy transitions research insights and cautionary tales. *Energy Policy* 50:8–16
- Asif M, Muneer T (2007) Energy supply, its demand and security issues for developed and emerging economies. *Renew Sustain Energy Rev* 11:1388–1413
- Australian Government (2018a) About the renewable energy target. <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target>. Accessed 20 Jan 2020
- Australian Government (2018b) How the scheme works. <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works>. Accessed 20 Jan 2020
- Azzuni A, Breyer C (2018) Definitions and dimensions of energy security: a literature review. *Wiley Interdisc Rev Energy Environ* 7:e268. <https://doi.org/10.1002/wene.268>
- Bahgat G (2013) Oil producers' perspectives on energy security. In: Dyer H, Trombetta MJ (eds) *International handbook of energy security*. Edward Elgar Publishing
- Barton B (2004) *Energy security: managing risk in a dynamic legal and regulatory environment*. Oxford University Press, Oxford
- Bejarano AC, Michel J (2010) Large-scale risk assessment of polycyclic aromatic hydrocarbons in shoreline sediments from Saudi Arabia: environmental legacy after twelve years of the Gulf war oil spill. *Environ Pollut* 158(5):1561–1569
- Berger A et al (2017) How much can nuclear energy do about global warming. *Int J Global Energy Issues* 40:43–77
- Birol F (2018) *Renewables 2018: market analysis and forecast from 2018 to 2023*. <https://www.iea.org/renewables2018/>. Accessed 24 Jan 2020
- Blumer YB et al (2015) The precarious consensus on the importance of energy security: contrasting views between Swiss energy users and experts. *Renew Sustain Energy Rev* 52:927–936
- BP (2018) *BP energy outlook 2018*. <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2018.pdf>. Accessed 30 Oct 2019
- BP (2019) *BP energy outlook 2019*. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2019.pdf>. Accessed 1 Feb 2020
- Brazil (2015) Brazil's intended nationally determined contribution towards achieving the objective of the United Nations framework convention on climate change. www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx. Accessed 20 Jan 2020
- Brazil, Law 13,844 of 18 June 2019
- Brazil, Law 9,478 of 6 August 1997
- Bridge G (2015) Energy (in)security: world-making in an age of scarcity. *Geogr J* 181:328–339
- Cherp A, Jewell J (2011) The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration. *Curr Opin Environ Sustain* 3(4):202–212
- Cherpa A, Jewell J (2014) The concept of energy security: beyond the four As. *Energy Policy* 75:415–421
- Chester L (2010) Conceptualising energy security and making explicit its polysemic nature. *Energy Policy* 38:887–895

- Ciută F (2010) Conceptual notes on energy security: total or banal security? *Secur Dialogue* 41(2):123–144
- Clack CTM et al (2017) Evaluation of a proposal for reliable low-cost grid power with 100% wind, water, and solar. *Proc Natl Acad Sci USA* 114(26):6722–6727
- Collins M (2018) Interior department takes step toward drilling in Alaska's Arctic National Wildlife Refuge. *USA Today*. <https://eu.usatoday.com/story/news/politics/2018/04/19/trump-administration-takes-initial-step-steps-toward-oil-and-gas-drilling-alaskas-arctic-national-wi/533176002/>. Accessed 24 Jan 2020
- Connor PM et al (2018) Sources of risk and uncertainty in UK smart grid deployment: an expert stakeholder analysis. *Energy* 161:1–9
- Costantini V et al (2007) Security of energy supply: comparing scenarios from a European perspective. *Energy Policy* 35(1):210–226
- Cowell R (2017) Rescaling the governance of renewable energy: lessons from the UK devolution experience. *J Environ Plann Policy Manage* 19:480–502
- Creutzig F et al (2017) The underestimated potential of solar energy to mitigate climate change. *Nat Energy* 2:17140. <https://doi.org/10.1038/nenergy.2017.140>
- Crispim J et al (2014) Smart grids in the EU with smart regulation: experiences from the UK, Italy and Portugal. *Utilities Policy* 31:85–93
- Cronin K (2016) Shale gas will boost UK energy security. *Financial Times*. <https://www.ft.com/content/de708c26-2334-11e6-9d4d-c11776a5124d>. Accessed 24 Jan 2020
- Dalcher D (2004) Stories and histories: case study research (and beyond) in information systems failures. In: Whitman ME, Woszczynski AB (eds) *The handbook of information systems research*. Idea Group Publishing
- Department for Business, Energy & Industrial Strategy (2018) UK energy in brief 2018. <https://www.gov.uk/government/statistics/uk-energy-in-brief-2018>. Accessed 24 Jan 2020
- Department for Business, Energy & Industrial Strategy (2019) UK energy in brief 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/857027/UK_Energy_in_Brief_2019.pdf
- Department of Climate Change, National Development and Reform Commission of China (2015) China's intended nationally determined contribution: enhanced actions on climate change. <http://www4.unfccc.int/Submissions/INDC/Published%20Documents/China/1/China%20INDC%20-%20on%2030%20June%202015.pdf>. Accessed 20 Jan 2020
- Department of Energy and Climate Change (2011) UK renewable energy roadmap. <https://www.gov.uk/government/publications/renewable-energy-roadmap>. Accessed 20 Jan 2020
- Dudley B (2018) Shaping the future energy landscape. <https://www.bp.com/en/global/corporate/media/speeches/shaping-the-future-energy-landscape.html>. Accessed 30 Oct 2019
- Elkind J (2010) Energy security: call for a broader agenda. In: Pascual C, Elkind J (eds) *Energy security: economics, politics, strategies, and implications*. Brookings Institution Press
- European Commission (2010) Communication from the commission to the European Parliament, the Council, the European economic and social committee and the Committee of the Regions *Energy 2020: a strategy for competitive, sustainable and secure energy*, COM 639 final. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0639:FIN:EN:PDF>. Accessed 24 Jan 2020
- European Commission (2018) Smart grids. <http://s3platform.jrc.ec.europa.eu/smart-grids>. Accessed 24 Jan 2020
- Farah PD, Ötvös T (2018) Competition law and trade in energy vs. sustainable development: a clash of individualism and cooperative partnerships? *Ariz State Law J* 50:497–513
- Fay et al (2015) Decarbonizing development: three steps to a zero-carbon future. World Bank
- Geels FW et al (2016) The enactment of socio-technical transition pathways: a reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990–2014). *Res Policy* 45:896–913
- Gomm R, Hammersley M, Foster P (2000) Case study and generalization. In: Gomm R, Hammersley M, Foster P (eds) *Case study method: key issues, key texts*. Sage, London

- Goodman N (1978) *Ways of world making*. Hackett Publishing, Indianapolis
- Gosden E (2016) Winter power crunch fears as UK-France cables severed during storm. <https://www.telegraph.co.uk/business/2016/11/29/winter-power-crunch-fears-uk-france-cables-severed-storm/>. Accessed 10 Oct 2019
- Gruenig M, O'Donnell B (2016) Reshaping equilibria: renewable energy mega-projects and energy security. In: Lombardi P, Gruenig M (eds) *Low-carbon energy security from a European perspective*. Elsevier
- Gubrium JF, Holstein JA (2008) The constructionist mosaic. In: Holstein JA, Gubrium JF (eds) *Handbook of constructionist research*. The Guilford Press
- Hamed TA, Bressler L (2019) Energy security in Israel and Jordan: the role of renewable energy sources. *Renew Energy* 135:378–389
- Heffron RJ (2018) The just transition to a low-carbon economy. *Renew Energy Law Policy Rev* 8(4):39–41
- Heffron RJ, McCauley D (2018) What is the 'just transition'? *Geoforum* 88:74–77
- Heffron RJ, McCauley D, Sovacool BK (2015) Resolving society's energy trilemma through the Energy Justice Metric. *Energy Policy* 87:168–176
- Hernandez C (2008) Philippine energy policy: implications for human security and regional cooperation. In: Marquina Antonio (ed) *Energy security: visions from Asia and Europe*. Palgrave MacMillan, New York
- Hodges A (2015) Intertextuality in discourse. In: Tannen D, Hamilton HE, Schiffrin D (eds) *The handbook of discourse analysis*. Wiley
- Hufbauer GC, Meléndez-Ortiz R, Samans R (2016) Setting the horse before the cart to preserve a viable world. In: Hufbauer GC, Meléndez-Ortiz R, Samans R (eds) *The law and economics of a sustainable energy trade agreement*. Cambridge University Press
- India—Certain Measures Relating to Solar Cells and Solar Modules*, WT/DS456
- International Energy Agency (2014) Energy security. <http://www.iea.org/topics/energysecurity/>. Accessed 26 Jan 2020
- International Energy Agency (2016a) World energy outlook. <https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExecutiveSummaryEnglish.pdf>. Accessed 20 Jan 2020
- International Energy Agency (2016b) Energy and air pollution: world energy outlook special report. <https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlookSpecialReport2016EnergyandAirPollution.pdf>. Accessed 30 Oct 2019
- International Energy Agency (2018) Global energy & CO2 status report 2017. <https://www.iea.org/publications/freepublications/publication/GECO2017.pdf>. Accessed 30 Oct 2019
- Intergovernmental Panel on Climate Change (2018) Global warming of 1.5 °C. <http://www.ipcc.ch/report/sr15/>. Accessed 30 Oct 2019
- Jacobson MZ et al (2017) 100% clean and renewable wind, water, and sunlight all-sector energy roadmaps for 139 countries of the world. *Joule* 1:108–121
- Jenkins N, Long C, Wu J (2015) An overview of the smart grid in Great Britain. *Engineering* 4:413–421
- Jha V (2009) Trade flows, barriers and market drivers in renewable energy supply goods: the need to level the playing field. *BIORES* 3:1
- Karim ME et al (2018) Energy revolution for our common future: an evaluation of the emerging international renewable energy law. *Energies* 11:1–20. <https://doi.org/10.3390/en11071769>
- Knox-Hayes J et al (2013) Understanding attitudes toward energy security: results of a cross-national survey. *Glob Environ Change* 23:609–622
- Kruyt B et al (2009) Indicators for energy security. *Energy Policy* 37:2166–2181
- Kruyt B et al (2011) Indicators for energy security. In: Sovacool BK (ed) *The Routledge handbook of energy security*. Routledge
- Leal-Arcas R (2018) New frontiers of international economic law: the quest for sustainable development. *Univ Pennsylvania J Int Law* 40:83–133

- Lilliestam J, Ellenbeck S (2011) Energy security and renewable electricity trade—will Desertec make Europe vulnerable to the “energy weapon”? *Energy Policy* 39:3380–3391
- Manglik M, Ram M (2015) Behavioural analysis of a hydroelectric production power plant under reworking scheme. *Int J Prod Res* 53(2):648–664
- Marra JJ, Merrifield MA, Sweet WV (2015) Sea level and coastal inundation on Pacific Islands. In Keener V et al (ed) *Climate change and Pacific Islands: indicators and impacts: report for the 2012 Pacific Islands regional climate assessment*. Island Press, pp 65–88
- McCauley D, Heffron R (2018) Just transition: integrating climate, energy and environmental justice. *Energy Policy* 119:1–7
- Ministério de Minas e Energia (Brazil) (2018) Balanço Energético Nacional 2018: Ano Base 2017. <http://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/balanco-energetico-nacional-2018>. Accessed 24 Jan 2020
- Moore S (2017) Evaluating the energy security of electricity interdependence: perspectives from Morocco. *Energy Res Soc Sci* 24:21–29
- Müller-Kraenner S (2008) Energy security: re-measuring the world. Earthscan
- Murshed M (2018) Does improvement in trade openness facilitate renewable energy transition? Evidence from selected South Asian economies. *South Asia Econ J* 19:151–170
- Nance MT, Boettcher WA (2017) Conflict, cooperation, and change in the politics of energy interdependence: an introduction. *Energy Res Soc Sci* 24:1–5
- National Intelligence Council (2008) Global trends 2025: a transformed world. www.dni.gov/nic/NIC_2025_project.html. Accessed 20 Oct 2019
- Omorogbe Y (2004) Regional and national frameworks for energy security in Africa. In: Barton B (ed) *Energy security: managing risk in a dynamic legal and regulatory environment*. Oxford University Press
- Pascual C, Elkind J (2010) *Energy security: economics, politics, strategies, and implications*. Brookings Institution Press
- Parker I (1992) *Discourse dynamics*. Routledge
- Ralph N, Hancock L (2019) Energy security, transnational politics, and renewable electricity exports in Australia and Southeast Asia. *Energy Res Soc Sci* 49:233–240
- Rathore PKS, Chauhan DS, Singh RP (2019) Decentralized solar rooftop photovoltaic in India: on the path of sustainable energy security. *Renew Energy* 131:297–307
- Reese SD (2001) Prologue—framing public life. In: Reese SD, Gandy OH Jr, Grant AE (eds) *Framing public life: perspectives on media and our understanding of the social world*. Lawrence Erlbaum
- Röpke L (2013) The development of renewable energies and supply security: a trade-off analysis. *Energy Policy* 61:1011–1021
- Rüdiger M (2008) *The culture of energy*. Cambridge Scholars Publishing
- Song J (1999) Energy security in the Asia-Pacific: competition or cooperation? http://www.apcss.org/Publications/Report_Energy_Security_99.html. Accessed 20 Jan 2020
- Sovacool BK (ed) (2011) *The Routledge handbook of energy security*. Routledge
- Sovacool BK (2016) How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Res Soc Sci* 13:202–215
- Sovacool BK, Brown MA (2010) Competing dimensions of energy security: an international perspective. *Annu Rev Environ Resour* 3:77–108
- Sovacool BK, Mukherjee I (2011) Conceptualizing and measuring energy security: a synthesized approach. *Energy* 36:5343–5355
- Sovacool BK et al (2012) Exploring propositions about perceptions of energy security: an international survey. *Environ Sci Policy* 16:44–64
- Stake RE (2008) Qualitative case studies. In: Denzin NK, Lincoln YS (eds) *Strategies of qualitative inquiry*. Sage Publications
- Stillwell AS et al (2011) The energy-water nexus in Texas. *Ecol Soc* 16(1):2–22
- The Development, Concepts and Doctrine Centre (2010) *Global strategic trends—out to 2040*. Ministry of Defence

- The Intergovernmental Panel on Climate Change (2014) Climate change 2014: impacts, adaptation, and vulnerability. <https://www.ipcc.ch/report/ar5/wg2/>. Accessed 15 Feb 2020
- Umbach F (2010) Global energy security and the implications for the EU. *Energy Policy* 38:1229–1240
- Umbach F (2012) The intersection of climate protection policies and energy security. *J Transatlantic Stud* 10(4):374–387. <https://doi.org/10.1080/14794012.2012.734672>
- United Nations (2015) World population prospects, the 2015 revision: key findings and advance tables. https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf. Accessed 30 Oct 2019
- United Nations (2018) The sustainable development goals report 2018. <https://unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf>. Accessed 30 Oct 2019
- United Nations World Water Assessment Programme (2015) The United Nations world water development report 2015: water for a sustainable world. UNESCO
- Vidal J (2008) Canadians ponder cost of rush for dirty oil. *The Guardian*. <https://www.theguardian.com/environment/2008/jul/11/fossilfuels.pollution>. Accessed 24 Jan 2020
- Vivoda V (2010) Evaluating energy security in the Asia-Pacific region: a novel methodological approach. *Energy Policy* 38(9):5258–5263
- Watcharejyothin M, Shrestha RM (2009) Regional energy resource development and energy security under CO₂ emission constraint in the greater Mekong sub-region countries (GMS). *Energy Policy* 37:4428–4441
- Watts J (2015) Brazil's worst drought in history prompts protests and blackouts. <https://www.theguardian.com/world/2015/jan/23/brazil-worst-drought-history>. Accessed 20 Jan 2020
- Winzer C (2012) Conceptualizing energy security. *Energy Policy* 46:36–48
- Wood Z, Butler S (2018) Heatwave in Europe set to push up UK food prices. <https://www.theguardian.com/business/2018/aug/03/heatwave-in-europe-set-to-push-up-uk-food-prices>. Accessed 31 Oct 2019
- World Bank (2018) Improving energy security in Gaza through solar energy. <https://www.worldbank.org/en/news/press-release/2018/10/10/improving-energy-security-in-gaza-through-solar-energy>. Accessed 24 Jan 2020
- Xenias D et al (2015) UK smart grid development: an expert assessment of the benefits, pitfalls and functions. *Renew Energy* 81:89–102
- Yin RK (2018) Case study research: design and methods. SAGE Publications, Thousand Oaks

Chapter 2

Energy Security and Green Energy in Great Britain: The Discourse of the Lights Going Out



1 Introduction

1.1 Aim and Contribution of the Chapter

Although Great Britain (GB)'s energy system is dominated by fossil fuels (BEIS 2019), it is currently undergoing a major transition (Geels et al. 2016). The closure of a number of coal- and oil-fired plants due to high pollution levels as well as the closure of nuclear plants which are coming to the end of their working lives have decreased the electricity capacity margin between supply and demand, which increases the risks to the security of energy supply (DECC 2012). In addition, due to the decline of supplies from the UK Continental Shelf, GB has increasingly become dependent on energy imports, being an energy importer since 2004 (BEIS 2019). These factors have all contributed to take energy security to the top of the political agenda in GB. Concomitantly, GB has been active in grid modernisation efforts, including the shift to smart grid with, for instance, the integration of green energy sources to the system, vehicle-to-grid and vehicle-to-home technologies (Crispim et al. 2014; Jenkins et al. 2015; Xenias et al. 2015; Connor et al. 2018). The expansion of electric vehicle markets in GB has also raised security of energy supply concerns due to the potential to substantially increase load across distribution networks and significantly change patterns of electricity demand (National Grid 2017; Archer 2018).

Within this overall context, this chapter carries out an empirical exploration of the discursive construction of energy security and its link with law and policies promoting green energy amongst key energy experts from different sectors of the economy in GB. Although there are empirical studies exploring public and expert meanings of energy security in the UK (Demskei et al. 2014; Cox 2016), there is no empirical data examining the views of energy experts from different sectors of the economy in GB on the interplay between energy security and law and policy on green energy development. The overarching objective of this chapter, therefore, is to reveal some of the on-the-ground perceptions of key energy experts in GB on this interplay that so far have remained unseen in scholarly analysis. By doing so, this

chapter presents original research that has never been published before and makes a novel contribution to the legal and socio-legal scholarship on energy security, green energy development and the just energy transition.

As energy security is used as an argument in debates which inform law and policies on the transition to an energy system with increased share of green energy deployment, a contribution of the kind this chapter makes is important because it helps us understand how the concept is construed by different actors in the economy in GB and its impact on green energy law and policies. Rather than speak for them, therefore, the aim is to present the discursive realities according to participants themselves by letting them set out their accounts in their own words and in their own terms. This chapter, thus, seeks to go beyond assumptions and speculation to focus on discourses directly. This is in line with the methodological approach adopted in this study which is based on the assumption that discourses not only represent reality, but also help shape it in consequential ways.

Understanding how participants discursively frame energy security and its links with law and policy on green energy development is crucial here because when one frame is selected from amongst a range of competing frames it can be incorporated into law and policies and it has consequences for how green energy development is subsequently seen and acted on. Gathering participants' accounts is, therefore, relevant because their ways of framing the interplay between energy security and law and policy on green energy development provides on-the-ground insights into the discourses which inform and shape the creation of law and policies on green energy development.

1.2 Structure of the Chapter

To set the stage for this empirical exploration of energy security and law and policies promoting green energy in GB, this chapter starts by outlining the investigative method used. It then explores participants' views on green energy, followed by an analysis of the core themes identified from the interviews. The focus throughout is on energy security definitions and on the interplay between energy security and law and policy on green energy development.

1.3 Summary of Findings

This chapter will demonstrate the multiple framing employed by leading energy experts in GB as part of discursive contests that lead to divergent constructions of energy security. In summary, energy security not only means different things to different people in different contexts, but also to different sectors of the economy. Based on participants' discursive constructions, this chapter will highlight the challenges posed to the transition to a green energy system in GB.

First, this chapter will show that energy security in GB is first and foremost a political issue, particularly as a result of risks associated with governments toppling in cases of energy interruption in the country. Second, this chapter will demonstrate that energy politicisation in GB was framed as having negative impacts on green energy development due to vested interests, unequal lobbying power and association of green energy with left-wing politics. Third, the analysis will also reveal a discursive struggle over energy security and green energy links with positive and negative frames identified. In particular, the analysis will show the emergence of two novel themes in relation to green energy and energy security: (i) the potential shift in the debate surrounding green energy intermittency as a result of large-scale commercial energy storage; and (ii) the emergence of ‘prosumers’, a new actor in the energy market which challenges the current energy system.

By presenting the multiple voices of participants, this chapter will call for integration and dialogue among experts from different sectors of the economy in GB and suggests that green energy technological advancements should be embraced in the context of the transition to a green energy system. Further research should also be carried out to address the challenges and uncertainties posed by the increasing integration of green energy sources into the system, particularly in how the legal and regulatory framework can assist in tackling those issues and support the transition to a green energy system.

2 Method

2.1 Sampling, Access and Recruitment of Participants

In trying to ensure the correct proportion of participants from different sectors of the economy which deal with energy, it was a priori determined that participants from the public, private and third sectors of the economy would be invited to participate. The range of interviewees was also determined on the basis of an assumption that different sectors will ex ante adhere to different viewpoints, and hence greater diversity among participants would provide the research with a range of competing constructions.

Participants were identified initially through the literature review, an internet search of energy organisations and some personal contact made via attendance at workshops, conferences and energy events. A snowball sampling process—a process of reference from one person to the next (Denscombe 2003)—was then followed. Participants were approached in writing via letter or email. The main inclusion criteria were expertise, direct relevance (people directly involved and active in the energy and climate/environmental field) and experience.

A total of 24 participants took part in the research. To adhere to the process outlined in the ethics application approved by the relevant Research Ethics Committee, responses and institutions visited were listed anonymously to protect confidentiality. Participants were placed into three categories according to who they

Table 1 Summary of participants’ job positions

Positions	Sectors		
	Private	Government	Not-for-profit
Director	2	3	–
Head of department	4	1	1
Chairman	–	2	2
Manager	1	–	–
Engineer	1	–	–
Solicitor	1	–	–
Senior policy analyst	1	–	1
Policy analyst	–	–	1
Energy analyst	2	–	–
Researcher	–	–	1
Total	12	6	6

worked for: (i) government/governmental organisations, (ii) private sector and (iii) not-for-profit organisations. From the total of 24 participants, 6 belonged to government/governmental organisations, 12 came from the private sector and 6 from not-for-profit organisations. In terms of positions of leadership, 15 were head of departments, directors or chairmen; the other 9 were managers, engineers, solicitors, senior policy analysts, policy analysts, energy analysts or researchers (Table 1).

2.2 Data Collection

Semi-structured interviews were conducted by the author with 24 participants from June 2016 to November 2016 (Table 2).

The semi-structured research interview format meant it was possible to ask the experts involved a set of standard questions while also allowing the conversation to build and deviate to explore new ideas brought up by the interviewees during the interview. Interviews were face-to-face and took place in London, Leeds, Liverpool, Peterborough, Chester and Kings Langley. Interviewing time ranged from 15 to 90 min. 90% of the interviews lasted between 45 and 60 min. All individual participants included in the study provided informed written consent on the day of the interview and were fully briefed about the project and the voluntary nature of their participation as well as anonymity.

Participants were asked broad questions outlined in the interview guide under Appendix 1. All participants answered all the questions outlined in the interview guide. Responses from 23 participants were captured with a digital audio recorder.

Table 2 Summary of interviews (sector/position/dates)

Sector	Position	Date	Code
Government/governmental organisation	Managing director	22 July 2016	Participant A
Private	Head of department	27 July 2016	Participant B
Private	Engineer	3 August 2016	Participant C
Not-for-profit sector	Policy analyst	8 August 2016	Participant D
Not-for-profit sector	Senior policy analyst	8 August 2016	Participant E
Private	Energy analyst	9 August 2016	Participant F
Government/governmental organisation	Head of department	9 August 2016	Participant G
Private	Director	11 August 2016	Participant H
Private	Head of department	17 August 2016	Participant I
Private	Solicitor	17 August 2016	Participant J
Private	Head of department	18 August 2016	Participant K
Not-for-profit organisation	Researcher	19 August 2016	Participant L
Not-for-profit organisation	Chairman	23 August 2016	Participant M
Private	Head of department	24 August 2016	Participant N
Private	Energy analyst	25 August 2016	Participant O
Not-for-profit organisation	Chairman	14 September 2016	Participant P
Government/governmental organisation	Director	14 September 2016	Participant Q
Private	Managing director	28 September 2016	Participant R
Not-for-profit organisation	Head of department	29 September 2016	Participant S
Private	Senior policy analyst	7 October 2016	Participant T
Government/governmental organisation	Director	11 October 2016	Participant U
Private	Manager	17 October 2016	Participant V
Government/governmental organisation	Chairman	19 October 2016	Participant W
Government/governmental organisation	Chairman	20 October 2016	Participant X

One participant from the private sector did not wish to have the interview recorded, but note-taking was allowed and, therefore, notes were taken.

All interviews were transcribed verbatim by the author. Transcripts were checked for errors against the taped version of each interview to ensure accurate and authentic reproductions of participants' accounts. Participants received a copy of the interview transcript with the exception of three participants who verbally expressed that submission of the transcript to them was not necessary. Upon submission of the transcript,

participants had the opportunity to carry out any amendments that they deemed necessary. In all cases, no amendments in relation to change of views were made. In addition, information was not omitted as participants did not remove any substantial part of the comments.

2.3 Data Analysis

The transcripts were analysed thematically. Thematic analysis is a search for themes that emerge as important to the description of the phenomenon (Daly et al. 1997). It is a flexible method that can be applied across a range of theoretical perspectives (Braun and Clarke 2006). According to the constructionist paradigm adopted in the work, meaning and experience are treated as socially produced and reproduced, rather than inhering within individuals (Burr 1995). In addition, within discourse analysis, discourses are orientated towards action and aim to establish a particular prevailing view or social reality. Therefore, following the constructionist paradigm and the discourse analytic approach, the analysis of the interviews did not seek to focus on motivation or individual psychologies of the participants, but instead sought to examine the underlying ideas, assumptions and conceptualisations that were given voice within the participants' accounts. A data-driven inductive or 'bottom up' approach focused on the lines of similarity and difference emerging from the interviews was followed and the 6-phase guide to performing thematic analysis of Braun and Clarke (2006) provided recursive and iterative tools for the analysis of the data.

Firstly, transcripts were carefully read and re-read to familiarise myself with the depth and breadth of the content. Secondly, due to the narrowing of the research topic to be analysed for the purpose of this work, the data suitable for analysis was determined with a focus on energy security. Thirdly, codes were generated inductively, which means that the themes identified were strongly linked to the data themselves and not driven by the author's theoretical interest in the topic. The process of coding the data was therefore carried out without an attempt to fit it into a pre-existing coding frame, or the author's analytic preconceptions. Interviews were coded manually. Although Nvivo is a useful software package for managing data and coding, the limitation of seeing only sections of material on screen made it difficult for the author to visualise and contextualise all of the data. As the transcripts were also examined as a whole, with a view of identifying the overarching discursive frames deployed by the participants, the author felt that manual coding was better suited to the task.

Fourthly, once the data was coded, the codes were consolidated into broader themes. The development of the themes themselves involved the observation of patterns across accounts and issues of potential interest in the data. There is no universally accepted standard for establishing the relevance of a pattern in thematic analysis. In qualitative data analysis, the researcher is the instrument for analysis, making judgments about coding, theming, decontextualizing, and recontextualising

the data (Starks and Trinidad 2007). The author, therefore, used her own judgment to determine whether themes were present in the data, based on whether a concept captured something important to the research aims. Fifthly, those themes were reviewed to ensure that they were adequately supported by the extracts relating to that theme. This involved a constant moving back and forth between the entire data set, the coded extracts of data and the themes. Sixthly, each theme was given a name designed to give an immediate sense of its meaning and the specifics of each theme. Lastly, extracts were selected to best illustrate each theme. Participants' quotes presented in this work are unedited to minimise the chances of any possible misinterpretation and distortion. The core themes identified from the interviews are presented in this chapter. Interview data was supplemented by literature review.

2.4 *Limitations and Caveats*

The current study has some limitations. Primary among these is its small sample size relative to the entire pool of energy experts in GB and views are restricted to those participants. However, given that, at times, participants were recurrently returning to similar themes, sample size issues are not a significant concern with this data set given this study's aims. Larger sampling would be needed if someone were to seek to replicate or re-enforce these findings but in terms of identifying recurrent themes and the discursive practices which underpin them, this sample provides clear insights into the discursive construction of the issues.

Another limitation is regional representativeness, the sample being restricted to England. However, although all interviews were carried out in England, participants were familiar with the energy market in Great Britain and pointed out appropriate differences in energy markets in England, Wales and Scotland where pertinent. Therefore, regional representativeness does not significantly affect the analysis either.

In terms of consistency of questioning, the same interview style was used for all participants and all questions on the form were posed to all participants. However, since a semi-structured interview protocol was employed, a few additional questions were addressed to each interviewee. Nonetheless, at the end of each of the interviews all participants were asked if they would like to add any additional comments in relation to the topic, offering participants, therefore, the opportunity to express their views in any aspect of the topic which they deemed important to mention. Given the aim of the exercise was to identify what participants saw as relevant, and to analyse how that was discursively constructed, that the questions asked were not identical in each case is not, again, a significant limit on the analysis offered.

Finally, in this chapter, verbatim extracts are used as evidence of the frames discursively constructed by participants. This approach also helps towards the reduction of subjectivity in writing and presenting data—as the author presents more than one account of the same event as advanced by participants, making sure that data which do not necessarily support the author's view are also offered to readers (Thody 2006). Therefore, due to the importance of verbatim extracts for evidencing participants'

use of discursive frames and for reducing subjectivity, the author disagrees with the view that interview extracts should be used sparingly since ‘overuse of quotes can become tedious and the point being made can get lost in the words’ (Darlington and Scott 2002). While that means more space is given to participants’ responses, it also means their discursive work can be more closely evaluated.

3 “There Are All Sorts of Scales as to How We Define Green Energy”: Conceptualising Green Energy

Participants defined green energy in a variety of ways: from specific views such as “anything that is renewable, excluding large scale hydro” (Participant F), “energy that is substantially better for the environment than traditional forms of energy production” (Participant I), “energy that is produced essentially from natural resources that are not being dug up or can be replaced” (Participant N) to broader views such as “low carbon forms of energy generation, such as renewables and nuclear” (Participants R and T), “energy that is from other than a carbon source” (Participant C) and “low or zero carbon energy, including technologies that can support low or zero carbon output, such as carbon capture and storage being something that can help to make fossil fuels green energy” (Participant H), and further to broader, more epistemically focused views, such as “there isn’t an accepted definition” (Participant X) or “the definition of green energy depends on the discussion we are having and in what context you are talking” (Participant O).

Participants, nevertheless, generally agreed that non-conventional renewable energy fits within the scope of green energy. Therefore, for clarity, in this chapter, the author uses the term green energy as a synonym for non-conventional renewable energy sources, such as wind, solar, wave and tidal.

4 The Empirical Definition of Energy Security in Great Britain

During the interviews, all participants answered the question “what do you understand by the term ‘energy security’?” The interviews with these leading energy experts enable us to find out more about the diversity of views on energy security as it is elaborated on-the-ground. By proceeding in this way, the study brings more clarity to the public debate by highlighting where the disagreements are and with respect to what in different sectors of the economy in GB. By bringing together the multiplicity of views of participants in one document, this study can also feed into energy decision-making processes and inform law and policies. This is not because the interviews generated an agreed-upon definition on energy security, they did not seek to. Instead, the interviews clarify the priorities of different energy actors from

different sectors of the economy, how those priorities inform perceptions of the interplay between energy security and law and policies promoting green energy in GB and how both translate into action on these issues.

4.1 “We Can Get to a Lot of Places with Your Energy Security”

The polysemic, multi-dimensional, contextual and dynamic nature of energy security can be observed in the variety of definitions of energy security given by interviewees. On the one hand, energy security was discursively constructed in an alarmist and fearful manner by focusing on “lights going out” which will be discussed at length later, and, on the other, in a broader and holistic manner emphasising sustainability and human welfare, in which, for example, “environment and energy security are the same things; they are two sides of the same coin” (Participant E) or “energy security is also a personal issue about poverty and inclusion” (Participant S). In line with this latter view, an energy system is not considered secure if it causes severe environmental and social externalities.

Energy security was recurrently discursively constructed via the energy trilemma—security of supply, affordability and sustainability—albeit in different ways. Some participants presented them as conflicting aspects of energy production in which one goal of the trilemma—energy security in particular—is selected as most important and privileged over the other two. For instance, one participant claimed that “that is not a true trilemma. There is a hierarchy of the three and energy security comes first. Still the trilemma would need to be resolved, but if you had to choose, security always comes first” (Participant H). In other participants’ words, “it has never been an evenly balanced trilemma. At various stages environmental policy or costs have been the most important of the three points and now I would say that security of supply is clearly the most important to government” (Participant X); “the real tension is between the affordability and the environmental and climate change aspects. The security of energy supply is a given” (Participant Q); or “energy security is a Minister’s top priority for energy policy. I think that you have heard of the trilemma. The requirements blend decarbonisation with security and affordability, and they [the government] put energy security on top amongst those. Even if you think about how you can maintain public support for decarbonisation, clearly if security is ever questioned, as a trade-off, then that really undermines support for energy decarbonisation” (Participant G). Other discursive constructions, nevertheless, sought to establish a balanced view of the trilemma in which one or two goals did not need to be pursued at the expense of the other(s).

The need for Britain to have a much broader and more flexible way of thinking about energy security and develop policies for energy security and climate change mitigation in the same silos is advanced in the academic literature (Mitchell and Watson 2013). However, a summary of the elements of energy security raised by

participants (Table 3) demonstrates that climate change, environment and social inclusion were only part of energy security definitions of participants from the not-for-profit sector. It is important to point out here that one participant from the government sector showed awareness that energy security definition could include climate change considerations, but s/he ‘doesn’t think that at the moment people in the industry and politicians think of it in those terms’ (Participant X). Thus, this study finds that participants from the government and private sectors do not seem to consider climate change, environment and social inclusion to be a part of the current energy security concept in GB. This does not necessarily mean that climate change, environmental and social issues were fully excluded from the views of these participants in the debate on energy. Instead it means that they were not presented by participants within the energy security concept and, therefore, were each seen as independent concepts. By not presenting climate change, environmental and social considerations within the definition of energy security, the implication is that law and policies pursuing energy security can be created which negatively impact the climate, the environment and social inclusion.

The dominant energy security frame deployed by most participants from the government sector was based on “the lights going out”. The focus here was on capacity adequacy—including whether capacity was of the right type to respond in a timely way, but also whether the relationship between peak demand and the amount of generation capacity was well balanced—and resilience—whether the energy system could be made robust enough to cope with external events and continue to deliver energy services and whether it could recover from those events (Chaudry et al. 2009). Thus, the primary energy security concern of government experts who took part in this study was with respect to availability and reliability.¹ Costs were also considered important by participants from the government sector, but, with the exception of one

Table 3 Summary of energy security definitions from participants per sector

Government	Private	Not-for-profit
Availability and reliability	Availability and reliability	Availability and reliability
Availability, affordability and reliability	–	–
–	–	Availability and environmental sustainability
–	–	Availability, affordability, reliability, climate change, social and environmental sustainability
Capacity and resilience/keeping the lights on	Capacity and resilience/keeping the lights on	Keeping the lights on in the context of climate change

¹5 out of 6 participants from the government sector (83.3%) framed energy security in the sense of availability and reliability or capacity and resilience/Keeping the lights on.

participant (Participant A), affordability was not presented as part of the concept of energy security. This emphasis on availability and reliability is in line with the government definition of energy security in the 2017 Clean Growth Strategy (HM Government 2017):

Energy security is about ensuring secure, reliable, uninterrupted supplies to consumers, and having a system that can effectively and efficiently respond and adapt to changes and shocks. It is made up of three characteristics: flexibility, adequacy and resilience.

Surprisingly, all participants from the private sector also framed the concept of energy security in relation to availability and reliability alone.² A summary of energy security definitions in Table 3 shows that a focus on availability and reliability was common to definitions of energy security offered by experts from all three sectors.

Affordability was an important element in the discussion, but no participant from the private sector included affordability within the definition of energy security. It is also interesting to note that only one participant from the not-for-profit sector included affordability within the concept of energy security. What the analysis shows, therefore, is that, although availability and reliability is a common definition for all three sectors, divergent constructions of energy security are being advanced by participants from different sectors. Also, the broader concepts of energy security presented in the literature have not been fully incorporated into practice yet, particularly by the government and industry, as the majority of the on-the-ground views focused on narrow energy security definitions related to availability and reliability.

The changing nature of energy security also resonated in interviewees' accounts. According to a participant, "energy security now means something quite different from when I first started looking into renewables" (Participant A). These changes in definitions of energy security and the different priorities attached to their elements were presented as being driven by political, economic and social factors. They were also seen as a result of its correlation to local, national and global events, being intrinsically linked to externalities of the globalised economy. As pointed out by participant U:

Energy security is driven heavily by what is happening in the world and the local situation as well, which is why it changes so much. So it's very complicated and what you call security of supply today will be different to say ten years ago, twenty years ago and to ten years hence as well.

[...] [Energy security] is driven by how the government strategically feels at the time about what is going on, which is interesting, because energy policy should be good in long-term, about generating electricity, but actually, if you look at it, it changes according to the social, economic and political kind of things that are going on in the world at the time.

These contexts and external influences are well exemplified by the narrative of participant X explaining energy supply in Britain:

In 2005, we had fairly cheap energy. We were still enjoying the tail end of that period of energy security. Until the early 2000s, we had gas prices that were lower than the rest of

²Participants' references to capacity and resilience/ keeping the lights on can also be interpreted as availability and reliability of energy supply.

the world as we had an oversupply. Then we became an importer just at a time that the international gas price started going up a lot, so our gas price went up even further because we had to catch up with the rising target, but before that happened we had relatively low energy costs, we had a high degree of security of supply, and therefore the focus was all about green energy. Then between about 2006 and 2010, energy prices went up a lot and the focus changed almost exclusively to consumer cost and how you achieve environmental objectives and security of supply at acceptable costs to the consumer. More recently, because we have been running down, in particular, coal-fired generation, the margin of supply over demand is narrower than it has been. That narrowness is often exaggerated, but it is narrower than it has been historically. Politicians are therefore focused on what they see as the real risk to them, which is the lights going out one day and something going horribly wrong.

The “lights going out” frame was heavily influenced by a political memory of the energy supply interruption in the 1970s, an outcome typically linked by participants to industrial action in the mining sector, during which coal miners went on strike and, as a consequence, the country experienced rolling power cuts. This event was framed as having “a huge amount of resonance and symbolism” (Participant Q) in the national psyche and impacting on how people perceive energy security in the country as “it colours attitudes” (Participant X) to the conversations related to energy security today. As such, the construction of energy security was based on a ‘fear factor’ which came as a result of the 1970s strike and energy supply interruption and this was used as a recurrent reminder to politicians to take action for the lights not to go out. As mentioned by participant Q:

Now, when people whisper ‘Minister, do you really want the lights to go out?’ that is what they are insinuating, that is how this is going to be received. There will be no worse thing for a Minister than seeing this thing happen, because of this resonance, because the tabloid newspapers would just come out with that line. Energy security is imbued with that image of the lights going out.

This section revealed the underlying concepts which were used by leading energy experts in relation to energy security. The fact that the majority of energy security definitions focused on the elements of availability and reliability does not question the construction of the broader energy security concepts also advanced by some participants. This empirical evidence on energy security definition demonstrates, therefore, that there is no uniform understanding of energy security among different sectors of the economy in GB. While some participants from the not-for-profit sector advanced a definition in line with broader scholarly concepts of energy security which include climate change and social and environmental sustainability considerations, participants from the private and government sectors presented a narrower view on energy security, focusing mainly on availability and reliability. Another divergence is that, while the element of affordability can be found in the energy security concepts of one participant from the government and one participant from the not-for-profit sector, affordability is absent from definitions of participants from the private sector.

4.2 *Contending Energy Security Indicators*

In connection with participants' competing energy security definitions related to the elements of availability, reliability, affordability, climate change, environmental and social considerations, analysis of the interview data revealed a number of contending energy security indicators offered by participants. As pointed out under Chap. 1, a number of energy security indicators have been developed in the academic literature. Sovacool and Mukherjee (2011), for example, identified 372 indicators that can be used to measure and track performance on energy security. In this empirical study in GB, the elements of availability and reliability in particular were presented in a variety of ways by participants in relation to the following indicators: control over energy sources, import dependency, securing adequate investments and energy infrastructure.

4.2.1 **Control Over Energy Sources**

Control over energy sources was raised by participants from all sectors as an important energy security dimension. There were, however, different views here. On the one side, there were those who stressed control via the ability to manage energy supply from around the world, a view which exposes a reliance on global trade networks and nondomestic actors for provisioning of energy supply. For those who framed control in this way, energy security is ensured via the diversification of foreign sources of energy supply (Participants G and X) and by sourcing energy from places where there is minimal risk of interruption (Participant G). This view is also rooted in scholarship via the association of energy security in the UK with promoting open and competitive energy markets (Nuttall and Manz 2008; Chang and Lee 2008; Brown and Sovacool 2011). In fact, the UK relies in part on international energy trade to ensure adequate supplies of energy in the country. In 2018, 36% of energy used in the UK was imported (BEIS 2019).

On the other, there were those which stressed control through reliance on (totally or mainly) indigenous sources of energy supply (Participants A, B, L and R). This narrative was presented by some participants from all sectors and is also found in scholarly work claiming an end to 'market fundamentalism' in UK energy governance (Rutledge and Wright 2010). The empirical work, therefore, presented narratives that stand in direct contrast to each other.

