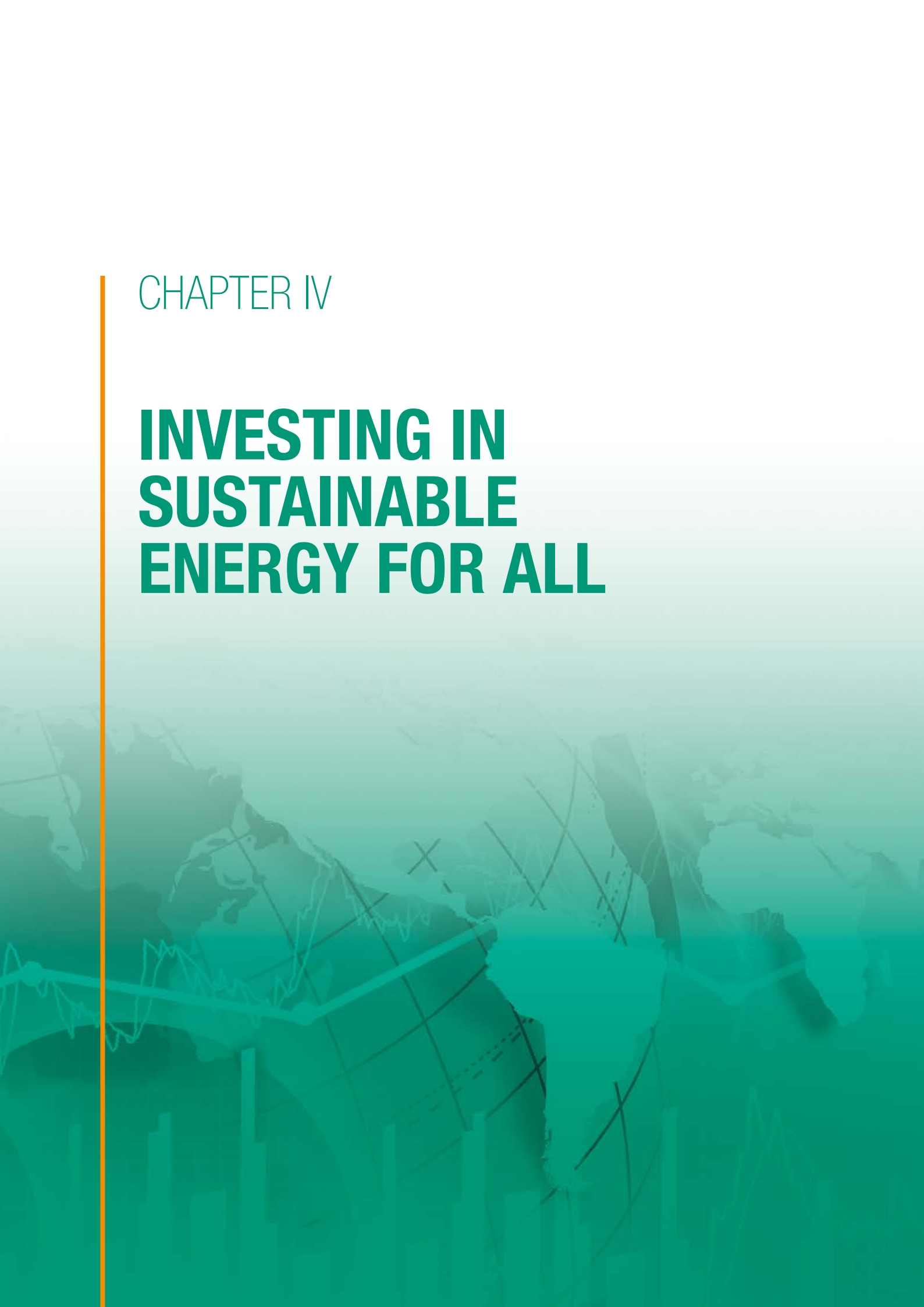
CHAPTER IV

INVESTING IN SUSTAINABLE ENERGY FOR ALL



INTRODUCTION

Combatting climate change is one of the defining challenges of our time. It hinges to a large extent on making the transition from energy generated by fossil fuels to renewable energy. The energy transition is central to achieving the 2030 Agenda for Sustainable Development, which not only calls for urgent action to combat climate change and its impacts (Sustainable Development Goal (SDG) 13), but also underscores the need to ensure access to affordable, reliable, sustainable and modern energy for all (SDG 7).

The energy transition will take huge amounts of investment, over many years, in renewable energy generation, energy efficiency and energy infrastructure. To keep the world on track to meet the goal set out in the Paris Agreement of limiting global warming to, or close to, 1.5°C above pre-industrial levels will require investing about 1.5 times today's global GDP between now and 2050.

Financing the energy transition has been at the centre of global debate ever since the adoption of the SDGs and the Paris Agreement in 2015. Specialized agencies such as the International Energy Agency and the International Renewable Energy Agency, as well as United Nations programmes such as the UN Framework Convention on Climate Change and UN Environment Programme, have made enormous progress in tracking climate finance and investment in green energy assets. Multilateral development banks (MDBs), in addition to the concrete support they provide to projects on the ground, have developed reams of data and analysis on investment in energy infrastructure. UNCTAD, after being the first to estimate the gap in SDG investment – including climate mitigation investment – in *WIR14*, has continued its focus on sustainable finance and investment in its reporting on trends, national policy developments and international investment agreements.