4.2.2 **Import Dependency**

Import dependency was another significant frame raised as an energy security issue. This was not only in terms of fossil fuel imports but also in terms of imports of low carbon electricity from Europe via the use of interconnectors, particularly in the context of uncertainty in connection with Brexit and the internal European energy

market. As pointed out by participant E “it is an energy security aspect if you are importing all of your electricity from the Continent, if we don’t generate it ourselves, because you are so reliant on another country supplying your power”. In terms of fossil fuel imports, participant Q framed reliance on imported fossil fuel sources as “heavily overplayed in the UK context” based on the existence of sufficient global diversified supply and fairly well established resilience to pricing changes that there are in global supplies of fossil fuels.

Additional themes related to import dependency concern the importation of energy equipment and technology and energy expertise, which was framed as “really a point of energy security” (Participant A), and maintaining human resources in the country and their energy skills capabilities was advanced as “essential for energy security” (Participant F). As exemplified by participants:

There is the wider energy security aspect if you are importing a lot of your equipment and your expertise in certain technologies. Is that actually secure? So, for example, in oil, gas and nuclear where most of the technologies and equipment are not British, they are essentially imported, there is an energy security risk. [...] Where the technology comes from and the benefits which can be accrued from that are almost as important as where the fuel is coming from (Participant E).

The wind industry is based mostly on German and Scandinavian technology, particularly offshore wind, so now [post-Brexit] you have the challenge for the UK in attracting that technology into the UK, whether being manufactured in the UK under a licence or being exported into the UK. It is a security issue, the ability to source wind turbines. That is part of the economics of energy security. It is not only people, it is also equipment, markets supplying renewable energy equipment (Participant A).

Therefore, participants also gave examples of dependence on foreign energy expertise, equipment and technology as energy security issues not only in the context of nuclear, oil and gas, but also green energy. There are no legal studies which analyse the legal implications of this view. However, it is this line of thought that appeared in India’s arguments in its legal dispute against the United States under the World Trade Organisation, which will be examined in Chap. 4.

4.2.3 Securing Adequate Investments: The “Rat Race”

Energy security in GB was also correlated by participants with the origin of foreign investment and the need to secure adequate investment. If foreign investment stopped, it was felt that this would negatively affect the steady supply of energy in the country. Securing adequate investment has already been highlighted in an empirical study as one of the most critical aspects of ensuring energy security in the UK on all timescales (Cox 2016). The study also found that there were concerns that the UK is currently at risk from a lack of investment in energy infrastructure (Cox 2016). It is estimated that over the next decade, GB will need around £100 billion of capital investment in its electricity infrastructure to accommodate projected future increases in electricity demand and to replace ageing power stations (OFGEM 2020a, b, c, d).

According to Sir Philip Lowe (2018), the post-Brexit framework, for instance, will certainly have an impact on the readiness of EU-27 companies to invest in the UK energy sector and Brexit will reduce the number of investors and suppliers operating in the UK. Participant A exemplified dependence on foreign investment and energy security in the following way:

If the Japanese banks are not going to invest in the UK anymore, for example, that is a big energy security issue. That is another strand or facet of energy security, where the investments in energy are coming from and they are not coming from the UK. Very little comes from the UK.

From another angle, some countries take the view that allowing foreign investment in energy industries endangers energy security (Goldthau 2012) or national security in the case of nuclear energy (Nakatani 2010). The go-ahead for Hinkley Point C, for instance, was publicly controversial with media coverage on speculation about Britain's national security concerns (Gracie 2016; Ward 2016). However, participant D, giving Hinkley Point C as an example, discarded national security concerns grounded on Chinese and French Governments investments in nuclear energy in GB, on the basis that this is how investments in the energy industry currently works as "we are living in a global age where that happens everywhere".

From another perspective, participant O pointed out the importance of energy security for ensuring investment and put energy security in a comparative perspective, where investment was presented as a zero-sum game, i.e. where if GB gets investment, someone else loses it:

[...] if energy security isn't there, the production, or consumption, of whatever the end goal is, isn't reliable, you can't guarantee production and in this fast paced changing business world guarantees are very valuable. [...]

It is the short-term production that you want your energy security for and that security will also inform investment decisions in the long-term. [...] For the long-term, incentive is to keep investment flowing and confidence in your system, your network, your ability to produce and guarantee payments for the investment. These are all down to energy security. Energy security will actually impact that. If you don't have energy security, then you won't have investment in the long-term to an extent. As long as you have more energy security than other countries you will do better, so I guess it is a rat race.

Therefore, participants in GB highlighted the importance of securing adequate investments as a critical aspect of ensuring energy security. On an interrelated angle, one participant pointed out the importance of energy security for ensuring investment. This demonstrates, therefore, a vicious circle where investments are necessary to ensure energy security and energy security is necessary to ensure investments, making it difficult to recover should either decrease.

4.2.4 Energy Infrastructure

The need to have a robust secure energy Infrastructure was also raised by participants as part of energy security concerns. This was characterised by four frames which are

explained here in no particular order of importance. First, security of the energy infrastructure from bombing and terrorist attacks, including cyber-attacks in which the energy sector has become prime target (World Energy Council 2016). Only participants C and R, both from the private sector, mentioned this aspect of the physical security of the energy infrastructure. However, participant R clearly stated that this was not what s/he had in mind when talking about energy security. Some energy security scholarship, nevertheless, refers to this aspect of energy security (Redgwell 2004; Zillman and Bigo 2004; Sovacool and Mukherjee 2011).

Second, security of the energy infrastructure from deterioration in which networks must be kept healthy in order to avoid power failures (Participant C). This is correlated to ensuring adequate investment in energy infrastructure, as pointed out in Sect. 4.2.3. Third, security of the energy infrastructure from natural disasters or accidents, such as fires at power stations (Collier 2014; Philipson 2014), which can cut people off from the electricity or gas supply (Participants C and Q).

Fourth, security of the energy infrastructure from the impacts caused by climate change, particularly as a result of extreme weather events (Participant S), such as damage to interconnectors during a storm (Gosden 2016), to the electricity transmission line network (Manis 2017) or to other aspects of the electricity power infrastructure (Ghanem et al. 2016). Following this line of thought, Paskal (2009) constructed climate change as a fundamental facet of energy security due to the fact that energy infrastructure tends to have a long lifespan and lies in areas that may become increasingly physically unstable owing to changes in the environment. Participant S raised concerns surrounding the development of Hinkley C nuclear power station in those terms in the context of the site being located near the coastline and uncertainties about sea level rises. According to the participant:

If they build another nuclear power station on that site, it will operate for forty or fifty years and it will take 200 years to decommission. The sea level will rise by a metre by 2100 but then will go on rising even with the carbon in the atmosphere at the moment for a very long time. In 250 years, we might have two to four meters of sea level rise and a very impoverished world trying to deal with an incredibly toxic nuclear power station clear up.

Publicly, nuclear developer, EDF, however, acknowledged assessing sea level rise as a result of climate change and was taking preventive measures to protect the nuclear station from tides, storm surges and tsunamis (Burnham-on-sea.com 2018). However, no participant from the private or government sectors considered security of energy infrastructure due to climate change as an indicator for energy security. It is worth noting that in the literature, climate change has increasingly been considered as having an effect on energy security not only related to impacts on the energy infrastructure as raised in this empirical study, but also due to impacts on energy demand and supply patterns (Klare 2015; Watson et al. 2018). However, no participant in this empirical study framed energy security in these latter terms (Table 4).

Table 4 Summary of energy security indicators from participants per sector

Government	Private	Not-for-profit
Control over energy sources through reliance on (totally or mainly) indigenous energy sources	Control over energy sources through reliance on (totally or mainly) indigenous energy sources	Control over energy sources through reliance on (totally or mainly) indigenous energy sources
Control over energy sources via the ability to manage energy supply from around the world	Control over energy sources via the ability to manage energy supply from around the world	–
Energy import dependency	Energy import dependency	Energy import dependency
Ability to source energy technology (equipment)	–	Ability to source energy technology (equipment)
Ability to source human expertise	Ability to source human expertise	Ability to source human expertise
Securing adequate investment	Securing adequate investment	–
Security of energy infrastructure (from natural disasters or accidents)	Security of energy infrastructure (from natural disasters or accidents)	–
–	–	Security of energy infrastructure (due to climate change)
–	Security of energy infrastructure (from bombing, attacks)	–
–	Security of energy infrastructure (network maintenance, security from deterioration)	–

4.3 *The Emotive and Dynamic Nature of Energy Security*

Participants from all sectors agreed on the use of emotive language surrounding energy security in GB and the use of this type of language for serving one's own interest. It was said that the media, in particular, blows energy security matters out of proportion and uses emotional and inflammatory language (Participants D, H and W). This emotional language along with energy security's broad spectrum of definitions and dimensions, as shown above, were constructed as being used to lobby a particular point of view, be it pro-green energy or against green energy. As participants pointed out, "people will play the energy security card for their own interests" (Participant Q), and it is "often used as a buzz word" (Participant E). This is something which is generally acknowledged by scholars that the language of energy security is "politically potent" (Kuzemko 2014) and the lack of a commonly agreed definition affords energy security a wide range of political possibilities, including its

capacity as a political “trump card” (Bridge 2015), in which protagonists use energy security to add more weight to their arguments.

In line with this, participant R from the renewable energy private sector pointed out the use of the language of energy security for pro-green lobbying purposes:

When I am lobbying government, or when I am talking to someone and trying to influence them, I mention energy security. I just don't think it is on top of the list, but sometimes I think that it is one of those sound bites that you see that does sort of hit the mark with some people, especially if you say 'of course we need to make sure that Russia isn't in control of our energy supplies' [...].

In another way which shows how the language of energy security can be used for very different purposes, participant B mentioned the use of the language energy security by the government in support of conventional forms of energy, particularly exploration of natural gas via the use of fracking. This also resonates with a view presented by Noé and Pring (2004), in which energy security is misused as a justification to push forward energy development projects that ignore social and environmental sustainability.

Still in relation to this manipulation of energy security language for one's own interest, a leading energy expert from the government sector indicated that stakeholders use the language of energy security in order to have financial resources allocated to them. As s/he put it, energy security “is the mechanism whereby, if you look at the big utility companies, they are always using this to get more money out of the government, always, that's their mechanism, so is National Grid” (Participant W).

What is observed in the empirical data, therefore, is the dynamic nature of energy security, one that can be continually taken up in new and different ways, where different players can break the concept up and reform it along lines which suit their own particular and sectoral interests.

4.4 Complexity of Energy Security Construction: Summary and Importance of Findings

The analysis under section 4 demonstrated the complexity of the discussion encapsulated in the concept of energy security and its dimensions. The examination of the interviews highlighted that energy security concepts are raised differently relative to different sectors of the economy. The fact that energy security “means a number of different things to different people” (Participant Q) or that “everyone has their own idea on energy security” (Participant X) has been discursively constructed as the “biggest problem” (Participant Q).

There is no consensus amongst participants from different sectors about whether climate change, and social and environmental concerns, in particular, should be a part of the energy security concept. Somewhat missing are attempts from industry and government to open up the energy security definition to broader issues of environmental protection, climate change and social inclusion. Interestingly, there is no

consensus amongst interviewees from different sectors in relation to the inclusion of affordability within the meaning of energy security either, as affordability was absent from definitions of participants from the private sector. Non-inclusion of these elements within the concept of energy security means that energy law and policies pursuing energy security can be created which negatively impact affordability, the climate, the environment and social inclusion. Encapsulating these elements within the concept of energy security would, therefore, assist the move towards a just energy transition, as law and policies on energy security would need to be justified under this broader scope.

Different indicators of energy security are also seen differently from different sectors with narratives standing in direct contrast to each other. For instance, although control over energy sources was advanced by participants from all sectors, its meaning was cast in opposing terms from having control via reliance on indigenous sources of energy supply, on the one hand, to having control via the ability to effectively manage energy supply from around the world, on the other. This study, therefore, presents divergent constructions of energy security by leading energy experts from different sectors of the economy in GB. These differences do not promote efficient communication amongst the sectors, but instead create more distance and misunderstanding.

The summary of energy security definitions and indicators advanced by participants per sector also reveals a partitioning of views across different sectors of the economy with regards to the different elements of energy security, where participants did not deliver a full picture in their discursive construction of the energy security complexity. This could be a result of the complexity involved in the concept of energy security or due to individual or sectoral bias, if participants just wanted to put forward their preferred energy security concept based on their own or their own sector's interests.

Having different energy security definitions amongst participants from different sectors of the economy means that efforts to improve energy security in the country will have to attenuate themselves to different audiences. This diversity of ways in which energy security was constructed by participants also shows that energy security, as stated by a participant, "isn't one size fits all, at all" (Participant U), and, therefore, there is not a single or common solution. This broad spectrum of energy security definitions and dimensions, along with a general acknowledgement of an emotional language associated with energy security, also showed that the language of energy security can be manipulated for one's own individual/sectoral interest and used to advance a particular point of view.

This variety of concepts amongst different sectors of the economy in GB can also be an obstacle to a meaningful debate surrounding energy security. Participants, for instance, may be referring to energy security from very different perspectives or may be selecting particular aspects of energy security to suit their agenda. One, therefore, needs to distinguish the different elements and dimensions of energy security upfront in order to have any meaningful debate surrounding the topic. Demonstrating the variety of arguments constructed by the protagonists in the energy field in GB is, therefore, relevant; not only because it brings more clarity to the public debate by

highlighting where the disagreements are and with respect to what, but also because it might assist in decision-making processes and inform law and policies. Thus, awareness of this conceptual diversity in GB assists in creating clear law and policies on the transition to a low carbon energy system.

The definition of energy security by participants, however, is only one piece of the puzzle which will inform the following sections. The subsequent sections will focus on answering the remaining two key research questions of this work: what are the discursive links between energy security and law and policies promoting green energy? And what are the implications of energy security construction to law and policy on green energy development?

5 Energy Security and Energy Politicisation in GB

This section examines energy security in the context of energy politicisation in GB as raised by participants in the interviews. It shows that energy security in GB is first and foremost a political issue and that governments are critical actors, in that is they who will be held responsible and accountable for energy supply interruption in the country. In connection with this debate, this section also demonstrates the implications of energy politicisation in GB to green energy development. The analysis of the empirical data showed that, according to participants' narratives, energy politicisation in GB is hindering green energy development as a result of three factors: vested interests, unequal lobbying power and association of green energy with left-wing politics.

5.1 *"It Is a Political Suicide for the Lights to Go Out": Energy Politicisation in GB*

As demonstrated in the previous section, apart from the very brief association of energy infrastructure with terrorist attacks, no participant associated energy security with national security, showing an absence of energy securitisation in the discursive terrain of this empirical work in GB. Energy politicisation, on the other hand, where there is public and political interest in the matter which is subject to contestation and political deliberation, was a remarkably dominant frame in the empirical data.

As explained by participants, "governments fall if they don't provide people with electricity, so there is an important political reason why people and Ministers take it seriously" (Participant W), "if you are in government, you would never like to be the government that stands over a bunch of blackouts in the country, would you? It's pretty terminal from a political perspective" (Participant U) or "for democratically elected governments it [energy supply interruption] means that those who are in power are likely to be out of power very quickly" (Participant I).

As relevant as having a political party removed from government as a result of energy supply interruptions is the impact on the chances of getting re-elected, as explained by participant W in a mixed metaphor “you have got to keep governments with their feet to the fire and they are not going to keep their feet to the fire if the lights aren’t on”. Energy security in GB, therefore, was recurrently construed as a matter of priority because of its direct consequences of governments toppling and its negative impact on the chances of a political party getting re-elected in cases of energy interruption in the country.

Energy security and energy politicisation in GB were, however, framed in apparently contradictory ways by participants. On the one hand, it was framed as a priority due to governments falling due to energy supply interruption. On the other hand, energy security issues were framed as policy concerns which “tend to be the football that is kicked around” (Participant P), and, as a result, were not high on the political agenda. In the words of participant N: “You can see that energy security is not top of the political pile, because it has become a political football, which means that people have been able to use it for politics.”

Some light is shed on this apparent contradiction when one observes that energy security is not only defined differently but also categorised into short-term and long-term.³ What participants meant was that energy security in the sense of “the lights going out” was a government priority treated as a day-to-day threat, where interruptions to the energy system were known to foster political and social unrest, disrupt economic growth and topple governments. As exemplified by participants, “the lack of supply can lead to competition, and even social and political unrest. The ripple effect can be endless” (Participant C) or, with reference to GB, “people will riot if they arrive at home and can’t turn their TV on” (Participant V). The association of public dissatisfaction as a result of energy interruption in GB and its direct impact on the collapse of a government was clear in the data.

Conversely, long-term energy security was framed as not being taken seriously by governments in GB. As participants highlighted “everybody knows that in the long-term it [energy security] is really important, but in the immediate short-term, nobody is going to lose their political career over it” (Participant N), “[energy] policy is being driven by today’s headlines and not on the long-term view that it needs” (Participant I) or “the problem about energy is that it is absolutely essential, but at the same time, when things are going well, not many people take much interest in it” (Participant W). The challenge is that government tends to operate on a short timescale, based on electoral cycles, and this timescale is inappropriate for developing the policies needed to manage long-term energy security.

Be it short-term or long-term energy security, however, there is the assumption presented in participants’ narratives that satisfying national energy requirements is a critical government responsibility in which the GB government will be held accountable for any energy supply interruption. This is seen particularly in relation to criticisms of government choices of energy policy or absence of clear long-term energy policies and the certainty advanced by participants of governments toppling

³Participant J also made this distinction between short-term and long-term energy security.

as a result of energy outage in GB. In fact, the Secretary of State and the Gas and Electricity Markets Authority do have a legal responsibility for energy security in GB set out in the Electricity Act 1989. According to article 3(A)(2)(a), they have “the need to secure that all reasonable demands for electricity are met”. However, the language used in the Act implies that the responsibility is for security of the supply of electricity relative to demand, not the broader definition of energy security examined under Chap. 1.

In addition to being political, two participants placed energy security on an equal footing with economics. For participant U, interest in energy matters reflects phases in economic cycles, i.e. during times of economic depression there is an interest in energy, which is driven by price and security; conversely, during times of economic prosperity energy matters have less importance, because “people feel less worried about price and security, because it is all free and it is all there and we can afford it, it is all jolly because we are trading with everybody”. For participant O, as previously mentioned under Sect. 4.2.3, interest in energy security is related to its importance for ensuring investment in the country. These associations of energy security with economics as a primary factor were only raised by two participants, demonstrating that this is not the majority of views in this empirical work in GB.

This section, therefore, demonstrated that short-term energy security in GB is first and foremost a political issue, as a result of its direct consequences of governments toppling and its negative impact on the chances of a political party getting re-elected in cases of energy interruption in the country. Participants also pointed out that energy security is also a priority because, in addition to political disruption, lack of energy supply can lead to economic and social disruption if measures are not taken to change the energy supply scenario. Energy security, nonetheless, was not associated with national security by participants.

5.2 Political Factors as Barriers for the Transition to a Green Energy System in GB

As shown above, the interplay between energy security and law and policies on green energy development was framed by participants in the context of energy politicisation in GB. It demonstrated that energy security in GB is first and foremost a political issue and that governments will be held responsible and accountable for energy supply interruption in the country. In connection with this debate, this section reveals the implications of energy politicisation in GB to green energy development as raised by participants. The analysis of the empirical data showed that, according to participants’ accounts, energy politicisation in GB is hindering green energy development as a result of three factors: vested interests, unequal lobbying power and association of green energy with left-wing politics.

5.2.1 Vested Interests

Vested interests were constructed as connected to the close personal relationships between the government and the nuclear, oil and gas industries, and their unwillingness to see the energy system changed (Participants B, and M). The rationale provided for this reluctance towards changes to a green energy system was not only due to their familiarity with conventional energy sources (Participant L), but also because the conventional energy industries do not want to lose revenue streams or have their business models negatively affected (Participant Q).

Aspects of this are perhaps unsurprising as a fully-fledged policy drive to a green energy system will certainly have important consequences for future revenues of conventional energy industries. According to Petit (2017), for instance, as the volume of renewable energies grows and becomes naturally competitive with conventional generation, many conventional power plants now face situations where their profitability is threatened. However, a review of the three great energy transitions of modern times—the rise of steam during the first Industrial Revolution in the eighteenth century, electrification in the nineteenth century, and the advent of oil-fuelled cars in the twentieth century—finds that where vested interests were overly protected, transitions were delayed at a high cost (Trebilcock 1981; Fay et al. 2015). A successful transition to a low carbon energy system will, therefore, require managing vested interests.

5.2.2 Unequal Lobbying Power

Unequal lobbying power was advanced by participants as a key issue. According to Barbier (2011), vested interests and political lobbying help delay the transition to sustainable development because powerful interest groups influence governments to block policy reforms that redistribute costs and benefits against their interest. The nuclear, oil and gas industries in GB are made up of large, multinational and multibillion pound organisations and these were seen as having far more lobbying power over the government than wind, solar and biomass, because the renewable energy sector was framed as not wanting to speak with a single voice and not being as large (Participant B). Valentine (2011) agrees with the existence of a fragmented structure of the renewable energy technology sector and argues that it places the sector at a financial disadvantage when compared to fossil fuels, a sector which does unite to engage in collective lobbying.

Publicly, fossil fuel companies were claimed to enjoy far greater access to UK government ministers than renewable energy companies or climate campaigns (Evans et al. 2015). In the literature, it has also been argued that a strong nuclear lobby in Britain orchestrated the UK plan to build two nuclear reactors at the Hinkley Point C site, although it is not readily apparent who that lobby might contain (Thomas 2016). Unequal lobbying power is, therefore, another issue which needs to be tackled to increase green energy deployment in the energy system in GB.

5.2.3 Green Energy as Tied to Left-Wing Politics

Participants also advanced a construction of public perception based on people associating “wind turbines or solar energy as hippy” (Participant B), “totemic for the left” (Participant R) or that “green energy equals left wing” (Participant A). However, participant A mentioned that attempts have been made to move on from that discussion and associate green energy with business opportunity.

There are signs that this perception of green energy as tied to left-wing politics is changing. In June 2019 the Conservative government enshrined in the Climate Change Act 2008 a commitment to reach net zero carbon emissions by 2050. The increase of the UK offshore wind target from 30 to 40 GW by 2030, for example, was one of the Conservative Party pledge on the last campaign in the end of 2019 (Bairstow 2019).

In summary, vested interests, unequal lobbying power and association of green energy with left-wing politics were issues advanced by participants which need to be managed to increase the deployment of green energy in the energy system in GB. Law and policies in this area may, therefore, be useful in tackling these issues if the goal is to increase the share of green energy deployment in the energy system.

6 Analysing the Links Between Energy Security and Law and Policies on Green Energy Development

One of the findings of the analysis of the empirical view on energy security definitions under section 4 above was that elements of climate, environmental and social considerations as part of the energy security concept were only part of energy security definitions advanced by participants from the not-for-profit sector. In this regard, only three participants in total, out of the 24 participants which took part in this research, included those elements in the concept of energy security, representing just 12.5% of the sample for this study. In terms of the element of affordability, it was interesting to find that no participant from the private sector included affordability within the concept of energy security. Only two participants in total—one participant from the government sector and one participant from the not-for-profit sector—included affordability within the definition of energy security, representing only 8.3% of the sample. As previously stated, this shows that the broader concepts of energy security presented in the literature review under Chap. 1 have not been fully incorporated into practice yet. The majority of on-the-ground views in GB focused instead on a narrow energy security definition, relating it primarily to availability and reliability.

Law and policies on green energy development were debated by participants not only in the context of energy security in the narrower sense, but also within the affordability and sustainability aspects of the energy trilemma. This work, however, is centred on the interplay between energy security and law and policies on green energy development. Therefore, since the narrow view of availability and reliability of

energy supply was the prevalent energy security definition presented by participants in this study, this section will focus on energy security based on this definition. This narrow energy security construction will serve as the basis for the subsequent examination of the interplay between energy security and law and policies on green energy development in GB as framed by participants.

As a first step in that analysis, it is worth noting that there has been an increasing recognition in the literature of energy security factors behind the support for green energy deployment, particularly in the context of energy security strategies with a view to diversification of energy sources and/or energy import dependency reduction (Marques et al. 2010; Valentine 2011; Aguirre and Ibikunle 2014; Lucas et al. 2016) including in the context of GB (Grubb et al. 2006). In fact, Lucas et al. (2016) identified energy security strategies, and not environmental concerns, as the main driver in current green energy deployment in the European Union (EU) and a Renewable Energy Security Index has even been developed as a quantifiable energy security index of national power generation sectors (García-Gusano et al. 2017). In addition to these EU-wide moves, political leaders in the UK have recognised the role played by green energy in ensuring energy security. As stated by the UK Secretary of State for Energy in 2014, '[i]nvesting in homegrown clean energy and energy efficiency across our economies is fundamental to greater energy security, just as it is to fighting climate change' (Davey 2014).

This section, therefore, investigates how participants discursively constructed the links between energy security and law and policies on green energy development in GB at a time when the government approach appeared to be shifting.⁴ As previously stated, understanding participants' discursive framing of energy security and its links with law and policies on green energy development is important because when one frame is selected from amongst a range of competing frames it can be incorporated into law and policies and it has consequences for how green energy development is subsequently seen and acted on.

Against that background, the analysis presented in this chapter shows, in summary, that the construction of energy security and green energy links involves three competing ways of framing how energy security impacts on green energy development. These frames are not entirely clear cut and uniform amongst participants: (i) the positive frame, (ii) the negative frame and (iii) the emerging frame. Generally speaking, the positive frame, which associates energy security and green energy in a positive way, has the implication of promoting green energy development. The negative frame, which associates energy security and green energy in a negative way, has the implication of hindering green energy development; however, there is the

⁴The interviews were carried out from June 2016 to November 2016. In May 2015, the UK held a general election to elect members to the House of Commons. The Conservative Party won and took over from the Conservative and Liberal Democrat coalition government (2010–2015). In terms of energy policy, the new Conservative Party pushed forward the exploitation of domestic sources of oil and gas, including from fracking, the construction of Hinkley Point nuclear power station and reduced the amount of financial support towards some renewable technologies, particularly onshore wind and solar. These approaches to energy policy were subject to media attention during the time of the interviews.

potential shift in the debate surrounding the negative frame as a result of large-scale commercial energy storage. Finally, the emerging frame, centred on ‘prosumers’ as a new actor in the GB energy market, is challenging the current energy system and threatening the maintenance of the existing energy infrastructure.

6.1 *Analysing the Positive Frame*

Data analysis produced four themes associated with the interplay between energy security and law and policies on green energy development in a positive way: energy availability, energy diversification, energy independence and energy decentralisation. Participants deployed this positive frame to point out the importance of developing green energy to ensure energy security. In the analysis which follows, there has been no attempt to rank these themes in order of importance.

First, participants praised green energy for its wide availability, for not being subject to depletion like fossil fuel resources, and for delivering energy security as a result of its contribution to meeting energy demands and contribution, second, to the diversification of the energy matrix.

Third, energy independence, in the sense of green energy being a domestic source and in the sense of less or no imported fossil fuels, was also mentioned in a positive way in relation to green energy, albeit raising some controversy. Participants pointed out that the emphasis on energy independence does not favour green energy exclusively as this argument has also been used extensively for fracking in the UK (Participants L and Q, Cockburn 2018).

Moreover, the debate about energy independence was criticised from two different perspectives: (i) less imported fossil fuel was seen as not completely shielding the energy sector from the price effects of a global constraint on oil and gas, and it was recognised that reducing high priced imports would not mean that everybody would be better off because of the way that energy markets work and because of customers contractual structures in place (Participant Q); and (ii) energy independence was constructed as an outdated debate in the context of the current energy interdependence in GB, particularly as a result of installation of interconnectors with neighbouring European countries which allows for energy exportation when there is over-supply or energy importation when there is under-supply (Participant D, Kelly and Adomaitis 2016; European Commission 2018),⁵ providing, of course, that the continental energy producers themselves are not under stress to produce more for their own local markets. Lindquist (2017) has argued that cross-border interconnectors have been seen as key to improving the reliability of the energy system and reducing power interruptions. This position reveals a preference for an integrated energy system that is based on high quality infrastructure. Nevertheless, Brexit and

⁵Britain’s electricity market is currently interconnected with France, Netherlands, Northern Ireland and the Republic of Ireland. There were discussions to build a power interconnector from Iceland to Britain (IceLink), but this has been delayed due to Brexit.

the future uncertainty over the internal energy market was constructed as being capable of influencing the rhetoric around energy independence and energy security as Brexit could potentially make it harder to secure energy supplies from the Continent (Participant E).

Fourth, energy decentralisation—where a generation plant can be connected to the distribution network or off grid, at a location close to the point of use—as a characteristic of green energy deployment was constructed as contributing to energy security. By being able to supply energy in a decentralised manner, green energy was framed as contributing to the flexibility of the energy system and its resistance to central shocks or system-level failures (Participant P). Mini nuclear power plants, however, can also contribute to a decentralised power generation and this may be the approach taken by the UK (Shrestha 2019; Bairstow 2020).

Concerning the benefits of energy decentralisation, similar views can be found in the literature where decentralised energy systems are considered to have positive impacts in the operation of electric grids, as they increase system reliability and power quality, minimize land use effects, reduce grid congestion costs and the need of peak power supply, and allow savings in transmission and distribution losses whilst offering greater levels of energy security (Finney et al. 2012; Römer et al. 2012; Blarke and Jenkins 2013; Chmutina and Goodier 2014). The literature on energy decentralisation, however, also point to factors that can negatively impact energy security, such as increased need for load balancing (Barton et al. 2015) and the possibility of lack of coordination between different network operators (Vaccaro et al. 2011; Lau et al. 2018).

Thus, energy security concerns framed around energy availability, energy diversification, energy independence and energy decentralisation were generally advanced by participants as a positive frame which pushed forward the promotion of green energy development in the discourse.

6.2 “Energy Security Is Being Used as a Stick to Beat Green Energy with”: Analysing the Negative Frame

Data analysis produced two themes associated with energy security and green energy development when framed negatively: grid upgrading issues and unreliability due to intermittency. This negative frame in the discourse had the implication of hindering green energy development. The allegation that some green energy projects in GB could generate energy but could not have the energy gridded due to grid upgrading issues was constructed within the negative frame (Participant A). In fact, there are large parts of GB energy network which are in need of replacing or upgrading (DECC 2015). This shows that, although green energy can provide energy availability, modernisation of the electricity grid is a critical element to ensure energy security and has been used as an argument which negatively impacts green energy development.

Green energy's intermittent nature was also recurrently presented as negatively affecting the energy security element of reliability. An acknowledged issue with green energy sources, such as solar and wind energy, is the variability in its output. The period during which wind or solar power is produced is not controllable or even always predictable. These sources, therefore, do not produce power in synchrony with demand. In order to ensure energy security, it is, nonetheless, mandatory to permanently balance electricity production and consumption. The lack of balance has devastating consequences for the electrical network, including frequency and voltage variations. Beyond certain limits, these variations can result in damage to connected equipment as well as blackouts (Price 2014). This, therefore, created a general indisposition among some participants to associate green energy sources with energy security in a positive way.

This negative frame was mainly constructed in connection with green energy's impact on the security of the electricity system, particularly the transmission system, due to challenges for the energy system operator to keep the system stable as a result of the intermittent character of green energy. As explained by participant X:

[...] the characteristics of green energy sources are such that they tend to mess up the smooth operation of the system and so they bring short-term energy security problems. Partly because they are normally intermittent, they don't run all the time or exactly when you need them, so you need back up sources of supply to fill in the gaps which is expensive, because those sources are sitting around doing nothing for some time.

As a result of the negative impact on the functionality of current electricity systems, green energy was framed as causing "genuine risks to energy security in the sense literally of the lights going out" (Participant X). In Japan, for example, a utility curbed the use of solar power supplies in order to maintain grid stability and avoid the threat of sudden blackouts (Reuters 2018). The International Energy Agency (IEA) (2016) has underlined the point that the sweeping green energy generation revolution has propelled a new debate over the design of the evolving power market and electricity security. Therefore, as shown under section 5, taking into account the political nature of interruption of energy supply in GB, capable of toppling governments, some participants have placed heavy weight on this negative frame surrounding the interplay between energy security and green energy in GB. That negativity is exemplified by a participant labelling green energy as a "threat" to the energy system's operation (Participant Q).

Those who contested this negative framing sought to refocus the debate on the role of technological advancement. Indeed, in regard to the operational aspects of green energy integration by transmission system operators (TSOs) and distribution system operators (DSOs), the variability of electricity generation from green energy has led many not to rule it out but to call for the use of new technologies to make better production forecasts and increase grid flexibility (Lindquist 2017). In an attempt to reverse key aspects of the negative frame, these short-term energy security challenges, particularly grid balancing, were framed positively as stimulating innovation via the development of new energy technologies, such as energy storage (Participants I

and J, Centrica 2019).⁶ Large scale commercial energy storage was also advanced as one of the answers to the short-term energy security challenges that come with green energy deployment in the system (Participants X), where energy storage would constitute a “game changer” (Participants O and X) or, as Winfield et al. (2018) have put it, a “technology which may disrupt conventional utility models”. According to participant O:

They say that energy will be too cheap to bill because it will be everywhere. I am sure you have seen how much energy is hitting the earth at any given time and how much of that energy we are capturing and using, it is very small. If we are able to harness a percentage of the solar power and store it in batteries, then you wouldn't need anything else.

While the addition of energy storage technologies to the energy system addresses some problems, however, it also raises legal, regulatory and social issues, such as lack of agreed legal definition of energy storage (Crossley 2013), jurisdictional uncertainty to regulate energy storage facilities and the services they provide as well as costs recovery uncertainty (Stein 2014), contractual issues in the context of energy storage services (Burlinson and Giulietti 2018) and issues of social acceptance of and resistance to energy storage as a technological change to the energy system (Devine-Wright et al. 2017).

It is acknowledged that low-cost, reliable, and efficient methods to store energy would constitute a valuable addition to a network with a high penetration of green energy generation (Price 2014). Nevertheless, energy storage is not yet a technology that has been commercially proven at large scale and readily available at low cost, although we can see widespread energy storage projects worldwide and in the UK (US Department of Energy 2020). An analysis of participants' narratives shows large-scale commercial energy storage to be an essential factor to shift the negative frame to a positive frame surrounding the interplay between energy security and law and policies on green energy development. Thus, in order to increase the share of green energy in the energy system in GB and move towards a low carbon energy system, further investment and research in this area are necessary to lower the cost, increase scalability of energy storage technologies as well as understand legal, regulatory and social issues around the addition of energy storage technologies to the energy system.

6.3 Analysing the Emerging Frame: ‘Prosumers’ and Energy Security

Adding green energy to the power sector has given rise to a new actor in the energy debate called the “prosumer”, defined as “an energy user who generates renewable energy in his/her domestic environment and either stores the surplus energy for future use or trades to interested energy customers in smart grid” (Rathnayaka et al. 2015).

⁶Energy battery and solar technology, for instance, were installed at 100 homes in Cornwall, UK as a trial.

Other definitions of prosumers are found in the literature (Parag and Sovacool 2016; Zafar et al. 2018). However, in general, prosumers are both producers and consumers of energy and they can also trade energy surpluses.

Nowadays, the concept of ‘energy prosumer’ is gaining more ground within the energy market as multiple consumers produce domestically electricity (Hwang et al. 2017). A recent study, for instance, speculated that by 2050, 44% of UK energy could be generated by prosumers (Kampman et al. 2016; Good Energy 2016). It has also been predicted that the number of British energy ‘prosumers’ could grow from one million in 2015 to 24 million by 2050 (Clover 2016).

Prosumers are an illustration of how the deployment of emerging green energy technologies has disrupted the manner in which the existing network and energy sector operate, by creating a shift in the value chain from transmission through distribution. Electrical power systems are usually broken down into 3 element types: generation, transmission, and distribution. The current energy system structures in GB revolve around large-scale centralised generation to deliver energy security. The electricity transmission system operator in Britain is a monopoly, performed by National Grid Electricity Transmission plc (National Grid), which is responsible for ensuring the stable and secure operation of the whole transmission system (OFGEM 2020a, b, c, d), and the distribution network is run (and owned) by the UK’s Distribution Network Operators (DNOs). There are now 6 DNOs running the 14 distribution networks in England, Scotland and Wales (OFGEM 2020a, b, c, d), and the dominant supply business model has been the corporate utility (commonly known as ‘the big six’ in the UK), selling units of energy to consumers in national markets (Hannon et al. 2013).

However, the installation of photovoltaic (PV) panels in properties, for example, along with storage technologies is changing the roles played by the participants in the energy system. For instance, solar energy is directly transmitted to the property via installed solar panels and can be stored via the use of domestic energy storage (Colthorpe 2018). As a result, consumers can generate, store and consume energy independently from the grid, reducing, as such, revenues for the utilities sector, and replacing the traditional role of an energy supplier. Thus, prosumers are altering the fundamental geography of energy networks, blurring previously fixed distinctions between consumers and producers, sites of energy production and of use, and the relationship between supply and demand in general (Ellsworth-Krebs and Reid 2016). This transformation in the energy system structure has recently been acknowledged by an ex-Secretary of State for Business, Energy and Industrial Strategy in his statement that ‘[t]he distinction between [energy] supplier and distributor may no longer hold in this new world’ (Clark 2018).

The appearance of prosumers has been claimed to have both positive and negative implications for energy security. According to Staffell et al. (2015), prosumers add to energy security by, for instance, reducing the need for new generation and infrastructures by generating energy where it is used and by adding to the diversity of the energy supply. However, in an opposite vein, participant X pointed out how prosumers can have a negative impact on energy security. This participant advanced issues related to undermining the integrity of the national energy networks, ownership of the assets

and consumer law issues as prosumers impact the perceived fairness of who pays for the physical maintenance and operation of the energy network infrastructure.

Those engaged in producing and consuming their own energy do not want to pay for the maintenance of the energy infrastructure, but if the energy network costs are shifted onto a smaller group of energy consumers, their electricity costs can become very high. This means that prosumers have important consequences for future revenues related to the energy infrastructure. As seen under section 4, the physical maintenance of the energy infrastructure from deterioration was advanced as one of the elements of energy security and, with the introduction of green energy to the system, grid modernisation is also needed. Maintenance and upgrading of the energy infrastructure are, however, costly processes (OFGEM 2018)⁷ which can be jeopardised if funding is not available.

Diesendorf and Elliston (2018) also add that the increase in local energy self-reliance may reduce the political power of the large energy utilities and the fossil and nuclear power industries. This, therefore, may also cause resistance to further deployment of green energy via prosumers. In any case, the appearance of prosumers is evidence that the energy system is evolving into a more decentralised, distributed and multi-directional energy grid. With an increasing share of green energy in GB and with the introduction of home energy storage to the market (Woollacott 2018), the role of consumers as active participants in the energy system, as energy producers and/or suppliers is bound to increase. Further research on the implications of prosumers for the energy system is, therefore, needed.

One can observe that technological advances, such as energy storage, and the appearance of prosumers are bringing a shift in the frame of the debate. Where green energy was presented as being an energy security concern mainly as a result of supply interruption in the electricity system due to its intermittent nature, as new technologies come on-stream now it is increasingly being presented as a concern because it undermines the integrity of national energy networks, disrupting the traditional way of doing things, disturbing the 'business as usual' scenario, driving changes in old monopoly industries and "forcing big monopoly industries to start thinking differently" (Participant H). How monopolies, such as the electricity transmission system operator, adapt to these changes has been raised as a current challenge. As participant H put it, "how do you transform a massive business like the National Grid to go from being quite rules based, loving the process and doing the same old thing, quite stagnant, quite stale and not very agile to start being more like a Google or a Tesla?"

Indeed, policies favouring more distributed or decentralised electricity generation have led to concerns in some circles about a 'death spiral' for traditional monopoly electric utilities (Armstrong et al. 2016). This demonstrates the need for energy players to learn how to effectively manage the uncertainties associated with the technological advancements which play a critical role in offsetting the inherently variable nature of green energy sources and can fundamentally change electricity

⁷In March 2018, around £250 of a typical household's dual fuel energy bill went towards running and maintaining the network—around a fifth of an overall bill of £1100.

market dynamics. As pointed out by participant H, “any business that has tried to be defensive has just died, it is just death by a thousand cuts”. It cannot be denied that changes to adapt and improve the energy system in GB are greatly needed in the just energy transition. The solution then may be to embrace the changes rather than fight them.

In light of the above, then, it becomes clear that the relationship between energy security and green energy is being constructed as a dilemma. On the one hand, green energy is constructed as offering solutions to many energy supply challenges by being able to provide environmentally-friendly availability of energy, energy independence and diversification. On the other, it is constructed as a threat to the current energy system in two different ways: (i) as a threat to short-term energy security as a result of grid balancing and intermittency issues; and (ii) as a threat to the maintenance of the current energy infrastructure as well as to the current electricity market dynamics and its dominant players as a result of technological development and challenges associated with consumers seeking independence from utilities through energy self-sufficiency. One can observe, therefore, that green energy is framed as tackling energy security issues, but also being the cause for the upsurge of emerging energy security problems.

This section has demonstrated that the links between energy security and green energy are far from straightforward. It has also revealed how existing discursive constructions are broadening, deepening and transforming the relationship between energy security and law and policies on green energy as well as showing its complexity, particularly as a result of technological innovation and the introduction of new challenges to energy infrastructure and market operators following the increasing integration of green energy sources into the system. These challenges will certainly benefit from further research for a deep and thorough analysis in terms of solutions, particularly in how legal and regulatory frameworks can assist in tackling those issues.

7 Conclusion

This chapter delved into the interplay between energy security and law and policies on green energy in the context of Great Britain. It sought to examine empirical perceptions of leading energy experts in GB, by presenting the discursive realities according to participants. The analysis revealed a contested terrain around the topic. In terms of how participants construed energy security, although the majority of the on-the-ground views on energy security definitions focused on the elements of availability and reliability, there was a multiple framing employed by leading energy experts as part of discursive contests that led to divergent constructions of energy security. While some participants from the not-for-profit sector advanced a definition in line with broader scholarly concepts of energy security with the inclusion of climate change, environmental and social considerations, participants from the private and government sectors presented a narrower view on energy security, focusing mainly on availability and reliability alone. Interestingly, there was no unanimity amongst

interviewees from different sectors in relation to the inclusion of affordability within the meaning of energy security either, as affordability was absent from definitions of participants from the private sector and could be found in the energy security concepts of one participant from the government and one participant from the not-for-profit sector.

Thus, this study has found that somewhat missing are attempts in industry and government to open up the energy security definition to broader issues of environmental protection, climate change and social inclusion and only a minority of definitions included affordability within the concept of energy security. What this shows, therefore, is that the broader concepts of energy security presented in the literature have not been fully incorporated into practice yet. One of the consequences of the non-inclusion of these elements within the concept of energy security is that energy law and policies pursuing energy security can be created which negatively impact affordability, the climate, the environment and social inclusion. Encapsulating these elements within the concept of energy security would, therefore, assist the move towards a just energy transition, as law and policies pursuing energy security would need to be justified under this broader frame, with much present law and policy falling short of that standard.

Different indicators of energy security were also seen differently by different sectors with participants' accounts standing in direct contrast to each other. For instance, although control over energy sources was treated as important by participants from all sectors, it was cast in opposing terms from, on the one hand, having control via reliance on indigenous sources of energy supply to, on the other, having control via the ability to effectively manage energy supply from around the world. This broad spectrum of energy security definitions and indicators along with a general acknowledgement of the emotional language associated with discussions of energy security also showed that the language of energy security can be manipulated for one's own interest and used to advance a particular point of view. The analysis, therefore, reminds us that energy security meanings reflect contradiction and contestation, and that the concept possesses interpretive flexibility exploited by different protagonists to advance their own positions.

These divergent constructions of energy security by leading energy experts from different sectors of the economy in GB do not promote effective communication amongst the sectors, but instead create more distance and misunderstanding. Participants, for instance, may be referring to energy security from very different perspectives or may be selecting particular aspects of energy security to suit their agenda when making it an issue. It is critical, therefore, to distinguish the different elements of energy security upfront in order to have any meaningful debate surrounding the topic. This diversity of ways in which energy security was constructed by participants also shows that there is not a single or common solution for achieving energy security and efforts to improve energy security in the country will have to attenuate themselves to different audiences.

Another principal finding in this chapter was that energy security in GB is first and foremost a political issue and governments will be held responsible and accountable for energy supply interruption in the country. The analysis of the empirical data

showed that, according to participants' narratives, energy politicisation in GB is hindering green energy development as a result of three factors: vested interests, unequal lobbying power and association of green energy with left-wing politics. Therefore, these issues need to be managed to increase the deployment of green energy in the energy system in GB, and law and policies in this area may be useful to tackle these issues.

The analysis also found that the construction of energy security and green energy links have been characterised by competing perspectives on how energy security construction is impacting green energy development. Three frames were found which were not entirely clear cut and uniform amongst participants: (i) the positive frame, where energy availability, energy diversification, energy independence and energy decentralisation were generally advanced by participants as a positive frame which pushed forward the promotion of green energy development in the discourse; (ii) the negative frame, where grid upgrading issues and unreliability of green energy due to grid balancing challenges and its intermittent nature were construed as hindering green energy development. However, there is the potential shift in the debate surrounding the negative frame as a result of large-scale commercial energy storage; and (iii) the emerging frame, focused on 'prosumer' as a new actor in the energy market which is challenging the current energy system and threatening the maintenance of the current energy infrastructure.

The interplay between energy security and law and policies on green energy development is, therefore, far from being straightforward. On the one hand, green energy was constructed as offering solutions to core energy security challenges by being able to provide environmentally-friendly availability of energy, energy independence, decentralisation and diversification. On the other, it was constructed as a threat to the current energy system in two different ways: (i) as a threat to short-term energy security as a result of grid upgrading issues, grid balancing and intermittency issues; and (ii) as a threat to the maintenance of the energy infrastructure as well as to the current electricity market dynamics and its dominant players as a result of technological development and challenges associated with consumers seeking independence from utilities and desiring energy self-sufficiency. One can observe, therefore, that green energy was framed as a means to tackle energy security issues, but also a cause for the upsurge of emerging energy security problems.

These findings reveal how existing discursive constructions are broadening, deepening and transforming the relationship between energy security and law and policies on green energy as well as showing its complexity, particularly as a result of technological innovation and the emergence of new challenges to energy infrastructure and market operators following the increasing integration of green energy sources into the system. These challenges will certainly benefit from further research and analysis in terms of solutions, particularly in terms of how the legal and regulatory framework can assist in tackling those issues and supporting the transition to a green energy system in GB.

By presenting the multiple voices of participants from different sectors of the economy in GB, this chapter calls for integration and dialogue so to contribute to a more sophisticated debate amongst energy players. This, in turn, would help achieve

a better understanding of the current challenges posed to the energy transition. It was not possible to explore in depth all the concerns advanced by participants in this chapter. However, the discussion and findings are valuable in pointing to areas for future research as well as informing the analysis of the interplay between energy security and green energy in international trade law as encapsulated by the law of the WTO under Chap. 4.

In line with the approach adopted in this work, one which aims to capture a plurality of views and the discursive frames that arise from them, the next chapter examines the official discourse surrounding energy security and law and policies on green energy development in Brazil, an example of a perspective from an emerging economy with a dominant low carbon energy system. The contextual variations provided by the case study on Brazil in the next chapter cast further light on the nexus of interests at work across this contested field.

References

- Aguirre M, Ibikunle G (2014) Determinants of renewable energy growth: a global sample analysis. *Energy Policy* 69:374–384
- Archer J (2018) Centrica, uber launch electric vehicle trial to monitor impact on UK energy grid. <https://www.telegraph.co.uk/technology/2018/11/30/centrica-uber-launch-electric-vehicle-trial-monitor-impact-uk/>. Accessed 28 Jan 2020
- Armstrong RC et al (2016) The frontiers of energy. *Nat Energy* 1:1–8
- Bairstow J (2019) Boris Johnson: Conservative Party will increase UK's offshore wind goal to 40 GW. <https://www.energylivenews.com/2019/11/14/boris-johnson-conservative-party-will-increase-uks-offshore-wind-goal-to-40gw/>. Accessed 30 Jan 2020
- Bairstow J (2020) Rolls-Royce plans mini-nuclear reactors for UK by 2029. <https://www.energylivenews.com/2020/01/27/rolls-royce-plans-mini-nuclear-reactors-for-uk-by-2029/>. Accessed 2 Feb 2020
- Barbier EB (2011) Transaction costs and the transition to environmentally sustainable development. *Environ Innov Societal Transitions* 1:58–69
- Barton J et al (2015) Distributing power, a transition to a civic energy future. Realising Transition Pathways Research Consortium
- Blarke MB, Jenkins BM (2013) SuperGrid or SmartGrid: competing strategies for large-scale integration of intermittent renewables? *Energy Policy* 58:381–390
- Braun V, Clarke V (2006) Using thematic analysis in psychology. *Qual Res Psychol* 3:77–101
- Bridge G (2015) Energy (in)security: world-making in an age of scarcity. *The Geograph J* 181:328–339
- Brown MA, Sovacool BK (2011) Climate change and global energy security: technology and policy options. MIT Press
- Burlinson A, Giulietti M (2018) Non-traditional Business models for city-scale energy storage: evidence from UK case studies. *Economia e Politica Industriale* 45:215–242
- Burnham-On-Sea.com (2018) EDF Rejects fears that Hinkley C will be vulnerable to rising sea levels', Burnham-on-sea.com. <http://www.burnham-on-sea.com/news/2018/hinkley-c-rising-sea-levels-01-08-18.php>. Accessed 28 Jan 2020
- Burr V (1995) An introduction to social constructionism. Routledge, London
- Centrica (2019) Centrica's local energy market trial completes battery installation in 100 Cornish homes. <https://www.centrica.com/news/battery-powered-britain-centricas-local-energy-market-trial-completes-battery-installation-100>. Accessed 28 Jan 2020

- Chang Y, Lee JL (2008) Electricity market deregulation and energy security: a study of the UK and Singapore electricity markets. *Int J Global Energy Issues* 29:109–132
- Chaudry M et al (2009) Building a resilient UK energy system. <http://www.ukerc.ac.uk/publications/building-a-resilient-uk-energy-system-working-paper.html>. Accessed 2 Feb 2020
- Chmutina K, Goodier CI (2014) Alternative future energy pathways: assessment of the potential of innovative decentralized energy systems in the UK. *Energy Policy* 66:62–72
- Clark G (2018) After the trilemma—4 principles for the power sector. <https://www.gov.uk/government/speeches/after-the-trilemma-4-principles-for-the-power-sector>. Accessed 28 Jan 2020
- Clover I (2016) UK could be home to 24 million clean energy prosumers by 2050, Says Report. https://www.pv-magazine.com/2016/09/27/uk-could-be-home-to-24-million-clean-energy-prosumers-by-2050-says-report_100026268/. Accessed 28 Jan 2020
- Cockburn H (2018) More than 6,000 fracking wells needed in UK to halve gas imports, study says. <https://www.independent.co.uk/environment/fracking-uk-gas-imports-energy-environment-renewable-a8320661.html>. Accessed 28 Jan 2020
- Collier H (2014) Fire hits Ferrybridge power station. <https://www.theguardian.com/uk-news/2014/jul/31/fire-ferrybridge-power-station-west-yorkshire>. Accessed 10 Feb 2020
- Colthorpe A (2018) Duracell to launch ai-enabled home battery system next month for UK market. https://www.solarpowerportal.co.uk/news/duracell_to_launch_ai_enabled_home_battery_system_next_month_for_uk_market. Accessed 28 Jan 2020
- Connor PM et al (2018) Sources of risk and uncertainty in UK smart grid deployment: an expert stakeholder analysis. *Energy* 161:1–9
- Cox E (2016) Opening the black box of energy security: a study of conceptions of electricity security in the United Kingdom. *Energy Re Soc Sci* 21:1–11
- Crispin J et al (2014) Smart grids in the EU with smart regulation: experiences from the UK, Italy and Portugal. *Utilities Policy* 31:85–93
- Crossley P (2013) Defining the greatest legal and policy obstacle to energy storage. *Renew Energy Law Policy Rev* 4:268–281
- Daly J, Kellehear A, Gliksman M (1997) *The public health researcher: a methodological approach*. Oxford University Press, Oxford
- Darlington Y, Scott D (2002) *Qualitative research in practice: stories from the field*. Allen & Unwin
- Davey E (2014) Statement by Edward Davey, Secretary of State for energy, following his meeting with G7 Ministers in Rome. <https://www.gov.uk/government/news/g7-energy-ministers-meeting-in-rome>. Accessed 20 Jan 2020
- Department for Business, Energy and Industrial Strategy (BEIS) (2019) UK energy in brief 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/857027/UK_Energy_in_Brief_2019.pdf. Accessed 29 Jan 2020
- Department of Energy and Climate Change (DECC) (2012) Energy security strategy. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65643/7101-energy-security-strategy.pdf. Accessed 10 Feb 2020
- Department of Energy and Climate Change (DECC) (2015) Delivering UK energy investment: networks. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/394509/DECC_Energy_Investment_Report_WEB.pdf. Accessed 28 Jan 2020
- Demski C, Poortinga W, Pidgeon N (2014) Exploring public perceptions of energy security risks in the UK. *Energy Policy* 66:369–378
- Denscombe M (2003) *The good research guide: for small-scale social research projects*. Open University Press 2003
- Devine-Wright P et al (2017) A conceptual framework for understanding the social acceptance of energy infrastructure: insights from energy storage. *Energy Policy* 107:27–31
- Diesendorf M, Elliston B (2018) The feasibility of 100% renewable electricity systems: a response to critics. *Renew Sustain Energy Rev* 93:318–330

- Ellsworth-Krebs K, Reid L (2016) Conceptualising energy prosumption: exploring energy production, consumption and microgeneration in Scotland, UK. *Environ Plann* 48:1988–2005
- European Commission (2018) Interconnection between Iceland and United Kingdom. http://ec.europa.eu/energy/maps/pci_fiches/pci_1_13_en_2017.pdf. Accessed 28 Jan 2020
- Evans R et al (2015) Shell and BP alone eclipse renewable energy sector on access to ministers. <https://www.theguardian.com/environment/2015/apr/28/fossil-fuel-lobby-given-far-more-access-to-uk-ministers-than-renewables-analysis>. Accessed 28 Jan 2020
- Fay M, Hallegatte S, Vogt-Schilb A (2015) Decarbonizing development: three steps to a zero-carbon future. World Bank Publications
- Finney KN, Sharifi VN, Swithenbank J (2012) The negative impacts of the global economic downturn on funding decentralised energy in the UK. *Energy Policy* 51:290–300. <https://doi.org/10.1016/j.enpol.2012.08.010>
- García-Gusano D, Iribarrena D, Garraín D (2017) Prospective analysis of energy security: a practical life-cycle approach focused on renewable power generation and oriented towards policy-makers. *Appl Energy* 190:891–901
- Geels FW et al (2016) The enactment of socio-technical transition pathways: a reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990–2014). *Res Policy* 45:896–913
- Ghanem DA, Mander S, Gough C (2016) “I think we need to get a better generator”: household resilience to disruption to power supply during storm events. *Energy Policy* 92:171–180
- Goldthau A (2012) From the state to the market and back: policy implications of changing energy paradigms. *Glob Policy* 3:198–210
- Good Energy (2016) Community energy. https://www.goodenergy.co.uk/media/3538/good-energy_community-energy-report_oct-16.pdf. Accessed 28 Jan 2020
- Gosden E (2016) Winter power crunch fears as UK-France cables severed during storm. <https://www.telegraph.co.uk/business/2016/11/29/winter-power-crunch-fears-uk-france-cables-severed-storm/>. Accessed 10 Feb 2020
- Gracie C (2016) Is China the hitch for the Hinkley point Deal? <https://www.bbc.co.uk/news/world-36922898>. Accessed 10 Feb 2020
- Grubb M, Butlerb L, Twomey P (2006) Diversity and Security in UK electricity generation: the influence of low-carbon objectives. *Energy Policy* 34:4050–4062
- Hannon MJ, Foxon TJ, Gale WF (2013) The co-evolutionary relationship between energy service companies and the UK energy system: implications for a low-carbon transition. *Energy Policy* 61:1031–1045
- Hwang J et al (2017) Energy prosumer business model using blockchain system to ensure transparency and safety. *Energy Procedia* 141:194–198
- HM Government (2017) The clean growth strategy: leading the way to a low carbon future. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf. Accessed 28 Jan 2020
- International Energy Agency (IEA) (2016) World energy outlook. <https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExecutiveSummaryEnglish.pdf>. Accessed 16 Jan 2020
- Jenkins N, Long C, Wu J (2015) An overview of the smart grid in Great Britain. *Engineering* 4:413–421
- Kampman B, Blommerde J, Afman M (2016) The potential of energy citizens in the European Union. CE Delft
- Kelly J, Adomaitis N (2016) Giant Iceland-UK power cable plan seen facing Brexit Delay. <https://uk.reuters.com/article/uk-britain-iceland-power-idUKKCN12L1O5>. Accessed 6 Oct 2016
- Klare MT (2015) Climate change blowback: the threats to energy security. *SAIS Rev Int Aff* 35:61–72. <https://doi.org/10.1353/sais.2015.0008>
- Kuzemko C (2014) Politicising UK energy: what ‘speaking energy security’ can do. *Policy Polit* 42:259–274

- Lau ET et al (2018) Efficient economic and resilience-based optimization for disaster recovery management of critical infrastructures. *Energies* 11:3418. <https://doi.org/10.3390/en11123418>
- Lindquist H (2017) The journey of reinventing the European electricity landscape. In: Jones LE (ed) *Renewable energy integration: practical management of variability, uncertainty, and flexibility in power grids*. Elsevier, Amsterdam
- Lowe P (2018) Brexit and energy: time to make some hard choices. *European Energy J* 7:38–46
- Lucas JNV, Francés GE, González ESM (2016) Energy security and renewable energy deployment in the EU: liaisons dangereuses or virtuous circle? *Renew Sustain Energy Rev* 62:1032–1046
- Manis P (2017) Climate change and extreme wind effects on transmission towers. *Proc Inst Civ Eng Structures and Build* 170:81–97. <https://doi.org/10.1680/jstbu.16.00013>
- Marques AC, Fuinhas JA, Pires Manso JR (2010) Motivations driving renewable energy in European Countries: a panel data approach. *Energy Policy* 38:6877–6885
- Mitchell C, Watson J (2013) Conceptualising energy security. In: Mitchell C, Watson J, Whiting J (eds) *New challenges in energy security: The UK in a multipolar world*. Palgrave Macmillan, London
- Nakatani K (2010) Restrictions on foreign investment in the energy sector for national security reasons: the case of Japan. In: McHarg A et al (eds) *Property and the law in energy and natural resources*. Oxford University Press, Oxford
- National Grid (2017) Future energy scenario. National Grid
- Noé SY, Pring G (2004) The ‘fear factor’: why we should not allow energy security rhetoric to trump sustainable development. In: Barton B et al (eds) *Energy security: managing risk in a dynamic legal and regulatory environment*. Oxford University Press, Oxford
- Nuttall WJ, Manz DL (2008) A new energy security paradigm for the twenty-first century. *Technol Forecast Soc Chang* 75:1247–1259
- OFGEM (2018) How the energy networks work for you. <https://www.ofgem.gov.uk/network-regulation-riio-model/how-energy-networks-work-you>. Accessed 28 Jan 2020
- OFGEM (2020a) The GB electricity transmission network. <https://www.ofgem.gov.uk/electricity/transmission-networks/gb-electricity-transmission-network>. Accessed 28 Jan 2020
- OFGEM (2020b) The GB electricity distribution network. <https://www.ofgem.gov.uk/electricity/distribution-networks/gb-electricity-distribution-network>. Accessed 28 Jan 2020
- OFGEM (2020c) Electricity interconnectors. <https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors>. Accessed 28 Jan 2020
- OFGEM (2020d) Electricity market reform (EMR). <https://www.ofgem.gov.uk/electricity/wholesale-market/market-efficiency-review-and-reform/electricity-market-reform-emr>. Accessed 28 Jan 2020
- Parag Y, Sovacool BK (2016) Electricity market design for the prosumer era. *Nat Energy* 1:1. <https://doi.org/10.1038/NENERGY.2016.32>
- Paskal C (2009) The vulnerability of energy infrastructure to environmental change. Chatham House and Global EASE
- Petit V (2017) *The energy transition: an overview of the true challenge of the 21st century*. Springer, Berlin
- Philipson A (2014) Didcot power station fire: as it happened. <https://www.telegraph.co.uk/news/earth/energy/11173594/Didcot-Power-Station-fire-as-it-happened.html>. Accessed 10 Feb 2020
- Price A (2014) The exploitation of renewable sources of energy for power generation. In: Garcke J, Moseley PT (eds) *Electrochemical energy storage for renewable sources and grid balancing*. Elsevier, Amsterdam
- Rathnayaka AD et al (2015) Framework to manage multiple goals in community-based energy sharing network in smart grid. *Int J Electr Power Energy Syst* 73:615–624
- Redgwell C (2004) International energy security. In: Barton B et al (eds) *Energy security: managing risk in a dynamic legal and regulatory environment*. Oxford University Press, Oxford
- Reuters (2018) Japan’s Kyushu elec restricts renewable energy supplies for first time. <https://www.reuters.com/article/japan-nuclear-renewables-restrictions/japans-kyushu-elec-restricts-renewable-energy-supplies-for-first-time-idUSL4N1WS390>. Accessed 28 Jan 2020

- Römer B et al (2012) The role of smart metering and decentralized electricity storage for smart grids: the importance of positive externalities. *Energy Policy* 50:486–495
- Rutledge I, Wright P (2010) The content and delivery of future UK energy policy. In: Rutledge I, Wright P (eds) *UK energy policy and the end of market fundamentalism*. Oxford Institute for Energy Studies, Oxford
- Shrestha P (2019) Government mulls investing £18 m to develop UK's first mini nuclear reactor. <https://www.energylivenews.com/2019/07/23/government-mulls-investing-18m-to-develop-uks-first-mini-nuclear-reactor/>. Accessed 2 Feb 2020
- Staffell I et al (2015) *Domestic microgeneration: renewable and distributed energy technologies, policies and economics*. Routledge, London
- Starks H, Trinidad SB (2007) Choose your method: a comparison of phenomenology, discourse analysis, and grounded theory. *Qual Health Res* 17:1372–1380
- Stein AL (2014) Reconsidering regulatory uncertainty: making a case for energy storage. *Florida State Univ Law Rev* 41:697–766
- Sovacool BK, Mukherjee I (2011) Conceptualizing and measuring energy security: a synthesized approach. *Energy* 36:5343–5355
- Thody A (2006) *Writing and presenting research*. Sage, Beverly Hills
- Thomas S (2016) The Hinkley point decision: an analysis of the policy process. *Energy Policy* 96:421–431
- Trebilcock C (1981) *The industrialization of the continental powers*. Longmans, Harlow
- US Department of Energy (2020) Global energy storage database: projects. <http://www.energystorageexchange.org>. Accessed 28 Jan 2020
- Vaccaro A et al (2011) An integrated framework for smart microgrids modeling, monitoring, control, communication, and verification. *IEEE Proc* 99:119–132
- Valentine SV (2011) Emerging symbiosis: renewable energy and energy security. *Renew Sustain Energy Rev* 15:4572–4578
- Ward A (2016) Hinkley point: is the UK getting a good deal? <https://www.ft.com/content/9037d7c4-7ade-11e6-b837-eb4b4333ee43>. Accessed 28 Jan 2020
- Watson J et al (2018) The security of UK energy futures. UK Energy Research Centre
- Winfield M, Shokrzadeh S, Jones A (2018) Energy policy regime change and advanced energy storage: a comparative analysis. *Energy Policy* 115:572–583
- Woollacott E (2018) How your home could generate, store and sell energy. <https://www.bbc.co.uk/news/business-44540726>. Accessed 28 Jan 2020
- World Energy Council (2016) Managing cyber risks. <https://www.worldenergy.org/publications/2016/the-road-to-resilience-managing-cyber-risks/>. Accessed 10 Feb 2020
- Xenias D et al (2015) UK smart grid development: an expert assessment of the benefits, pitfalls and functions. *Renew Energy* 81:89–102
- Zafar R et al (2018) Prosumer based energy management and sharing in smart grid. *Renew Sustain Energy Rev* 82:1675–1684
- Zillman DN, Bigos MT (2004) Security of supply and control of terrorism: energy security in the United States in the early twenty-first century. In: Barton B et al (eds) *Energy security: managing risk in a dynamic legal and regulatory environment*. Oxford University Press, Oxford

Chapter 3

Energy Security and Green Energy in Brazil: The Discourse of Economic Development



1 Introduction

1.1 Aim and Contribution of the Chapter

It is widely acknowledged that the energy transition of the twenty-first century will need to be rapid (Solomon and Krishna 2011; Sovacool 2016a, b). In order to assist moves towards the goal of a just low-carbon energy transition taking place as well as to ensure that the share of green energy deployment to energy systems is increased worldwide, it is crucial to understand the connections between energy security and green energy in diverse contexts. The fact that Brazil has a very different energy system and energy law and policies from Great Britain makes Brazil a relevant case study to add variety and complexity to the analyses presented in the work and, as a result, bring additional understanding. As with the case study of GB, the findings of the case study of Brazil will also serve to inform the legal analyses surrounding room for green energy security in the law of the World Trade Organisation (WTO) under Chap. 4.

Brazil is an emerging economy which has and will have to cope with a strong increase in energy demand in the future. The country currently ranks 10th in the world in terms of energy consumption (Central Intelligence Agency 2020) and has a population of more than 208.5 million inhabitants (IBGE 2018), which grew 21% when compared to 2001 (Silveira 2018) and is predicted to grow almost another 30 million by 2047 (Brito and Alvarenga 2018). This, combined with efforts to climb the ladder of socioeconomic development, mean that energy demand in Brazil is likely to rise sharply. The BP Energy Outlook report, for instance, foresaw a growth of 60% in Brazil's energy consumption by 2040 (BP 2018).

Globally, Brazil has one of the highest shares of energy generated from renewable sources (MME 2018)¹ and, according to the International Energy Agency, it has

¹In the power sector, renewable sources account for 80.4% of the domestic supply of electricity in Brazil.

the greenest energy mix worldwide (Birol 2018). The Brazilian power sector, however, is dominated by large-scale hydropower, an energy source which has become controversial as a result of its environmental and social impacts (Ramos and Alves 2018; Fearnside 2018; Eloranta et al. 2018) as well as due to studies demonstrating that large-scale hydropower plants have the potential to produce high amounts of methane—a greenhouse gas—owing to methane leakage that can take place when areas are flooded to create reservoirs (Barros et al. 2011; Miller et al. 2017). Brazil is also a leading producer and consumer of bioenergy and has been a pioneer in the worldwide promotion of and support to biofuels, discursively emphasising, in particular, the right to social and economic development and the needs of poorer communities.

Against this background, the case of Brazil brings value and novelty to this work because of two main reasons: (i) there is a lack of comprehensive legal and socio-legal energy studies research in developing countries—which, as pointed out by Sovacool (2014), “are the very places in the world where future growth in energy demand will likely be the greatest, [but] where capacity to acquire capital and technology will be the most limited”—and (ii) although there are case studies of Brazil in the area of energy law (Paim et al. 2019), there is absence of studies on the construction of energy security in Brazil in particular. For instance, a literature survey covering 104 energy security studies identified 68 country-specific energy security studies and none of them referred to Brazil (Ang et al. 2015). As will be explained in Chap. 4, how energy security is construed by a country has legal implications in the law of the World Trade Organisation and is an issue not previously discussed in the academic literature.

1.2 Structure of the Chapter

To set the stage for this analysis of energy security and green energy in Brazil, this chapter starts with a brief background to the energy governance in Brazil. It then outlines the investigative method used to gather and analyse the data it is based around. In line with the methodological approach adopted in this work, this chapter traces the way that energy security is construed and given meaning and significance through the articulation and production of ‘texts’ of many kinds, from speeches to policy statements and laws, with emphasis on the energy security discursive frames’ role in constructing or deconstructing green energy initiatives. As underscored several times already, understanding the discursive framing of energy security and its links with law and policies on green energy development is important because when one frame is selected from amongst a range of competing frames it has consequences for how green energy development is subsequently seen and acted on.

The first product of this approach is an initial analysis of the socio-legal factors underpinning the emergence of national rules that have encouraged the promotion of green energy initiatives through national policymaking. This examination of socio-legal factors provides the groundwork for an analysis of the interplay between energy

security and green energy law and policies in Brazil. The purpose of this deeper level of analysis is to reveal how the concept of energy security is conceptualised and contextualised in Brazil within the period of analysis (January 2001–December 2015). This is useful as energy security constructions are analysed not at a static point in time, but over a period of years. Such enhanced analysis better captures the heterogeneity of perspectives advanced in a national context, the findings of which may require policymakers, planners and analysts to re-examine their own assumptions about what energy security is, and how it can be best improved. Following this, this chapter then moves on to analyse and reflect upon the ways in which the discursive links between energy security and green energy law and policies have been forged in practice.

1.3 Summary of Findings

This chapter will demonstrate that energy security is discursively framed differently in different green energy law and policies within different energy sectors. Due to its importance to economic and social stability in Brazil, when a positive frame in relation to the links between energy security and green energy development is made, it has the implication of promoting green energy. On the contrary, when a negative frame on the connections between energy security and green energy development is formed, it has the implication of hindering green energy development.

In particular, this chapter will reveal two main findings: (i) that a positive frame for energy security and green energy connection is advanced in the context of the transport sector, which, as a result, supported biofuels development; and (ii) that a dominant negative frame is advanced in the context of deployment of green energy, solar and wind in particular, in the electricity system in Brazil, which, as a result, hindered solar and wind energy technologies and promoted fossil fuels development. This negative frame coupled with the absence in the official discourse of reference to emerging innovative technologies with the potential to minimise green energy intermittency issues, such as energy storage and smart grid, have had the result of contributing to Brazil moving in an opposite direction to a low carbon energy transition.

This chapter argues that Brazil should be seeking further diversification of its energy matrix by increasing the share of green energy sources and creating supportive laws and policies for the development, commercialisation and deployment of emerging green energy technologies to unlock their potential for the country. In order to assist with this task, a dominant positive frame should be forged in relation to the interplay between energy security and wind and solar energy development, and a broader concept of energy security should be incorporated in law and policies. This chapter also points out that further research is needed to identify the legal, regulatory and social challenges in order to enable the development, commercialisation and deployment of emerging green energy technologies in Brazil, particularly around energy storage and smart grid.

2 Background to Energy Governance in Brazil

The President of the Republic of Brazil (President) is both the head of State and the head of government, as per article 84 of the Constitution. A number of government institutions are involved in the development of energy policies in Brazil, as shown in Fig. 1. In terms of institutions, at the top of the organogram is the National Council for Energy Policy (CNPE). The CNPE is directly linked to the Presidency of the Republic with the attribution of proposing to the President national energy policies. The final decision of the proposed energy policies by the CNPE lies with the President who then ultimately defines the national energy policy of the country (Law 9,478 of 6 August 1997, article 2, and Law 13,844 of 18 June 2019, article 14).

The Ministry of Mines and Energy (MME) is another key agency directly related to the Brazilian energy policymaking process. The MME is responsible for the planning, supervision and implementation of national energy policies (Decree 9,675 of 2 January 2019). The President has the exclusive power to appoint and dismiss the Minister of the MME without participation of the National Congress (Constitution of the Federative Republic of Brazil, article 84). The planning of the energy sector by the MME is supported by research carried out by the Company for Energy Research

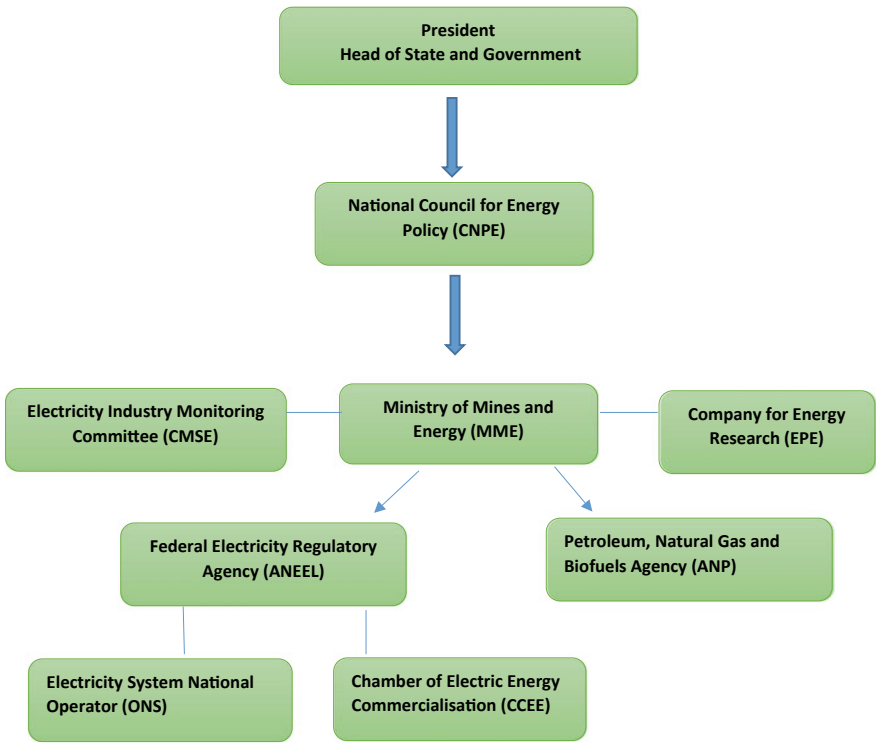


Fig. 1 Institutional structure of the energy sector in Brazil. Source Author's own

(EPE) (Law 10,847 of 15 March 2004). The Electricity Industry Monitoring Committee (CMSE) supervises the continuity and security of electricity supply in the country (Law 10848 of 15 March 2004, article 14). The Federal Electricity Regulatory Agency (ANEEL) is responsible for regulating and controlling the generation, transmission, distribution and commercialisation of electricity in compliance with national policies and existing legislation (Law 9,427 of 26 December 1996). The Electricity System National Operator (ONS) coordinates and controls the generation and transmission of electricity in the National Interconnected System (Sistema Interligado Nacional—SIN) under the regulation and control of ANEEL (Law 9648 of 27 May 1998, article 13). The Chamber of Electric Energy Commercialisation (CCEE) manages the operation of the Brazilian power market and, by delegation of ANEEL, execute the regulated power auctions (Law 10848 of 15 March 2004, article 4). The Petroleum, Natural Gas and Biofuels Agency (ANP) is responsible for regulating the petroleum, natural gas and biofuels industry in Brazil (Law 9,478 of 6 August 1997).

3 Method

3.1 Data Selection

The method of data selection adopted in this chapter follows the principle of a top-down approach, starting from a ‘universe of possible texts’ (Titscher et al. 2000) and progressively narrowing the choices. All of the texts taken into consideration refer to energy matters. The initial set of texts identified according to that criterion were then sampled according to the Relevance Sampling Method, also known as ‘purposive sampling’ (Krippendorff 2004). They were sampled according to the timeframe (only texts from January 2001 to December 2015 are included), theme (energy supply) and additional relevance criteria (e.g. via a focus on documents from relevant energy bodies). This method of data selection yielded 162 texts. These are not meant to be taken as representative of a population of texts; rather, they are the population of relevant texts, excluding the textual units that do not possess relevant information. The documents were obtained from the Brazilian National Archive, the President of the Republic Archive and the Federal Senate Archive during the author’s stay in Brazil from December 2015 to February 2016. All the official documents selected for analysis are outlined in chronological order in Annex 2.

In terms of identifying relevant official texts, the analysis revealed that several government bodies are involved in the development of green energy in Brazil. However, for the purpose of analysis only the main regulatory instruments and documents of the main bodies with direct responsibility for the development of energy in the country were selected—the Ministry of Mines and Energy (MME), the Brazilian Federal Electricity Regulatory Agency (ANEEL) and the National Council for Energy Policy (CNPE).

In terms of their roles, the MME is responsible for the planning, supervision and implementation of national energy policies. ANEEL is responsible for regulating and controlling the generation, transmission, distribution and commercialisation of electricity in compliance with national policies and existing legislation. The CNPE acts as an aid to the President of Brazil in the formulation of energy policies. Statements and speeches of the President of Brazil (President) that referred to the supply of energy were also selected because the words of the leader of the Executive as the head of the State and Government carry particular weight and set out directions around energy policy. In terms of legislation, the main legislative acts applicable to the development of energy, particularly green energy, at the federal level were selected. The documents that preceded the enactment of the legislative acts, such as reports, technical notes and meeting records, were also analysed.

The Petroleum, Natural Gas and Biofuels Agency (ANP) also plays an important role in the development of green energy in the country, particularly biofuels, as it is the federal governmental agency responsible for the regulation of the biofuels sector. However, as the key elements regarding biofuels development were enacted via federal legislation, the regulatory instruments issued by ANP were not included in this analysis.

The time frame for the analysis is from January 2001 to December 2015. The reason for starting the analysis in 2001 is because until 2001 green energy had a minor presence in the Brazilian electricity sector, contributing less than three per cent of the total energy mix (Congresso Nacional (Brazil) 2002). However, as it will be further explained, Brazil suffered a crisis in the electricity sector in 2001 and this provided a new discursive context in which green energy initiatives were framed and re-framed. The period for the analysis ended in December 2015, because, as previously mentioned, documents were obtained from archives during the author's stay in Brazil from December 2015 to February 2016.

3.2 Data Analysis

This chapter adopts a data-driven inductive or 'bottom up' approach to data analysis, focusing on the overall messages emerging from the evidence as opposed to adopting a grand theory before study commenced.

Therefore, in view of determining how specific kinds of discourses emerge out of the text in a dialogue with the reader or recipient to whom the text addresses itself, the documents were analysed through the method of interrogative insertion, where by formulating and inserting questions into a text, the analyst attempts to uncover the logic of the discourse and the direction and emphasis of the argument made in the texts (Walliman 2006). It involved a careful reading of the texts of the documents and then proceeded with an interrogation of the texts organised around the work principal research questions: (i) how has energy security been discursively con-

structed? (ii) what are the discursive links between energy security and green energy law and policies? (iii) what are the implications of energy security construction to law and policy on green energy development?

3.3 *Translation*

Unless otherwise stated, the author has carried out all translations from the original Portuguese text.

4 National Forces Influencing Green Energy Development

By way of background, this section aims to analyse the socio-legal factors that influenced the emergence of national rules which have promoted green energy development in Brazil. This section focuses on the relevant legislative acts from January 2001 to December 2015 and attempts to draw out the socio-legal factors foregrounded by the legal texts themselves as well as their stated implications for current practices. Table 1, which is subsequently analysed, provides a summary of the drivers as specifically mentioned in legislative instruments that promoted green energy development in Brazil. In summary, the drivers found are: energy access, economic development, environmental protection, climate change, social development and energy security. The role played by energy security in green energy development is at the core of this work and will be examined in Sect. 5.

4.1 *Energy Access*

Lack of modern energy access remains an enduring global problem, limiting opportunities for income generation and the ability to tackle extreme poverty (Sovacool and Drupady 2016). Conversely, ensuring access to energy supplies serves as a means to promote economic development by increasing productivity and growth. In Brazil, the benefits brought by improving access to energy were a theme in speeches of the President across the period chosen for analysis.

Energy access was also a recurrent theme in the legal framework. Law 10,438 of 26 April 2002, which created the Alternative Energy Sources Incentive Programme (PROINFA),² under article 13, marks the universalisation of energy access in Brazil, announcing the promotion of universal electricity services across all of the national territory with the aim of combating energy poverty in Brazil.

²Only wind, biomass and small-scale hydro energy sources were included in PROINFA.

Table 1 Summary of drivers for the promotion of green energy development in Brazilian legislation

Legislation/regulations	Date	Energy type	Objective	Drivers
Resolution 24	05/07/2001	Wind	Created the PROEOLICA programme to promote wind energy	• Foreseen energy deficit • Security of supply • Economic, social and environmental development
Law 10,438 (provisional measure 14 of 21/12/2001)	26/04/2002	Wind Biomass Small hydro	Created the Programme for Incentive of Alternative Electric Energy Sources (PROINFA)	• Foreseen energy deficit • Security of supply • Reduction of hydropower dependency • Use of local resources instead of fuel importation • Access to energy/support to rural electrification • Reduction of greenhouse gases emissions
Decree 4,873	11/11/2003	Mainly solar	Created the programme 'Light for All'	• Access to energy • Social goal • Economic development of rural areas
ANEEL Normative Resolution 83	20/09/2004	Solar	Regulated the use of household photovoltaic systems for the electrification of isolated areas	• Access to energy • Social goal • Economic development of rural areas
Law 11,097 (Provisional Measure 214 of 13/09/2004)	13/01/2005	Biodiesel	Introduced biodiesel to the Brazilian energy matrix	• Social inclusion • Economic development • Environment protection • Pollution reduction • Improvement of quality of life of urban centres • Technology development • Security of supply
Law 11,116 (Provisional Measure 227 of 06/12/2004)	18/05/2005	Biodiesel	Created a registry of biodiesel producers and importers and provided for the tax regime for biodiesel producers and importers	• Economic development • Improvement of quality of life of urban centres • Greenhouse gases emissions reduction • Technology development • Social inclusion
Decree 5,882	31/08/2006	Wind Biomass Small hydro	Regulated PROINFA	• Reduction of greenhouse gases emissions • The use of financial resources from Clean Development Mechanisms to reduce PROINFA costs

(continued)

Table 1 (continued)

Legislation/regulations	Date	Energy type	Objective	Drivers
CNPE Resolution 7	05/12/2007	Biodiesel	Established guidelines for the formation of biodiesel stocks	• Security of supply • Ensure the protection of the interests of consumers with regard to price, quality and supply of biodiesel
CNPE Resolution 2	13/03/2008	Biodiesel	Set the minimum percentage of biodiesel to be added to diesel oil at 3%	• Increase in employment and income • Social development • Development of national industry of goods and services • Reduction in oil imports, with gains in the commercial balance • Decrease of vehicle pollutants emissions
CNPE Resolution 2	27/04/2009	Biodiesel	Increased the biodiesel blending mandate to 4% from July 2009	• Increase in employment and income • Development of national industry of goods and services • Social development • Reduction in oil imports with gains in the commercial balance • Decrease of vehicle pollutants emissions
CNPE Resolution 6	16/09/2009	Biodiesel	Increased the biodiesel blending mandate to 5%	• Development of national industry of goods and services • Increase in employment and income • Reductions of greenhouse gases emission • Reduction in oil imports with gains in the commercial balance
Law 12,187	29/12/2009	Low carbon emission energy sources	Established the National Policy on climate change	• Reduction of greenhouse gases emissions • Socio-economic development • Poverty eradication • Reduction of socio inequalities

(continued)

Table 1 (continued)

Legislation/regulations	Date	Energy type	Objective	Drivers
Law 12,490 (Provisional Measure 532 of 28/04/2011)	16/09/2011	Biofuels	Biofuels were included expressly in the Brazilian legislation as a key energy resource for the country, as well as the security of supply of biofuels throughout the country as being one of the objectives of the National Energy Policy	• Security of supply • Price regulation • Protection of consumers in relation to price, quality and supply • Economic and technological development • Promotion of Brazil's competitiveness in the international market of biofuels • Reduction of greenhouse gases emissions
Law 12,783 (Provisional Measure 579 of 11/09/2012)	11/01/2013	Wind Small hydro Biomass Solar	Promoted the competitiveness of energy produced from wind power, thermosolar, photovoltaic, small hydro, biomass, other renewables and natural gas	• Reduction of energy costs • Energy security (availability and affordability of electricity)
Law 12,859 (Provisional Measure 613 of 07/05/2013)	10/09/2013	Bioethanol	Reduced the tax for bioethanol	• Reduction of ethanol costs • Reduction of oil consumption and importation with gains in the commercial balance • Reduction of greenhouse gases emissions
Law 13,033 (Provisional Measure 647 of 28/05/2014)	24/09/2014	Biofuels	Increased the biodiesel blending mandate to 5%	• Balanced environment • Reduction of greenhouse gases emissions • Increase in employment, income and high value-added products • Reduction in oil imports with gains in the commercial balance • Energy security (protect the national supply in atypical situations)

(continued)

Table 1 (continued)

Legislation/regulations	Date	Energy type	Objective	Drivers
Law 13,097 (Provisional Measure 656 of 07/10/2014)	15/01/2015	Wind	Provided import tax exemptions for wind turbine components	• Increase in competitiveness of national industry in the face of international industry • Reduction of energy price
CNPE Resolution 3	21/09/2015	Biodiesel	Authorised and set guidelines for the commercialisation and the voluntary use of biodiesel	• Economic, social and environmental basis • Consumers' protection

In Brazil, solar energy has played an important role in achieving the social aim of universal energy access and tackling energy poverty. In terms of its framing, it is a poverty-alleviating energy resource. However, the incentive programmes targeting alternative energy sources in Brazil did not initially include solar. The situation changed following various public energy access programmes from the 1990's, such as 'Luz da Terra' (Light of the Land), 'Luz no Campo' (Light in the Countryside), and 'Luz para Todos' (Light for All), which involved government as well as businesses and non-profit organisations. These programmes envisaged the provision of energy services through renewable energy, particularly via the use of solar panels.