UNCTAD's research and policy analysis in recent years has highlighted several serious challenges to the energy transition. International investment in the infrastructure needed is not growing at the necessary pace. Investment in renewable technologies has increased significantly, but the much-needed acceleration began only in 2021 and much of the growth has been confined to developed countries. Other critical elements of energy infrastructure, such as power grids, have seen much less growth. In global capital markets, large sums are being raised through sustainable financial products such as green bonds and green growth funds, but not enough of those funds find their way to investment projects on the ground in developing countries.

The solutions that have been put forward to tackle these challenges are well known and widely accepted. UNCTAD's own *Investment Policy Framework for Sustainable Development* and its *SDG Investment Action Plan* propose, for example, the development of pipelines of bankable projects that can be marketed to institutional investors and project financiers looking for large investment opportunities with minimal regulatory risk. Investment promotion agencies (IPAs) have been urged to shift part of their traditional focus from labour- or export-intensive industries to green growth investment areas, and to evolve into sustainable investment project development agencies. And development partners have been called to action to increase the use of investment guarantees and blended finance to catalyse private investment in sustainable infrastructure.

The theme chapter of this *WIR* will not cover this well-trodden ground. Instead, it will aim to answer four questions:

- What has been achieved to date in stimulating international investment in sustainable energy for all?

- How do energy investors choose between sources of energy, including fossil fuels and renewables, and between different renewable technologies?
- How do countries, and especially developing countries, approach their decisions on how to finance the energy transition?
- What more can be done to boost international investment in the energy transition and to maximize sustainable development impact?

The overall objective of the chapter is to identify international investment bottlenecks that risk holding back the energy transition and to find the root causes for these bottlenecks in investment decision-making processes, both among investors and among countries.

The chapter is structured as follows:

Section A presents a taxonomy of investment areas relevant for the energy transition, covering not only renewables and energy infrastructure, but also other clean and low-emission technologies. It looks at the role of public, private, domestic and international investment, pinpointing the relevance of foreign direct investment (FDI) for the energy transition. The section presents an assessment of investment needs and shows why many developing countries, including those where energy investment is most critical to improve access to electricity, continue to be unsuccessful in attracting international investment in sustainable energy.

Section B discusses the drivers and determinants of investment in sustainable energy, showing how these affect international private investors specifically. The section looks at how firms approach choices between energy sources and technologies. And it provides a detailed analysis of the impact on the cost of capital – a key investment determinant – of various degrees of participation in projects by different stakeholders.

Section C examines how investment policies connect to nationally determined contributions (NDCs) under the Paris Agreement and country-level energy transition strategies. It analyses the key elements of a comprehensive policy and regulatory framework for promoting energy transition investment and distils key success factors from cases where countries have successfully built investment policies on energy transition plans.

Section D brings together the findings of the overall report and provides policy recommendations based on the analysis of the fundamental investment decision-making processes of both investors and countries. The recommendations are placed in the context of existing policy advice on promoting investment in sustainable energy, drawing in also conclusions from the discussion of national policy trends and developments in international investment agreements in chapter II as well as from the analysis of FDI trends in chapter I and sustainable finance trends in chapter III.

In its concluding section, the chapter presents a Global Action Compact for Investment in Sustainable Energy for All. It includes a set of guiding principles for energy transition investment policymaking and several action packages intended to stimulate debate and inspire concrete initiatives at this year's World Investment Forum, which will take place immediately ahead of COP28, and in the same location.

A. INTERNATIONAL INVESTMENT IN THE ENERGY TRANSITION

This section presents a taxonomy of investment areas relevant for the energy transition, covering not only renewables and energy infrastructure, but also other clean and low-emission technologies. It looks at the roles of public, private, domestic and international investment, pinpointing the relevance of FDI for the energy transition. The section presents an assessment of investment needs and shows how many developing countries, including those where energy investment is most critical to improve access to electricity, continue to be unsuccessful in attracting international investment in sustainable energy.

1. Types of investment and estimated needs

a. Taxonomy of energy transition investments

Investment will be the engine of the energy transition, and it needs substantial cross-sectoral backing. The energy transition requires capital expenditures not only on renewable energy generation and electrification, but also on sustainable infrastructure and energy-efficient buildings, and on decarbonizing industry (table IV.1). In addition, continued investment in fossil fuel-based power generation will be necessary in the short to medium term to allow for a scaled cross-over that creates a pathway towards sustainable energy for all, alongside the sustainable phasing-out of fossil fuel-based power. Continued investment in existing infrastructure is critical to deal with capacity and intermittency issues. Innovation also has a crucial role to play on many fronts and itself requires significant investment. Innovative solutions will help manage supply interruptions and ensure new routes for transmission, storage and integration with renewable sources. They will also play a more active role in demand-side sector coupling (i.e. increased integration of energy end-use and supply sectors with one another). These investment requirements extend across the renewables supply chain, including research and development (R&D), supply of critical minerals, component manufacturing and production, and installation and operation of solar panels, wind turbines, batteries and other key technologies (chapter I).

The role of private investors varies for each type of investment. Domestic operations have traditionally been prevalent in investment in power generation and especially transmission and distribution. Public investment has also been important in these areas and remains so in sustainable infrastructure and low-emissions transport, among others. Capital expenditures towards achieving energy-efficient buildings or industry decarbonization affect the greenfield investment plans of both domestic and international investors and lead to brownfield or modification investments, which are crucial for a sustainable transition. Nonetheless, the main renewable energy generation industries and the fossil fuel industry are dominated by large multinational enterprises (MNEs) and international investors. Hence, these industries are the principal focus of the chapter.