These programmes were aimed at providing electricity to isolated poor communities, which did not have access to electricity supply through the conventional network. They prioritised the provision of electricity to government funded schools, health centres and water supply wells, and projects aimed at local and family agricultural development. Thus, solar energy served as a means of rescuing the poor, isolated and distant rural communities by providing energy services, improving their living standards as well as ensuring environmental sustainability. In this way, solar was positioned within the wider discourse of energy policy in Brazil.

4.2 *Economic Development*

What emerges very powerfully through the texts is the stress on the importance of energy supply to economic development. As the President put it in 2004: 'The truth is that no country develops without energy' (Da Silva 2004). The role that green energy promotion has played in the drive to achieve economic development is multi-fold.

Firstly, as explained in the previous section, green energy promotion was discursively positioned as a means to pursue the economic development of rural areas, through public energy access programmes.

Secondly, the texts work to mutually elaborate a rationale for green energy development in terms of increasing employment and income as well as the acquisition and development of technology and development of a national industry of goods and services.

Thirdly, the pursuit of green energy, specifically biofuels, is discursively tied to an economic strategy centred on maintaining the continuity of energy supply as well as bringing gains in the national balance of payments through the reduction of oil imports (Exposure of Motives 44/MME of 9 September 2004).

Conversely, wind and solar energy sources also appear in presidential speeches as insufficient to provide economic development in the country (Rouseff 2011b). This demonstrates, therefore, that the country's economic, social and sustainable development has also been discursively used to downplay the importance of wind and solar energy sources.

4.3 *Environmental Matters*

Some regulatory instruments discursively present green energy development as a way forward in achieving a balanced environment. The PROEOLICA programme which promoted wind energy, for instance, was supported by the argument that it would attract environmental development (Resolution 24 of 5 July 2001). Environmental matters have also been discursively implicated in the debates within high ranking meetings regarding energy development. As stated in a CNPE meeting, for instance: 'ecological and socio-economic issues should be considered strategically on [energy] projects before any signalling to the market for eligible exploitations.' (Records of the 27th Ordinary CNPE Meeting of 17 December 2013).

However, these discursive attempts to knit together green energy projects and environmental protection have also met resistance. Green energy projects have been characterised as facing difficulties in meeting the demands of environmental agencies. Taking one example, environmental licencing has gradually come to be portrayed as a villain in relation to green energy projects. Reports by the Federal Senate (Comissão de Serviços de Infraestrutura 2015) and the Federal Court of Accounts (Tribunal de Contas da União 2014) have shown concerns over the lack of clear and objective definitions of the necessary criteria for the granting of licences as well as uncertainties in relation to timescale and the length of the process, delays due to judicial decisions and lack of technicians to analyse environmental studies and the general complexity of the environmental licencing process as a whole. As an illustration of the success of this counter-discourse in problematising the practical implementation of green energy initiatives, a new legal framework is currently under debate which would speed up the environmental licencing process for energy projects while taking into account concerns over the environmental impacts of the activity and any compensatory measures due (Project of Law of the Federal Senate 654 of 2015).

By way of another example, environmental conflicts in relation to how green energy development projects have been implemented have also been brought to the discursive surface. In this rather different form of counter-discourse, such things as, for instance, the devastation of sand dunes, interference with aquifers, visual and noise pollution in the case of wind energy (Meireles 2011) have all come to be discursively juxtaposed against the claims of environmental protection.

In relation to interference with aquifers used by indigenous populations in the case of small-scale hydropower, for instance, statements like this one from the Federal Public Ministry in Rondonia do a particular kind of discursive work (Procuradoria da República em Rondônia 2011):

...[S]mall-scale hydropower plants are considered “clean energy” because they do not have an environmental impact on the rivers where they are installed. However, over the years, several small-scale hydropower plants have been installed in the bed of the Branco River, which have caused serious environmental and social impacts to the indigenous population who inhabit the region. This was because environmental impact studies only took dams into account individually – one by one – and disregarded the fact that, from an environmental point of view, a group of small-scale hydropower plants is equivalent to a large enterprise.

In this statement, doubt is discursively introduced along a new plane. Rather than treating the issuing of environmental licenses for green energy projects as too inflexible, they instead emerge as flexible enough to allow green energy projects which cause environmental and social impacts.

The process of facilitating the issue of environmental licenses to speed up energy projects has also been criticised by scholars (Porto et al. 2013). Environmental conflicts have been invoked in academic studies (Meireles 2011; Brown 2011; Santos 2014) and complaints have been registered in the Map of Conflict, Environmental Injustice and Health (NEEPES, ENSP and FIOCRUZ 2020) from social movements and affected population groups. In addition, civil lawsuits have been filed by the Federal Public Ministry due to environmental protection concerns, particularly in relation to wind power³ and small-scale hydropower projects,⁴ with the allegation that appropriate environmental studies are not being carried out in relation to energy projects. This demonstrates a growing opposition movement against the green energy industry due to conflicts over environmental impacts. As the above suggests, environmental conflict is both expressed through and given shape by discursive practices, with one side finding its statements repositioned, modified and made to serve quite different ends to the ones they were initially meant to serve—one person’s inexcusable delay in environmental licencing for much needed energy is another person’s healthy governmental and judicial oversight.

³See, for example, civil lawsuit JFCE/LN-0000396-30.2009.4.05.8101-ACP, filed on 21 September 2009 against the construction of Aracati Eolic Park.

⁴See, for example, civil lawsuit JF-RO-0012760-49.2011.4.01.4100-ACP, filed on 27 September 2011 against the construction of small hydropower plants Santa Cruz de Monte Negro, Jamari and Canaã; and civil lawsuit 0000736-29.2015.403.6125, filed on 1 June 2015 by Sao Paulo Federal Public Ministry against the construction of small hydropower plants in Pardo river.

4.4 *Climate Change*

The fact that explicit major forces driving green energy policies in Brazil have motivations other than climate change has been echoed in the literature (Schaeffer et al. 2015). An analysis of the Brazilian legal framework on green energy development within the period of study (2001–2015) corroborates the finding that curbing energy's contribution to climate change did not initially surface as an important priority. For instance, in the aforementioned 2001 wind energy development programme PROEOLICA and 2003 energy access programme 'Light for all', which promoted solar energy, climate change issues were not even mentioned.

The impact of reducing greenhouse gas emissions was raised as one of the benefits for the implementation of the main programme for incentivising alternative energy sources, PROINFA (Exposure of Motives 00376-A-CCIVIL/MF/MME/MDIC of 21 December 2001). However, the reduction of greenhouse gas emissions as an aim of PROINFA was not included in the wording of the original legislation in 2002. It was in 2006 that new legislation was enacted to expressly include the reduction of greenhouse gas emissions in the legal discourse itself so as to explicitly allow the use of the financial resources from Clean Development Mechanisms to offset costs of the PROINFA programme (Decree 5,882 of 31 August 2006).

Similarly to PROINFA, reducing greenhouse gas emissions was discursively construed as a factor surrounding the initial discussions of biodiesel promotion (Provisional Measure 227 of 6 December 2004), but it was not specifically included in the biodiesel legislation. Law 11,097 of 13 January 2005 (the Biodiesel Law), for example, expressly introduced biodiesel as a key fuel in the Brazilian energy matrix. It also set the objective to increase the share of biofuels in the national energy matrix on economic, social and environmental grounds. Climate change concerns, therefore, were articulated in the discussions of Brazilian regulatory instruments for biodiesel, but not expressly included in legislation. It was only in 2011, via the enactment of Law 12,490 of 16 September 2011 that the reduction of greenhouse gas emissions was included as an aim in official legal discourse and directly connected with biofuels. The absence of express references to the reduction of greenhouse gas emissions in the original official legislation shows, therefore, that, although climate change concerns were taken into account as a factor for the initial creation and implementation of some forms of green energy, they were not considered the primary driver.

Today, green energy and climate change are directly and expressly linked in Brazil's official legal discourse nationally and internationally. In its climate action plan submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in the context of the negotiations to the 2015 Paris Agreement, Brazil committed to reduce greenhouse gas emissions by 37% below 2005 levels in 2025. In addition to measures focusing on deforestation and land use, the country has sought to promote the role played by green energy in meeting this target in the international arena. It has done this by, for example, committing to the adopting of measures which will increase the share of green energy in the power supply to 23% by 2030 by focusing on wind, solar and biomass (Braga 2015) and to increasing

the share of sustainable biofuels in its energy mix to approximately 18% by 2030, by expanding biofuel consumption, increasing ethanol supply, including by increasing the share of advanced biofuels (second generation), and increasing the share of biodiesel in the diesel mix. Therefore, Brazil's commitments in the international arena have discursively elevated climate change as an important driver for green energy development.

4.5 *Social Issues*

The regulatory framework for green energy development discursively presents social development and social inclusion as one of its goals. The biodiesel programme, for example, created the Social Fuel Seal (SFS), *Selo Combustível Social* (Decree 5,297 of 6 December 2004), which promotes the inclusion of small agriculture in the biodiesel production chain, particularly from the poorest and most disadvantaged regions in Brazil. Biodiesel producers must purchase a certain percentage of feedstock from family-based farmers, enter into contracts with them to establish specific income levels, and guarantee technical assistance and training. As such, this procedure allows small communities to generate an income from the plantation and harvest of feedstock.

However, social conflicts have not been absent from green energy development. In fact, social issues have become discursively relevant in high ranking debates. In the CNPE's meeting of 17 December 2013, for example, it was acknowledged that 'social issues have been overtaking environmental issues in regard to conflicts over the development of energy projects'.

Social conflicts in the development of green energy projects are mainly framed as a result of their negative impacts on small farmers, local and indigenous communities and riverine populations by lowering their quality of life, for instance, due to the displacement of communities, blocking access to fishing areas and damage to homes from construction equipment. Two cases can serve as illustration. First, there have been land conflicts and displacement of traditional populations in Caetité-BA, where wind parks were constructed (Comissão Pastoral da Terra 2013). Second, indigenous populations and energy companies have been in conflict in relation to the construction of Juruena small hydropower plant in the state of Mato Grosso due to a drastic reduction in fish population numbers in the river which are essential for food and for the maintenance of the indigenous cultural practices (Ministério Público Federal 2016). The conflict was intensified when about 120 native Indians invaded and set fire to a small hydropower construction site (Ricardo and Ricardo 2011). Therefore, just as was the case with environmental conflicts, although green energy development has social inclusion as one of its key goals, concrete green energy projects have raised concerns about their negative social impacts.

5 The Role Played by Energy Security in Green Energy Development

In the previous section, the socio-legal factors that influenced the emergence of national rules which have promoted green energy development in Brazil were explained as a background to understand what kind of forces were at play in Brazil at the time of enactment of green energy law during the period of analysis. Energy security was also one of the factors that influenced law and policies on green energy development and is at the centre of this work.

Although the notion of “energy security” is widely debated within academic literature, an agreed definition has not yet been reached. While some scholars argue that a broader array of criteria needs to be considered as a key component of energy security concepts—such as availability, reliability, affordability as well as environmental, climate and social considerations—others argue for a narrow notion of energy security and a clear separation between energy security and other policy objectives, leading to the definition of energy security as the continuity of energy supplies relative to demand. At the same time as these debates have unfolded, governments around the world, and Brazil is no exception, have been enacting new legislation, introducing new policies and, through both, weaving understandings of energy security into the discursive fabric of their societies’ laws and policies. Against this background, this section aims to examine how energy security has been configured as a concern in green energy law and policies in Brazil between January 2001 and December 2015.

The analysis is split into two discernible discursive periods; the period of the 2001 energy crisis (2001–2002) and the post-crisis period (2003–2015), respectively. This distinction is drawn in clear-cut ways for analytical purposes; in reality, the boundaries of each of the periods identified are fluid (that is, to a certain extent they overlap). The reason for distinguishing them is to identify the main discursive strands that have been central to the construction of the links between energy security and green energy law and policies in Brazil, establishing, in particular, continuities and changes in the ways in which it has been framed.

5.1 *Energy Security and Green Energy During the 2001 Energy Crisis (2001–2002)*

5.1.1 Constructing Energy Security

This section will demonstrate that, during the 2001 energy crisis in Brazil, energy security was conceptualised narrowly as uninterrupted availability of energy supply and was treated as intrinsically linked to the country’s economic development. There was no expressly stated association of energy security with national security in any of the documents analysed and there was no reference in the legal and political official discourse to any form of military action as a result of energy shortage. The creation

of a sense of urgency around the provision of energy supply was pursued mainly as a result of energy being framed as an essential element to support the growth of the economy. Additionally, in the official legal and political discourses, there is no reference to social unrest as one of the main reasons for adopting measures to ensure energy supply. Some street protests, however, did take place and were framed by the media at the time as being responses to electricity rationing and its negative impact on labour markets and jobs, not directly correlated to limitations on the use of modern appliances, focusing, as such, on the argument of economic development. What the 2001 energy crisis reveals, therefore, is that energy interruption in Brazil can cause economic instability and, as a result, lead to social instability. If necessary measures are not taken to correct imbalances in the energy supply, it might ultimately lead to economic collapse and chaos that disrupt the typical social order of society in Brazil.

2001 is significant in this context as it was in that year that Brazil went through what became generally known as the 2001 energy crisis, when the country had to ration electricity usage for several months to prevent large-scale blackouts. This situation was characterised by low water levels in the many reservoirs that are used to power Brazil's major hydroelectric generation facilities as a result of low amounts of rainfall in 2000 and early 2001, as well as by Brazil's significant dependence on electricity generated from hydrological resources. At that time, more than 80% of energy generation in Brazil came from hydroelectric power (Congresso Nacional (Brazil) 2002). The lack of financial investment in the energy sector came to be discursively framed as one of the reasons for the energy crisis (Cardoso 2001b; De Araújo 2006).

This period was characterised by language that emphasised tension and uncertainty, with frequent invocations of 'risk', 'vulnerability', 'emergency' and 'crisis', as well as the emergence of an alarmist discourse framed in terms of urgency and deployed to convey the sense that Brazilian society was at risk from interruption of its energy supply.

In addition to framing energy as an issue of absolute priority and creating a sense of importance and urgency required to resolve the problem, other elements of securitisation—a practice to dramatise an issue as having absolute priority (Wæver 1995)—can also be found in the manner which government sought to bypass the legislative process, by taking exceptional measures without the normal democratic scrutiny. As an illustration, during the 2001 energy crisis, the government enacted energy law via the use of provisional measures, a constitutional mechanism that has the force of law and may be adopted by the President of the Republic in relevant and urgent cases without first being submitted to the National Congress for deliberation (Federal Constitution of 1988, article 62).

However, it is widely acknowledged that provisional measures in Brazil are not used just in extraordinary moments. On the contrary, they are frequently issued as an instrument of governance to promote the governmental agenda and to implement public policies (Da Ros 2008; Arias 2010; De Paula 2016). Nevertheless, on the one hand, use of such instruments results in a lack of open or collective political deliberation as public decisions cannot be analysed in detail and discussed in public—they are, therefore, characteristic of a shift towards securitisation. On the other hand,

energy was not expressly associated with national security in any of the documents analysed and there was no reference to any form of military action as a result of energy shortage. Therefore, some elements of securitisation are found in the energy discourse in Brazil, but it still lacks the express connection between energy and national security.

The creation of a sense of urgency to provide energy supply was pursued mainly as a result of energy being framed as an essential element to support the growth of the economy. This demonstrates that, at the time of the 2001 energy crisis, economic development was being presented in the official discourse as the crucial and priority driver for undertaking measures to ensure continuity of energy supply in Brazil. Energy consumption associated with economic growth and the argument that imbalances in energy supply and demand would negatively impact the country's economic development can be found in the majority of the texts of this period. The lack of energy supply as one of the most important impediments for economic growth in Brazil is also echoed in the literature (Saes and Loureiro 2014). As stated by the President: 'The development of the country demands energy' (Cardoso 2001e); 'The growth rates in Brazil are consistent today. (...) today we see the output of Brazilian industry as very significant, this means we have to increase the supply of energy a lot' (Cardoso 2001a).

The document justifying the enactment of provisional measure 2147 of 15 May 2001, which created the Energy Crisis Committee (Câmara de Gestão da Crise de Energia Elétrica—GCE), recognised that energy shortage can substantially impact social relations (Congresso Nacional (Brazil) 2001). Indeed, street protests took place and were framed by the media as being responses to electricity rationing and its negative impact on labour markets and jobs (Garcia 2011). The focus, therefore, was on the argument of economic development. However, in the official legal and political discourses, there was no reference to social unrest as one of the main reasons for adopting measures to ensure energy supply. The political discourse was framed in a positive way by thanking and praising the population for their cooperation and support.

An additional analysis, conducted as part of the present study, of articles published in 2001 in one of the main newspapers in Brazil, *Folha de S. Paulo*, identified no reference to protests sparked by a lack of energy supply correlated to limitations on the use of modern appliances. While a thorough analysis of all the media discourse at the time of the 2001 energy crisis would be needed to confirm the veracity of this statement, it is worth noting that no academic studies associate the electricity rationing episode in Brazil in 2001 with social unrest due to customers' inability to use electric appliances. What the 2001 energy crisis reveals is that energy interruption in Brazil can cause economic instability and, as a result, social instability and might ultimately lead to economic collapse and chaos that disrupt the typical social order of society if necessary measures are not taken to correct the scenario.

Provisional Measure 2,147, under article 1, also framed energy security narrowly in the sense of 'uninterrupted availability of energy supply', a concern that appeared in all documents in this analysis. In fact, the terms 'energy security' or 'security of energy supply' were not widely used. The term 'security of supply' was only

deployed once in the official discourse during this period in connection with electricity and natural gas importation (CNPE Resolution 1 of 17 September 2001). However, while not formulated in precisely those terms, the legal provision of Provisional Measure 2,147, in which the Energy Crisis Committee was created to ‘propose and implement emergency measures to match the demand and supply of electricity in order to avoid unfortunate or unexpected interruptions in electricity supply’ significantly characterises energy security narrowly as ‘uninterrupted availability of energy supply’.

Taking front stage at a time when Brazil was struggling to meet its energy requirements, the focus on energy security was distinctly framed in terms of energy availability and on its correlation to economic development. Other elements of the broader concept of energy security, such as environmental protection, also appeared in the discourse as concerns, albeit not as core priorities. Rules were thus created to speed up the analysis of environmental impact reports and for the procedures concerning environmental licenses in relation to energy projects, as well as to simplify the procedures for obtaining environmental licences in energy projects of small environmental impact (Provisional Measure 2,147, article 8). The introduction of these measures followed on from the President Cardoso (2001c)’s statement:

There must be greater speed in project evaluation. This will require special measures in the Ministry of the Environment, which is directly linked to the granting of authorisations. Of course, we must always take into account environmental issues. But also, given the nature of the emergency we face, those decisions can be faster.

In another example, the official discourse presents a conflict between energy supply and socio-economic development on the one hand, and environmental protection on the other. This is clearly seen in discussions surrounding the delay of works related to the generation and transmission of energy due to environmental issues. The official discourse presents a position where, if there is tension between energy supply, socio-economic development and environmental protection, energy supply and socio-economic development should come first, although respecting the environment. According to the President Cardoso (2001f):

It makes no sense at all, even in the name of environmental protection as a valid principle, to forbid the population from having the minimum welfare needed and getting a job to survive. These things must be reconciled. We must converge, respect the environment, but respect above all the hunger for energy and the desire of the Brazilian people to grow.

At this time, climate change concerns were also acknowledged in the official energy discourse. President Cardoso (2001f), for instance, stated his certainty that “all of us, who are aware of such things [climate change], know that climate change is a challenge. If we today are suffering from these rain changes, God only knows, when one looks over a period of 100 years, one sees that the average rainfall for every 20 years has decreased.” At the time of the energy crisis, in March 2002, the Kyoto Protocol was sent for ratification to the National Congress in Brazil, which would give it force of national law. However, Brazil was not part of Annex 1 of the Kyoto Protocol and, as such, had no mandatory emissions reduction targets. Therefore, apart from including the reduction of greenhouse gas emissions as one of the impacts of

the implementation of the main programme for incentive of green energy sources, PROINFA, climate change concerns had little influence on energy law and policies during this period, and were certainly not included within energy security definition.

5.1.2 Energy Security and the Push for Fossil Fuel Promotion

It is generally acknowledged by scholars (Cavaliero and da Silva 2005; Ottinger et al. 2013) and demonstrated in the laws enacted at the time that the period of the 2001 energy crisis in Brazil clearly advances one main energy strategy: to diversify away from hydropower. In the previous section it was shown that, during this period, energy security was narrowly construed as ‘uninterrupted availability of energy supply’ and intrinsically linked to the country’s economic development. In this context, two interrelated frames for the connection between energy security and green energy promotion are developed, frames whose principal features can be summarised as follows: a positive frame within which green energy is important for energy diversification; however, at the same time, alongside it, a negative frame, where green energy is treated as a complementary energy source due to its costs, intermittent nature and insufficiency for supporting economic development.

As explained in the introduction of this chapter, understanding the discursive framing of energy security and its links with law and policies on green energy development is important because when one frame is selected from amongst a range of competing frames it has consequences for how green energy development is subsequently seen and acted on. Thus, the positive frame in relation to the links between energy security and green energy had the implication of contributing to the development of green energy for the purpose of diversifying the energy matrix. However, simultaneously framing green energy as a complementary source had the implication of promoting it only for small-scale projects. Thus, although green energy was framed as playing a role in ensuring energy security via the diversification of the Brazilian energy matrix, the construction of energy security at this time as uninterrupted availability of energy supply served mainly to promote fossil fuels development as essential for energy security. This argument is evidenced by the following analysis.

The role played by green energy in the strategy to diversify the Brazilian energy matrix away from hydropower is evidenced, for instance, in the legal statement which constructs the main programme for incentive of green energy sources, PROINFA, as ‘an effort to guarantee the diversification of the Brazilian energy matrix, searching for solutions using alternative energy sources, independent from hydrological conditions (...)’ (Casa Civil et al. 2001).

This position is the culmination of a series of prior moves. The first stage in the promotion of green energy to diversify the energy matrix in Brazil during the period in analysis was the creation of the Emergency Programme for Wind Energy, PROEOLICA, via the Energy Crisis Committee Resolution 24 of 5 July 2001, which promoted 1050 MW generated from wind energy by December 2003. This programme had a short-term design that did not promote the long-term establishment of a wind industry in Brazil (Wachsmann and Tolmasquim 2003).

The development of the wind energy sector in Brazil at this time in a short-term period was promoted via agreements and partnership between public and private institutions, but was said to face challenges as a result of the currency exchange rate due to two reasons: (i) there was only one national manufacturer of complete equipment for wind turbines and few manufacturers for parts of wind turbines. In terms of viability for wind energy projects in Brazil in the short-term, the industry could not be dependent on few suppliers, so it was expected that the majority of wind equipment would be imported; and (ii) wind energy projects were considered capital intensive, requiring, therefore, long-term finance (15–20 years). However, foreign investments would not be available for wind energy projects due to the devalued currency exchange. The price set for purchase of wind energy was low when converted to US dollars as a result of the devalued currency exchange, which, therefore, would not recompense the investment (Leal 2001). Other factors, such as options for purchase/rental of adequate land to develop wind projects, connection to the grid, acquisition/confirmation of wind resources data in different places and cancellation of requests for wind parks due to a variety of reasons, such as restrictions from the Civil Aviation Department, also contributed to the delay of implementation of wind projects in Brazil at this time (Del Pino 2001). Although promoted via PROELICA, wind energy was also presented in the discourse ‘as expensive and insufficient for maintaining continuity of energy supply’ (Cardoso 2001d).

A few months later, President Cardoso passed Provisional Measure 14 of 21 December 2001, which created the Alternative Energy Sources Incentive Programme (PROINFA) designed to stimulate electricity generation from three green energy sources (wind, biomass and small-scale hydro) and a long-term basis to develop these energy sources was thus created. PROINFA was then enacted by Law 10,438 on 26 April 2002 (converted from the Provisional Measure 14/2001), and was later revised and amended by Decree 4,541 of 23 December 2002, Law 10,762 of 11 November 2003 and Decree 5025 of 30 March 2004, as well as regulated by MME Norm 45 of 30 March 2004. Two distinct phases were set up. In its first phase, to be met by December 2006,⁵ the programme was to establish fifteen-year contracts for generating 3300 MW, equally distributed amongst wind energy, biomass and small hydro resources. The second phase originally established a target share of 10% for green energy sources in Brazil’s electricity consumption within twenty years. Accompanying PROINFA’s legislation was a discursive assertion that the promotion of green energy was essential to guarantee the diversification of the energy matrix, as exemplified in the legal reasons given to justify the creation of PROINFA (Casa Civil et al. 2001):

Due to the critical situation of the power sector during this year which is spreading throughout the country to the detriment of all Brazilian citizens, there was an urgent need to promote investments and incentives for electricity production which are independent from weather issues that as factors are difficult to predict. In this sense, the creation of PROINFA was envisioned (...). This proposal represents an effort to guarantee the diversification of the

⁵This date was later extended to December 2008 by Law 11,075 of 30 December 2004; to December 2010 by Law 11,943 of 28 May 2009; to December 2011 by Law 12,431 of 24 June 2011.

Brazilian energy matrix, searching for solutions with the use of alternative energy sources, independent from hydrological conditions (...).

However, this period presented the promotion of fossil fuels as critical to ensuring energy security within its narrow concept of uninterrupted availability of energy supply and with the aim of diversifying away from large-scale hydropower. When compared with fossil fuel promotion, green energy development played only a minor role. The Strategic programme for Increase of Electricity Supply (2001–2003) predicted the increase of electricity supply primarily from thermoelectricity.

This push for fossil fuels in Brazil was framed in a unique kind of context. While many countries power generation was and remains dominated by fossil fuels and the deployment of green energy was and is needed to reduce greenhouse gas emissions, the Brazilian power sector not need to decarbonise; instead it needed to add fossil fuels to ensure energy security (Cardoso 2002). The increase of fossil fuels, particularly natural gas, in the Brazilian energy matrix to ensure energy security regularly appeared in presidential speeches and in discussions at the Energy Crisis Committee's and CNPE's meetings. Thermoelectric power plants, using natural gas mostly imported from Bolivia, were considered the main short-term alternative for reducing the dependency on the hydrological power regime (MME 2001; Cardoso 2001a, e).

The push for thermoelectricity presented in the energy discourse was accompanied by change in practice. In January 2002, there was 2753 MW of generation capacity from thermoelectric using gas, and 14 other large-scale thermoelectric plants were in construction totalling an installed power generation capacity of 6857 MW (ANEEL 2002). This, therefore, shows that the positive association between energy security and fossil fuels meant promoting it in large-scale.

5.2 Energy Security and Green Energy in the Post-crisis Period (2003–2015)

5.2.1 Constructing Energy Security

This section will demonstrate that, during the post-crisis period, the concept of energy security was expanded. Although environmental, climate change and social inclusion concerns within the energy debate started coming to the fore more prominently, uninterrupted availability, affordability and reliability appeared as the key elements for the construction of energy security. The official legal concept of energy security in Brazil thus remains notably narrower than the broader scholarly definitions presented in Chap. 1. This section will also point out that, as was the case around the 2001 energy crisis, national security was not linked to energy security in any of the documents analysed. In addition to the continued construction of energy security in the context of economic development, security of energy supply was recurrently emphasised as an essential element to attract investments.

Although Brazil had overcome the 2001 energy crisis by the end of 2002, the fear of a recurrence has appeared frequently in texts. The government and commentators have been continually on the lookout for warning sign of a repeat of the 2001 episode and continue to introduce measures discursively justified by the need to avoid it. As stated in a Federal Senate report (2015), '[t]he effects of the blackout at the beginning of the last decade are still latent in the Brazilian people's memory. At that time, it was possible to realise just how important the security of energy supply was in the country.' The blackout was, therefore, discursively presented as a clear indicator of the reliance of Brazilian society on uninterrupted energy supply.

The effects of the energy crisis were felt deeply. It wiped out expected Gross Domestic Product (GDP) growth of 4% (World Bank 2018) and cost the country 10 billion US dollars (Kingstone 2004). In addition to the continued construction of energy security as a vehicle of economic development, security of energy supply was recurrently emphasised as an essential element to attract investments during this period since 'everyone knows that any businessperson in the world, who wants to use his money for investment somewhere, requires a guarantee of energy supply' (Da Silva 2006b). This comment of ensuring energy security in order to attract investments is correlated with the one's made by participant O in the empirical work in GB.

As a result, concerns that the 2001 energy crisis would hinder investment in Brazil were also raised. As President Lula put it:

After the blackout, I thought that Brazil could not win the trust of any investor, Brazilian or foreign, if we could not give an objective answer to the question of energy security to be offered to all Brazilians (Da Silva 2006a).

After all, energy is the basis for the industrialization of a country. If you do not have energy to sell, be it gas, be it biomass, be it hydroelectric, be it any form, even diesel oil, if we do not have this to offer, we will have little chance of bringing investors here (Da Silva 2006c).

The post-energy crisis phase, therefore, presents itself as an all-embracing policy direction predicated on guaranteeing energy supply to attract internal and international investment, bring about economic development and avoid another energy crisis. Similarly to the 2001 energy crisis period, national security was not linked to energy security in any of the documents analysed. There was, however, an acknowledged association of energy interruption with conflicts, as evidenced in a presidential speech:

Incidentally, it is worth remembering that in many cases, history shows that due to interruptions in [energy] supply, even wars were made (Rousseff 2012).

The concept of energy security in official texts during this phase was expanded. In addition to the continuous focus on uninterrupted availability of energy supply, references to affordability and reliability were introduced expressly in legislation. For instance, Law 10,848 of 15 March 2004, enacting on the commercialisation of electricity, embodied the term energy security and stated that the sale of electricity 'should provide general criteria for the guarantee of electricity supply to ensure the proper balance between supply reliability and reasonableness of rates and prices

(...)' Availability, affordability and reliability in support of economic development appeared as the most recurrent criteria during this period.

The focus on affordability was due to the increase in energy price as a result of the measures taken during the 2001 energy crisis period (Rousseff 2015b). Electricity tariffs increased by 31.1% for industrial consumers and 64.1 percent for residential consumers (Goldenberg and Prado 2003). As such, affordability repeatedly appeared in documents of this period as an important aspect in the development of energy.

Furthermore, with the development of the Light for All programme in 2003, as pointed out in Sect. 4.1, access to energy also discursively entered the energy debate. Energy access is far from an official concern alone, however, with recent scholarship noting that survey respondents from Brazil rated affordability and equitable access to energy services to be of higher importance to the national energy culture than respondents from Denmark, Germany, Japan, Singapore, and the USA (Sovacool 2016a, b).

Environmental concerns also began to surface more regularly in the energy discourse after the 2001 energy crisis. The official discourse attempted to place environmental protection on an equal footing with energy security, in which fossil fuel exploration in Brazil, for example, should "safeguard the environment and security" (Rousseff 2012). However, environmental concerns and energy security were still seen as separate and independent concepts, not unified within the definition of energy security.

This was also a period which saw the judicialisation of energy projects over environmental and social matters, as there was a growing reliance on courts and judicial means for addressing environmental and social concerns and halting energy projects which were advanced in the official discourse as essential to ensure energy security in Brazil. The construction of Belo Monte dam, for instance, was subject to considerable controversy (Atkins 2018; Ramos and Alves 2018; Fearnside 2018) and gave rise to lawsuits due to its impacts on the environment, indigenous communities and nearby populations.

As a result of this judicialisation of energy projects, the official discourse promoted communication between environmental and energy departments in order to avoid lawsuits (Da Silva 2009) and the need for a joint effort between institutions such as the Public Ministry, NGOs, environmental institutions, the judiciary power (Da Silva 2006c). In addition, as explained under Sect. 4.3 above, partially as a result of delays in energy projects due to judicial decisions, proposals were also put forward to enact law that would accelerate the environmental licencing process. Currently under debate is a project that would see new laws designed to speed up the environmental licencing process for energy projects while taking into account concerns over the environmental impacts of the activity and initiating any compensatory measures due. The proposal to speed up the environmental licencing process in relation to energy projects was advanced in the discourse with a view of ensuring energy availability, affordability and the country's growth (Rousseff 2015b).

At the same time, climate change concerns within the energy debate started coming to the fore more prominently, not only in presidential speeches, but also in the

legal discourse. In presidential speeches, policies promoting biodiesel were particularly linked with climate change. In 2005, for example, the President stated that the National Programme on Biodiesel “was not only about an answer to the depletion of world oil reserves, but also an imperative of planetary survival that the Kyoto Protocol enshrined in the form of a new consensus amongst nations” (Da Silva 2005b). In addition, as mentioned under Sect. 4.4 above, in 2006 new legislation was enacted to expressly include the reduction of greenhouse gas emissions as an aim for PROINFA. In 2011, the reduction of greenhouse gas emissions was included as an aim of national energy policy in the official legal discourse via the enactment of Law 12,490 of 16 September 2011. Furthermore, Brazil included energy in its climate action plan submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in the context of the negotiations around the 2015 Paris Agreement.

The concept of energy security in legal documents during this time in Brazil, however, did not include the broader elements of environmental protection, climate change and social inclusion. This can be evidenced in Law 10,848 of 15 March 2004 which is the law in force today and its focus on availability, reliability and affordability as criteria for security of electricity supply. The legal official concept of energy security in Brazil thus remains notably narrower than the broader scholarly definitions presented in Chap. 1.

5.2.2 The Multiple Frames Around the Interplay Between Energy Security and Green Energy

The period of 2003–2015 continues advancing the frames from the 2001 energy crisis period in which, as a positive framing, green energy is treated as important for energy diversification; while, at the same time, as a negative framing, it is downgraded as a complementary energy source and insufficient to meet the energy demand required to support economic growth. The novelty in this period is the emergence of an additional positive frame in connection with biofuels development. All frames for this period are analysed below.

A. Biofuels and the Emergence of a New Positive Frame

This section will show that, in the context of biofuels, energy security concerns were framed in terms of energy use from exhaustible energy sources, dependency on imported energy sources, the oligopoly of oil producers and the uneven distribution of fossil fuels around the world as well as the risk of war associated with oil exploration. In law and policies, biofuels were construed as playing a key role in tackling these energy security concerns. This construction of a positive frame around the interplay between energy security and biofuels pushed forward the promotion of biofuels.

Biofuels policies in Brazil revolve around two main categories: first, sugarcane ethanol, and secondly, biodiesel made from vegetable oils or animal fats. The first official national policy in Brazil for the use of ethanol was set out in 1931 (Moreira and Goldemberg 1999) and took off in 1975 with the launch of the National Alcohol Programme (PROALCOOL) which aimed to progressively add alcohol to gasoline

so as to ultimately reach 20% of the mixture (Decree N 76,593, of 14 November 1975).

As a result of the oil shocks and aiming to replace fossil fuel imports, another two biodiesel programmes were created in 1980 and 1983 respectively: PROOLEO, the National Programme for the Production of Vegetable Oils for Energy Use, which enabled blending in natura raw vegetable oils into diesel and ultimately aimed at the complete substitution of diesel as fuel; and the Programme of Vegetable Oils—OVEG, which aimed to test different proportions of biodiesel in partnership with the automobile industry. As oil prices became stable, PROOLEO was never implemented and although the test results had been positive for biodiesel, the high costs of the product, at that time, prohibited its commercial use (Rutherford 2016). In early 2000s the biodiesel policy returned to the Brazilian agenda with the launch of the National Programme for the Production and Use of Biodiesel (Programa Nacional de Produção e Uso do Biodiesel—PNPB) in 2004 (Decree No 5,297 of 6 December 2004). In 2006, the dissemination of the use of biofuels worldwide became a priority for the Brazilian Government (Roehrkasten 2014).

The Brazilian biofuels programmes have generated considerable controversy for many reasons, including their impact on food prices, deforestation and impact on sensitive ecosystems, the undermining of rural livelihoods, concentration of land into the hands of large corporations, displacement of smallholders as well as labour-related and human rights issues (Fernandes et al. 2010; De Andrade and Miccolis 2011). However, green energy development does not preclude environmental impacts and this work analyses non-conventional energy sources which are considered ‘green’ in the country’s official discourse.

As mentioned above, in the context of biofuels, energy security concerns were framed in terms of energy use from exhaustible energy sources, dependency on imported energy sources, the oligopoly of oil producers and the uneven distribution of fossil fuels around the world as well as the risk of war associated with oil exploration. This construction of a positive frame around the interplay between energy security and biofuels pushed forward the promotion of biofuels in a number of ways:

- (i) Concerns surrounding energy use from exhaustible energy sources supported the narrative of biofuels as a preferred substitute for finite oil not only from an energy strategic point of view, but also from an economic angle (Ministério de Minas e Energia (Brazil) 2004; Da Silva 2005b).
- (ii) The co-relation between concerns over dependency on imported energy sources and its impact on the balance of payments supported the narrative which gave biofuels a key role in reducing the use of diesel oil, something which would enable Brazil to save on foreign exchange (Da Silva 2005b).
- (iii) Concerns surrounding the oligopoly of oil producers and the uneven distribution of fossil fuels around the world advanced the narrative of biofuels as a way to democratise access to energy and energy production, as well as to achieve economic development and fair income distribution globally (Da Silva 2007b).
- (iv) The risk of war associated with oil exploration was also construed as having a positive impact on biofuels promotion which was advanced as being able to

de-securitise energy by avoiding military conflict around competition for finite energy resources (Da Silva 2005a, 2007a).

Therefore, biofuels were positioned as helping to ensure energy security in the country by playing a key role in the reduction and substitution of exhaustible energy sources, by democratising access to energy and energy production worldwide, as well as by achieving economic development and fair income distribution globally, and being able to de-securitise energy and avoid military conflict. This positive frame around energy security and biofuels had the implication of promoting biofuels in law and policies in Brazil.

B. Green Energy and Diversification of the Energy Matrix

The period of 2003–2015 continued advancing the frames from the 2001 energy crisis period in which, as a positive frame, green energy was treated as important for energy diversification; however, at the same time, as a negative frame, it was discursively downgraded to being only a complementary energy source and insufficient to meet the energy demands of a growing economy. Unlike the 2001 energy crisis which saw the promotion of green energy for small-scale projects, the dominant negative frame in relation to the links between energy security and green energy prevented the adoption of new specific policies and stimulus for green energy development in the electricity system. As will be demonstrated in the following section C, this negative frame contributed to the further promotion of fossil fuels.

Mostly as a result of climatic conditions and Brazil's dependency on hydropower, scholars have highlighted that Brazil has been suffering from an energy crisis with a frequency of 10–15 years, i.e. the years 1924, 1944, 1955, 1964, 1986, 2001 and 2015 (Hunt et al. 2018). In 2015, Brazil went through another water related episode, which became known generally as the 'water crisis' due to drought. In contrast with the 2001 energy crisis, there was no need to ration electricity. Scholars argued that rationing had been partially avoided because new transmission lines were built to interconnect the electricity grid from different regions (Da Silva et al. 2016). In addition to energy interconnection, the diversification of the Brazilian energy matrix was seized upon as a key factor in the official discourse. The role played by wind energy and biomass, for example, in ensuring energy security was discursively acknowledged (Rousseff 2015a). In 2015, Brazilian electricity supply had indeed diversified when compared to 2001, although hydropower remained the main source, accounting for 64% of the national total electricity supply (EPE 2016).

A combination of concerns about over-reliance on hydropower, risk of drought as well as problems with lawsuits halting energy projects—particularly new large-scale dams—due to environmental and social concerns, such as the construction of Belo Monte dam and the fact that Brazil faces a near exhaustion of its environmentally feasible hydropower potential (Schaeffer et al. 2015), contributed to efforts to diversify the Brazilian energy matrix away from large-scale hydropower with the inclusion of green energy sources, particularly wind and biomass. However, with the exception of biomass, despite contributing to diversification, green energy sources, such as wind and solar, played only a small role in the diversification of energy sources for the electricity system in Brazil.

Although Brazil has impressive solar power potential (Martins and Pereira 2011; Viana et al. 2011), there have been no policies focusing on its promotion on a large scale during this period. From 2003 to 2015, PROINFA and 'Light for All' remained the programmes which promoted green energy sources for the electricity system. Law 12,783 of 11 January 2013 amended Law 10,438 of 26 April 2002, which created PROINFA, to include that funds from the Energy Development Fund (Conta de Desenvolvimento Energético—CDE) should be used to promote the competitiveness of energy produced from wind power, thermosolar, photovoltaic, small hydropower, biomass, other renewables and natural gas. However, apart from the inclusion of this aim in the legal framework, there were no new specific policies and stimulus for green energy development in the electricity system for a period of circa 13 years.

C. The Continuation of the Negative Frame and the Promotion of Fossil Fuels

Compared to 2001, green energy technologies, such as biomass, wind and solar energy, saw increasing use in the electricity sector with a view to diversification, as a result of programmes started during the 2001 energy crisis. However, this section will show that the negative framing of green energy, particularly wind and solar energy, as insufficient to meet the energy demand required to support economic growth has contributed to preventing the promotion of these energy sources for large scale use. It will also be demonstrated that positive links in relation to energy security and fossil fuels had the implication of promoting fossil fuels development in the country. During this period, the concept of energy security as availability, affordability and reliability of energy supply coupled with challenges over dependency on hydropower and on foreign energy resource advance a predominant paradigm of energy independence based on national fossil fuel exploration, where wind and solar energy sources played no role.

Brazil promoted fossil fuels, particularly oil and gas, as a way of making the country's electricity sector more resilient to extreme weather events and guarantee energy security. In 2001, a maximum of 12.74% of electricity was generated from fossil fuels (Congresso Nacional (Brazil) 2002). By 2015, this amount had increased to almost 23% (MME 2016). The sharp increase of oil and gas consumption in Brazil is also clear. From 2004 to 2014 oil consumption increased 54.9% while natural gas consumption increased 100.6% (de Melo et al. 2016). During this period, in addition to dependency on one energy source and the need to diversify, energy security was framed in terms of dependency on foreign energy resource—gas from Bolivia in particular.

In 2006, the Bolivian President, Evo Morales, nationalised the hydrocarbons industry in Bolivia and increased royalties from 50 to 82% in their two largest fields (The Economist 2006; De Carvalho 2006). This had a negative impact on the security of energy supply in Brazil because, as stated above, during the 2001 energy crisis, thermoelectric power plants using natural gas mostly imported from Bolivia were developed as the main alternative to reduce the dependency on hydropower. The nationalisation of the hydrocarbons industry in Bolivia resulted in the appearance of alarmist language, such as the 'gas crisis' (Da Silva 2010). However, as previously

stated, no explicit links were made between energy security and national security in the official discourse.

As a result of the nationalisation of Bolivian gas, Brazil promoted the exploration of its natural gas to achieve self-sufficiency. The discourse, as such, reveals a predominant paradigm of energy independence based on fossil fuel exploration. Wind and solar energy sources were not discursively framed as playing a role in minimising any impact related to dependency on foreign energy resources (Da Silva 2010; Rousseff 2011a).

However, even though gas self-sufficiency was presented as a priority in the discourse, in 2013 Brazil was still dependent on Bolivian gas. In 2013 Brazil imported 59% of its natural gas with Bolivia accounting for 67% of the total Brazilian gas imports (MME 2014). The claim that this dependency on gas from Bolivia constituted a threat to Brazilian energy security is also found in the literature (Tasca 2017). As a result of dependency on Bolivian gas, Brazil promoted the national exploration and production of oil and natural gas from conventional and unconventional petroleum resources (CNPE Resolution 6 of 25 June 2013). The approval of oil and gas exploration which requires the use of hydraulic fracturing (fracking) in 2013 caused controversy in Brazil and was challenged, among others, by politicians, the Federal Public Ministry, NGOs and the public in general (Altafin 2013). Civil lawsuits were filed by the Federal Public Ministry on the basis that fracking causes irreversible harms to the environment, human health and regional economic activity.

Affordability, as part of the energy security concept adopted during this period, was, however, presented as an important driver in the official discourse when it came to pushing forward the exploration of fossil fuels in the country. For example, when rejecting the Project of Law 1409/13 which sought the suspension of CNPE Resolution 6, the Brazilian Mines and Energy Commission expressly advocated the exploration of shale gas as in the public interest. Presenting shale gas as a cheap and clean energy source, the Commission supported the view that shale gas had the potential to supply a great part of the Brazilian energy demand for decades and its exploration would positively impact gas for cooking and electric energy. This is because access to it would reduce the gas price as well as the operational costs of thermoelectric power plants thus benefiting, as such, society, in particular those on low income (Miranda 2014). Thus, the notion of energy security—framed in terms of concerns related to external energy dependency and affordable prices—was used to push forward the approval of a fossil fuel policy.

The promotion of oil and natural gas in Brazil was also favoured by the discovery of significant offshore oil and natural gas reserves under extensive layers of salt and rocks ('pre-salt') in 2007 with its exploration regulated by Law 12,351 of 22 December 2010. The daily oil output from pre-salt extraction rose from an average of approximately 41,000 barrels per day in 2010 to 1 million barrels per day by mid-2016 (Petrobras 2020). In 2030 it is predicted that daily oil output will be around 31 million barrels (Sauer and Rodrigues 2016). However, technical challenges surround the extraction of these reserves, given the depth and pressures involved, associated freezing temperatures, and distance offshore. In addition, the fields have the potential to include large volumes of associated natural gas for which major infrastructure

would be required to either transport it to markets via pipelines or liquefy it at sea, both of which introduce additional technical, logistical, economic, and safety considerations (Coyle and Simmons 2014). In this context, Brazil is now ranked 15th among the world's biggest proven oil reserves (Worldatlas 2018) and 9th among the world's biggest oil producers (US Energy Information Administration 2018). In the last decade, Brazil has, therefore, emerged as a significant fossil fuel player.

As a result of pre-salt and Brazil's rise to become one of the largest oil producers in the world, researchers have argued that renewable energy policies have been marginalised (Martinez and Colacios 2016), that pre-salt might cause major changes to the national patterns of electricity generation (Ottinger et al. 2013) and that the government's disproportionate investment in exploration for fossil fuels is clearly at odds with its claims that Brazil is fully committed to a 'clean' energy matrix (Vieira and Dalgaard 2013). It has been pointed out in the literature that the low-carbon energy system in Brazil could change in the future if the Brazilian system fails in boosting the large economic development while at the same time keeping its energy sector eco-friendly (Farinosi 2017).

Some researchers highlight the potential of Brazil to improve electricity supply security by increasing the share of green energy sources and increasing the energy storage potential of the country (Hunt et al. 2018). Other researchers propose the use of a fraction of the pre-salt petroleum revenue to invest in the promotion and deployment of renewables in Brazil, including developing those energy sources not yet technologically mature, such as solar energy (Goldemberg et al. 2014). The evidence presented here suggests a rather different picture. The analysis of official documents in Brazil for the post-energy crisis period (2003–2015) demonstrates that, with the exception of bioenergy, green energy law and policies were not further developed, particularly in relation to the electricity sector.

An analysis of the official discourse in Brazil during the post-crisis period demonstrates two important points. First, it reveals that fossil fuels development has been advanced as essential for energy security in Brazil with regards to the electricity sector while green energy is construed as complementary energy and insufficient to meet the energy demands required for economic growth. Second, it shows a lack of debate in the official discourse surrounding emerging technological developments that can minimise the intermittency of green energy, such as around energy storage and smart grid. There was no mention of energy storage or smart grid in any of the documents analysed.

What this section demonstrates, therefore, is that the dominant positive frame on the interplay between energy security and fossil fuel, coupled with the prevalence of a negative discursive frame in relation to green energy technologies for the electricity sector and the absence of a debate in the official discourse surrounding emerging technological advances which support the deployment of green energy technologies are contributing to Brazil moving in an opposite direction to a low carbon energy transition. It seems clear that, in order to transition to a low carbon energy system, Brazil should be seeking further diversification of its energy matrix by increasing the share of green energy sources.

6 Conclusions

This chapter analysed the interplay between energy security and green energy law and policies in Brazil. It uncovered the socio-legal factors underpinning the emergence of the national rules that encouraged the promotion of green energy initiatives in Brazil through national policymaking, a policy domain which included energy access, economic development, environmental protection, climate change, social development and energy security. After examining the forces that were at play in Brazil at the time of the enactment of green energy law and policies during the period of analysis (January 2001–December 2015), the chapter then moved on to investigate the interplay between energy security and law and policies on green energy development, a subject which is at the centre of this work. Based on the key research questions, the focus here was on the discursive construction of energy security and its law and policy on green energy development, as well as the discursive links between energy security and law and policies promoting green energy. In this process, the chapter established a number of important findings.

By examining how the concept of energy security was conceptualised and contextualised in Brazil within the period of analysis, it revealed that, during the 2001 energy crisis, energy security concerns were distinctly focused on energy availability and reliability, while the concept adopted in the post-2001 energy crisis period was expanded to include affordability, confirming, as such, the evolving and multifaceted nature of the meaning of energy security. However, it is clear that broader concepts of energy security found in the literature which include environmental, climate and social considerations have not reached the official discursive terrain of green energy law and policies in Brazil as yet.

What emerged as a common feature from 2001 to 2015 is the absence of explicit links between energy security and national security/military action in the official discourse. The framing of energy security was in the context of economic development, demonstrating that energy security in Brazil is first and foremost an economic issue. This finding is relevant, because, although absent from the official discourse, street protests took place during the 2001 energy crisis and were framed by the media at the time as being responses to electricity rationing and its negative impact on labour markets and jobs. What this reveals, therefore, is that energy interruption in Brazil can cause economic instability and, as a result, lead to social instability. If necessary measures are not taken to correct the imbalance in energy supply, the evidence suggests this can lead to economic crises and chaos that disrupts Brazil's social order.

The analysis of the links between energy security and green energy law and policies was further contextualised in relation to Brazil's high dependence on large-scale hydropower and its pursuit of diversification in its energy matrix. This chapter demonstrated that energy security was discursively framed differently in different green energy law and policies within different energy sectors. Due to its importance to economic and social stability in Brazil, when the connections between energy security and an energy source were positively framed, it had the implication of promoting that energy source. On the contrary, when the connections between energy security

and an energy source were negatively framed, it had the implication of hindering the development of such energy source.

Attention, therefore, should be paid to how the discourse of energy security has been framed in green energy law and policies and how it has affected green energy development. In this respect, this chapter showed that in the context of the transport sector, a positive frame in law and policies for energy security and biofuels connections was advanced in terms of biofuels' key role in tackling energy security concerns over energy use from exhaustible energy sources, dependency on imported energy sources, the oligopoly of oil producers and the uneven distribution of fossil fuels around the world as well as the risk of war associated with oil exploration. This positive construction, as a result, has supported biofuels development.

In the electricity sector, the dominant positive frame linked energy security and fossil fuel, with a particular emphasis on fossil fuel's essential role in ensuring energy security via the diversification away from large scale hydropower and achievement of energy self-sufficiency based on national fossil fuel exploration. Although there was a positive frame within which green energy was cast as important for energy diversification and which, therefore, saw its promotion for small-scale projects, a dominant negative frame was advanced in the context of the deployment of green energy, solar and wind in particular, in which it was treated as a complementary energy source due to its costs, intermittent nature and insufficiency for supporting economic development. This positive frame for fossil fuel and negative frame for wind and solar energy in law and policies coupled with the absence of any reference in the official discourse to emerging innovative technologies with the potential to minimise green energy intermittency issues have had the result of contributing to the hindrance of these green energy technologies and the promotion of fossil fuels development in Brazil. Consequently, Brazil is moving in an opposite direction to a low carbon energy transition.

It seems clear that, in order to move towards a low carbon energy transition, Brazil should be seeking further diversification of its energy matrix by increasing the share of green energy sources. Here, three actions would be of assistance. First, a dominant positive frame should be forged in law and policies in relation to the interplay between energy security and green energy, particularly wind and solar energy, since a positive frame in relation to this link has the implication of significantly contributing to the promotion of an energy source. Second, the broader energy security concept should be incorporated in law and policies which includes environmental, climate and social considerations. As demonstrated in this chapter, although there are environmental and social conflicts in relation to some green energy projects, nowadays green energy is directly linked with climate change in law and policies and solar energy has played an important role in achieving the social aim of universal energy access. Adopting this broader concept, therefore, would facilitate understanding on the role played by green energy in ensuring energy security. Third, Brazil should create law and policies which support the development, commercialisation and deployment of emerging green energy technologies to unlock their potential to the country, particularly around energy storage and smart grid—something research could contribute

to by identifying, for example, the legal, regulatory and social challenges to enable the development and diffusion of such technologies.

In line with the approach adopted in this work, the following chapter will examine the interplay between energy security and green energy in the law of the World Trade Organisation (WTO), building on the findings of the case studies of GB and Brazil.

References

- Agência Nacional de Energia Elétrica (Brazil) (2002) Atlas de Energia Elétrica do Brasil. ANEEL
- Altafin IG (2013) CMA discute impacto econômico e ambiental da exploração de gás de xisto. <https://www12.senado.leg.br/noticias/materias/2013/08/23/cma-discute-impactos-economicos-e-ambientais-da-exploracao-de-gas-de-xisto>. Accessed 3 February 2020
- Ang BW, Choong WL, Ng TS (2015) Energy security: definitions, dimensions and indexes. *Renew Sustain Energy Rev* 42(1):1077–1093
- Arias C (2010) Um Estudo sobre as Medidas Provisórias no Brasil. *Mediações: Revista de Ciências Sociais* 6:29–53
- Atkins E (2018) Dams, political framing and sustainability as an empty signifier: the case of Belo Monte. *Area* 50(2):232–239
- Barros N et al (2011) Carbon emission from hydroelectric reservoirs linked to reservoir age and latitude. *Nat Geosci* 4:593–596
- Birol F (2018) Renewables 2018: market analysis and forecast from 2018 to 2023. <https://www.iea.org/renewables2018/>. Accessed 31 Jan 2020
- BP (2018) BP energy outlook 2018—Brazil. <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2018-country-insight-brazil.pdf>. Accessed 31 Jan 2020
- Braga E (2015) A Matriz Energética Brasileira e os Desafios do Setor em Decorência das Mudanças Climáticas. Senado Federal, Comissão Mista Permanente Sobre Mudanças Climáticas
- Brito C and Alvarenga D (2018) População Brasileira Chegará a 233 Milhões em 2047 e Começará a Encolher, Aponta IBGE. <https://g1.globo.com/economia/noticia/2018/07/25/populacao-brasileira-chegara-a-233-milhoes-em-2047-e-comecara-a-encolher-aponta-ibge.ghtml>. Accessed 31 Jan 2020
- Brown KB (2011) Wind power in Northeastern Brazil: local burdens, regional benefits and growing opposition. *Clim Dev* 3(4):344–360
- Cardoso FH (2001a) Speech at the ceremony introducing the ministers of social security and mines and energy, Brasília-DF, on 13 March 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/dDaSilvavscursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2001b) Statement in national radio and television, Brasília-DF, on 7 May 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2001c) Statement after the energy crisis committee meeting', Brasília-DF, on 14 May 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2001d) Speech to celebrate the world environment day, Brasília-DF, on 5 June 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2001e) Speech at the ceremony to sign agreements relating to the public service concession of electric power transmission between the union and amazon company of power transmission and para company of power transmission, Brasília, on

- 12 June 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2001f) Speech at the inauguration ceremony of william arjona thermoelectric plant', Campo Grande, on 28 June 2001. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Cardoso FH (2002) Speech at the opening ceremony of thermoelectric power plant of Nova Piratininga, Santo Amaro-SP, on 4 July 2002. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/fernando-henrique-cardoso/discursos/discursos>. Accessed 31 Jan 2020
- Casa Civil et al (2001) Exposição de Motivos Interministerial 00376-A-CCIVIL/MF/MME/MDIC, 21 December 2001. http://www.planalto.gov.br/ccivil_03/Exm/2001/exm376-A-mep14.pdf. Accessed 10 Feb 2001
- Cavaliere CKN, da Silva EP (2005) Electricity generation: regulatory mechanisms to incentive renewable alternative energy sources in Brazil. *Energy Policy* 33:1745–1752
- Central Intelligence Agency (2020) The world Factbook. <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2233rank.html>. Accessed 31 Jan 2020
- Comissão de Serviços de Infraestrutura (2015) Política Nacional de Recursos Hídricos: Abastecimento. Energia e Saneamento Básico, Senado Federal
- Comissão Pastoral da Terra (2013) O Avanço do Capital e sua Influência nos Modos de Vida das Populações Tradicionais no Município de Caetité (BA). <http://www.cptnacional.org.br/index.php/publicacoes/noticias/artigos/1676-o-avanco-do-capital-e-sua-influencia-nos-modos-de-vida-das-populacoes-tradicionais-no-municipio-de-caetite-ba>. Accessed 29 Jan 2020
- Congresso Nacional (Brazil) (2001) Exposure of Motives 00203 of 15 May 2001, Diário do Congresso Nacional, n 29 of 2 Aug 2001
- Congresso Nacional (Brazil) (2002) Comissão Mista Especial Destinada a Estudar as Causas a Crise de Abastecimento de Energia no País, bem como Propor Alternativas ao seu Equacionamento, A Crise de Abastecimento de Energia Elétrica: Relatório. Senado Federal, Secretaria Especial de Editoração e Publicações
- Coyle ED, Simmons RA (2014) Understanding the global energy crisis. Purdue University Press
- Da Ros L (2008) Poder de Decreto e Accountability Horizontal: Dinâmica Institucional dos Três Poderes e Medidas Provisórias no Brasil pós-1988. *Revista de Sociologia e Política* 16(31):143–160
- Da Silva LIL (2004) Speech at the official ceremony of the construction and installation of turbines of the Tucuruí Hydroelectric Plant, Tucuruí—Pará, on 25 Nov 2004. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2005a) Speech at the opening ceremony of the biodiesel plant Soyminas', Cássia-MG, on 24 Mar 2005. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2005b) Speech at the opening ceremony of biodiesel plant Agropalma, Belém-PA, on 27 Apr 2005. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2006a) Speech at the opening ceremony of Viana Electric Power Substation, Viana-ES, on 30 Jan 2006. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2006b) Speech at the visit of ceremony to the works of the Wind Farm Osorio, Osório-RS', on 19 Apr 2006. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2006c) Speech at the signing ceremony of the concession contracts of hydroelectric plants with entrepreneurs, Brasília-DF, on 15 Aug 2006. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2007a) Speech at the international conference on Biofuels', Brussels—Belgium, on 5 July 2007. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020

- Da Silva LIL (2007b) Speech at the opening of the seminar on biofuels, Stockholm-Sweden, on 12 Sept 2007. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2009) Speech during a visit to the works of the Jirau hydroelectric plant, Porto Velho-RO, on 12 Mar 2009. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva LIL (2010) Speech during a visit to platform facilities and collection of first oil production of the well in the pre-salt Campo Baleia Franca, Vitória-ES, on 15 July 2010. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/luiz-inacio-lula-da-silva>. Accessed 31 Jan 2020
- Da Silva RC, de Marchi Neto I, Seifert SS (2016) Electricity supply security and the future role of renewable energy sources in Brazil. *Renew Sustain Energy Rev* 59:328–341
- De Araújo JLRH (2006) The case of Brazil: reform by trial and error? Elsevier
- De Andrade RMT, Miccolis A (2011) Policies and institutional and legal frameworks in the expansion of Brazilian Biofuels. <https://pdfs.semanticscholar.org/226e/089aa98594635a50787b49f079dc48870ebd.pdf>. Accessed 3 Feb 2020
- De Carvalho GC (2006) A Indústria dos Hidrocarbonetos no Brasil: O Problema com o Caso Gasoduto Bolívia- Brasil e a Solução com os Combustíveis Renováveis. *Papel Político* 11:739–760
- De Melo CA, Jannuzzi GM, Bajay SV (2016) Nonconventional renewable energy governance in Brazil: lessons to learn from the German experience. *Renew Sustain Energy Rev* 61:222–234
- De Paula F (2016) Does Brazil have a legislative policy? *Theor Pract Legislation* 4(3):329–353
- Del Pinto (2001) Letter EN-ANEEL-20/11/01-001 from Mr Alberto Seisdedos Fernandez del Pino, Director of Enerbrasil, to the Brazilian Federal Electricity Agency (Agência Nacional de Energia Elétrica—ANEEL) on 20 Nov 2001, in reply to ANEEL document *Ofício n. 400/2001—SCG/ANEEL* of 12 November 2001 (obtained from the Brazilian National Archive)
- Eloranta AP et al (2018) Hydropower impacts on reservoir fish populations are modified by environmental variation. *Sci Total Environ* 618(5):313–322
- EPE (2016) Brazilian energy balance 2016 year 2015. <https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-126/topico-94/Relat%C3%B3rio%20Final%202016.pdf>. Accessed 10 April 2020
- Farinosi F (2017) Energy transitions and climate security in Brazil. In: Looney RE (ed) *Handbook of transitions to energy and climate security*. Routledge, London
- Fearnside PM (2018) Belo Monte: Atores e Argumentos na Luta sobre a Barragem Amazônica mais Controversa do Brasil. *Revista NERA* 21(42):162–185
- Fernandes BM, Welch CA, Gonçalves EC (2010) Agrofuel policies in Brazil: paradigmatic and territorial disputes. *J Peasant Stud* 37:793–819
- Garcia R (2011) Protesto na Paulista Critica Racionamento de Energia e Pede CPI. *Folha de S. Paulo*
- Goldenberg J, Prado LTS (2003) Reforma e Crise do Setor Elétrico no Período FHC. *Tempo Soc* 15(2):219–235
- Goldemberg J et al (2014) Oil and natural gas prospects in South America: can the petroleum industry pave the way for renewables in Brazil? *Energy Policy* 64:58–70
- Hunt JD, Stilpen D, de Freitas MAV (2018) A review of the causes, impacts and solutions for electricity supply crises in Brazil. *Renew Sustain Energy Rev* 88:208–222
- Instituto Brasileiro de Geografia e Estatística (IBGE) (2018) Resolução Nº 2, de 28 de agosto de 2018. http://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/38727425/do1-2018-08-29-resolucao-n-2-de-28-de-agosto-de-2018-38727285. Accessed 4 Feb 2020
- Kingstone P (2004) Critical issues in Brazil's energy sector: the long (and uncertain) march to energy privatization in Brazil. The James A Baker III Institute for Public Policy of Rice University
- Krippendorf K (2004) *Content analysis: an introduction to its methodology*. Sage Publications, Inc
- Leal A (2001) Electronic correspondence from Mr Andre Leal, Executive Director of SeaWest Windpower do Brasil, to the Minister of Mines and Energy, Mr Jose Jorge de Vasconcelos Lima,

- and the Minister Chief of Staff of the Presidency of the Republic, Mr Pedro Parente, on 29 Oct 2001 (obtained from the Brazilian National Archive)
- Martins F, Pereira E (2011) Enhancing information for solar and wind energy technology deployment in Brazil. *Energy Policy* 39:4378–4390
- Martinez PH, Colacios RD (2016) Pré-Sal: Petróleo e Políticas Públicas no Brasil (2007–2016). *J Soc Technol Environ Sci* 1(5):145–167
- Meireles AJ (2011) Danos Socioambientais Originados pelas Usinas Eólicas nos Campos de Dunas do Nordeste Brasileiro e Critérios para Definição de Alternativas Locacionais. *Confins* [Online] 11. <https://journals.openedition.org/confins/6970?lang=pt>. Accessed 31 Jan 2020
- Miller BL et al (2017) Methane ebullition in temperate hydropower reservoirs and implications for US policy on greenhouse gas emissions. *Environ Manage* 60:615–629
- Ministério de Minas e Energia (Brazil) (2004) Exposição de Motivo no 44/2004, do Ministro de Estado de Minas e Energia of 9 Sept 2004
- Ministério de Minas e Energia (Brazil) (2014) Boletim Anual de Exploração e Produção de Petróleo e Gás Natural. <http://www.mme.gov.br/web/guest/secretarias/petroleo-gas-natural-e-biocombustiveis/publicacoes/boletim-anual-de-exploracao-e-producao-de-petroleo-e-gas-natural>. Accessed 3 Feb 2020
- Ministério de Minas e Energia (MME) (2018) Balanço Energético Nacional 2018: Ano Base 2017. Ministério de Minas e Energia, Empresa de Pesquisa Energética
- Ministry of Mines and Energy (MME) (2001) Strategic programme for increase of electricity supply (2001–2003) (obtained from the Brazilian National Archive)
- Ministry of Mines and Energy (MME) (2016) Brazilian energy matrix year 2015. https://ben.epe.gov.br/downloads/Relatorio_Final_BEN_2016.pdf. Accessed 20 Dec 2019
- Ministério Público Federal (2016) MPF Recebe Relatório contra a Construção de Hidrelétricas no Vale do Juruena (MT). <http://www.mpf.mp.br/mt/sala-de-imprensa/noticias-mpf-recebe-relatorio-contra-a-construcao-de-hidreletricas-no-vale-do-juruena-mt>. Accessed 3 Feb 2020
- Miranda T (2014) Minas e Energia rejeita suspensão de leilão para explorar gás natural e de xisto' Câmara Notícias <https://www.camara.leg.br/noticias/433317-minas-e-energia-rejeita-suspensao-de-leilao-para-explorar-gas-natural-e-de-xisto/>. 3 Feb 2020
- Moreira J, Goldemberg J (1999) The alcohol program. *Energy Policy* 27:229–245. [https://doi.org/10.1016/s0301-4215\(99\)00005-1](https://doi.org/10.1016/s0301-4215(99)00005-1)
- NEEPES, ENSP and FIOCRUZ (2020) Mapa de Conflitos envolvendo Injustiça Ambiental e Saúde no Brasil. <http://www.conflitoambiental.icict.fiocruz.br/index.php>. Accessed 3 Feb 2020
- Ottinger RL, de Figueiredo DS, Demange LHML (2013) Case study of renewable energy in Brazil. In: Ottinger RL (ed) *Renewable energy law and development: case study analysis*. Elgar, Cheltenham
- Paim MA et al (2019) Evaluating regulatory strategies for mitigating hydrological risk in Brazil through diversification of its electricity mix. *Energy Policy* 128:393–401
- Petrobras (2020) Pre-salt. <http://www.petrobras.com.br/en/our-activities/performance-areas/oil-and-gas-exploration-and-production/pre-salt/>. Accessed 3 Feb 2020
- Porto MFS, Finamore R, Ferreira H (2013) Injustiças da Sustentabilidade: Conflitos Ambientais Relacionados à Produção de Energia “Limpa” no Brasil. *Revista Crítica de Ciências Sociais* 100:37–64
- Procuradoria da República em Rondônia (2011) Conjunto de Pequenas Centrais Hidrelétricas Prejudica Índios e Meio Ambiente em Rondônia. <http://www.mpf.mp.br/ro/sala-de-imprensa/noticias-ro/conjunto-de-pequenas-centrais-hidreletricas-prejudica-indios-e-meio-ambiente-em-rondonia>. Accessed 29 Jan 2020
- Ramos AM, Alves HPF (2018) Conflito Socioeconômico e Ambiental ao Redor da Construção da Usina Hidrelétrica Belo Monte. *Desenvolvimento e Meio Ambiente* 46:174–196. <https://doi.org/10.5380/dma.v46i0.50248>
- Ricardo B, Ricardo F (eds) (2011) *Povos Indígenas no Brasil: 2006/2010*. Instituto Socioambiental
- Roehrkasten S (2014) *Global governance on renewable energy: contrasting the ideas of the German and the Brazilian Governments*. Springer

- Rousseff D (2011a) Speech during the announcement ceremony of the implementation of the regasification terminal of Liquefied Natural Gas (LNG) in Bahia, Salvador-BA, on 1 Mar 2011. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/dilma-rousseff/discursos/discursos>. Accessed 31 Jan 2020
- Rousseff D (2011b) Speech during the start ceremony of the deviation of the Madeira River for the Santo Antônio Hydroelectric Power Plant, Porto Velho-RO, on 5 July 2011. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/dilma-rousseff/discursos/discursos>. Accessed 31 Jan 2020
- Rousseff D (2012) Speech during the introduction of Magda Chambriard, General Director of the National Petroleum Agency (ANP), Rio de Janeiro-RJ, on 21 Mar 2012. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/dilma-rousseff/discursos/discursos>. Accessed 31 Jan 2020
- Rousseff D (2015a) Speech at the opening ceremony of Geribatu wind farm and the associated transmission system in Santa Vitória do Palmar/RS, Santa Vitória do Palmar-RS, on 27 Feb 2015. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/dilma-rousseff/discursos/discursos>. Accessed 31 Jan 2020
- Rousseff D (2015b) Speech during the announcement ceremony of the investment programme in energy, Brasília-DF, on 11 Aug 2015. <http://www.biblioteca.presidencia.gov.br/presidencia/ex-presidentes/dilma-rousseff/discursos/discursos>. Accessed 31 Jan 2020
- Rutherford AP (2016) Regulatory framework for biofuels in Brazil: history and challenges under the law of the WTO. *J Energy Nat Resour Law* 34(2):213–238. <https://doi.org/10.1080/02646811.2016.1147900>
- Schaeffer R et al (2015) Who drives climate-relevant policies in Brazil? Institute of Development Studies/Universidade Federal do Rio de Janeiro
- Saes AM, Loureiro FP (2014) What developing countries' past energy policies can tell us about energy issues today? lessons from the expropriation of American Foreign and Power in Brazil (1959–1965). *Utilities Policy* 29:36–43
- Santos AN (2014) A Energia Eólica no Litoral do NE no Brasil: Desconstruindo a “Sustentabilidade” para Promover “Justiça Ambiental”. Heinrich-Böll-Stiftung
- Sauer IL, Rodrigues LA (2016) Pré-sal e Petrobras além dos Discursos e Mitos: Disputas, Riscos e Desafios. *Estudos Avançados* 30(88):185–229
- Silveira D (2018) Brasil Tem Mais de 208,5 Milhões de Habitantes, segundo o IBGE. <https://g1.globo.com/economia/noticia/2018/08/29/brasil-tem-mais-de-208-milhoes-de-habitantes-segundo-o-ibge.ghtml>. Accessed 31 Jan 2020
- Solomon BD, Krishna K (2011) The coming sustainable energy transition: history, strategies, and outlook. *Energy Policy* 39:7422–7431
- Sovacool BK (2014) What are we doing here? Analysing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research and Soc Sci* 1:1–29
- Sovacool BK (2016a) How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Research and Soc Sci* 13:202–215
- Sovacool BK (2016b) Differing cultures of energy security: an international comparison of public perceptions. *Renew Sustain Energy Rev* 55:811–822
- Sovacool BK, Drupady IM (2016) Energy access, poverty, and development: the governance of small-scale renewable energy in developing Asia. Routledge, London
- Tasca T (2017) De Roboré aos anos 2000: A Bolívia como Vértice de (In)Segurança Energética Brasileira? *Conjuntura Internacional* 14(1):12–24
- The Economist (2006) Now it's the people's gas. <https://www.economist.com/the-americas/2006/05/04/now-its-the-peoples-gas>. Accessed 3 Feb 2020
- Titscher S et al (2000) Methods of text and discourse analysis. Sage, Thousand Oaks
- Tribunal de Contas da União (Brazil) (2014) Relatório TC 017.421/2013-6 of 18 June 2014
- US Energy Information Administration (2018) What countries are the top producers and consumers of oil? The 10 largest oil producers and share of total world oil production in 2018. <https://www.eia.gov/tools/faqs/faq.php?id=709&t=6>. Accessed 3 Feb 2020

- Viana T et al (2011) Assessing the Potential of Concentrating Solar Photovoltaic Generation in Brazil with Satellite-derived Direct Normal Irradiation. *Sol Energy* 85:486–495
- Vieira MA, Dalgaard KG (2013) The energy-security–climate-change nexus in Brazil. *Environ Polit* 22(4):610–626
- Wachsmann U, Tolmasquim MT (2003) Wind power in Brazil—transition using German experience. *Renew Energy* 28(7):1029–1038
- Waever O (1995) Securitization and desecuritization. In: Lipschutz RD (ed) *On security*. Columbia University Press, New York
- Walliman N (2006) *Social research method: the essentials*. SAGE Publications Ltd, Thousand Oaks
- Worldatlas (2018) The World's largest oil reserves by country. <https://www.worldatlas.com/articles/the-world-s-largest-oil-reserves-by-country.html>. Accessed 3 Feb 2020
- World Bank (2018) GDP growth (annual %). <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>. Accessed 3 Feb 2020

Chapter 4

The Applicability of the Law of the WTO to Green Energy Security



1 Introduction

1.1 Aim and Contribution of the Chapter

The country case studies of Great Britain (GB) and Brazil have shown that two main discursive frames can be found in relation to the interplay between energy security and national law and policies on green energy development: (i) the positive frame, which points out the importance of developing green energy to ensure energy security, i.e. green energy security; and (ii) the negative frame, where green energy is seen as negatively affecting energy security, particularly as a result of its intermittent nature, costs and insufficiency to meet the energy demands of a growing economy.

Revealing these differences of approaches in relation to the interplay between energy security and green energy in the country case studies is relevant because this divergence of views, learnt in each country case study, may be at stake in legal disputes. In particular, legal disputes between countries concerning energy security and green energy development have already taken place within international trade law as encapsulated in the law of the World Trade Organisation (WTO), an international trade organisation which adjudicates between competing discursive claims and pronounces on their legal status.

The WTO, therefore, was selected as a third case study because it shows how this diversity of views raised in national contexts can lead to legal disputes in international forums when attempts are made to address the issue of the interplay between energy security and green energy development. Literature on international green energy trade disputes in the WTO, however, have predominantly focused on the consistency of green energy policies with WTO law and the balance between WTO obligations and domestic public policy space as a way to address environmental and climate change objectives (Rubini 2012; Cosbey and Mavroidis 2014; Lewis 2014; Cottier 2014; Kulovesi 2014; Lee 2016; Lai 2016). Although a few studies have mentioned the significance of green energy to energy security as a facet of public policy within the WTO (Leal-Arcas et al. 2014; Jayagovind 2016; Rutherford 2016), energy security

as a justification under WTO rules for trade restrictive measures to support green energy development is largely unexplored. Thus, the key contribution of this study to the existing academic literature on the law of the WTO is the analysis of WTO rules on green energy through the prism of energy security, based on data of the country case studies never published before.

As countries transition to a low carbon energy system, the participation of green energy in the energy mix will increase worldwide. Renewable energy, for example, is the fastest growing source of energy, accounting for around half of the increase in energy (BP 2019). Thus, countries' dependence on green energy as a dominant energy source may be greater in the future. In this sense, green energy will also increasingly play a larger role in ensuring energy security globally.

It is therefore important to analyse green energy security in the law of the WTO for a number of reasons. First, the WTO acts as the primary global trade governance body and plays a key role in settling interstate trade disputes through panels and the Appellate Body of its Dispute Settlement Body (DSB). Since the WTO DSB has come to act as a significant international forum to channel complaints related to trade restrictive measures supporting green energy development, it is therefore relevant to explore trends in energy security put forward to this specialised tribunal. Second, as the WTO DSB makes crucial jurisprudential moves that impact domestic law and policies, WTO Member States need to take WTO rules into account when shaping their domestic green energy law and policies. Therefore, a legal analysis of energy security in the green energy context within the WTO rules is needed, in particular, how a well-designed energy security policy promoting green energy could fail or succeed the various public policy exceptions provided in the law of the WTO. Third, with increasing green energy trade disputes under the WTO DSB over the years, more trade disputes might be heard at the WTO on the subject of green energy security as to the purpose of government support for green energy. This chapter, then, explores whether there is any flexibility within the current WTO rules and the interpretations given to them that permit trade restrictive measures that support national green energy development with a view of ensuring energy security, i.e. green energy security.

It is generally acknowledged in the literature that a successful transition to a low carbon energy system will require government support to develop new green energy sectors and technologies (Fay et al. 2015; Amrutha et al. 2018). Countries, therefore, have adopted trade restrictive measures, particularly local content requirements and subsidies, as instruments to develop a national green energy industry. These trade restrictive measures, however, have been challenged in green energy legal disputes under the WTO DSB. *Canada—Certain Measures Affecting the Renewable Energy Generation Sector* (WT/DS412), *Canada—Measures Relating to the Feed-in Tariff Programme* (WT/DS426) and *India—Certain Measures Relating to Solar Cells and Solar Modules* (WT/DS456) are examples here. The analysis of these cases in the literature focuses on justifying these trade restrictive measures on environmental and climate change grounds (Rubini 2012; Shadikhodjaev 2017; Karttunen and Moore 2018). However, these cases also raise issues surrounding energy security as a justification under WTO rules for trade restrictive measures to support green energy development, but this has been largely unexplored. The following sections,

therefore, will expand on the interaction between green energy and energy security within the law of the WTO.

1.2 Structure of the Chapter

The chapter begins with an overview of the nature of international trade in green energy, followed by an examination of green energy trade law under the WTO as a background for contextual purposes. The following section focuses on energy security in the law of the WTO. It reveals how energy security has been raised within the WTO green energy jurisprudence so far. Based on the findings of the case studies on GB and Brazil, it also analyses whether there is room for green energy security as a justification for trade restrictive measures. The final section elaborates on a proposal for policy space for green energy security in the law of the WTO.

1.3 Summary of Findings

Overall, this chapter will demonstrate that green energy development has increasingly come to be associated with energy security in the WTO jurisprudence. An analysis of the WTO green energy disputes involving energy security will also reveal that energy security concepts have been raised differently by respondents, and broader concepts of energy security found in the literature which include environmental, climate and social considerations have not reached the jurisprudence in the WTO system yet. The analyses of room for green energy security as a justification for trade restrictive measures will demonstrate that there might be some room for green energy security within the defences under Articles III:8(a), XX(a) and (j) and Article XXI. However, these defences have limited applicability and may also have undesirable outcomes. Finally, this chapter will argue that an evenly distributed market share of green energy technologies and equipment around the world is the best solution to ensure green energy security in the context of the just energy transition and propose a way forward to create the legal space within the WTO for trade restrictive measures aimed at ensuring green energy security.

2 The Nature of International Trade in Green Energy

Green energy technologies are made up of packages of goods, services and embedded intangibles (such as software) that come together as a result of multiple transactions involving the providers of supply chains operating across several jurisdictions. In this manner, the goods, services and intellectual property (IP) involved in any particular wind energy park or a solar photovoltaics (PV) installation, for example, have usually

crossed several borders to get there. Any such equipment would generally also include locally produced components and services (Hufbauer et al. 2016). For instance, solar firms in the US and the EU are linked with Chinese firms through global supply chains (Nahm 2017).

The emergence of global supply chains has enabled solar photovoltaics companies to specialise in specific stages of manufacturing, and to scale up global solar photovoltaics production capacity (Nahm and Steinfeld 2014). The photovoltaics industry consists of a long value chain from raw materials to photovoltaics system installation and maintenance. In general, when people talk about the PV industry, the main focus is on the solar-cell and module manufacturers. However, there is also the upstream industry (e.g. materials, polysilicon production, wafer production and equipment manufacturing) as well as the downstream industry (e.g. inverters, balance of system (BOS) components, system development, project development, financing, installations and integration into existing or future electricity infrastructure, plant operators, operation and maintenance) (Jäger-Waldau 2017). As a result of these developments, the nature of the green energy sector has resulted in increasing tradability of green energy goods and services, and internationalisation of green energy activities.

The trend towards privatisation and liberalisation of the energy sector has also accelerated green energy trade. Until the 1980s, it was a conventional wisdom of the post-war years that markets are hopelessly inadequate in providing appropriate energy supplies (Helm 2004), and governments worldwide have considered the energy sector too crucial to be left to market forces. Accordingly, monopoly was the norm (Kirschen and Strbac 2004). However, with the deregulation movement, there was a paradigm shift in the electricity industry across the world from a system of State ownership and centralised management to one that favours decentralised structures, competition, independent regulatory oversight, and private ownership (OECD 2000). As a result, trade in electricity is a new dimension of trade in energy, in which the green energy sector plays an important role. As such, industries in the green energy sector have not been dominated by State-owned vertically integrated utilities, who would typically have engaged in the production, transport and distribution of energy products. As a result, this has left ample margins for trade and competition.

3 Green Energy Trade and the Law of the WTO: An Overview

This section introduces some of the key rules of WTO law as well as examines how green energy has been addressed in the law of the WTO.

3.1 WTO Main Trade Obligations

The WTO was created in 1995 as the successor to, and incorporates within it, the General Agreement on Tariffs and Trade (GATT). As a forum for negotiation to reduce trade barriers, the GATT oversaw eight rounds of multilateral trade negotiations, culminating in the Uruguay Round that created the WTO (Stern 2013) with the WTO taking responsibility for establishing the rules governing the international trading system within a multilateral framework. Generally speaking, WTO rules are aimed at liberalising global trade and are based on agreements negotiated by Member States. As part of that, the GATT/WTO system provides a framework for conflict resolution in international trade relations.