Achieving the energy transition requires investment in a number of elements that complement renewable energy generation installations: in the necessary infrastructure (notably grid capacity and flexibility), in the entire renewable energy value chain, in alternative technologies

Table IV.1. Taxonomy of energy transition investments and importance of international investors

Investment	Explanation	Importance of international investors
Renewables		
Power generation	Wind (onshore and offshore), solar photovoltaic, concentrated solar power, hydropower, biomass, geothermal energy and ocean-based (tidal) energy	●
Power grids and storage capacity	Expansion and modernization of grid infrastructure and transmission lines that enable trade of energy across countries	◐
Other clean and low-emission technologies		
Nuclear power	Can complement renewables in cutting power sector emissions while contributing to electricity security as a dispatchable power source	◔
Hydrogen	Clean hydrogen along with synthetic fuels (green ammonia and methanol) and clean hydrogen-based feedstocks; clean hydrogen is green (produced with renewables) and blue (produced using fossil fuels in combination with carbon capture and storage)	◔
Low-emission fuels	Low-emission fuels not derived from hydrogen: biogases, biomasses, synthetic methane, liquid biofuels and synthetic liquid hydrocarbon fuels	◔
Supply chain of renewables		
R&D	Investment in energy R&D (new fuels, new technologies, new materials)	◔
Components	Photovoltaic panels, turbines, batteries	●
Critical minerals	Copper, nickel, lithium, cobalt and rare earth elements for renewable energy installations and storage solutions	●
Energy efficiency, electrification and renewables for end uses	Measures to reduce demand and improve efficiency of energy for end-use applications	
Buildings	Renovation and retrofitting of buildings, direct use of clean electric heat and cooking applications (e.g. heat pumps)	◔
Industry	Investment in initiatives to decarbonize industrial processes and improve energy efficiency	◔
Transport	Direct use of clean electricity in transport (electric vehicles, but also airplanes and shipping), including charging infrastructure, clean mass transit and alternative transport modes	◔
Carbon capture and storage	Carbon captured and stored from point-source fossil fuel-based and other emitting processes	◐
Fossil fuel phase-out	Gradually changing the energy mix in an economy, restructuring oil companies and eventually writing off assets	●

Source: UNCTAD.
Note: Estimations based on the share of international investment in total investment and the share of investment that requires public support.

for lower-emissions energy generation and in energy efficiency measures (IEA, 2022b; IRENA, 2022e). It also requires phasing out investment in fossil fuels. All these elements can attract foreign private investors to varying degrees, depending on the prospective business case, expected returns and risks involved in the investment (see table IV.1). But the opportunity and urgency also call for new investment strategies.

Three primary actors drive investment activity in the energy transition: global MNEs, governments, and private households and domestic companies. Global MNEs are significantly involved in deploying new renewable energy projects in many countries. In other industries relevant for the energy transition, governments play an important role with interventions to solve market failures. These include industries that still require relevant R&D (i.e. hydrogen, carbon capture and storage) or infrastructure investment (i.e. power grids, charging infrastructure for electric vehicles). In other areas, such as investment in efficiency, the key actors are private households (e.g. heat pumps, residential building renovations) or companies (e.g. making industrial processes more energy efficient).

b. Energy transition investment needs

Investment needs for the energy transition, in particular in infrastructure, R&D and efficiency, are enormous. Estimates by the International Energy Agency (IEA) and the International Renewable Energy Agency (IRENA) put the total capital expenditures associated with the Paris climate goals at more than $125 trillion, and annual investment needs until 2030 at $5.7 trillion.

Beyond renewable energy generation, investment in other energy sectors is needed for the transition. In particular, investment needs for energy efficiency – including in industry, buildings and construction, and electrification of transport – are more than one third higher than those for renewable power generation, power grids and storage capacity combined (table IV.2). Energy efficiency is also the area in which reported financial commitments lag farthest behind. While financial commitments cover more than 40 per cent of projected investment needs for renewables and grids, they cover less than 25 per cent of needs in energy efficiency. Energy efficiency investment for buildings represents more than half of this sector. Households and individuals, often sustained by government incentive schemes, are the main investors in improving the energy performance of new and old buildings. Efficiency improvements in industrial production often imply replacing old assets or machinery, or deploying new production processes, and therefore they typically do not come in the form of dedicated projects. As a consequence, announced international investment projects in energy efficiency are negligible, except in electric vehicle production.

Looking only at renewable power generation, worldwide annual investment needs to 2030 exceed $1 trillion. Annual financial commitments reported for 2021 amounted to $430 billion, suggesting a gap of more than half a trillion dollars. However, international project

Table IV.2. Energy transition investment needs, by type (Billions of dollars)

	Annual financial commitments, 2021 ($ billion)	Annual investment needed to 2030 ($ billion)	Announced international investment ($ billion)	
			2021	2022
Renewables	**715**	**1 693**	**614**	**544**
Power generation	430	1 046	485	471
Power grids and storage	285	648	129	73
Other low-emission technologies				
Nuclear power	44	100	2	9
Hydrogen	2	133	239	251
Low-emission fuels	16	158[a]	1	2
Energy efficiency, electrification and renewables for end uses				
Buildings	193	1 556	..	..
Industry	37	549	..	..
Transport	64	155	..	..
Electric vehicles	264	..	53	143
Charging infrastructure for electric vehicles	9	86	0.5	1
Carbon capture and storage	**0.1**	**41**	**13**	**24**

Source: IRENA (2022a and b), IEA (2022a), CPI and IRENA (2023) based on BNEF (2023) for financial commitments 2021; UNCTAD for international investment.
[a] Includes needs for bio-based ammonia and methanol, and biofuels.