The principle of non-discrimination constitutes a cornerstone in international trade relations. WTO law requires States to abide by the non-discrimination obligations of most-favoured nation and national treatment. The Most Favoured Nation (MFN) obligation is reflected in several WTO Agreements, including GATT Article I. The MFN obligation under GATT Article I requires WTO Members to grant any 'advantage, favour, privilege or immunity' given to one WTO Member to 'like products' originating from all other WTO Members. The WTO members are obliged to grant MFN treatment immediately and unconditionally. Thus, according to the MFN obligation, discrimination between trading partners is prohibited under WTO law. The National Treatment obligation under GATT Article III:4 implies non-discrimination between domestic and imported goods. The basic concept is that imported products shall be accorded treatment 'no less favourable' than that accorded to domestic products. While MFN applies to both imports and exports, the national treatment is applicable only to non-discrimination of imports, and not exports (Selivanova 2014).

The GATT recognises that derogations from international trade obligations are sometimes necessary to protect legitimate non-trade policy interests. This is possible, for example, by virtue of GATT Article XX entitled 'general exceptions' and Article XXI entitled 'security exceptions'. In Sect. 4 below, these exceptions will be analysed in the context of green energy security.

3.2 Green Energy Trade and the Law of the WTO

The world is currently going through a period of legal, economic and political quarrelling around the evolution of green energy technologies (Hufbauer et al. 2016), particularly with respect to trade. As governments put in place policies to stimulate the green energy sector, trade tensions arise that test the limits of existing trade rules. Several disputes on related policies have been brought to the dispute settlement system of the WTO.

Given the ongoing disputes at an international level, there is increased acknowledgement of the interaction between trade and energy, and regulating green energy trade has been recognised as one of the WTO's key challenges (WTO 2007). Energy

is not specifically addressed in the law of the WTO and has not been singled out as a specific sector of trade under the WTO system. When the original GATT was drafted in 1947, energy was not contemplated. The former WTO Director-General Pascal Lamy explained the absence of energy as a distinct sector by stating that ‘[w]hen the rules of the GATT—which preceded the WTO—were negotiated 60 years ago, opening trade in energy was not a political priority. World energy demand was a fraction of today’s and you could buy a barrel of crude oil for USD20 at current prices’ (Lamy 2007). Cross-border trade for grid-linked energy was not very developed at the time of the GATT negotiations either (Selivanova 2014). In addition, at that time, green energy was neither on the agenda of the institutions of global governance nor the domestic policy agenda of member countries. Thus, interest in green energy was not a major concern. The emphasis was on economic reconstruction following the destruction of World War II, and avoiding a depression like that which took place after World War I.

Nevertheless, although the rules of the WTO were not directly negotiated with energy in mind, many scholars have argued that WTO rules are applicable to trade in energy and energy products (Marceau 2010; Yanovich 2011; Meyer 2016). This implies that the non-discrimination principles of WTO law form an integral part of the legal framework that applies to international trade in energy. In practice, WTO rules have been treated as applicable to green energy trade disputes and the first cases on green energy decided by the WTO DSB made it clear that green energy falls under the disciplines of the GATT and its related agreements. The fact that many of the main green energy producing and exporting countries as well as suppliers and importers of green energy generation equipment in the world, such as China, the US and the EU, are WTO members who have subscribed to its dispute settlement system, may have contributed to the emergence of the WTO as a forum for green energy trade-related disputes.

Due to the multifaceted character of green energy trade, which encompasses a wide range of matters ranging from, for instance, trade in goods to trade in services, various agreements covered under the WTO system are relevant to green energy matters. As demonstrated by Cottier (2014), tariffs on hardware, such as photovoltaic equipment, fall under Articles II and XXVIII GATT. Import and export restrictions on green energy are dealt with under Articles XI and XX GATT. Local content rules and government procurement are addressed by Article III GATT, the Agreement on Trade-Related Investment Measures (TRIMs), and the Government Procurement Agreement (GPA). Trade remedies (safeguards, anti-dumping, subsidies and countervailing measures) extend to energy and are subject to the disciplines of Articles VI, XVI, XIX GATT, as well as to the Anti-Dumping Agreement (ADA), the Agreement on Subsidies and Countervailing Measures (ASCM) and the Agreement on Safeguards (SG). Biofuels partially fall under the Agreement on Agriculture (AoA), with the application of its regime to bioethanol. Furthermore, the green energy sector is strongly based upon services, such as metering, scoping, scouting, engineering and maintenance of installations and finance, and thus fall under the General Agreement on Trade in Services (GATS). Technical standards, which are of crucial importance for safety as well as for achieving high productivity, fall under the Agreement on

Technical Barriers to Trade (TBT). Finally, green energy may touch upon intellectual property rights, transfer of technology and competition under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs).

An important issue in ongoing international debates on energy is how it should be defined for WTO purposes. For instance, should energy be defined in terms of products or in terms of their use? Marceau (2010) suggests that energy should be defined as the action (product and process) through which energy-containing natural resources are transformed and consumed in response to a series of societal and individual human requirements for heat and power. However, the author notes that such a definition is not sufficient for WTO purposes as it does not fall neatly within the goods/services parameters of the WTO (Marceau 2010). There is no agreement, for instance, on whether electricity qualifies as a good or a service under WTO rules. This impacts upon electricity produced from green energy sources because WTO rules are based on a distinction between goods and services and, depending on the classification, different WTO rules apply. However, whilst classificatory ambiguities should certainly be noted in terms of their legal relevance, it is not the purpose of this chapter to provide a detailed analysis with regards to this matter. Rather, the emphasis is on the policy space for green energy security in the law of the WTO, an issue that will, in all likelihood, have to be addressed as a result of increasing links between energy security and green energy development, and as this body of law continues to be elaborated.

When it comes to the development of case law, environmental and climate change concerns have been the central issue with regards to green energy in the context of WTO law. Many of the main contemporary green energy goods and services, such as wind turbines, solar panels and solar water heaters, geothermal energy sensors and storage technologies like batteries, have been negotiated as environmental goods and services in the Doha Round, the latest round of trade negotiations among the WTO's membership. While there is a lack of specific rules on green energy and related products under the WTO system, there is reference to sustainable development in the 1994 WTO agreement's preamble. The preamble covers the need for the Contracting Parties to make 'optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment', and this element has been widely associated with green energy in the literature as well as in WTO case law. What is lacking is an analysis of green energy security within the WTO, an issue which will be examined in the following section.

4 Energy Security and Green Energy in the WTO Jurisprudence

An examination of room for national policy space for green energy security in the law of the WTO only makes sense if it is first acknowledged that green energy plays a role in ensuring energy security. Evidence from the case studies of GB and Brazil

highlights the importance of green energy to energy security in a variety of ways. As green energy deployment in countries' energy mixes increases and may become the dominant energy source, it is likely that national law and policies on green energy development will come to be associated with energy security more widely. This section, therefore, will investigate how energy security has been construed within the WTO green energy jurisprudence so far.

The case study on Brazil demonstrated the evolving concept of energy security within a specific country, while the case study on GB showed the dynamic and controversial concept of energy security within different sectors of the economy in a specific country. The WTO deals with different Member States, which will have different contexts and will, therefore, have a multiplicity of ways of understanding what energy security is.

The differences in concepts of energy security and their uses have already come to be seen as a cause of controversy and debate, generating significant deadlock in international negotiations. As one participant to the G8 Summit in St Petersburg put it: '[i]n preparing the St. Petersburg Summit's final documents, the most stubborn arguments up to the last day concerned the interpretation of the very idea of "energy security"' (Simonia 2010). The recent WTO case on conventional energy between Russia and the European Union (EU), *European Union and its member States—Certain Measures relating to the Energy Sector* (WT/DS476/R) is another example of how a lack of agreed definition on security of energy supply can create controversy. In this case, Russia submitted that "neither the Directive nor any other EU authority on the record identifies a clear and consistent definition of security of supply" and in Russia's view, this was "deliberate" and meant to "maximize [the European Union's] discretion to define security of supply in the manner most advantageous to its overall objectives, to include reducing reliance on Russian pipeline transport services and natural gas imports." Therefore, an analysis of how energy security has been configured through WTO case law is important and timely. The definitions and interpretations of energy security in the WTO shape the term's role in legal texts and negotiations. Its interpretation can not only shape the outcome of individual disputes but also determine future trends in national policymaking.

WTO law does not provide a definition of energy security. Strictly speaking, there is no official definition of energy security in existing, legally binding instruments of international law. This complicates the process of clarifying the 'ordinary meaning' with reference to the term's context. The WTO has been acting as a forum for energy disputes, particularly green energy, for some time. Since its creation in 1995, 17 cases involving energy have been initiated under the WTO DSB and, among those cases, 15 cases involved green energy as of 20 February 2020. In total, three green energy cases make reference to energy security matters: *Canada—Renewable Energy*, *Canada—Feed-In Tariff Programme* and *India—Solar Cells*. These cases, which will be subsequently analysed, provide an indication of how energy security has been raised and dealt with in the WTO green energy jurisprudence so far.

4.1 *Canada—Renewable Energy and Canada—Feed-In Tariff Programme*

4.1.1 Facts

In *Canada—Renewable Energy and Canada—Feed-In Tariff Programme*, the terms ‘energy security’ or ‘security of energy supply’ were not expressly used. However, concerns around energy availability and reliability—constitutive elements that form part of the energy security concept as shown in the previous chapters—were expressly raised. The case *Canada—Renewable Energy* initiated by Japan in 2010, and prompted the WTO Dispute Settlement Body to decide, for the first time, on matters relating to trade in green energy, specifically the legal status of renewable energy and measures of support to enhance its contribution to a specific nation’s energy matrix. Almost a year later, the EU also started a dispute under *Canada—Feed-In Tariff Programme* with regards to the same issue.

The central complaint in these two cases related to the domestic content requirements for certain wind and solar photovoltaic electricity generation projects in the feed-in tariff programme (the ‘FIT Programme’), established by the Canadian Province of Ontario, and the discriminatory treatment affecting imports of renewable energy generation equipment this led to. Generally, a feed-in tariff (FIT) scheme is designed to promote investment in the development of the green energy industry. A FIT typically provides for a fixed price for green electricity per kilowatt-hour fed into the grid on a common basis via long-term contracts (Mendonça et al. 2010). Ontario linked eligibility for its FIT to a local content requirement, as an instrument to promote green industries (Charnovitz and Fischer 2015).

Under the Government of Ontario’s FIT Programme, generators of electricity, producing from certain forms of renewable energy (wind, solar PV, renewable biomass, biogas, landfill gas, and waterpower), were paid a guaranteed price per kilowatt hour of electricity delivered into the Ontario electricity system under 20-year or 40-year contracts. In the case of wind power projects having a capacity to produce electricity greater than 10 kW, and solar projects with a capacity of up to 10 MW, some minimum level of domestic content had to be satisfied in the development and construction of the qualifying electricity generation facility.

Japan and the EU argued that Ontario’s FIT Programme granted and maintained prohibited subsidies that were contingent upon the use of domestic over imported renewable energy equipment from other WTO Members and accorded less favourable treatment to like products of Japanese and EU origin, contrary to the national treatment principle. On this basis, Japan and the EU submitted that the FIT programme was not compatible with Canada’s obligations under: (i) Articles 3.1(b) and 3.2 of the ASCM; (ii) Article III:4 of the GATT 1994; and (iii) Article 2.1 of the TRIMS Agreement. Thus, the complainants requested the elimination of the domestic content requirement.

In response, Canada argued that the procurement of electricity through the FIT Programme fell within the scope of the government procurement exception under

Article III:8(a) of GATT and as a consequence, was not subject to Article III of GATT and could not be inconsistent with Article 2.1 of the TRIMS Agreement as a result. Both the Panel and the Appellate Body found that the domestic content requirements under the FIT Programme were inconsistent with Article III:4 of GATT and Article 2.1 of the TRIMs Agreement. In relation to the subsidy claim, the question of whether FITs qualify as a subsidy under the ASCM remained unanswered because neither the Panel nor the Appellate Body reached a final conclusion as to whether FIT confers a benefit within the meaning of Article 1.1(b).

4.1.2 Energy Security Concepts

Canada made it clear that the FIT programme had two important contributions to make: (i) in helping secure the supply of electricity, and (ii) in helping protect the environment as it reduced Ontario's reliance on electricity from coal, thus reducing the production of greenhouse gases. Throughout its arguments, Canada emphasised that 'FIT Programmes play an important role in securing clean electricity supply'. Although the wording 'energy security' or 'security of energy supply' was not explicitly used, the role played by the Government of Ontario in ensuring an adequate, reliable and secure supply of electricity, including from green sources, was highlighted throughout Canada's arguments. Canada, therefore, focused on energy security in the sense of availability and reliability of energy supply. These are similar elements to those raised by the majority of participants in the case study on GB. The temporary shutdown of several nuclear facilities for maintenance, phasing out of coal-fired generation by 2014 and subsequent reduction in generation capacity, as well as the increase of Ontario's population by 28% by 2030 and the subsequent increases in energy demand were all invoked to express concerns about energy security.

What is interesting in these cases is also how the Panel and the Appellate Body presented the link between energy security and green energy. While the Panel presented only a negative frame where green energy does not support energy security because of the intermittency of wind and solar energy sources, the Appellate Body advanced a positive frame where green energy does play a role in ensuring energy security in the long-term by reducing reliance on fossil energy resources. Therefore, in these cases, the Panel and the Appellate Body presented two different approaches in regard to framing green energy and energy security. From a legal perspective, this divergence in frames has implications for the interplay between energy security and green energy under WTO law, because the frame adopted can impact the applicability and interpretation of WTO provisions. The negative frame, for instance, reduces the room for energy security as a legal justification for trade restrictive measures adopted to promote green energy.

4.2 *India—Solar Cells*

4.2.1 Facts

India—Solar Cells is the first case in the history of the WTO case law where the wording ‘energy security’ and ‘security of energy supply’ have been expressly used in connection with green energy development. This case was brought by the United States (US) against India concerning local content requirements imposed under the Jawaharlal Nehru National Solar Mission (National Solar Mission) for solar cells and solar modules. According to India, the National Solar Mission was a major initiative of the Government of India to promote ecologically sustainable growth while addressing India’s energy security challenge, as well as to contribute to the global effort to meet the challenges of climate change. It was launched by the Government of India in 2010, with the aim of generating 20,000 megawatts (MW) of grid-connected solar power capacity by 2022. India subsequently increased that target to 100,000 MW of grid-connected solar power capacity by 2022. In order to meet this target, the scheme provided that the Government of India would enter into long-term Power Purchase Agreements (PPAs) with private solar power developers (SPDs).

The US alleged that India required SPDs to purchase and use solar cells and solar modules of domestic origin to enter into and maintain PPAs with the Government of India. In addition, SPDs received certain benefits and advantages, such as long-term tariffs for electricity, contingent on the purchase and use of solar cells and solar modules of domestic origin. The US claimed violations of the National Treatment obligation under GATT Article III:4 and Article 2.1 of the TRIMs Agreement. India used the government procurement derogation under Article III:8(a) of GATT 1994, the ‘general or local short supply’ exception under GATT article XX(j) and the need to ‘secure compliance’ exception under GATT article XX(d).

4.2.2 Energy Security Concepts

Although ecological sustainability and climate change were also presented as driving forces for the National Solar Mission, India not only directly and explicitly associated green energy development with energy security, but also presented energy security as one of the priority drivers for the promotion of green energy. India asserted that its procurement of solar power was an act pursuant to the government purpose of promoting ecologically sustainable growth while addressing India’s energy security challenge. India’s focus on energy security is clearly discernible in its repeated invocation of ‘energy security’ or ‘security of supply’ 23 times in its summaries of the arguments included in the Panel Report.

In elucidating the meaning of energy security, India referred to definitions in which availability, reliability and affordability were emphasised as the main aspects of energy security. For instance, India mentioned the International Energy Agency

(IAE) definition of ‘the uninterrupted availability of energy sources at an affordable price’, a report by the United Nations Development Programme, which similarly defines energy security as ‘the continuous availability of energy in varied forms in sufficient quantities at reasonable prices’, and its own *Integrated Energy Policy*, which affirms the need to ‘supply lifeline energy to all our citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected’. Availability, reliability and affordability are similar energy security elements to those found in the current legal framework in Brazil, as shown in Chap. 3.

India pointed out that the Government of India was currently being challenged by crippling electricity shortages, the rising price of electricity, and the gradual shift towards imported coal to meet its energy demand, which India stated that in turn would only lead to further increase in electricity prices. In India’s arguments, energy security issues were triggered by energy deficit, increasing demands for energy, and India’s dependence on fossil fuels and imported materials for its energy requirements. Solar energy development would lead to energy security through displacement of coal and petroleum. Here, India can be seen associating energy security and solar energy through a positive frame highlighting the reduction of fossil fuel dependency, just like the official discourse in Brazil positively associated energy security and biofuels, as shown in Chap. 3. By associating energy security with solar energy, India aimed to justify the adoption of national law and policies supporting solar energy, whilst having a restrictive effect on international trade.

According to India, an essential corollary to the energy security objective was the need to ensure control over the country’s energy destiny. This would require security of supply of energy products, such as solar cells and modules. These were, from India’s point of view, critical components intrinsic to solar power development and were currently being heavily imported, and, as a result, exposed India to the risks of market fluctuations in international supply. Thus, in pursuance of energy security, government intervention was necessary in order to ensure domestic resilience in addressing any supply side disruptions since any dependence on imports brought with it risks associated with supply side vulnerabilities and fluctuations. As such, from India’s perspective, the domestic content requirement measures disputed by the US did not seek to maximise self-sufficiency by reducing imports of solar cells and modules; instead they aimed to ensure the existence of an adequate domestic manufacturing capacity and human skills in order to reduce the risks linked to dependence solely on imports of solar cells and modules which were intrinsic to solar power generation. Interestingly, some participants in the case study on GB in Chap. 2 also highlighted the link between energy security and the importation of energy equipment, technology and expertise as well as maintenance of human resources in the country and their energy skills and capabilities. The question here then – which will be subsequently examined – is whether green energy equipment import dependence is a green energy security issue.

4.2.3 Is Green Energy Equipment Import Dependence a Green Energy Security Issue?

In the literature, trade appears as an indicator for energy security (Sovacool and Mukherjee 2011). In this approach, reducing barriers to trade fosters energy security, so the goal is to keep energy markets open and fight protectionism. Liberalisation of international trade is advanced by complainants in the WTO green energy disputes as a way to have access to the best available technology from the global marketplace at competitive prices. Countries which depend profoundly on energy equipment and technology imports have to rely on the secure and smooth-functioning of international trade in energy in order to ensure security of energy supply. Participants in the case study on GB also presented the argument that restrictions in access to green energy technology markets would affect energy security as some green energy equipment is not produced in the country. One can, therefore, conclude that green energy technology and equipment import dependence can entail green energy security issues, particularly for green energy import dependent countries, if trade is not available.

Although green energy equipment can be easily traded or transported short and long distances, situations of supply constraints, such as pandemics, political unrest, conflicts and trade embargoes, can occur. These trade disruptions usually happen without much warning and do not allow time for countries to plan different energy strategies to ensure green energy security. One of the goals of the transition to a low carbon energy system is to increase the participation of green energy in the energy mix. As a consequence, countries dependent on solar and wind energy as a dominant energy source, for example, may be more common in the future. In these cases, if a country's energy mix is designed to be dependent on solar and wind energies, trade restrictions on equipment in this area without advance warning would not realistically allow countries to plan their energy supply from other energy sources and produce the necessary green energy equipment while the trade restrictions issues are solved.

While a globally integrated and liberalised trade environment is presented as a solution for energy security issues, realistically, we currently do not live in a world where international trade is one hundred percent guaranteed. The COVID-19 pandemic is an example here. Political unrest, conflicts and trade embargoes can also happen and cause supply constraints. It is wise, therefore, that countries ensure domestic resilience against disruptions in supplies of green energy technologies and equipment, by developing a local green energy technology manufacturing industry.

The debate here, then, is about importing countries choosing to adopt some temporary trade restrictive measures non-compliant with WTO law in order to develop their national green energy industry and ensure long-term green energy security in the event of supply side disruption. One can argue that temporarily restricting trade imports could cause energy insecurity in importing countries. For example, if an importing country restricted the importation of non-locally produced green energy technology, it would negatively impact the security of green energy supply, because the country would not have this product available nationally and would not have access to the product internationally. Each country, however, is best situated to assess

its own energy security interests and to decide whether essential energy security interests are at stake relative to certain types of trade measures. Energy security is context dependent and countries could plan their energy strategies to ensure that energy would still be available if they chose to temporarily restrict the trade. For instance, if solar energy equipment importing countries wanted to develop their national solar energy industry, they could temporarily plan to ensure energy security from other energy sources while a percentage of its solar energy domestic market is developed. Strategic plans, therefore, could prevent any general energy supply interruption.

Developing green energy technologies nationally is not an easy and straightforward task. The case of Brazil serves as an example that green energy manufacturing facilities do not just spring up overnight. As seen in Chap. 3, during the 2001 energy crisis, Brazil acted to develop wind energy via its Emergency Programme for Wind Energy, PROEOLICA, to ensure energy security. Evidence showed that a domestic manufacturing base could not be developed in the short-term, because the industry could not be dependent on very few national suppliers for the viability of wind energy projects in Brazil in that initial development period. At the time, there was only one national manufacturer of complete equipment for wind turbines and only a few manufacturers of parts for wind turbines. Therefore, it was expected that the majority of wind equipment would be imported. However, in cases where this international trade is restricted, the country would not be able to ensure its green energy security.

Supply constraints on green energy equipment can result not only in physical supply interruptions, but can also have negative consequences for prices in green energy markets, which, as such, affect, in particular, energy security in the sense of availability and affordability. The concentration of green energy equipment producers in a small number of countries heightens the impact of these issues on energy market volatility, and periods of wildly fluctuating green energy equipment prices will have an impact on the green energy security of country importers, particularly on the element of affordability.

The question then is how likely is international trade on green energy equipment to be disrupted? The full impact of the COVID-19 pandemic on green energy trade is still unknown and so far there has not been any political unrest, conflict or trade embargo with regards to green energy equipment. However, today there is concentration of some green energy equipment in the hands of a few. In 2016, for instance, of the 20 largest solar cells production companies, in terms of actual production/shipments, 11 were 100% Chinese and an additional five had Chinese participation (Jäger-Waldau 2017). In the same year, China and Taiwan held a share of 68% of PV module production in the world (Fraunhofer Institute for Solar Energy Systems 2018). This market share dominance, on the one hand, may not have any negative impact on the energy security of an importer country if access to the supply of the product is stable, accessible and reliable. On the other hand, if this market share dominance makes international trade unreliable, then it is a factor which should be considered when examining energy security concerns.

It seems an open matter as to whether the concentration of some green energy equipment production in the hands of a few is or is not a problem. However, one can safely conclude that market share dominance is not the ideal position for the world to

be in. An evenly distributed market share of green energy technologies and equipment around the world is the best solution to ensure energy security in the context of the just energy transition. No country should depend totally on a few suppliers. The diversification of green energy players in the market is essential and the WTO has an important role to play in achieving this goal. In view of this, the next section will examine whether there is policy space within WTO law for Member States to adopt trade restrictive measures to develop their national green energy industry with a view of ensuring green energy security.

5 Green Energy Security as a Justification for Trade Restrictive Measures

The previous section shows evidence that WTO Member States are increasingly associating energy security with green energy in their legal disputes under the WTO DSB. Member States which have adopted or intend to adopt trade restrictive measures to support national green energy development with a view of ensuring energy security should familiarise themselves with the following question: Does WTO law provide room for national public policy on green energy security grounds? This section aims at answering this question in the context of the WTO agreement on trade in goods, GATT, an agreement that has been raised in all green energy disputes in the WTO system so far. As such, this section is not intended to be either definitive or exhaustive of the legal defences around green energy security within all agreements of the WTO framework. Instead, it focuses on room for green energy security within the current exceptions under GATT.

As a rule, WTO Member States are required to design their internal legislation and regulations in a way that is compatible with WTO law. However, if a WTO Member State wishes to pursue some legitimate non-trade policy objectives, it may enact certain measures that, although inconsistent with WTO rules, may still be justified under GATT. Literature on green energy development and the GATT exceptions focuses mainly on environmental and climate change grounds within the scope of GATT Article XX(b) relating to measures ‘necessary to protect human, animal or plant life or health’ and GATT Article XX(g) relating to ‘the conservation of exhaustible natural resources’ (Rubini 2012; Oniemola 2013; Maggio 2017). In the context of green energy security, the examination of four legal defences under GATT is pertinent: Article III:8(a), Article XX(a), Article XX(j) and Article XXI.

5.1 GATT Article III:8(a)

Article III:8(a) of GATT provides:

The provisions of this Article [National Treatment on Internal Taxation and Regulation] shall not apply to laws, regulations or requirements governing the procurement by governmental agencies of products purchased for governmental purposes and not with a view to commercial resale or with a view to use in the production of goods for commercial sale.

Article III:8(a) of GATT exempts government procurement programmes from the national treatment obligation, leaving, as such, room for discrimination concerning the exercise of government actions relating to the procurement of ‘products purchased for governmental purposes, and not with a view to commercial resale or with a view to use in the production of goods for commercial sale’. Article III:8(a), therefore, establishes a derogation from the national treatment obligation under Article III for government procurement activities falling within its scope.

In all three green energy security cases so far, *Canada—Renewable Energy*, *Canada—Feed-In Tariff Programme* and *India—Solar Cells*, this exception was raised in an attempt to justify the discriminatory measure adopted to support domestic green energy development. Canada’s and India’s argument was that the purchase of electricity from green energy was for government purposes not with a view to commercial resale or with a view to use in the production of goods for commercial sale, as a result of government’s role in ensuring energy security. Although energy security as a legal defence per se is not part of Article III:8(a) of GATT, this is still an important case for green energy security, as green energy security can be raised as a rhetorical defence of the disputed procurement measures. It has also been echoed in the literature that the decision on *Canada—Renewable Energy*, *Canada—Feed-In Tariff Programme* and *India—Solar Cells* in relation to GATT Article III:8(a) will have far reaching implications for the energy security debate (Sarmah 2017).

The Panel and the Appellate Body interpreted Article III:8(a) of GATT differently in *Canada—Renewable Energy/Feed-In Tariff Programme*. The Panel found that the Government of Ontario’s purchases of electricity generated from green energy sources under the FIT programme were ‘with a view to commercial resale’, because whether an electricity system is highly regulated or made up entirely of competitive markets at the different levels of trade, the electricity purchased by the government and sold to retail consumers were in competition with private sector electricity retailers.

What can be concluded from the Panel’s reasoning is that, if countries with a competitive electricity market with private sector electricity retailers adopt trade restrictive measures to promote green energy development, these measures cannot be justified under GATT Article III:8(a) and will be considered in conflict with WTO law. As such, based on the Panel’s decision, to satisfy the ‘not with a view to commercial resale’ criteria and justify their trade restrictive measure to support green energy development under GATT Article III:8(a), it seems that countries would basically need to be in two positions: (i) have a nationalised electricity system, where the government is the only supplier of electricity; or (ii) have government

agencies acting on behalf of the government under the express authority conferred by it and be performing activities exclusively performed by the government. Sarmah argues that this appears to cover several public-private partnerships, especially those secured through a tendering process (Sarmah 2017). However, there is no express confirmation of this by the Panel or Appellate Body in the cases. What seems certain is that companies cannot be involved in a competitive and commercial setup.

The Appellate Body did not elaborate on ‘with a view to commercial resale’, so its position is unknown. The Appellate Body legal reasoning, applied in *Canada—Renewable Energy/FIT Programme* and followed in *India—Solar Cells*, was on the finding that the product of foreign origin allegedly being discriminated against must be in a competitive relationship with the product purchased by the government. In the given cases, the foreign product was the green energy generation equipment (manufactured/purchased by the private sector to generate electricity) while the product purchased by the Ontario and India governments was electricity. Therefore, the discrimination relating to generation equipment contained in the FIT Programme was not covered by the derogation of Article III:8(a) of the GATT 1994. The Appellate Body’s approach has been criticised in the literature in favour of the Panels’ approach (Davies 2015).

What is crucial in the Appellate Body’s decision is that it is irrelevant that the products (i.e. solar panels) might be in a close relationship, in the sense that electricity cannot be generated and then procured without electricity generating equipment (i.e. solar panels). Under the current technological stage, without solar cells and modules there is no solar generated electricity. Therefore, solar cells are a central aspect of solar electrical power generation. If the Appellate Body’s position is followed in future disputes, one of the primary conditions for Article III:8(a) of the GATT to be applied is that the trade restrictive measures should be in relation to the product purchased by the government. Therefore, if the trade restrictive measures are directed to green energy equipment, then the government itself should purchase the equipment and generate green electricity. This would, as a result, amount to a situation where the government could only directly acquire the green energy equipment and generate electricity from it. This implies the existence of an electricity market structure with more government interference and participation in the electricity sector, as the role of electricity generation would be carried out by the government.

If governments want electricity to be generated by the private sector, and then be purchased by governments, in order to apply Article III:8(a) of the GATT, the trade restrictive measure would need to be in relation to green electricity not green energy generation equipment (i.e. solar panels). However, in these circumstances, there would be no direct incentive to develop a national green energy manufacturing industry, as the electricity producers could import all equipment to generate green electricity. Therefore, what can be concluded here is that the panel and Appellate Body may have wanted to prevent protectionist measures, but their limited approach may have had the opposite effect. As shown in the case study in GB, for example, participants pointed out that the government would be held responsible and accountable for energy interruption in the country. This may also apply to many other countries. As such, in attempting to prevent trade litigation and be compliant with WTO law,

Member States, particularly countries facing energy security issues, may decide to take control of their national electricity system and exclude the participation of the private sector so as to enable them to adopt policies necessary to ensure their green energy security.

5.2 GATT Article XX

GATT Article XX provide exceptions to its main substantive obligations. The adequacy and sufficiency of Article XX exceptions to enable Member States to meet contemporary challenges have been questioned in the literature (Conrad 2011). With respect to green energy security, Article XX(a) and (j) are most relevant. Article XX(a) and (j) states:

Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(a) necessary to protect public morals;

(j) essential to the acquisition or distribution of products in general or local short supply; Provided that any such measures shall be consistent with the principle that all contracting parties are entitled to an equitable share of the international supply of such products, and that any such measures, which are inconsistent with the other provisions of the Agreement shall be discontinued as soon as the conditions giving rise to them have ceased to exist. The CONTRACTING PARTIES shall review the need for this sub-paragraph not later than 30 June 1960.

According to the interpretation by the Appellate Body of the introductory paragraph to Article XX, known as the “chapeau”, exceptions under Article XX have to observe the requirements in the chapeau of Article XX: the measures must not be applied in a manner which involves ‘arbitrary or unjustifiable discrimination’ and they must not be used as a ‘disguised restriction on international trade’. The application of GATT Article XX involves a two-tier test: (i) justification under one of the exceptions—(a) and (j) for green energy security—and (ii) examination of the chapeau. The chapeau is examined after a disputed measure is found to fall provisionally under one of the specific exceptions. A panel adjudicating Article XX should first consider the threshold question to see if the governmental measure being litigated fits within the range of policies covered by the exceptions in the paragraphs of Article XX. If so, then the chapeau would be examined. The burden of proof lies on the party invoking these exceptions (Charnovitz 2014).

There is controversy over whether Article XX can be invoked to justify breaches of WTO Agreements other than GATT. Subsidies, for example, are enacted under the ASCM which does not integrate the provisions of GATT Article XX. In *China—Raw Materials*, the Panel held that GATT exceptions could only be applied to

violations of the GATT unless specifically incorporated into a non-GATT instrument. For Rubini (2012), the need to include ‘express language’ referring to GATT Article XX is ‘unduly restrictive’ and ‘clearly wrong under general principles of interpretation’. However, in *China—Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products* (WT/DS363/AB/R), the Appellate Body held that Article XX of the GATT could apply to China’s Protocol of Accession, and for the first time it showed a positive attitude towards the idea that Article XX might be applicable beyond the scope of the agreement (Pauwelyn 2010; Farah and Cima 2013). This topic, nonetheless, is still being debated and, therefore, it is uncertain whether Article XX can be used to justify green energy subsidies under the ASCM.

Article XX(a) and (j) will be analysed in the following sections.

5.2.1 Article XX(a)—Social Disruption Within Public Morals Exception?

As shown in the case study of Brazil, and acknowledged by participants in the case study of GB, lack of energy supply can lead to social disruption. In this context, the maintenance of public order as an exception may be applicable to green energy security, i.e. as a defence for trade restrictive measures to promote green energy development with a view of ensuring energy security.

However, unlike Article XIV(a) of the GATS which expressly includes as defence measures necessary to “protect public morals” or to “maintain public order”, the exception IN Article XX(a) of the GATT does not expressly include the wording “to maintain public order”. Article XX(a) of the GATT applies to measures “necessary to protect public morals” only. Nonetheless, difficulty remains in determining whether policy objectives invoked in a specific case would actually fall within the scope of public morals or order (Diebold 2008). In this case, could social disruption as a result of lack of energy supply be included within the public morals exception under GATT Article XX(a)?

The interpretation of “public morals” was developed by the Panel in *United States—Measures Affecting the Cross-Border Supply of Gambling and Betting Services* (WT/DS285/R) and adopted by the Panel in *China—Publications and Audiovisual Products*. In particular, it was held that “the term ‘public morals’ denotes standards of right and wrong conduct maintained by or on behalf of a community or nation” and that “the content of these concepts for Members can vary in time and space, depending upon a range of factors, including prevailing social, cultural, ethical and religious values.” The panel also acknowledged that in applying this and other similar societal concepts, Member States “should be given some scope to define and apply for themselves the concepts of ‘public morals’ ... in their respective territories, according to their own systems and scales of values”.

It can be argued that cases of social unrest as a result of lack of energy supply are likely to affect the standards of right and wrong maintained by a country. Thus, following *Brazil—Certain Measures Concerning Taxation and Charges* (WT/DS472/R),

the responding party would have had to establish that green energy development was very important to the country, as a means of maintaining its standards of right and wrong, and that green energy security as a public policy objective at issue was indeed a public moral objective according to its value system. As such, the discriminatory aspects of the trade restrictive measure would need to be necessary in order to ensure continuity of green energy supply.

However, in *Brazil—Taxation*, the Panel also ruled that imports must be taken into account when assessing continuity of supply in a WTO Member State. Thus, the exception under Article XX(a) would probably not succeed for green energy security if green energy technologies were available to be imported. Also, the complaining parties would probably suggest WTO-consistent alternative approaches, such as the lowering of trade barriers to green energy technologies, as a more effective approach of achieving green energy security objectives. WTO-consistent alternative approaches could be valid for ensuring short-term energy security, but not for long-term energy security in circumstances where countries are adopting strategies to have domestic green energy technologies available in cases of trade supply disruptions. Thus, the exception under Article XX(a) is only likely to succeed in situations where there is no green energy technologies available in the international market to be imported. However, as previously stated, the development of a green energy technology industry is not straightforward, so countries would be in a position where they would need to cope with social disruption for some time until their domestic industry is developed to ensure green energy security.

Although not available under GATT Article XX(a), the public order exception is available under the WTO agreement on services set out at GATS Article XIV(a), which establish under footnote 5 that '[t]he public order exception may be invoked only where a genuine and sufficiently serious threat is posed to one of the fundamental interests of society'. An analysis of the defences under GATS is outside the scope of this chapter. However, the recent Panel's decision in *EU—Energy Package* on the public order exception under GATS Article XIV(a) provides insights into how future disputes on green energy security may unfold in the WTO DSB, as the Panel concluded that security of energy supply is a fundamental interest of society within the meaning of footnote 5 to Article XIV(a) of the GATS.

EU—Energy Package is a recent and the only WTO case so far where security of energy supply was directly related to maintenance of public order. In *EU—Energy Package*, the European Union (EU) raised the public order exception under GATS Article XIV(a), arguing that the trade restrictive measure was necessary to ensure the EU's security of energy supply and hence to maintain public order on the basis that security of energy supply is a fundamental interest of society. Although dealing with the interpretation of the public order exception rather than the public morals exception, and with conventional energy rather than green energy, the recent Panel's decision in *EU—Energy Package* made important remarks relating to the concept of security of energy supply.

According to the Panel, the lack of a definition of security of energy supply in a Member State's legal documents are no basis for concluding that Article XIV(a) covers only fundamental interests which are defined in the challenged measure or

elsewhere in the legislation of the responding party. However, a certain minimum level of clarity is required in order to assess, in a meaningful manner, whether a stated interest can be considered a fundamental interest of society within the meaning of footnote 5. Also, as the responding party bears the burden of making a *prima facie* case when advancing a defence, it is then for the responding party to provide sufficient clarity concerning the meaning of the concept of security of energy supply during the proceedings.

Thus, there is no reason as to why the same conclusions should not be applied to the public morals exception. This, therefore, means that, if energy security is invoked as an element of public morals, legal documents do not necessarily need to define what energy security is as long as the concept is defined with clarity during proceedings. Given the multiplicity of energy security concepts shown in previous chapters, and the manipulation of energy security language for one's own interest as shown in the case study on GB in Chap. 4, this approach leaves broad discretion for energy security to be defined in proceedings in a way which is most advantageous for the responding party. It is unfortunate that the Panel took this approach as, based on this, it would be wise for Member States not to define energy security in their laws and policies, as this would limit the range of interpretative possibilities relating to the concept that a respondent party could raise as defence. However, such an approach will not bring clarity or stability to the green energy security debate.

Another important finding of *EU—Energy Package* is that the Panel did not require imminent or actual social unrest to grant the defence. Therefore, that social disruption has materialised is not a prerequisite for the public order exception. What is needed is the existence of a real and true possibility of security of supply being undermined. As this was the standard applied to public order, there is no reason as to why a Panel would apply a higher standard to the public morals exception. Therefore, it seems that it is sufficient for a Member State to show evidence that social unrest as a result of lack of security of green energy supply would undermine the protection of public morals. The materialisation of social unrest is not necessary. However, this exception for green energy security is still likely to fail if there is international green energy technologies trade. This exception, therefore, does not allow for countries to strategically prepare in advance for long-term green energy security in circumstances where international trade is not available.

5.2.2 Article XX(j)—Short Supply Exception

Article XX(j) was interpreted for the first time by the WTO DSB in *India—Solar Cells*. When raising Article XX(j) exception as a defence, India advocated a holistic approach by arguing that the domestic content requirement measures and the basis for invoking Article XX(j) needed to be seen in the context of the overall objectives of energy security and ecologically sustainable growth for which acquisition or distribution of indigenously manufactured solar cells and modules was essential, as well as being seen in the context of India's overall energy scenario and the challenges it

was currently facing, which were characterised by India's rising energy deficit, and its dependence on fossil fuels and imported materials for its energy requirements.

The US, as complainant and appellee, made no categorical comments in relation to India's public policy regarding energy security. The US advocated the narrow approach of taking into account the language of the WTO provisions only and not considerations regarding the achievement of policy objectives. For the US, the policy rationale behind the measure should not be considered a valid ground. In the US's written submissions to the Panel and to the Appellate Body, the wording 'energy security' or 'security of supply' was never used in the US's own arguments. The US acknowledged the environmental underpinnings of the National Solar Mission by noting that the promotion of solar energy was 'a laudable goal that the United States and many other WTO Members share, and it is not this environmental objective that the United States challenges in this dispute'.

The US gave no explanation about the lack of debate on their part concerning energy security as a public policy and the reason as to why this was not advanced remains unknown. Two hypothetical reasons for this can only be briefly surmised here. It could be that the US decided not to draw attention to energy security as an important factor as a diversionary tactic to actually prevent the Panel and Appellate Body from having to acknowledge energy security as an important ground for derogation, or that the US genuinely thought that energy security played no explicit role in the configuration of the issues at stake in this case. However, there is no certainty in these arguments. Whatever the reason might be, the US decision not to engage with the energy security argument reveals a tension surrounding this issue and the potential for energy security to be deployed in various strategic ways to suit certain policy needs.

The Panel did not endorse India's argument, but limited and centred its legal reasoning on the interpretation of the terms of the provisions pursuant to the ordinary meaning of the terms, as well as in light of the interpretation related to the history of Article XX(j) as a way of confirming its interpretation.

India's policy objectives were dismissed as 'legally irrelevant' by the Panel:

[...] we do not consider that these wider objectives of energy security and sustainable development would be legally relevant to the question of whether the DCR measures are "essential to the acquisition" of products in short supply under Article XX(j). We therefore disagree with India's statement that, in the context of Article XX(j), the DCR measures must "be examined in the context of the overall objectives of energy security and ecologically sustainable growth for which acquisition or distribution of domestically manufactured solar cells and modules is essential".

Similarly to the Panel, the Appellate Body's analysis was limited to the interpretation of the language in the articles raised by the parties. The Appellate Body confirmed the Panel's finding that India's lack of domestic manufacturing capacity was not sufficient to constitute product shortage and agreed that India merely identified potential disruptions to imports and failed to demonstrate any actual disruptions. Energy security as a public policy played no role in the legal reasoning of the Panel or the Appellate Body. For the Panel, policy objectives are legally irrelevant under article XX(j). For the Appellate Body, policy considerations may inform the nature

and extent of the provisions under Article XX(j), but the party invoking the exception must demonstrate the applicability of the ordinary meaning of the terms of the WTO provisions. Therefore, the focus has been primarily on the need for the invoking party to meet the substantive requirements of the relevant provision of WTO law.

Turning to the interpretation of the language under Article XX(j), the argument that import dependency amounts to energy security concerns will most likely fail in any dispute. Based on the Panel and Appellate Body's decision, it can be understood that the following criteria must apply concomitantly:

- (i) Members are not entitled to an equitable share in the international *production* of green energy products but instead are entitled to an equitable share of the international *supply* of green energy products. Therefore, a Member State cannot raise the argument that it needs its own domestic production of green energy equipment when there is access to the international supply of the product. Thus, if there is supply availability of the product in the international market, Article XX(j) cannot be raised;
- (ii) There must be *imminent* risks of supply shortage or *actual* supply shortage of green energy equipment, not *potential* risks. The simple existence of low domestic manufacturing capacity does not qualify as an imminent risk. Thus, evidence of the lack of supply or evidence of imminent risks of supply shortage is key for the applicability of Article XX(j). Arguments about possible shortages in the future do not fall within Article XX(j). The level of domestic production, the relevant product and geographic market, potential price fluctuations, and accessibility of international supplies, for instance, will be taken into account to demonstrate the availability and sufficiency of the product. Also, in assessing whether a product is in general or local short supply, the stage of development of a Member State should be taken into account in determining exposure to supply disruption. As noted by the Appellate Body, 'different levels of economic development of Members may, depending on the circumstances, impact the availability of supply of a product in a given market. Developing countries may, for example, have less domestic production, and may be more vulnerable to disruptions in supply than developed countries.' Although the Appellate Body leaves more room to apply the short supply exception under Article XX(j) to developing countries, only allowing imminent or actual risks of supply shortage may still cause greater adverse impact on developing countries that are dependent on imported green energy technological products. These products require a certain level of human and technological expertise and time in order to develop an adequate domestic manufacturing capacity, and if there is a significant imminent or actual supply shortage it may be too late to adopt measures that avoid green energy supply disruption;
- (iii) The trade restrictive measures must be *essential* to address the situation of short supply. The meaning of essential was not clarified by the Appellate Body. However, the Appellate Body points out that the same process of weighing and balancing a series of factors for a "necessity" analysis under Article XX(d) is relevant in assessing "essential" under Article XX(j).

Therefore, for trade restrictive measures with a view to developing green energy to be justified under GATT Article XX(j), there must be an imminent or actual supply shortage and the measures must be essential to addressing the supply shortage. The position is, therefore, based on short-termism, which can cause great adverse impact on countries dependent on imported green energy technological products in an event of unavailability of the products in the market. These products require a certain level of human and technological expertise and time in order to develop an adequate domestic manufacturing capacity and if there is a significant imminent or actual supply shortage it may be too late to adopt measures that avoid green energy supply disruption. Also, based on the interpretation given to GATT Article XX(j), the argument of developing a green energy domestic manufacturing capacity in order to ensure long-term green energy security has no chance to succeed.

5.3 *GATT Article XXI: National Security*

GATT Article XXI provides:

Nothing in this Agreement shall be construed

- (a) to require any contracting party to furnish any information the disclosure of which it considers contrary to its essential security interests; or
- (b) to prevent any contracting party from taking any action which it considers necessary for the protection of its essential security interests
 - (i) relating to fissionable materials or the materials from which they are derived;
 - (ii) relating to the traffic in arms, ammunition and implements of war and to such traffic in other goods and materials as is carried on directly or indirectly for the purpose of supplying a military establishment;
 - (iii) taken in time of war or other emergency in international relations; or
- (c) to prevent any contracting party from taking any action in pursuance of its obligations under the United Nations Charter for the maintenance of international peace and security.

GATT Article XXI permits derogation from otherwise applicable trade obligations, such as the WTO provisions of national treatment and MFN, in cases of ‘essential security interest’. Unlike the general exceptions under Article XX, the security exception encompasses a non-conditional provision. In the literature, the view is advanced that, with Article XXI, Members have sought to retain a degree of autonomy over decisions in ‘sensitive’ policy areas, while balancing the tension between their national security and free trade (Akande and Williams 2003). Scholars agree that the language of Article XXI is broad and ambiguous, (Jackson 1997; Cann 2001; Lindsay 2003; Neuwirth and Svetlicinii 2015) giving Member States an open-ended discretion and a potential power to abuse it (Yoo and Ahn 2016).

A number of authors have debated the self-judging character of essential security provisions. At invocation, a contest existed between security exceptions as self-judging ‘release valves’ on the one hand, where only WTO Member States had the

authority to define their ‘essential security interests’, and as a justiciable and limited means of escaping trade obligations on the other hand, where security exceptions allowed members restricted, but lawful, derogation from their trade obligations subject to review by a dispute settlement body. However, in *Russia—Traffic in Transit*, a panel interpreted Article XXI for the very first time. In *Russia—Traffic in Transit*, the Panel found that WTO panels have jurisdiction to review aspects of a Member’s invocation of Article XXI and clarified the requirements for a successful invocation of this exception provision. The question then is whether clean energy security falls within the security exception under GATT Article XXI.

5.3.1 Applicability of Article XXI to Green Energy Security

Article XXI is divided into three paragraphs, but, generally speaking, the security exception embraces five categories: (1) national security information [Article XXI(a)]; (2) fissionable materials [Article XXI(b) (i)]; (3) military goods and services [Article XXI(b)(ii)]; (4) war or international emergencies [Article XXI(b)(3)]; and (5) UN obligations [Article XXI(c)] (Perez 1998).

Common to the first two paragraphs of Article XXI is that both provide that the essential security interest of the WTO Members is protected under the security exception. However, the difference between them lies in the fact that paragraph (a) allows for abstention from actions in order to protect these interests, whereas paragraph (b) provides that a Member State could, for the interest of its essential security interests, take certain actions, even though they might be infringing. However, the panel in *Russia—Traffic in Transit* clarified that this discretion to take action is limited to circumstances that objectively fall within the scope of the three subparagraphs of Article XXI(b). Paragraph (c) requires prior decision under the UN Charter in order to become applicable. Thereby, this provision expressly gives priority to the obligations under the UN and specifically the Security Council, when clashing with the GATT (Bhala 2013).

Even though in the case study of Brazil there was no express association of energy security with national security in law and policies in any of the documents analysed, and in the case study of GB, interviews with leading energy experts did not present express evidence of an association of energy security with national security, energy security can be closely tied up with national security. Although GATT Article XXI was not drafted with energy trade in mind (Shih 2009), the fact that traditional energy goods could rely on the national security exception under Article XXI has already been accepted by the WTO (1998). Nonetheless, the reference to ‘traditional energy goods’ can be precisely interpreted as fossil fuels and nuclear energy. Scholars have also already suggested the use of energy security as a ground on which national measures can be insulated from trade under the national security exception of GATT Article XXI on the basis that energy products and services are absolutely essential for society to function (Zillman 1994; Shih 2009; Hough 2010; Nedumpara 2014). However, their analysis points towards reference to fossil fuels and nuclear energy only. There are no studies which examine whether green energy security can fall

within the national security exception under GATT Article XXI. What can be safely inferred is that including green energy security as a ground under Article XXI would require the terms of this provision to be interpreted in light of contemporaneous circumstances.

That the term ‘essential security interests’ in the first two paragraphs of Article XXI includes matters beyond purely military threats can be safely concluded from the Panels’ finding in *Russia—Traffic in Transit* that ‘essential security interests’ could be generally understood as referring to those interests relating to the quintessential functions of the State. However, as the specific interests at issue depends on the particular situation and perceptions of the State in question and vary with changing circumstances, the Panel left ‘essential security interests’ to be interpreted by the country invoking it, although its interpretation and application must be done in good faith.

As such, if Member States wish to raise clean energy security within the scope of Article XXI, evidence in laws and policy documents of clean energy security being defined as essential security interests would be important when the Panel and the Appellate Body examine whether the Member’s designation of its essential security interests was made in good faith and whether the measures taken were plausible to protect those security interests or constituted an apparent abuse.

However, would the association of clean energy security with national security be beneficial? In a positive vein, it would promote the national development of clean energy. However, in a negative vein, Member States would be securitising the promotion of clean energy, which can make, for instance, the development of clean energy a justification for using military force or other instruments of coercion, override access to information, reinforce the discourses of control, restrict public participation and limit individual freedom. These consequences would certainly not be desirable. Nonetheless, Member States now seem to be willing to defend their measures by an invocation of the security exception in formal dispute resolution proceedings. It is, therefore, possible that Article XXI would be raised on the grounds of clean energy security.

5.3.2 Is Economic Security a National Security Interest Under Article XXI?

Another way of attempting to include green energy security within the scope of Article XXI is to ask whether economic security can amount to national security interest. It is widely acknowledged that energy is an essential enabler of economic prosperity. As demonstrated in the case studies of GB and Brazil, energy supply interruption not only negatively impact the economy in terms of production and job availability, for instance, but also in terms of attracting investments. Energy security is, therefore, essential for the well-functioning of an economy. In the case study of Brazil, in particular, the framing of energy security was in the context of economic development, demonstrating that energy security in Brazil is first and foremost an economic issue. In this sense, green energy supply interruption, particularly supply

of biofuels in the context of Brazil, could negatively impact the economy not only as a result of lack of energy, but also as a result of reduction of the economic output for the country from biofuels. Therefore, associating green energy with economic security is not a difficult task. In these circumstances, could a Member State raise the argument of economic security under Article XXI in order to adopt trade restrictive measures to promote green energy development?

So far, economic security has not been invoked under GATT Article XXI in a WTO dispute. However, in the literature, economic security has been argued to be a dimension of national security (Covey 1996; Ronis 2011; Valdrón 2016; Antonova and Ponomarenko 2016), particularly as a result of increased interdependence in global markets where one nation's default may trigger a worldwide chain reaction, cascade failures and may cause a calamity (Romm 1993). Economic security has been broadly defined to include securing a nation's industrial and technological base, access to critical materials and resources and the functioning of critical infrastructures and services that are required for critical societal functions (Fjäder 2016) as well as with reference to global capital and commodities markets flows (Rickards 2009).

In terms of the inclusion of economic security within the national security exception under GATT Article XXI, according to Broome, the few disputes in the GATT invoking Article XXI, as well as the negotiating history of Article XXI do not seem to support economic security within the meaning of "essential security interests" (Broome 2006). In his view, equating economic security with national security in the context of Article XXI would likely constitute an unacceptably broad interpretation of Article XXI.

However, the broader concept of economic security would not be difficult to be included within the dimension of essential security interests under Article XXI if a contemporary interpretation was adopted. It would be important for a Member State raising this point to show in its laws and policies that its society places a great importance on its economic security as a national security interest, although this should be done in good faith.

As the textual content of the GATT was not fully developed regarding the situations where measures could be adopted for security reasons, the scope of Article XXI is still quite unsettled. One of the consequences of securitisation is that security concerns can be devised in order to achieve certain policy aims. Policy makers can place a specific matter of interest under the security umbrella to prioritise and push forward the approval of preferred policies. However, care should also be taken in its interpretation as, in the words of Professor Jackson (1969), the national security exception 'can reopen the door to arbitrary abuse'. GATT Article XXI should not be seen as a political instrument with the aim to enable the contracting parties to take actions or adopt measures with a view of achieving a particular public policy and protecting certain interests, such as green energy security. Its applicability should be as a last resort.

5.4 *Final Remarks on the Section*

This section has demonstrated that there might be some room for short-term green energy security within the defences under Articles III:8(a), XX(a) and (j) and Article XXI. However, under Article XX(a), this means that the defence only applies in circumstances where there is no international trade available, and the exception under Article XX(j) also requires actual or imminent short supply. These defences, therefore, are of no use to countries wishing to apply trade restrictive measures to develop their green national industry as a strategic way to prepare them for any circumstances where there is limited or no international trade, such as pandemics, political unrest, conflicts and trade embargoes.

For long-term green energy security, i.e. countries seeking to develop their domestic green energy industry so that they do not become overly dependent on imports and international trade in cases of trade disruption, the only possible defences are under GATT Article III:8(a) and GATT Article XXI. However, according to the Panel's and Appellate Body's decisions on green energy jurisprudence so far, it seems that trade restrictive measures under Article III(8) will only have chances to succeed in a scenario where the energy market structure is basically nationalised, that is, without the participation of the private sector in a competitive relationship. Invocation of the national security exception under Article XXI to defend trade restrictive green energy measures may also be possible, but will have the consequence of green energy being securitised. From the foregoing analysis, therefore, it seems that room for long-term green energy security is only available under GATT if the government takes control over the energy market or if green energy is expressly associated with national security.

Future WTO Panels and the Appellate Body could follow a different approach, be it a wider and holistic one or even a more restrictive approach, as the Appellate Body has a significant amount of discretion in how they interpret WTO provisions (Scott 2007). Previous cases show, for example, that some adjudicators in the GATT/WTO have contributed to shifts in the meaning of the general exceptions enshrined in Article XX of the GATT (Venzke 2011). Nevertheless, while in WTO jurisprudence previous decisions are not binding for all future cases, the Appellate Body strives to maintain consistency between a ruling in an appeal and of that in subsequent appeals involving the same issue (Matsushita 2015).

An option for reverting the limited defences available for long-term green energy security could be the adoption of a broader, holistic and contemporary interpretation of the provisions, involving weighing and balancing the importance of the interest being protected, the contribution of the measure to the protection of that interest, and the trade-restrictiveness of the measure, in light of any WTO-consistent less trade-restrictive reasonably-available alternatives that could achieve the same level of protection. As per Van Damme, '[t]reaties are incomplete. Nothing is decided comprehensively in advance. Treaties reflect a negotiated political compromise and will leave issues unanswered, unprovided for, or unclear (Van Damme 2009). Such

is the case for green energy security when the texts of the WTO agreements were negotiated.

Nonetheless, how far can the WTO DBS adjudicators go beyond what could be considered ‘ordinary interpretation’? The answer is controversial and brings criticisms of illegitimacy directed at the WTO system as a whole. The fine line between interpretation of factual circumstances of vague provisions and that which goes beyond is hard to draw. What is clear, nonetheless, is that the modern world faces challenges which were not in place when WTO law was enacted. Therefore, WTO rules are not well designed to address some issues. For example, transitioning to a greener energy supply whilst having to cope with increasing population and rising energy demand is a key issue worldwide, and the terms of the WTO provisions were not negotiated with these problems in sight. A reductionist interpretation, particularly if the interpretation of WTO law is by recourse to the history of the provision, may not be able to take into account the current challenges faced by society or prepare society for possible future challenges. The primary responsibility for achieving green energy security lies not with the WTO, but rather its Members: national governments.

Rule change through litigation strategies to alter the interpretation of existing WTO rules also has additional negative aspects, such as governments having to use taxpayers’ money to resort to the lengthy and costly litigation process under the WTO. This would particularly affect developing and least developed countries as they often lack the resources to participate in the litigation (Horlick and Fennell 2011). Also, the decisions still would not bring legal certainty as decisions are not authoritative in all future cases. WTO rules, nonetheless, must address the concerns of Member States in ensuring green energy security without fearing WTO litigations. The next section will propose a possible solution.

6 Proposal for Green Energy Security in the Law of the WTO

The previous section demonstrated that policy space for green energy security within the GATT exceptions is limited, particularly for long-term green energy security strategies. However, green energy security solutions must be not only short-term, but also long-term. The benefits of trade do not necessarily imply that WTO membership has been doing an adequate and sufficient job of promoting green energy security worldwide. Green energy security should be a critical long-term domestic policy goal, and, as such, should not be ignored in the WTO and should assume a high profile in this system due to the need to transition to a low carbon energy system.

The WTO seeks liberalised trade in a world where green energy technologies are still an emerging industry in most countries. The WTO, therefore, should support the creation of competitive and stable domestic industries that could supply the domestic and international markets. The proposal which follows is based on the assumption that where domestic producers could not compete with foreign imports

absent government protection, WTO law should allow the protection afforded to domestic producers, so that such producers can develop their industry. Support for the development of domestic green energy industries worldwide could enable an otherwise uncompetitive domestic industry to become competitive to such an extent that it could supply the national and international markets, resulting in a more evenly distributed global green energy market and lower prices for consumers and, therefore, a net welfare benefit in terms of social development and inclusion worldwide.

There might be WTO compliant incentives available to promote green energy development domestically. However, if countries are using local content requirements and subsidies non-compliant with WTO law, one could expect that this would be based on an economic and technical analysis of the most viable and efficient manner to develop a green energy industry nationally in accordance with a country's circumstances. Therefore, as long as there is evidence of this economic and technical analysis, i.e. an analysis of absence of viable and efficient non-trade restrictive measures to foster the development of a domestic green energy industry, Member States should be allowed some policy space to develop their green energy industry with a view of ensuring short-term and long-term green energy security. The proposal below will elaborate on how to create such policy space.

The WTO multilateral trading system could and should become a relevant tool for supporting green energy security in a world where green energy security concerns are becoming increasingly more widespread and attempts are made to carry out a just energy transition. However, how do we create the legal space in the WTO for trade restrictive measures aiming to ensure green energy security? A proposal will be discussed in the following subsection.

6.1 Proposal—The Way Forward

While the multilateral trade rules are oriented towards ensuring market access, WTO law should also be supporting green energy scale-up. Thus, the proposal is to allow temporary trade restrictive measures subject to an economic and technical analysis of the most viable and efficient manner to develop green energy technologies domestically in accordance with a country's circumstances, so that Member States can develop a percentage—ten percent, for example, to be agreed amongst Member States—of their national green energy industry. This would temporarily bring the world to a scenario in which there would be two basic groups of main players: (i) countries with national green energy industry developed and (ii) countries with no or emerging green energy industry.

These two groups would have differing sets of trade obligations. Countries with no or emerging green energy industry would enjoy “special and differential treatment,” to allow them to develop a percentage of their domestic industry. Although this approach means that the trade regime would be asymmetrical, this asymmetry would be temporary, as when countries achieved, for example, ten percent of domestic market share, they would graduate to taking on full trade obligations. One may

criticise this proposal as inadequate for a sustainable non-discriminatory multilateral trading system. However, this type of measures would be transitional and would assist in bringing a plurality of green energy players into the national and global green energy markets. By increasing the number of market participants, it would boost reliability of green energy technologies supply. With a plurality of green energy players worldwide, unpredicted trade restrictions scenarios would also be less likely to cause green energy interruption, as this proposal would support the opening of new routes to supply of green energy technologies. How the proposal could be implemented is discussed as follows.

6.2 *How to Implement the Proposal?*

Member States need to use a pragmatic approach to address green energy security. Thus, Member States could consider two options: (i) add a permanent green energy security exception; or (ii) agree on a temporary implementation of a waiver.

Amendment of existing WTO rules and the formulation of new rules in order to strengthen policy space for green energy security purposes could be an option via the inclusion of a green energy security exception under GATT. Attempting to amend agreements under the WTO is, nonetheless, quite complicated, not only because of the nature of the negotiations, but also because of the body's decision-making processes (Gardoqui and Ramírez 2015). Realistically, negotiations on this process would be complex, time consuming and subject to political will. Given the unsuccessful Doha Round trade talks, the latest round of trade negotiations among the WTO membership, this option seems unfeasible at the moment. It would, nonetheless, serve to demonstrate the functionality of the global trade body's negotiating arm.

Waivers may also be an option. The WTO's waiver power is found in Article IX:3 of the Agreement Establishing the WTO (WTO Agreement). It allows the Ministerial Conference '[i]n exceptional circumstances... to waive an obligation imposed on a Member by this Agreement or any of the Multilateral Trade Agreements, provided that any such decision shall be taken by three-fourths of the Members'. Thus, the WTO waiver is the power of the WTO Ministerial Conference to suspend any legal obligation of the WTO Agreement or the annexed Multilateral Trade Agreements to address tensions, such as the tension between international governance and domestic government, and the tension between societies at different stages of economic development and with different forms of government (Feichtner 2011). The waiver is a binding legal act which formally suspends legal obligations and thus allows for non-compliance without putting into question the validity of WTO law (Schermers and Blokker 2003). The waiver, therefore, can allow Member States to take measures in violation of WTO obligations in respect of green energy development. Thus, Member States should consider the waiver as an option for policy space for green energy security as its use would flexibilise WTO law and thus address the tensions identified above.

The terms and conditions governing the applicability of the waiver for the development of a minimal percentage of a national green energy industry in line with the aforementioned proposal should provide for specific time limits to be set when a waiver is granted, an annual review and its termination.

A waiver decision, according to Article IX:3 of the WTO Agreement, needs to be adopted by three-fourths of the members. Although this is a strict voting requirement, it is less challenging than attempts to modify WTO texts. However, waivers are not granted to developed Member States to allow them to adopt protectionist measures (Feichtner 2011). Therefore, waiver to allow green energy development could only be granted to developing and least-developed country members. This limitation, nonetheless, should not prevent the use of a waiver as, in practice, developing and least-developed country members have far greater difficulties in developing their national green energy industry.

The waiver would, therefore, allow developing and least-developed Member States to maintain trade restrictive measures in violation of WTO law for green energy security reasons to allow a minimal percentage of a national green energy industry to be developed. An exception in this direction could provide the right incentives for countries to acquire serious commitments on long-term green energy security and at the same time promote the stability of the multilateral trading system with the existence of a plurality of green energy players widespread around the world.

The international community needs to respond realistically to countries wanting to develop their green energy industry on the basis of ensuring green energy security. With this proposal, domestic policies supporting the development and scale-up of green energy for energy security purposes would be more explicitly permissible and thus sheltered from challenge. This proposal is intended to open the debate in this direction.

7 Conclusions

This chapter examined whether there is any flexibility within the current GATT/WTO rules and the interpretation given to them that permit trade restrictive measures which support green energy security. It showed that green energy development has increasingly come to be associated with energy security in the WTO jurisprudence. An analysis of the WTO green energy disputes involving energy security revealed that broader concepts of energy security found in the literature which include environmental, climate and social considerations have not reached the jurisprudence in the WTO system yet.

Energy security concepts have been raised differently by respondents. While in *Canada—Renewable Energy* and *Canada—Feed-In Tariff Programme* the concept focused on availability and reliability, in *India—Solar Cells*, in addition to availability and reliability, affordability is also placed as part of the energy security concept. Interestingly, the energy security concept as raised by Canada is the same concept

raised by the majority of participants in the case study of GB, which is correlated to the view adopted by the UK government in recent policy documents. The concept raised by India which include the elements of availability, reliability and affordability is the same concept in the current legal framework in Brazil as shown in Chap. 3. However, energy security concept is dynamic and evolves, so it may be just a coincidence that developed countries, i.e. Canada and UK, currently use the same concept, while emerging economies, i.e. India and Brazil, currently use the same concepts. Further comparative studies on the topic would be necessary to draw any further conclusions here.

What was also an interesting finding in the analyses of *Canada—Renewable Energy and Canada—Feed-In Tariff Programme* was the fact that the panel and Appellate Body presented a different framing for green energy and energy security links. While the panel focused on green energy not supporting energy security due to green energy intermittent nature, the Appellate Body advanced the role played by green energy in ensuring energy security in the long-term. From a legal perspective this divergence in frames has implications for the interplay between energy security and green energy under WTO law, because the frame adopted can impact the applicability and interpretation of WTO provisions. The negative frame, for instance, cuts down the room for energy security to be raised as a legal defence for trade restrictive measures adopted to promote green energy. Such negative frame might signal about the inability of WTO to adapt to a changing global landscape and add to the discontent among its membership.

The analyses of room for green energy security as a justification for trade restrictive measures concluded that there might be some room for short-term green energy security within the defences under Articles III:8(a), XX(a) and (j) and Article XXI. However, under Article XX(a), this means that the defence only applies in circumstances where there is no international trade available, and the exception under Article XX(j) also requires actual or imminent short supply. These two exceptions under GATT Article XX are only likely to succeed in situations where there are no green energy technologies available in the international market to be imported. However, the development of a green energy technology industry is not straightforward, so countries would be left in a position where they would need to cope with the negative consequences of imminent or actual green energy supply disruption for some time until their domestic industry is developed to ensure green energy security. These defences are also inapplicable to countries wishing to adopt trade restrictive measures to develop their national green energy industry as a strategic way to prepare them for any circumstances where there is limited or no international trade, such as pandemics, political unrest, conflicts and trade embargoes.

For long-term green energy security, i.e. countries wanting to develop their domestic green energy industry so that they do not become overly dependent on imports and international trade in cases of trade disruption, the only possible defences are under GATT Article III:8(a) and GATT Article XXI. However, according to the Panel's and Appellate Body's decisions on green energy jurisprudence so far, it seems that trade restrictive measures under Article III:8(a) will only have chances to succeed in a scenario where the energy market structure is basically nationalised, that is, without

the participation of the private sector in a competitive relationship. The panel and Appellate Body may have wanted to prevent protectionist measures, but their limited approach may have the opposite effect. In attempting to prevent trade litigation and be compliant with WTO law, State Members, particularly countries facing energy security issues, may decide to take control of their national electricity systems and exclude the participation of the private sector to adopt policies necessary to ensure their green energy security.

Trade restrictive measures within the national security exception under Article XXI may also be possible, but will have the consequence of securitising green energy, which is not desirable. However, given how rarely GATT Article XXI is invoked, Member States do not seem to be willing to defend their measures via the invocation of the security exception in formal dispute resolution proceedings. In any case, given the negative consequences of securitisation, such as justification for using military force or other instruments of coercion, overriding access to information, reinforcing discourses of control, restricting public participation and limiting individual freedom, GATT Article XXI should be used as a last resort.

An option for reverting the limited defences available for green energy security could be the adoption of a broader, holistic and contemporary interpretation of the terms of the provisions, involving weighing and balancing the importance of the interest being protected, the contribution of the measure to the protection of that interest, and the trade-restrictiveness of the measure, in light of any WTO-consistent less trade-restrictive reasonably-available alternatives that could achieve the same level of protection. However, rule change through litigation strategies to alter the interpretation of existing WTO rules has negative aspects, such as governments having to use taxpayers' money to resort to the lengthy and costly litigation process under the WTO. This would particularly affect developing and least developed countries as they often lack the resources to participate in the litigation. Also, the decisions still would not bring legal certainty as decisions are not authoritative in all future cases.

This chapter argued that an evenly distributed market share of green energy technologies and equipment around the world is the best solution to ensure green energy security in the context of the just energy transition. The WTO multilateral trading system could and should become a relevant tool for supporting green energy security in a world where green energy security concerns are becoming increasingly more widespread and attempts are made to carry out a just energy transition. This work, therefore, proposed a way forward to create the legal space within the WTO for trade restrictive measures aimed at ensuring green energy security. The proposal involved allowing temporary trade restrictive measures subject to an economic and technical analysis of the most viable and efficient manner to develop green energy technologies domestically in accordance with a country's circumstances, so that Member States could develop a percentage of their national green energy industry. With this proposal, domestic policies supporting the development and scale-up of green energy for energy security purposes would be more explicitly permissible and thus sheltered from legal challenge. This proposal is intended to open the debate in this direction.

References

- Akande D, Williams S (2003) International adjudication on national security issues: what role for the WTO. *Va J Int Law* 43(2):365–402
- Amrutha AA, Balachandra P, Mathirajan M (2018) Model-based approach for planning renewable energy transition in a resource-constrained electricity system—a case study from India. *Int J Energy Res* 42(3):1023–1039
- Antonova AD, Ponomarenko EV (2016) External debt is a threat to national security? *RUDN J Econ* 4:49–60
- Bhala R (2013) *Modern GATT Law: a treatise on the General Agreement on tariffs and trade*. Sweet & Maxwell
- BP (2019) BP energy outlook. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2019.pdf>. Accessed 20 Feb 2020
- Broome SA (2006) Conflicting obligations for oil exporting nations? Satisfying membership requirements of both OPEC and the WTO. *George Washington Int Law Rev* 38:409–436
- Cann WA Jr (2001) Creating standards and accountability for the use of the WTO security exception: reducing the role of power-based relations and establishing a new balance between sovereignty and multilateralism. *Yale J Int Law* 26:413–485
- Charnovitz S (2014) Trade and environment. In: Lukauskas A, Stern RM, Zanini G (eds) *Handbook of trade policy for development*. Oxford Scholarship Online
- Charnovitz S, Fischer C (2015) Canada-renewable energy: implications for WTO law on green and not-so-green subsidies'. *World Trade Rev* 14(2):177–2010
- Conrad C (2011) Processes and production methods (PPMs) in WTO law: interfacing trade and social goals. Cambridge University Press
- Cosbey A, Mavroidis PC (2014) A turquoise mess: green subsidies, blue industrial policy and renewable energy: the case for redrafting the subsidies agreement of the WTO. *J Int Econ Law* 17(1):11–47
- Cottier T (2014) Renewable energy and WTO law: more policy space or enhanced disciplines? *Renew Energy Law Policy Rev* 1:40–52
- Covey RD (1996) Adventures in the zone of twilight: separation of powers and national economic security in the Mexican Bailout. *Yale Law J* 105(5):1311–1345
- Davies A (2015) The GATT Article III:8(a) procurement derogation and Canada—renewable energy. *J Int Econ Law* 18(3):543–554
- Diebold NF (2008) The morals and order exceptions in WTO law: balancing the toothless tiger and the undermining mole. *J Int Econ Law* 11(1):43–74
- Farah PD, Cima E (2013) Energy trade and the WTO: implications for renewable energy and the OPEC Cartel. *J Int Econ Law* 16(3):707–740
- Fay M, Hallegatte S, Vogt-Schilb A (2015) *Decarbonizing development: three steps to a zero-carbon future*. World Bank
- Feichtner I (2011) *The law and politics of WTO waivers: stability and flexibility in public international law*. Cambridge University Press
- Fjäder CO (2016) National security in a hyper-connected world: global interdependence and national security. In Masys AJ (ed) *Exploring the security landscape: non-traditional security challenges*. Springer, Cham
- Fraunhofer Institute for Solar Energy Systems (2018) Photovoltaics report. <https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/Photovoltaics-Report.pdf>. Accessed 2 Jan 2020
- Gardoqui BL, Ramírez I (2015) Identifying a WTO exception to incorporate climate clubs. *BioRes* 9(7):22–25
- Helm D (2004) *Energy, the state and the market*. Oxford University Press

- Horlick GN, Fennell K (2011) WTO dispute settlement from the perspective of developing countries. In Lee Y et al (eds) *Law and development perspective on international trade law*. Cambridge University Press
- Hough DJ (2010) World Trade Organization agreements and principles as a vehicle for the attainment of energy security. *Richmond J Glob Law Bus* 9(2):199–228
- Hufbauer GC, Meléndez-Ortiz R, Samans R (2016) Setting the horse before the cart to preserve a viable world. In: Hufbauer GC, Meléndez-Ortiz R, Samans R (eds) *The law and economics of a sustainable energy trade agreement*. Cambridge University Press
- Jackson J (1969) *World trade and the law of GATT*. Bobbs-Merrill Co, Inc
- Jackson J (1997) *The world trading system: law and policy of international economic relations*. MIT Press
- Jäger-Waldau A (2017) PV status report 2017. Publications Office of the European Union
- Jayagovind A (2016) Missing the wood for the trees: a critique of the WTO ruling in India: solar cells and modules. *Indian J Int Law* 56(2):201–220
- Karttunen M, Moore MO (2018) India-Solar Cells: trade rules, climate policy, and sustainable development goals. *World Trade Rev* 17(2):215–237
- Kirschen D, Strbac G (2004) *Fundamentals of power system economics*. Wiley, Hoboken
- Kulovesi K (2014) International trade disputes on renewable energy: testing ground for the mutual supportiveness of WTO law and climate change law. *Rev Eur Community Int Environ Law* 23(3):342–353
- Lai H (2016) The climate-trade conundrum: a critical analysis of the WTO's jurisprudence on subsidies to renewable energy. In: Matsushita M, Schoenbaum TJ (eds) *Emerging issues in sustainable development: international trade law and policy relating to natural resources, energy, and the environment*. Springer, Tokyo
- Lamy P (2007) Doha round will benefit energy trade. https://www.wto.org/english/news_e/sppl_e/sppl80_e.htm. Accessed 21 Feb 2020
- Leal-Arcas R, Filis A, Abu Gosh ES (2014) Renewable energy in the World Trade Organization. In: Leal-Arcas R, Filis A, Abu Gosh ES (eds) *International energy governance: selected legal issues*. Edward Elgar Publishing Ltd
- Lee J (2016) SCM agreement revisited: climate change, renewable energy, and the SCM agreement. *World Trade Rev* 15(4):613–644
- Lewis JI (2014) The rise of renewable energy protectionism: emerging trade conflicts and implications for low carbon development. *Glob Environ Polit* 14(4):10–35
- Lindsay P (2003) The ambiguity of GATT Article XXI: subtle success or rampant failure? *Duke Law J* 52:1277–1313
- Maggio AR (2017) *Environmental policy, non-product related process and production methods and the law of the World Trade Organization*. Springer, Berlin
- Marceau G (2010) The WTO in the emerging energy governance debate. In Pauwelyn J (ed) *Global challenges at the intersection of trade, energy and the environment*. Centre for Trade and Economic Integration
- Matsushita M (2015) Reflections on the functioning of the Appellate Body. In: Marceau G (ed) *A history of law and lawyers in the GATT/WTO: the development of the rule of law in the multilateral trading system*. Cambridge University Press
- Mendonça M, Jacobs D, Sovacool BK (2010) *Powering the green economy: the feed-in tariff handbook*. Earthscan, London
- Meyer T (2016) The World Trade Organization's role in global energy governance. In Van de Graaf T et al (eds) *The Palgrave handbook of the international political economy of energy*. Palgrave
- Nahm J (2017) Renewable futures and industrial legacies: wind and solar sectors in China, Germany, and the U.S. *Bus Polit* 19(1):68–106
- Nahm J, Steinfeld ES (2014) Scale-up nation: China's Specialization in Innovative manufacturing. *World Dev* 54:288–300
- Nedumpara JJ (2014) Energy security and the WTO agreements. In: Mathur S (ed) *Trade, the WTO and energy security: mapping the linkages for India*. Springer, New Delhi

- Neuwirth RJ, Svetlicinii A (2015) The economic sanctions over the Ukraine conflict and the WTO: 'Catch-XXI' and the revival of the debate on security exceptions. *J World Trade* 49(5):891–914
- OECD (2000) Regulatory reform in network industries: past experience and current issues. OECD Economic Outlook 67, Organisation for Economic Co-operation and Development
- Oniemola PK (2013) International law on renewable energy: the need for a worldwide treaty. *Ger Yearb Int Law* 56:281–314
- Pauwelyn J (2010) Squaring free trade in culture with Chinese censorship: the WTO Appellate Body report on "China-Audiovisuals". *Melbourne J Int Law* 11(1):119–140
- Perez AF (1998) WTO and U.N. law: Institutional Comity in National Security. *Yale J Int Law* 23:301–381
- Rickards JG (2009) Economic security and national security: interaction and synthesis. *Strateg Stud Q* 3(3):8–49
- Romm JJ (1993) Defining national security: the nonmilitary aspects. Council on Foreign Relations
- Ronis SR (2011) Economic security neglected dimension of national security? National Defense University Press
- Rubini L (2012) 'Ain't wastin' time no more: subsidies for renewable energy, the SCM agreement, policy space, and law reform. *J Int Econ Law* 15(2):525–579
- Rutherford AP (2016) Regulatory framework for biofuels in Brazil: history and challenges under the law of the WTO. *J Energy Nat Resour Law* 24(2):213–238
- Sarmah A (2017) Renewable energy and Article III:8(A) of the GATT: reassessing the environment-trade conflict in light of the next generation cases. *Trade Law Dev* 9(2):314–337
- Schermers HG, Blokker NM (2003) International Institutional Law. Nijhoff
- Scott J (2007) International trade and environmental governance: relating rules (and Standards) in the EU and the WTO. *Eur J Int Law* 15(2):307–354
- Selivanova Y (2014) The WTO agreements and energy. In Talus K (ed) Research handbook on international energy law. Elgar Law
- Shadikhodjaev S (2017) India—certain measures relating to solar cells and solar modules. *Am J Int Law* 111(1):139–147
- Shih W (2009) Energy security, GATT/WTO, and regional agreements. *Nat Resour J* 49:433–484
- Simonia NA (2010) Energy security: Russia, the European Union and the G8. In: Kirton J, Larionova M, Savona P (eds) Making global economic governance effective: hard and soft law institutions in a crowded world. Ashgate
- Sovacool BK, Mukherjee I (2011) Conceptualizing and measuring energy security: a synthesized approach. *Energy* 36:5343–5355
- Stern RM (2013) The multilateral trading system. In: Lukauskas A, Stern RM, Zanini G (eds) Handbook of trade policy for development. Oxford University Press, Oxford
- Valdron T (2016) Economic security: an analysis of the strait of Malacca. In Masys AJ (ed) Exploring the security landscape: non-traditional security challenges. Springer, Berlin
- van Damme I (2009) Treaty interpretation by the WTO Appellate Body. Oxford University Press, Oxford
- Venzke I (2011) Making general exceptions: the spell of precedents in developing article XX GATT into standards for domestic regulatory policy. *Ger Law J* 12(5):1111–1140
- WTO (1998) Energy services: background note by the secretariat, S/C/W/52. https://www.wto.org/english/tratop_e/serv_e/w52.doc. Accessed 10 April 2020
- WTO (2007) World trade report 2007: six decades of multilateral trade cooperation: what have we learnt? https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report07_e.pdf. Accessed 16 Jan 2020
- Yanovich A (2011) WTO rules and the energy sector. In: Selivanova Y (ed) Regulation of energy in international trade law: WTO, NAFTA, and Energy Charter Treaty. Kluwer
- Yoo JY, Ahn D (2016) Security exceptions in the WTO system: bridge or bottle-neck for trade and security? *J Int Econ Law* 19(2):417–444
- Zillman DN (1994) Energy trade and the national security exception to the GATT. *J Energy Nat Resour Law* 12:117–127

Chapter 5

Conclusion



1 Important Findings of the Study on Energy Security

Existing scholarly debates on energy security demonstrate that energy security is a complex and multifaceted topic and the mainstream academic literature on energy security is characterised by a pervasive lack of consensus in relation to its different concepts and dimensions. The diversity of accounts provided by the case studies shows that there is no unanimity here. The findings of the case studies of Great Britain (GB) and Brazil in Chaps. 2 and 3 and legal analysis of the World Trade Organisation (WTO) green energy jurisprudence in Chap. 4 demonstrate the discursive contests that lead to divergent constructions of energy security not only in the context of different countries, but also in different sectors of the economy within a country. The polysemic, multi-dimensional, contextual and dynamic nature of energy security can, therefore, be observed in the variety of definitions of energy security given in the case studies examined in this work.

The empirical work in GB shows that, on the one hand, energy security is discursively constructed in an alarmist and fearful manner by focusing on “lights going out” and, on the other, in a broader and holistic manner emphasising affordability, sustainability and human welfare. However, the majority of energy security definitions given by energy experts in GB focused on the elements of availability and reliability, advancing, therefore, a narrow definition of energy security found in the mainstream academic literature. This, nonetheless, does not question the construction of the broader energy security concepts also advanced by some participants in GB and, therefore, shows that there is no uniform understanding of energy security here.

The case study of Brazil uncovers the evolving and multifaceted nature of the meaning of energy security. By examining how the concept of energy security was conceptualised and contextualised in Brazil within the period of analysis (2001–2015), it reveals that, during the 2001 energy crisis, energy security concerns were distinctly focused on energy availability and reliability, while the concept adopted in the post-2001 energy crisis period was expanded to include affordability.

These divergent constructions of energy security definitions are also found in legal disputes under the WTO Dispute Settlement Body. While in *Canada—Renewable Energy and Canada—Feed-In Tariff Programme* the concept raised by Canada focuses on availability and reliability, in *India—Solar Cells*, in addition to availability and reliability, affordability is also placed by India as part of the energy security concept. Interestingly, the energy security concept as raised by Canada is the same concept raised by the majority of participants in the case study of GB, which is correlated to the view adopted by the UK government in recent policy documents, as demonstrated in Chap. 2. The concept raised by India which includes the elements of availability, reliability and affordability is the same concept found in the current legal framework in Brazil as shown in Chap. 3. However, the concept of energy security is dynamic and evolves, so it may be just a coincidence that developed countries, i.e. Canada and the UK, currently use the same concept, while emerging economies, i.e. India and Brazil, currently use the same concept. Further comparative studies on the topic would be necessary to draw any further conclusions here.

Overall, the results demonstrate that broader concepts of energy security found in the academic literature which include environmental, climate and social considerations have not reached the discursive terrain of green energy law and policies in the official discourse in Brazil, in the majority of views of participants in GB—particularly by the government and industry—or in legal green energy disputes in the WTO system.

In order to assist the just energy transition, this work puts forward the adoption of the broader energy security concept in law and policies which includes affordability, environmental, climate and social considerations. However, as it was shown, although the adoption of and elaboration on energy security concepts would bring clarity to the debate, it might disadvantage countries in legal disputes in the WTO system where recent jurisprudence in the case of *EU—Energy Package*, between Russia and the European Union (EU), required only certain minimum level of clarity on the concept of energy security. Adopting a specific concept would limit a country's capacity to break the concept up and reform it along lines which suit their own interests in the context of winning a legal dispute. It is unfortunate, therefore, that the WTO jurisprudence has taken this approach as this will serve as an obstacle for countries to engage in a more meaningful debate.

Another consequence of the non-inclusion of these elements within the concept of energy security is that energy law and policies pursuing energy security can be created which negatively impact affordability, the climate, the environment and social inclusion. Encapsulating these elements within the concept of energy security would, therefore, assist the move towards a just energy transition, as law and policies pursuing energy security would need to be justified under this broader frame, with much present law and policy falling short of that standard. Political will would be necessary to adopt this broader energy security concept, as countries may be at a disadvantage if the broader definition of energy security is set up as this would limit their ability to play with the concept to suit their own interests.

The academic literature also focuses on the competing dimensions of energy security. The variety of indicators put forward by scholars shows the complexity in

analysing national energy security policies and performance. There is no agreement here either. Academic studies present large variations in the choice of indicators and in the way energy security indexes are framed and constructed. The interview data from the empirical studies in GB reveals a number of contending energy security indicators offered by participants. For instance, although control over energy sources is advanced by participants from all sectors, its meaning is cast in opposing terms from having control via reliance on indigenous sources of energy supply, on the one hand, to having control via the ability to effectively manage energy supply from trade around the world, on the other.