finance and greenfield investment announced in the sector already amounted to more than $470 billion in both 2021 and 2022 (see table IV.2). It is useful to bear in mind the difference between "financial commitments" and "announcements" – i.e. the $430 billion figure is based on projects that reached financial close (money was contractually obligated), whereas the $470 billion figure is based on announcements of new projects (box IV.1). Although project announcements tend to overestimate actual investment flows, the data nevertheless suggests that total investment, including from domestic and public sources, is significantly closer to projected needs. Renewable power generation capacity has shown significant progress over the past decade, reaching 3,372 GW in 2022; however, it will need to triple to 10,772 GW by 2030 to keep the world on track to achieve the energy transition in line with IRENA's 1.5°C scenario (table IV.3) (IRENA, 2022e).

Box IV.1. Annual financial commitments versus announced projects

Some institutions, including IRENA and the Climate Policy Initiative, use the value of financially closed projects (tables IV.2 and IV.3) to collect data on investment in the energy transition. UNCTAD data is based on project announcements.

Using announcement data tends to overestimate the numbers and values of projects, because some projects never reach construction or completion. In contrast, using financial close data leads to underestimation, because many projects have open-ended financing arrangements or financial close data is not reported, even when construction has started or the project is completed. Looking at all project finance (including domestic deals) shows that the degree of underestimation from the use of financial close data is actually larger than the degree of overestimation from the use of announcement data. This is not always the case for international projects, where relatively more projects reach financial close, but the degree of underestimation remains substantial.

Ultimately, both data strategies are more complementary than conflicting. Restricting data collection analysis to deals that reach financial close gives a post-event view rather than a view of intent. Financial close comes at various stages of the project, often only after the start of construction (in 56 per cent of international project finance deals). In contrast, using announced deals to reveal data trends provides an indication of the investment intentions of stakeholders before financial deals close and an indication of policy commitments, with financial intent and opportunity. This provides a broader picture of the current state of play and future dynamics.

Source: Vine et al. (2022).

Table IV.3. Renewable energy: global total installed capacity and investment needs in power generation, by type (Gigawatts and billions of dollars)

Renewable energy type	Total installed capacity, 2022 (GW)	Projected capacity needed by 2030 (GW)	Annual financial commitments in 2021 ($ billion)	Annual investment needed to 2030 ($ billion)	Announced international investment ($ billion)	
					2021	2022
Solar	1 047	5 221	230	338	181	170
Wind	899	3 337	170	413	270	249
Hydropower	1 255	1 465	7	59	7	5
Other	171	749	23	236	27	47
Total	**3 372**	**10 772**	**430**	**1 046**	**485**	**471**

Source: IRENA (2022b and e), IRENA and CPI (2023) based on BNEF (2023) for financial commitments 2021; UNCTAD for international investment.
Note: Data for 1.5°C scenario. Other = geothermal, marine and bioenergy.

Among renewable energy technologies, hydropower was the largest renewable source in terms of installed capacity in 2022, but its requirements in terms of water and land, and the high environmental and social costs implied, limit its future contribution to the transition. For this reason, much of the need for renewable capacity will have to be filled by solar and wind power. Solar capacity will need to increase fivefold by 2030. Cost reductions deriving from technological advancement, high learning rates, policy support and innovative financing models together make solar photovoltaics the leading technology for power generation (IRENA, 2022a). It is worth noting that this is reflected in the fact that solar leads in the addition of renewable energy capacity, whereas hydropower leads in the overall stock of renewable energy capacity. Wind power is also required to grow significantly, with capacity worldwide needing to increase from 899 GW to 3,337 GW. Capacities in other renewable power technologies, including biomass, geothermal, waste-to-energy and marine energy, will also need to increase rapidly. The combined capacity need for these other technologies is 749 GW in 2030.

The required annual investment needs vary by type of source and cost of the technology. The two leading technologies, solar and wind power, need annual investment of more than $330 billion and $400 billion, respectively. Announced international projects in 2021 and 2022 already amount to more than half of the need under the current target, but this is not sufficient to reach the targets for the transition.

This potentially encouraging picture at the global level does not look the same in each region (table IV.4). In North America and Asia, announced international investment projects for 2022 add up to less than a quarter of projected needs and in Latin America and Africa to less than a third, implying that a significant share of projected needs is to be covered by domestic or public investment. The largest chunk of renewable energy investment is in fact made through domestic sources – 83 per cent between 2013 and 2020 on the basis of financial close data (IRENA and CPI, 2023). Only in Europe would announced international projects – if fully implemented – approximately cover projected investment needs.

The rates at which the different regions attract international investment in renewables contrast with the different speeds at which investment in each region needs to run. Installed renewable energy capacity needs to triple worldwide between now and 2030. However, to meet growing local energy needs, it needs to increase by a factor of 10 in the Middle East and Africa but only 2 in Europe.

Table IV.4. Renewable energy: global total installed capacity and investment needs in power generation, by region (Gigawatts and billions of dollars)

Region	Total installed capacity in 2022 (GW)	Projected capacity needed by 2030 (GW)	Annual financial commitments in 2021 ($ billion)	Annual investment needed to 2030 ($ billion)	Announced international investment ($ billion)	
					2021	2022
Global	**3 372**	**10 771**[a]	**430**	**1 045**	**485**	**471**
North America	490	1 882	60	235	57	35
Europe	828	1 573	69	180	175	248
Asia	1 630	5 442	197	545	152	75
Latin America and the Caribbean	283	708	22	120	36	40
Middle East and Africa	87	993	17	170	17	45
Oceania	55	172	65	45	47	27

Source: IRENA (2022b and e), IEA (2022b), IRENA and CPI (2023) based on BNEF (2023) for financial commitments 2021; UNCTAD for international investment.
Note: Data for 1.5°C scenario. Regions as identified by IRENA.
[a] The higher value includes hydrogen capacity already active in the power sector.

2. The role of foreign investment

a. Domestic, international, public and private investment in energy

FDI plays a major role in financing investment in renewables. Project finance data shows that worldwide almost half of investments involve a foreign sponsor or equity investor (table IV.5). In value terms, international project finance accounts for 55 per cent of investment in renewables. Most of this investment is purely private sector driven; less than one fifth involves equity stakes by host-country governments, although such projects with government involvement are, on average, larger.

International projects are also on average larger, often requiring a public-private partnership (PPP) or a consortium of sponsors, especially for more expensive types of renewable energy technologies. As the project companies need to be capable of feeding energy into the system, these projects tend to also include other critical and necessary infrastructure, such as transmission lines or battery storage facilities, especially in developing countries.

As a group, developing countries' share of international projects is similar to the global share; however, it varies across regions and economic groupings. In the least developed countries (LDCs), foreign sponsors account for more than three quarters of investment, whereas in East Asia, they account for only a quarter of investment as China, with its large internal market and leadership in renewable technologies (especially solar), dominates investment.

In developing countries, the share of projects with public sector involvement is higher than in developed countries, both for purely domestic projects and for international projects. Government can support a project by owning an equity share in it or retaining final ownership – even indirectly through a State-owned enterprise – of the project company. Government equity participation can be a catalyst for foreign private investors, as it helps reduce the perception of risk associated with a project, especially in countries with high political and economic uncertainty.

The size advantage of projects with public sector involvement is also greater in developing countries. For LDCs, the importance of international project finance is significantly higher because of the lack of domestic funding, but also because of low expertise and limited technologies and base infrastructure. International projects account for more than three quarters of investment values. The need for government involvement in LDCs also increases when compared with developing countries as a group, especially for high-value projects.

Table IV.5. Project finance in renewable energy generation, by investor type and country grouping, 2016–2022 (Per cent)

		Global		Developing		LDCs	
Type of project	**Unit**	**Domestic**	**International**	**Domestic**	**International**	**Domestic**	**International**
Total	**Value**	**45**	**55**	**45**	**55**	**23**	**77**
	Number	**53**	**47**	**56**	**44**	**45**	**55**
Public	Value	14	12	22	20	12	41
	Number	12	7	21	8	18	16
Private	Value	32	43	24	35	11	36
	Number	40	41	35	36	27	39

Source: UNCTAD, based on information from Refinitiv SA.
Note: A project is defined as public if the ultimate owner of the project company is a government agency, a State-owned enterprise or has an equity participation from the host State. Projects that have foreign State-owned sponsors (e.g. many projects in the Belt and Road Initiative) are not considered public. A project is defined as international if at least one sponsor is foreign.

Table IV.6. Project finance in renewable energy in developing economies, by investor type and technology, 2016–2022 (Per cent)

Type of investor	Unit	Solar		Wind	
		Domestic	International	Domestic	International
Total	**Value**	**59**	**41**	**29**	**71**
	Number	**58**	**42**	**47**	**53**
Public	Value	31	9	11	25
	Number	23	6	11	10
Private	Value	28	33	18	46
	Number	34	36	36	43

Source: UNCTAD, based on information from Refinitiv SA.

Internationally financed projects with the involvement of the host-country government account for more than 40 per cent of project values, compared with 20 per cent in developing countries as a group and a fraction of that in developed countries.

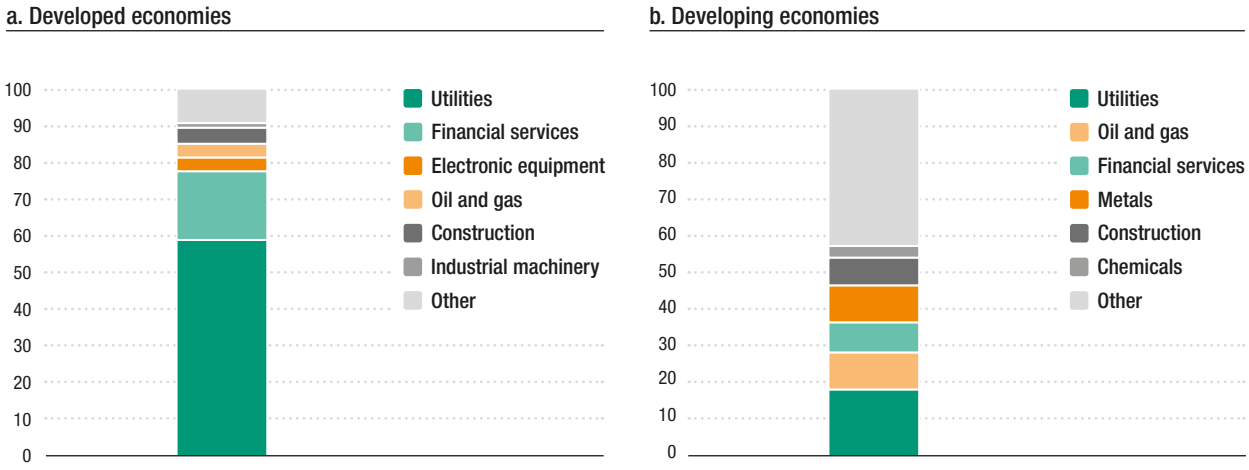
In developing countries, production of solar, hydroelectric and biomass energy all have higher shares of domestic projects. Sources of energy implying the use of complex or costlier technologies, such as geothermal and wind, have higher shares of projects that involve a foreign sponsor (table IV.6).