In some studies, for instance, trade in energy sources appears as an indicator for energy security. In this approach, reducing barriers to trade fosters energy security, so the goal is to keep energy markets open and fight protectionism. However, a contribution of this work to the literature lies in the fact that import dependency of energy equipment, technology and energy expertise is also seen as essential for energy security by some participants in the empirical work in GB, indicators that are absent from the present academic literature.

This work shows that these contending energy security indicators, which lead countries to adopt opposing national energy policies, are found in legal disputes in the WTO system. On the one hand, liberalisation of international trade is advanced by complainants in the WTO green energy disputes as a way to have access to the best available technology from the global marketplace at competitive prices, as seen in Japan's position in *Canada—Renewable Energy/Feed-in Tariff*. On the other hand, countries which depend profoundly on green energy equipment and technology imports have to rely on the secure and smooth-functioning of international trade in energy in order to ensure security of energy supply, and shows concern over their energy security as a result of this import dependency, as raised by India in *India—Solar Cells*. These different views on energy security, therefore, contribute to the literature on energy law, particularly by showing empirical evidence of how energy security is being understood on the ground.

2 Lessons from the Implications of Energy Security—Green Energy Links

Another difference present in the country case studies examined, which is also found in legal disputes in the WTO system, is in relation to the links between energy security and green energy development. The case studies of GB and Brazil show that positive and negative links are forged concerning the interplay between energy security and law and policies on green energy development. In GB, participants deployed a positive frame to point out the importance of developing green energy to ensure energy security as a result of energy availability, energy diversification, energy independence and energy decentralisation. In Brazil, law and policies on biofuels in particular were constructed in a positive frame around the energy security-green

energy links as a result of their role in tackling energy security concerns framed in terms of energy use from exhaustible energy sources, dependency on imported energy sources, the oligopoly of oil producers and the uneven distribution of fossil fuels around the world as well as the risk of war associated with oil exploration. Wind energy was also framed as playing a role in ensuring energy diversification.

In relation to the negative frame, in GB, energy security and green energy development links were framed negatively as a result of grid upgrading issues and unreliability due to intermittency, and this created a general indisposition among some participants to associate green energy sources with energy security in a positive way. In Brazil, green energy, particularly wind and solar, was framed negatively as being insufficient to meet the energy demand required to support economic growth.

These positive and negative frames are found in legal disputes in the WTO system. In terms of positive frames, in India's arguments in the case of *India—Solar Cells*, for instance, solar energy development would lead to energy security through displacement of coal and petroleum. Here, India can be seen associating energy security and solar energy through a positive frame highlighting the reduction of fossil fuel dependency, just like the official discourse in Brazil positively associate energy security and biofuels, as shown in Chap. 3. In the disputes of *Canada—Renewable Energy* and *Canada—Feed-In Tariff Programme*, Canada put forward the role played by green energy in helping secure the supply of electricity which was needed as a result of the temporary shutdown of several nuclear facilities for maintenance, phasing out of coal-fired generation and subsequent reduction in generation capacity, as well as the increase of Ontario's population by 28% by 2030 and the subsequent increases in energy demand.

What is also interesting in the WTO cases is how the Panel and the Appellate Body presented the link between energy security and green energy differently in *Canada—Renewable Energy* and *Canada—Feed-In Tariff Programme*. As was demonstrated in Chap. 4, while the Panel presented only a negative frame where green energy does not support energy security because of the intermittency of wind and solar energy sources, the Appellate Body advanced a positive frame where green energy plays a role in ensuring energy security in the long-term by reducing reliance on fossil energy resources. Therefore, in these cases, the Panel and the Appellate Body presented two different approaches in regard to framing green energy and energy security. From a legal perspective, this divergence in frames has implications for the interplay between energy security and green energy under WTO law, because the frame adopted can impact the applicability and interpretation of WTO provisions. The negative frame, for instance, reduces the room for energy security as a legal justification for trade restrictive measures adopted to promote green energy.

The analysis in Chap. 4 shows evidence that WTO Member States are increasingly associating energy security with green energy in a positive frame in their legal disputes under the WTO DSB. These countries are adopting trade restrictive measures to support national green energy development with a view of ensuring energy security. As explained in Chap. 4, literature around green energy trade disputes in the WTO DSB focuses its analysis on environmental/climate change grounds. However, this work adds to the literature in international trade law as it shows a new perspective

that these cases also raise issues surrounding energy security as a justification under WTO rules for trade restrictive measures to support green energy development. The significance of the divergences revealed in this work is also to draw the attention of policymakers and legal practitioners to the potential differences in national energy policies around the world that pursue different objectives of trade liberalisation, energy security and green energy development.

This work shows that countries that are taking trade restrictive measures to promote green energy development with a view of ensuring energy security should then familiarise themselves with the question of whether WTO law provides room for national public policy on green energy security grounds. The legal analyses of room for green energy security as a justification for trade restrictive measures concluded that there might be some room for short-term green energy security within the defences under Articles III:8(a), XX(a) and (j) and Article XXI. However, under Article XX(a), this means that the defence only applies in circumstances where there is no international trade available, and the exception under Article XX(j) also requires actual or imminent short supply. These defences, therefore, are inapplicable to countries wishing to adopt trade restrictive measures to develop their national green energy industry as a strategic way to prepare them for any future circumstances where there is limited or no international trade, such as pandemics, political unrest, conflicts and trade embargoes.

For long-term green energy security, i.e. countries wanting to develop their domestic green energy industry so that they do not become overly dependent on imports and international trade in cases of future trade disruption, the only possible defences are under GATT Article III:8(a) and GATT Article XXI. However, according to the Panel's and Appellate Body's decisions on green energy jurisprudence so far, it seems that trade restrictive measures under Article III:8(a) will only have chances to succeed in a scenario where the energy market structure is basically nationalised, that is, without the participation of the private sector in a competitive relationship. The Panel and Appellate Body may have wanted to prevent protectionist measures, but their limited approach may have the opposite effect, as countries may decide to take control of their national electricity systems and exclude the participation of the private sector to adopt policies necessary to ensure their green energy security.

Literature review also shows that countries may make connections between energy security and national security, although these connections were not found in the case studies of GB and Brazil. In terms of international trade law, trade restrictive measures within the national security exception under Article XXI may be possible, but will have the consequence of securitising green energy, which has undesirable consequences. This work also elaborates on economic security within the scope of the national security exception under Article XXI. Taking the case study of Brazil as example, where the framing of energy security is in the context of economic development, this work finds that associating green energy with economic security is not a difficult task if a contemporary interpretation of Article XXI is adopted. However, although there has been a recent decision in *Russia—Traffic in Transit*, where a panel interpreted Article XXI for the very first time, Member States do

not seem to be willing to defend their measures via the invocation of the security exception in formal dispute resolution proceedings.

An option for reverting the limited defences available for green energy security could be the adoption of a broader, holistic and contemporary interpretation of the terms of the provisions, involving weighing and balancing the importance of the interest being protected, the contribution of the measure to the protection of that interest, and the trade-restrictiveness of the measure, in light of any WTO-consistent less trade-restrictive reasonably-available alternatives that could achieve the same level of protection. However, rule change through litigation strategies to alter the interpretation of existing WTO rules has negative aspects, such as governments having to use taxpayers' money to resort to the lengthy and costly litigation process under the WTO. This would particularly affect developing and the least developed countries as they often lack the resources to participate in the litigation. Also, the decisions still would not bring legal certainty as decisions are not authoritative in all future cases.

This work argues that an evenly distributed market share of green energy technologies and equipment around the world is the best solution to ensure green energy security in the context of the just energy transition. In this regard, it demonstrates that the law of GATT/WTO presents limited room for green energy security as a justification for trade restrictive measures, and the limited applicability of defences available may have undesirable outcomes. It then proposes a way forward to create the legal space in the WTO for trade restrictive measures aimed at ensuring green energy security.

The proposal involves allowing temporary trade restrictive measures subject to an economic and technical analysis of the most viable and efficient manner to develop green energy technologies domestically in accordance with a country's circumstances, so that Member States can develop a percentage of their national green energy industry. With this proposal, domestic policies supporting the development and scale-up of green energy for energy security purposes would be more explicitly permissible and thus sheltered from legal challenge. This proposal is intended to open the debate in this direction. What also emerge from the analysis in the case studies is that the interplay between energy security and green energy poses challenges to a transition to a green energy system. For instance, when the connections between energy security and green energy development are negatively framed, it has the implication of hindering green energy development. Another challenge can be seen in the process of energy politicisation in GB, which is framed as having negative impacts on green energy development due to vested interests, unequal lobbying power and association of green energy with left-wing politics.

In order to assist the just energy transition, this work argues for the incorporation of a dominant positive frame in relation to the interplay between energy security and law and policies on green energy development since a positive frame in relation to this link has the implication of significantly contributing to the promotion of an energy source. It also advances the need to embrace emerging green energy technologies in energy systems and the need for further research in the area to unlock its potential were also advanced.

Finally, this work highlights that the interplay between energy security and green energy development is far from straightforward, as existing discursive constructions are broadening, deepening and transforming the relationship between energy security and law and policies on green energy as well as showing its complexity. This work does not seek to close down the diversity of views on the topic. Instead, the analysis in this work and its proposals are intended to stress the importance of this under analysed topic and open the debate in this direction.

3 Limitations and Future Avenues for Expanding This Research

Due to the multi-disciplinary nature of energy research, its complexity and the global challenge where it is inserted, it was not possible to explore in depth all the various aspects on the interplay between energy security and law and policies on green energy development. The case study of Brazil, for instance, would benefit from interviews with players in the energy sector in this country to highlight the plurality of views and perspectives on the subject as well as improve the understanding of problems associated with energy security and green energy development. Undertaking research of that kind was not possible in this case due to delays concerning the approval of the ethics application by the Brazilian National Ethics Committee as well as the extreme politicisation of energy politics in Brazil at the time the study was conducted. However, while this necessitated a shift of research strategy, that was ultimately to the benefit of the work in two ways. First, it allowed the different empirical sections of this work to focus on three different though related things: the contestation of green energy security definitions across different sectors of an economy (GB); the incorporation of green energy security into law and policy (Brazil); and the adjudication of disputes around law and policy in relation to green energy security (WTO). Second, it underscored the point that green energy security is political and its politicisation is something that countries must find ways of managing if they are to move towards a just energy transition.

Also, many very interesting topics associated with the theme of this study fell outside of this work. To give two examples, it can be mentioned (i) the role of governments and the market in ensuring energy security, and (ii) the interplay of energy security and green energy in all of the WTO agreements.

Results of this study point towards the emergence of novel themes which would benefit from further research, particularly relating to legal and societal challenges as a result of the development, commercialisation and deployment of green energy technologies, such as the emergence of ‘prosumers’ and energy storage.

Appendix A

Interview Guide

Participants answered the following questions:

- What do you understand by the term ‘energy security’?
- How important is energy security for energy policies in your country?
- How important is climate change/ the environment for energy policies in your country? Do you see them as ‘security’ issues?
- What are your views on the growing argument of nuclear as green energy?
- From your point of view what is the impact that security has had on the expression, shape, scope and character of policy, investment and legislation in the field of green energy?
- From your point of view what are the short and long term implications of the use of ‘security’ to the decision making process in relation to green energy development?
- What are your views on the relationship between energy security, public participation and access to information concerning green energy policies?
- From your point of view, what role do security concerns play in finding a balance between energy supply and environmental and climate change concerns?

Appendix B

Summary of documents selected for analysis for Chap. 3

Type	Date	Name	Authority	Main objective
Speech	13/03/2001	Speech at the ceremony introducing the Ministers of Social Security and Mines and Energy	President	Introduced the new Minister of Mines and Energy and highlighted the energy challenges ahead
Statement	07/05/2001	Statement on national radio and television	President	Informed the public of the need for energy rationing
Statement	14/05/2001	Statement after the Energy Crisis Committee Meeting	President	Informed the public of the initial decisions made to overcome the energy crisis
Legislation	15/05/2001	Provisional measure 2147	Executive Power	Created the Energy Crisis Committee and established guidelines for programmes to cope with the energy crisis
Note	15/05/2001	Exposure of motives 00203	Executive Power	Gave reasons to enact Provisional Measure 2147
Statement	18/05/2001	Statement on national radio and TV on the day of the implementation of the emergency programme of electricity consumption reduction	President	Informed the public of the need to reduce energy consumption
Statement	25/05/2001	Statement	President	Discussed measures that affected consumers' rights

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	5/06/2001	Speech in the ceremony to celebrate the World Environment Day	President	Speech to celebrate the World Environment Day
Speech	12/06/2001	Speech at the ceremony to sign agreements relating to the public service concession of electric power transmission between the Union and Amazon Company of Power Transmission and Para Company of Power Transmission	President	Discussed the energy crisis and solutions
Speech	27/06/2001	Speech on a visit to the San Alberto field of natural gas processing	President	Discussed the new plant of natural gas processing done by Petrobras in San Alberto—Bolivia
Speech	28/06/2001	Speech at the inauguration ceremony of the William Arjona thermoelectric plant	President	Inaugurated the first thermoelectric plant which uses gas from Bolivia
Speech	04/07/2001	Opening speech at the meeting of the Brazilian Forum of Climate Change	President	Discussed climate change
Meeting record	05/07/2001	Meeting N. 02/2001	Energy Crisis Committee	Discussed measures to overcome the energy crisis
Speech	05/07/2001	Speech at the meeting of the Energy Crisis Committee	President	Informed the decisions taken at the Energy Crisis Committee meeting
Regulation	05/07/2001	Resolution 24	Executive Power	Created the PROEOLICA programme to promote wind energy
Speech	06/07/2001	Speech on a visit to the Luis Eduardo Magalhaes hydroelectric plant	President	Informed society of the actions to overcome the energy crisis
Speech	20/07/2001	Speech on a visit to the Sergio Motta hydroelectric plant	President	Discussed the Brazilian energy matrix
Speech	24/07/2001	Speech at the launching ceremony of the business call notice to integrate the share capital of the Amazon Gas Company	President	Discussed the energy problem in the Amazon area
Speech	13/08/2001	Speech at the opening ceremony of Boa Vista substation with Brazil-Venezuela energy transmission line	President	Discussed grid interconnection between Brazil and Venezuela

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	03/09/2001	Speech at the presentation ceremony of the installation project of wind turbines from the Wobben factory in the Port of Pecem industrial complex	President	Discussed wind energy
Regulation	17/09/2001	CNPE Resolution 1	CNPE	Enacted about energy integration policy, electricity and natural gas imports
Speech	05/10/2001	Speech at the inauguration ceremony of Luis Eduardo Magalhaes hydroelectric plant	President	Discussed energy production
Speech	17/10/2001	Speech at the sanctioning ceremony of the project of law which provides for the National Policy Conservation and Rational Use of Energy	President	Discussed the National Policy Conservation and Rational Use of Energy
Meeting record	29/10/2001	Meeting N. 22/01	Energy Crisis Committee	Discussed measures to overcome the energy crisis
Electronic correspondence	29/10/2001	Electronic correspondence from Mr Andre Leal, Executive Director of SeaWest Windpower do Brasil, to the Minister of Mines and Energy	SeaWest Windpower do Brasil/MME	Stated challenges for the development of the wind energy sector in Brazil
Letter	20/11/2001	Letter EN-ANEEL-20/11/01-001 from Mr Alberto Seisdedos Fernandez del Pino, Director of Enerbrasil, to the Brazilian Federal Electricity Agency	Director of Enerbrasil/ANEEL	Stated reasons for the delay of implementation of wind projects in Brazil
Legislation	21/12/2001	Provisional measure 14	Executive Power	Created the Program for Incentive of Alternative Electric Energy Sources (PROINFA)
Note	21/12/2001	Exposure of motives 00376-A-CCIVIL/MF/MME/MDIC	Executive Power	Gave reasons to enact Provisional Measure 14
Speech	06/02/2002	Speech at the ministerial meeting—Work Program for 2002	President	Discussed the Work Program for 2002
Speech	13/03/2002	Speech at the ceremony which signs the message forwarding the Kyoto protocol to the national congress for ratification	President	Forwarded the Kyoto Protocol to the National Congress for Ratification

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Meeting record	16/04/2002	Debate and Voting	Federal Senate	Debate and voting for the conversion of Provisional Measure 14 into Law 10,438/02 in the plenary of the Federal Senate
Speech	23/04/2002	Speech at the signing ceremony of the concession contracts for the construction and exploitation of new hydroelectric power plants	President	Discussed changes in the energy system regulation
Legislation	26/4/2002	Law 10,438	Legislative Power	Created the Program for Incentive of Alternative Electric Energy Sources (PROINFA)
Speech	24/05/2002	Speech at the opening ceremony of Cana Brava hydroelectric power plant	President	Discussed the increase in energy production
Speech	28/06/2002	Speech in the rotor installation ceremony in the hydroelectric plant of Tucuruí	President	Discussed the increase in energy production
Speech	04/07/2002	Speech at the opening ceremony of the thermoelectric power plant of Nova Piratininga	President	Discussed energy development
Report	28/08/2002	The electricity supply crisis: final report	National Congress—Special Mixed Commission to study the energy crisis	Studied the causes of the energy supply crisis and proposed alternatives to address the issue
Legislation	23/12/2002	Decree 4541	Executive Power	Regulated PROINFA
Speech	02/05/2003	Speech at the opening ceremony of companhia energética Santa Elisa thermoelectric power plant	President	Discussed the alternative energy matrix
Speech	06/05/2003	Speech at a meeting with representatives of the sugar and alcohol sector	President	Discussed the development of alcohol as fuel
Speech	25/06/2003	Speech at the first infrastructure seminar for sustainable development	President	Discussed Brazil's development
Legislation	11/11/2003	Law 10,762	Legislative Power	Amended PROINFA
Speech	11/11/2003	Speech at the launching ceremony of the national program for universal access and use of electricity	President	Discussed rural electrification
Legislation	11/11/2003	Decree 4873	Executive Power	Created the program 'Light for All'

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Legislation	11/12/2003	Provisional measure 144	President	Established the principles for the energy sector
Note	11/12/2003	Exposure of motives EM 00095/MME	Executive Power	Gave reasons to enact Provisional Measure 144
Speech	16/01/2004	Speech at the official opening ceremony of the Padre Carlos plant (Poço de Caldas-MG)	President	Discussed the electricity sector
Speech	16/01/2004	Speech at the launching ceremony of biofuels pole	President	Discussed biodiesel production
Legislation	15/03/2004	Law 10,848	Legislative Power	Established the principles for the energy sector
Legislation	30/03/2004	Decree 5025	Executive Power	Regulated PROINFA
Regulation	30/03/2004	MME norm 45	MME	Regulated PROINFA
Speech	02/04/2004	Speech at the opening ceremony of Três Lagoas thermoelectric	President	Discussed unfinished energy projects
Speech	09/06/2004	Speech at the contract signing ceremony of the Light for All program	President	Discussed the Light for All program
Speech	30/07/2004	Speech at the decree signing ceremony that regulates Law 10,848, which provides for the sale of electricity	President	Discussed the decree which regulates Law 10,848
Legislation	30/07/2004	Decree 5163	Executive Power	Regulated the sale of electricity
Note	09/09/2004	Exposure of Motives 44/MME	Executive Power	Gave reasons to enact Provisional Measure 214
Legislation	13/09/2004	Provisional Measure 214	President	Introduced biodiesel into the Brazilian energy matrix
Report	14/09/2004	ANEEL report regarding normative resolution 83	ANEEL	Reasons for regulation of electricity supply to isolated communities through individual systems of electricity generation via the use of renewable energy

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Regulation	20/09/2004	Normative resolution 83	ANEEL	Regulated the use of household photovoltaic systems for the electrification of isolated areas
Speech	25/11/2004	Speech at the official ceremony of the construction and installation of turbines of the Tucuruí Hydroelectric Plant	President	Discussed electricity generation
Speech	30/11/2004	Speech at the opening of the Brazilian Forum on Climate Change meeting	President	Discussed biodiesel development
Legislation	06/12/2004	Provisional measure 224	President	Created a registry of biodiesel producers and importers and provided for the tax regime for biodiesel producers and importers
Note	06/12/2004	Exposure of motives EM Interministerial 00166/2004-MF/MDA/MME	Executive Power	Gave reasons to enact Provisional Measure 224
Speech	06/12/2004	Speech at the launching ceremony of the National Biodiesel Program	President	Discussed the biodiesel program
Debate	16/12/2004	Plenary debate for the enactment of law 11,097/2005	Federal Senate	Debated the enactment of Law 11,097
Speech	20/12/2004	Speech at the launching ceremony of the investment fund holdings Brazil Energy	President	Discussed energy investment
Speech	11/01/2005	Speech at the opening ceremony of the hydroelectric power plant Monte Claro	President	Discussed energy production
Legislation	13/01/2005	Law 11,097	Legislative Power	Introduced biodiesel into the Brazilian energy matrix
Speech	22/02/2005	Speech at the opening ceremony of the electrification network in 53 settlements	President	Discussed energy access
Speech	24/03/2005	Speech at the opening ceremony of the biodiesel plant Soyminas	President	Discussed biodiesel production
Speech	27/04/2005	Speech at the opening ceremony of biodiesel plant Agropalma	President	Discussed biodiesel production

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Legislation	18/05/2005	Law 11,116	Legislative Power	Created a registry of biodiesel producers and importers and provided for the tax regime for biodiesel producers and importers
Speech	04/08/2005	Speech at the ceremony relating to castor crop for the production of biodiesel	President	Discussed biodiesel production
Speech	04/08/2005	Speech at the opening ceremony of the biodiesel plant Brasil Ecodiesel S/A	President	Discussed biodiesel production
Speech	10/08/2005	Speech at the visit to the works of the hydroelectric plant Peixe Angical	President	Discussed energy development
Speech	17/11/2005	Speech at the ceremony of the social fuel seal	President	Discussed the biodiesel program
Speech	30/01/2006	Speech at the opening ceremony of the Electric Power Substation Viana	President	Discussed energy supply
Speech	03/02/2006	Speech at the signing ceremony of biodiesel purchase agreements of the ANP auction	President	Discussed biodiesel production
Speech	19/04/2006	Speech at the visit to the works of the wind farm Osorio	President	Discussed energy supply
Speech	05/05/2006	Speech at the opening ceremony of the hydroelectric plant Eliezer Batista	President	Discussed the nationalisation of Petrobras in Bolivia
Speech	20/06/2006	Speech at the launching ceremony of cornerstone of biodiesel plant BSBios	President	Discussed biodiesel
Speech	20/06/2006	Speech at the ceremony of the industrial test of H-Bio	President	Discussed biodiesel
Speech	25/07/2006	Speech at the signing ceremony of the contracts of the 2nd public auction of biodiesel	President	Discussed biodiesel
Speech	31/07/2006	Speech at the opening of the meeting on biodiesel	President	Discussed biodiesel
Speech	15/08/2006	Speech at the signing ceremony of the concession contracts of hydroelectric plants with entrepreneurs	President	Discussed energy production
Speech	31/08/2006	Speech at the first national meeting on biofuels	President	Discussed biofuels
Legislation	31/08/2006	Decree 5882	Executive Power	Amended Decree 5,025/2004. Added the reduction of greenhouse gases emissions as an aim of PROINFA

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	21/11/2006	Speech at the opening ceremony of the biodiesel plant Barralcool	President	Discussed biodiesel
Policy document	2007	The National Energy Plan 2030 (PNE)	MME	Provides a long-term integrated energy strategy
Speech	31/01/2007	Speech at the opening ceremony of biodiesel plant Ecodiesel	President	Discussed biodiesel
Speech	10/02/2007	Speech at the opening ceremony of the biodiesel plant Ecodiesel	President	Discussed biodiesel
Legislation	27/02/2007	Decree 6048	Executive Power	Allowed A1 to A5 auctions exclusively for renewables
Speech	18/05/2007	Speech at the opening ceremony of biodiesel plant Ecodiesel	President	Discussed biodiesel
Speech	21/05/2007	Speech at the opening of the seminar on Biofuels	President	Discussed biodiesel
Speech	21/05/2007	Speech at the opening ceremony of generating units of Itaipu hydroelectric power plant	President	Discussed Itaipu hydroelectric power plant
Legislation	15/06/2007	Law 11,488	Legislative Power	Created a fiscal incentive regime for infrastructure development, known as REIDI, which energy projects could benefit from
Speech	05/07/2007	Speech at the International Conference on Biofuels	President	Discussed biofuels
Speech	09/08/2007	Speech at the opening ceremony of the Jamaica Broilers Group's Ethanol Plant	President	Discussed biofuels
Speech	21/08/2007	Speech in the opening ceremony of the biodiesel plant Bertin	President	Discussed biodiesel
Speech	12/09/2007	Speech at the opening of the seminar on biofuels	President	Discussed biofuels
Regulation	05/12/2007	CNPE resolution 7	CNPE	Established guidelines for the formation of biodiesel stocks
Speech	21/01/2008	Speech at the introduction of the Mines and Energy Minister Edison Lobão	President	Discussed energy shortage in Brazil
Regulation	13/03/2008	CNPE resolution 2	CNPE	Set the minimum percentage of biodiesel to be added to diesel oil at 3%

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	03/06/2008	Speech at the meeting of the high level of FAO on food security, climate change and bioenergy	President	Discussed food security, climate change and biofuels
Speech	20/08/2008	Speech at the opening ceremony of the second commercial biodiesel plant of Petrobras	President	Discussed biodiesel
Speech	20/08/2008	Speech at the opening ceremony of the terminal of liquefied natural gas regasification	President	Discussed energy supply
Speech	21/11/2008	Speech at the closing of the plenary session of the International Conference on Biofuels	President	Discussed biofuels, food security and climate change
Regulation	12/02/2009	MME norm 60	MME	Approved the manual for special projects in the context of the Universal National Program for Access and Use of electricity—"Light for All"
Speech	12/03/2009	Speech during a visit to the works of the Jirau hydroelectric plant	President	Discussed energy development and the world economic crisis
Speech	06/04/2009	Speech during the opening ceremony of the Darcy Ribeiro biodiesel plant	President	Discussed biofuels and the world economic crisis
Regulation	27/04/2009	CNPE resolution 2	CNPE	Increased the biodiesel blending mandate to 4% from July 2009
Speech	12/05/2009	Speech during a visit to the works of Euzébio Rock thermoelectric plant	President	Discussed the world economic crisis
Legislation	28/05/2009	Law 11,943	Legislative Power	Extended the date for PROINFA projects to start commercial operations to December 2010
Regulation	16/09/2009	CNPE resolution 6	CNPE	Increased the biodiesel blending mandate to 5%
Speech	23/10/2009	Speech during the announcement of the mandatory blend of 5% biodiesel to diesel	President	Discussed biodiesel
Legislation	29/12/2009	Law 12,187	Legislative Power	Established the National Policy on Climate Change

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	19/01/2010	Speech at the start-up ceremony of ethanol usage in the Juiz de Fora thermoelectric power plant	President	Discussed thermoelectric with ethanol usage and climate change
Speech	15/07/2010	Speech during a visit to platform facilities and collection of first oil production at the well in the pre-salt Campo Baleia Franca	President	Discussed pre-salt
Speech	13/08/2010	Speech during a visit to the works of turbines of hydropower plant	President	Discussed the Brazilian energy matrix
Speech	26/08/2010	Speech at the signing ceremony of the concession contract for the Belo Monte hydroelectric plant	President	Discussed the construction of Belo Monte and environmental issues
Speech	19/10/2010	Speech during the opening ceremony of two hydroelectric plants in Goiás	President	Discussed energy investment
Speech	26/11/2010	Speech during the opening ceremony of the gas thermoelectric park in the North	President	Discussed gas development
Meeting record	13/12/2010	21st CNPE ordinary meeting	CNPE	Discussed the situation of the National Energy Policy
Legislation	22/12/2010	Law 12,351	Legislative Power	Established the framework for the exploration of oil and gas in the pre-salt area
Speech	01/03/2011	Speech during the announcement ceremony of the implementation of the Regasification Terminal of Liquefied Natural Gas (LNG) in Bahia'	President	Discussed gas development
Legislation	28/04/2011	Provisional measure 532	Executive Power	Biofuels were included expressly in the Brazilian legislation as a key energy resource for the country, as well as the security of supply of biofuels throughout the country as one of the objectives of the National Energy Policy
Note	28/04/2011	Exposure of motives EM INTERMINISTERIAL N 00013/MME/MF/MDIC/ MAPA/ MC/MP	Executive Power	Gave reasons to enact Provisional Measure 532

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	05/07/2011	Speech during the start ceremony of the deviation of the Madeira River for the Santo Antônio hydroelectric power plant	President	Discussed hydroelectricity generation
Legislation	16/09/2011	Law 12,490	Legislative Power	Biofuels were included expressly in the Brazilian legislation as a key energy resource for the country, as well as the security of supply of biofuels throughout the country as one of the objectives of the National Energy Policy
Speech	22/09/2011	Speech at the high-level meeting on nuclear safety	President	Discussed nuclear safety
Meeting record	05/12/2011	23rd CNPE ordinary meeting	CNPE	Discussed energy policies
Legislation	23/12/2011	Decree 7660	Executive Power	Provided import tax exemptions for wind power equipment, and set those for solar PV equipment in the 2–10% range
Speech	21/03/2012	Speech during the introduction of Magda Chambriard, general director of the National Petroleum Agency (ANP)	President	Discussed energy supply
Regulation	05/06/2012	Normative resolution 493	ANEEL	Regulated electricity supply through individual systems of electricity generation via the use of renewable energy
Meeting record	26/06/2012	24th CNPE ordinary meeting	CNPE	Discussed energy supply
Legislation	11/09/2012	Provisional measure 579	Executive Power	Promoted the competitiveness of energy produced from wind power, thermosolar, photovoltaic, small hydro, biomass, other renewables and natural gas
Note	11/09/2012	Exposure of motives EM Interministerial n° 37/MME/MF/AGU	Executive Power	Gave reasons to enact Provisional Measure 579

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	11/09/2012	Speech during the announcement ceremony of the reduction of energy cost	President	Discussed the energy sector
Speech	17/10/2012	Speech at the opening ceremony of the Estreito hydroelectric power plant	President	Discussed hydroelectricity
Legislation	11/01/2013	Law 12,783	Legislative Power	Promoted the competitiveness of energy produced from wind power, thermosolar, photovoltaic, small hydro, biomass, other renewables and natural gas
Statement	23/01/2013	Statement on lower electric power rates	President	Discussed lower electric power rates
Note	30/04/2013	Exposure of motives EM nº 00090/2013 MF	Executive Power	Gave reasons to enact Provisional Measure 613
Legislation	07/05/2013	Provisional measure 613	President	Reduced the tax for bioethanol
Regulation	25/06/2013	CNPE Resolution 6	CNPE	Authorised the exploration and production of petroleum and natural gas
Legislation	10/09/2013	Law 12,859	Legislative Power	Reduced the tax for bioethanol
Speech	29/10/2013	Speech during the opening ceremony of the 500 kV electrified line between Villa Hayes and the power substation on the right bank of Itaipu	President	Discussed energy interconnection and infrastructure
Speech	08/11/2013	Speech during the completion ceremony of Platform P-58 in Rio Grande/RS	President	Discussed oil exploration in Brazil
Meeting record	17/12/2013	27th CNPE ordinary meeting	CNPE	Discussed the national energy policy
Note	09/05/2014	Exposure of motives EMI nº 00015/2014 MME MAPA MF MDA MDIC	Executive Power	Gave reasons to enact Provisional Measure 647
Legislation	28/05/2014	Provisional measure 647	President	Set the minimal biodiesel blending mandate at 7%
Speech	28/05/2014	Speech during the announcement ceremony of measures for promotion of the production and consumption of biodiesel	President	Discussed biodiesel

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Speech	01/07/2014	Speech during the commemoration ceremony of 500,000 barrels of oil from the pre-salt in Rio de Janeiro/RJ	President	Discussed pre-salt area
Note	12/09/2014	Exposure of motives EMI nº 00144/2014 MF MJ MTE MDIC BACEN	Executive Power	Gave reasons to enact Provisional Measure 656
Legislation	24/09/2014	Law 13,033	Legislative Power	Set the minimal biodiesel blending mandate at 7%
Legislation	07/10/2014	Provisional measure 656	President	Provided import tax exemptions for wind turbine components
Meeting record	09/12/2014	29th CNPE ordinary meeting	CNPE	Discussed the national energy sector
Legislation	19/01/2015	Law 13,097	Legislative Power	Provided import tax exemptions for wind turbine components
Speech	27/02/2015	Speech at the opening ceremony of Geribatu Wind Farm and the associated transmission system in Santa Vitória do Palmar/RS	President	Discussed wind energy
Speech	28/02/2015	Speech at the inauguration ceremony of the wind farm Artilleros	President	Discussed wind energy
Meeting record	30/06/2015	30th CNPE ordinary meeting	CNPE	Discussed the national energy sector
Speech	11/08/2015	Speech during the announcement ceremony of the Investment Program in Energy	President	Discussed energy investment
Legislation	18/08/2015	Provisional measure 688	President	Provided for the renegotiation of the hydrological risk of electricity generation
Note	18/08/2015	Exposure of motives EMI 00023/2015 MME AGU MF	Executive Power	Gave reasons to enact Provisional Measure 688
Regulation	21/09/2015	CNPE resolution 3	CNPE	Authorised and set guidelines for the commercialisation and the voluntary use of biodiesel
Meeting record	08/12/2015	31st CNPE ordinary meeting	CNPE	Discussed the national energy sector

(continued)

(continued)

Type	Date	Name	Authority	Main objective
Legislation	08/12/2015	Law 13,203	Legislative Power	Provided for the renegotiation of the hydrological risk of electricity generation
Report	2015	National Policy of Water Resources: Supply, Energy and Basic Sanitation	Federal Senate	Evaluated the National Water Resources Policy, with emphasis on supply issues, energy and sanitation

Appendix C

Chronological list of WTO energy disputes cases

Full case title	Measure at issue	Agreements cited	Dispute status
<i>United States—Standards for Reformulated and Conventional Gasoline</i> , WT/DS2	The “Gasoline Rule” under the US Clean Air Act set different methods for domestic and imported gasoline	GATT 1994: Art. I, III, XXII:1 Technical Barriers to Trade (TBT): Art. 2, 14.1	Final decision in 1996
<i>Canada—Certain Measures Affecting the Renewable Energy Generation Sector</i> , WT/DS412	Local content requirements in Ontario’s Feed in Tariff programme for wind and solar PV	GATT: Art. III:4, III:5, XXIII:1 ASCM: Art. 1.1, 3.1(b), 3.2 TRIMS: Art. 2.1	Final decision in 2013
<i>China—Measures concerning Wind Power Equipment</i> , WT/DS419	Grants, funds, or awards to enterprises manufacturing wind power equipment in China	GATT 1994: Art. XVI:1 ASCM: Art. 3, 25.1, 25.2, 25.3, 25.4	In consultations
<i>Canada—Measures Relating to the Feed-in Tariff Programme</i> , WT/DS426	Local content requirements in Ontario’s Feed in Tariff programme for wind and solar PV	GATT 1994: Art. III:4 ASCM: Art. 1.1, 3.1(b), 3.2 TRIMS: Art. 2.1	Final decision in 2013
<i>United States—Countervailing Duty Measures on Certain Products from China</i> , WT/DS437	Imposition of countervailing duty measures by the United States on certain products from China (including solar panels and wind towers)	GATT: Art. VI ASCM: Art. 1.1, 2, 11.1, 11.2, 11.3, 12.7 and 14(d)	Final decision in 2014

(continued)

(continued)

Full case title	Measure at issue	Agreements cited	Dispute status
<i>European Union and a Member State—Certain Measures Concerning the Importation of Biodiesels</i> , WT/DS443	EU and Spain's measures affecting the importation of biodiesels for accounting purposes with regard to the compliance with the mandatory targets for biofuels	GATT: Art. III:1, III:4, III:5 and XI:1 TRIMS: Art. 2.1 and 2.2	Establishment of a panel deferred
<i>European Union and Certain Member States—Certain Measures Affecting the Renewable Energy Generation Sector</i> , WT/DS452	Domestic content restrictions that affect the renewable energy generation sector relating to the feed-in tariff programmes of EU member States	GATT: Art. I, III:1, III:4, III:5 ASCM: Art. 1.1, 3.1(b), 3.2 TRIMS: Art. 2.1, 2.2	In consultations
<i>India—Certain Measures Relating to Solar Cells and Solar Modules</i> , WT/DS456	Domestic content requirements under the India's Jawaharlal Nehru National Solar Mission ("NSM") for solar cells and solar modules	GATT: Art. III:4 TRIMS: Art. 2.1 ASCM: Art. 3.1(b), 3.2, 5(c), 6.3(a) and (c), and 25	Final decision in 2016
<i>European Union—Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry</i> , WT/DS459	Two types of measures adopted by the European Union and certain member States: (a) measures to promote the use of energy from renewable sources and to introduce a mechanism to control and reduce greenhouse emissions; and (b) measures to establish support schemes for the biodiesel sector	GATT: Art. I:1, III, III:1, III:2, III:4, III:5 TBT: Art. 2.1, 2.2, 5.1, 5.2 TRIMS: Art. 2.1, 2.2 ASCM: Art. 3.1(b), 3.2, 5(b), 5(c), 2.3, 1.1, 6.3(a)	In consultations

(continued)

(continued)

Full case title	Measure at issue	Agreements cited	Dispute status
<i>European Union—Anti-Dumping Measures on Biodiesel from Argentina</i> , WT/DS473	Two claims against the EU: (a) provisional and definitive anti-dumping measures imposed on biodiesel originating in Argentina; and, (b) a provision in Council Regulation (EC) 1225/2009 of November 2009, which refers to the adjustment or establishment of costs associated with the production and sale of products under investigation in the determination of dumping margins	The Anti-Dumping Agreement: Art. 1, 2.1, 2.2, 2.2.1.1, 2.2.2, 2.4, 3.1, 3.2, 3.4, 3.5, 6.2, 6.4, 6.5, 6.5.1, 9.3, 18 and 18.4 GATT: Art. VI	Final decision in 2016
<i>European Union and its Member States—Certain Measures Relating to the Energy Sector</i> , WT/DS476	Measures which regulated the natural gas sector and sought to facilitate the development of natural gas infrastructure within the European Union	GATS: Articles II, VI, XVI and XVII; GATT: Articles I, III, X and XI; ASCM: Article 3; TRIMS: Article 2	Panel report circulated on 10 August 2018
<i>European Union—Anti-Dumping Measures on Biodiesel from Indonesia</i> , WT/DS480	Two claims against the EU: (a) provisions of Council Regulation (EC) No 1225/2009 on protection against dumped imports from countries not members of the European Community; and (b) anti-dumping measures imposed in 2013 by the European Union on imports of biodiesel originating in, inter alia, Indonesia	The Anti-Dumping Agreement: Art. 1, 2, 2.1, 2.2, 2.2.1.1, 2.2.2, 2.3, 2.4, 3.1, 3.2, 3.4, 3.5, 6.5, 6.5.1, 7.1, 7.2, 9.2, 9.3, 15 and 18.4 GATT: Art. VI, VI:1 and VI:2	Panel report circulated on 25 January 2018

(continued)

(continued)

Full case title	Measure at issue	Agreements cited	Dispute status
<i>United States—Certain Measures Relating to the Renewable Energy Sector</i> , WT/DS510	Domestic content requirements and subsidies instituted by the governments of the states of Washington, California, Montana, Massachusetts, Connecticut, Michigan, Delaware and Minnesota, in the energy sector	GATT: Art. III:4, XVI:1 ASCM: Art. 3.1(b), 3.2, 5(a), 5(c), 6.3(a), 25 TRIMS: Art. 2.1	Panel composed on 24 April 2018
<i>United States—Safeguard measure on imports of crystalline silicon photovoltaic products</i> , WT/DS545	Definitive safeguard measures imposed by the United States on imports of certain crystalline silicon photovoltaic products	the Agreement on Safeguards: Articles 1, 2.1, 3.1, 3.2, 4.1, 4.2, 5.1, 5.2, 7.1, 7.4, 8.1, 12.1, 12.2 and 12.3; GATT: Article X:3, XIII and XIX:1(a)	In consultations
<i>United States—Safeguard Measure on Imports of Crystalline Silicon Photovoltaic Products</i> , WT/DS562	Definitive safeguard measure imposed by the United States on Chinese imports of certain crystalline silicon photovoltaic products	the Agreement on Safeguards: Articles 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 5.1, 7.1, 7.4, 8.1, 12.1, 12.2 and 12.3; GATT: Articles X:3, XIII, XIX:1(a) and XIX:2	In consultations
<i>United States—Certain Measures Related to Renewable Energy</i> , WT/DS563	Domestic content requirements and subsidies instituted by the governments of certain US states and municipalities	SCM Agreement: Articles 3.1(b) and 3.2; TRIMS Agreement: Articles 2.1 and 2.2; GATT: Article III:4	In consultations

(continued)

(continued)

Full case title	Measure at issue	Agreements cited	Dispute status
<i>Peru—Anti-dumping and countervailing measures on biodiesel from Argentina</i> , WT/DS572	Anti-dumping and countervailing measures imposed by Peru on biodiesel from Argentina	Anti-dumping (Article VI of GATT 1994): Art. 2.2, 2.2.1.1, 2.2.2(iii), 3.1, 3.4, 3.5, 5.2, 5.3, 5.8, 6.5, 9.3, 18.1, 18.4 Subsidies and Countervailing Measures: Art. 1.1(a), 1.1(a)(1)(iii), 1.1(b), 10, 12.4, 14(d), 15.1, 15.4, 15.5, 19.1, 19.4, 32.1, 32.5 GATT 1994: Art. VI:1, VI:2, VI:3, VI:5(a)	In consultations