Project finance, which involves multiple investors and financiers in large infrastructure projects, accounts for about 75 per cent of total cross-border investment in climate change mitigation, especially large, utility-size renewables projects. Greenfield projects by individual MNEs, which constitute almost half of the total number of international projects, tend to be significantly smaller. Because one of the main advantages of the use of international project finance is to mitigate and share risk, the relative importance of greenfield investment, internally financed by individual MNEs, is lower in developing countries and lowest in LDCs. Whereas greenfield projects account for about 25 per cent of international investment values globally, this share shrinks to 15 per cent in developing countries and 10 per cent in LDCs.[1] Typically, most domestic investment is State-owned, developed by State-owned utility companies that finance renewable energy installations from their balance sheet.

b. The international investor landscape

The landscape of private actors in project finance is heterogeneous. It is not just energy companies that are sponsoring investment in renewable energy, although they dominate. In recent years, a much wider range of potential sponsors have been financing such projects. These include firms in industries different from utilities (i.e., manufacturing, mining or finance) that are pursuing clean energy investment and companies in energy-intensive industries (e.g. metals, chemicals, cement and construction, machinery, oil and gas extraction) that aim to secure low-cost energy. They also include technology and electronics companies forced to confront high and growing energy consumption trends, pushing them to become important investors in renewable energy in developed economies (figure IV.1). For example, in October 2022, Amazon announced plans to invest more than €1 billion in the electrification of its infrastructure in Europe through the addition of charging stations and electric vehicles. For financial companies, investing in renewable energy projects helps diversify portfolios, lower

Figure IV.1. International investors in renewable energy, by industry, 2016–2022 (Per cent)



Source: UNCTAD, based on information from Refinitiv SA.

risk and improve returns (IEA and CCFI, 2022). In developing countries, the high share of investors in industries other than utilities is related to the relevance of off-grid technologies for powering commercial and industrial activities.

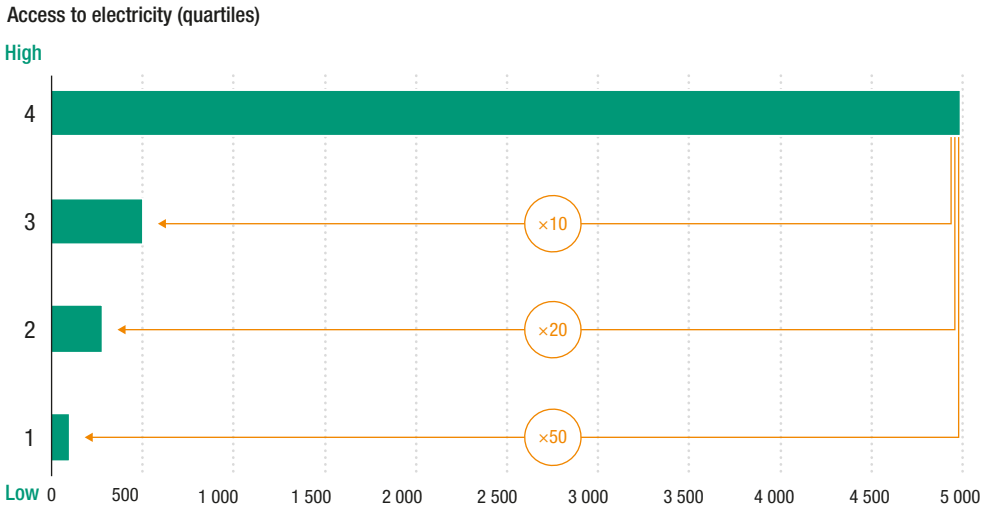
3. Investment needs and international investment potential in developing countries

Countries face different challenges in the energy transition (UNCTAD, 2021). Despite the vast investment needs, attracting investment in the energy transition remains a significant challenge. Limited access to funding and international investment, higher risk profiles, lack of institutional capacity and skills, and a less attractive project finance environment pose greater challenges to developing economies. This is more so for small and vulnerable economies because economic, technical and environmental barriers are higher for them. In addition to access to the finance and technical capacity required, the degree and speed of the transition will depend on factors such as energy security, macroeconomic impacts, access to renewable energy sources (e.g. minerals) that are critical for building supply chains, access to natural resources (e.g. wind and solar) and availability of infrastructure support.

A report by the Independent High-Level Expert Group on Climate Finance (Songwe, Stern and Bhattacharya, 2022) estimates that developing countries need to mobilize more than $2.4 trillion per year by 2030 – of which $1 trillion must come from external sources – to finance a big push to put them on a low-carbon, climate-resilient development trajectory. Moreover, at their current stage of development and with new needs after the pandemic, many developing countries face priorities that compete with the energy transition. Because about 900 million people have no access to electricity, the priority in many countries is to provide them with that access (SDG 7). The large upfront investment needed in the case of renewable energy projects and the complexity of grid connections and storage represent barriers for developing countries, forcing them to rely on fossil fuels.

Notwithstanding the need to expand access to electricity in many developing economies, it is notable that those with low rates of access to electricity are benefitting the least from international investment in renewable energy assets (figure IV.2). Since 2015, the year of the Paris Agreement, developing economies in which the entire population has access to

Figure IV.2. **International investment in renewable energy, by access to electricity, developing economies** (Dollars per person)



Source: UNCTAD, based on information from The Financial Times, fDi Markets (www.fdimarkets.com), and Refinitiv SA.
Note: Includes international project finance and greenfield investment, per person (cumulative between 2015 and 2022). Quartiles of the population with access to electricity: 1 = less than 53 per cent, 2 = between 53 and 91 per cent, 3 = between 92 and 99.8 per cent, and 4 = almost 100 per cent.

Table IV.7. **Developing economies with no international renewable energy projects since 2015**

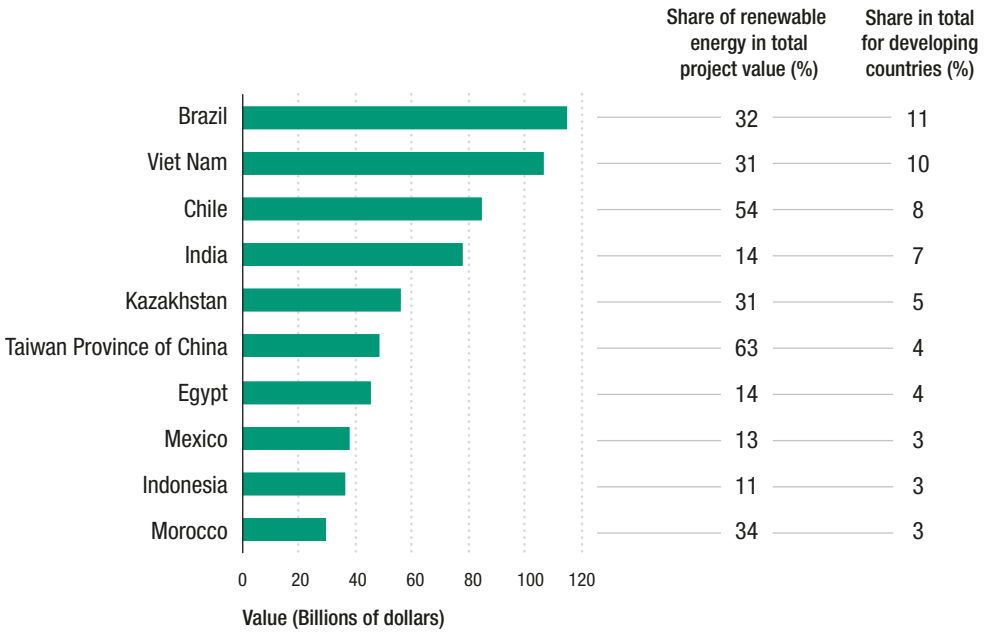
Grouping	Number of economies with no investment	Total number of economies in each grouping
Total	**31**	**149**
LDCs	11	46
SIDS	20	38
LLDCs	2	32
Economies with electricity access < 95%	18	80

Source: UNCTAD, based on information from The Financial Times, fDi Markets (www.fdimarkets.com) and Refinitiv SA.

electricity have received 50 times more international investment in renewable energy per capita than those with the lowest shares of the population with access to electricity. From 2015 to date, 31 developing countries – of which 11 are LDCs, 20 SIDS and 2 LLDCs – have registered no international private investment in renewable energy (table IV.7). In 18 of these countries, at least 5 per cent of the population still lacks access to electricity. Only eight of these countries show domestic project finance activity in renewable energy. In countries with low electricity access, building renewable energy installations is especially important, as doing so would allow them not only to leapfrog their current electricity deficit to the post-transition phase, but also to make progress on the goal of access to sustainable energy for all.

In most countries with low rates of international investment in renewable energy, this deficit reflects overall weakness as a destination for FDI. Countries that manage to attract diversified FDI also manage to attract FDI in renewables. In most of the 10 developing countries with the highest levels of international investment in renewable energy, investment in renewables represents between one tenth and one third of total FDI (figure IV.3).

Figure IV.3. **Top 10 developing economies by international investment in renewable energy, 2015–2022** (Billions of dollars and per cent)



Source: UNCTAD, based on information from The Financial Times, fDi Markets (www.fdimarkets.com), and Refinitiv SA.
Note: Includes international project finance and greenfield investment values.

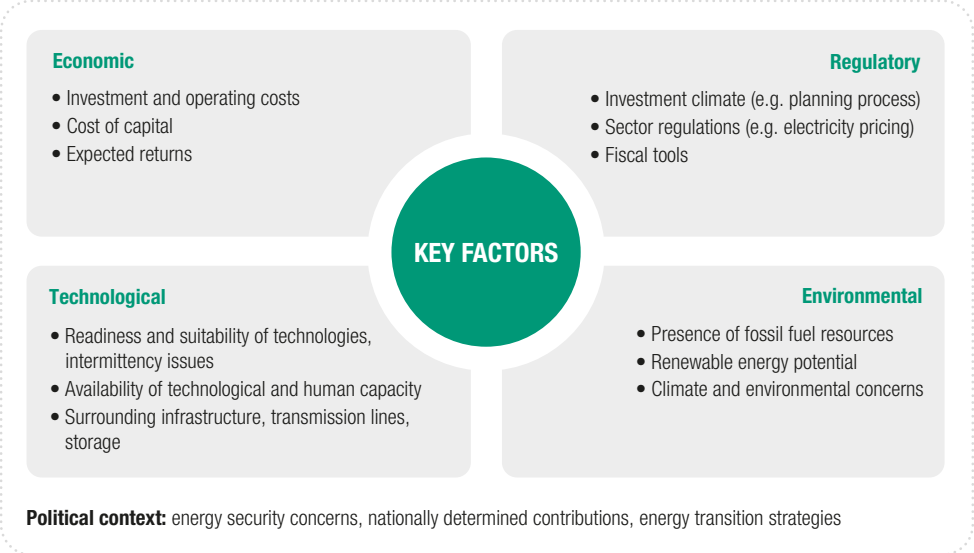
B. FIRM PERSPECTIVE: THE ECONOMICS OF INVESTMENT IN THE ENERGY TRANSITION

1. Investment in the energy transition: FDI determinants

Investment decisions by firms about development of new energy infrastructure are driven by economic, regulatory, technical and environmental factors. Some of these factors affect international investors differently from domestic investors, determining distinct roles and opportunities for FDI.

Investment decisions by firms about developing energy infrastructure and choices between sources of energy are driven by various factors – economic, regulatory, technical and environmental – within the context of the political environment in a given location (figure IV.4). Economic factors include initial investment requirements and operating costs, cost of capital, exchange rates and currency risks, and expected returns and demand factors. Regulatory considerations include the business climate (e.g., planning processes), sector regulations (e.g. electricity pricing) and fiscal instruments. Technical factors include the readiness of technologies, the availability of human and technological capacity, and surrounding infrastructure such as transmission lines and storage capacity. Environmental factors include the presence of fossil fuel resources, renewable energy potential and environmental risks. Finally, political considerations include energy security, national energy transition strategies, and overall political and regulatory risk.

Figure IV.4. Drivers and determinants of energy transition investment



Source: UNCTAD.

This section looks primarily at the economics of investment decisions related to the energy transition, considering the other factors as contextual.[2]

Each of these interdependent factors and considerations can affect different types of investors differently. They may be weighed differently by national and international, and public and private investors. As a result, the role that the various types of investors can play in the energy transition varies. For example, international investors may have access to lower costs of capital, advanced technologies or guarantees that affect their risk calculations. Local financiers may be better able to assess political and regulatory risks or anticipate developments driven by national energy transition plans.

Within each factor, several indicators underpin investment choices. Economic indicators include, for example, the relative investment cost per unit of capacity, capital versus operating expenditures per unit of energy, payback time, investment risk, risk of asset stranding and the relative cost of capital. Technical indicators include the energy return on energy invested, installed capacity of renewable energy sources, energy generated by renewable energy sources, total energy use, project duration, project lifetime, and reliability and readiness of renewable technologies. In addition, there are constraints related to technical and environmental factors that can arise from intermittency issues, weak existing energy infrastructure such as transmission lines and storage capacity, or the risk of natural disasters. Some of these factors and constraints are common to any type of investor whereas others, such as access to land, distance to connection points and export cabling, can be more relevant or binding for foreign investors.

Foreign and domestic investors play different roles in the energy transition, especially in a developing-country context. First, the substantial upfront capital expenditures required for renewable energy investment and especially energy infrastructure often cannot be entirely fulfilled by exclusively relying on local financial resources. Thanks to larger investment portfolios and access to global capital markets, foreign investors have access to a larger pool of financiers than do local investors. Second, compared with local sponsors, foreign investors can have an advantage in technological skills, knowledge, size and efficiency, as in any large investment project. Third, under certain circumstances, foreign investors may be able to take on higher levels of risk than local investors because they integrate projects into a wider and more diversified portfolio and can leverage their credibility and reputation in international markets. They can also insure against payment, political and regulatory risks through multilateral risk guarantees and bilateral investment agreements.

In contrast, local investors may have a deeper understanding of the local regulatory and policy environment, as well as established networks with key stakeholders, such as government officials and community leaders, which could be valuable for navigating the complexities of developing renewable energy projects. Moreover, they face less uncertainty than foreign investors, whose investment decisions can be hindered by a lack of information about the institutional and political environment, market size and macroeconomics. Political instability, in particular, is a key factor slowing down foreign investment in the energy transition (CCSI, 2022), although international investors can, depending on the country, mitigate payment and political risks through multilateral risk guarantees.

2. Investment decisions on energy sources and technologies

Investor choices between fossil fuel assets and renewables are significantly affected by the cost of capital. Higher costs of capital penalize renewable energy projects with high upfront costs. The higher cost of capital in developing countries represents a significant disincentive for their transition.

Investment decisions for new power plants related to the choice between different technologies and between different sources of energy, including the choice between fossil fuels and renewables, are made on the basis of an analysis that compares the cost of the electricity generated over the lifetime of different types of installations on an equal footing. The key measure used to establish a basis for comparison is the so-called levelized cost of electricity (LCOE). The LCOE is driven by numerous technical factors, such as capacity, operating costs, fuel prices, and maintenance and decommissioning costs, which are mostly the same for domestic and international investors (table IV.8).

A key component of the LCOE is the cost of capital, which can vary for different types of operators, potentially placing international investors with access to lower-cost finance at an advantage. Because the LCOE is a measure of the net electricity generation cost over the lifetime of a project, future costs are discounted on the basis of the cost of capital. Higher costs of capital increase the present value (i.e. cost) of electricity generation relatively more for investment projects with high upfront capital expenditures and low operating costs, because future operating expenditures are discounted more than initial upfront costs. As a result, in developing countries, which already struggle with the high upfront costs of renewable energy and weak energy sector fundamentals, high costs of capital further reduce the economic incentive to invest in renewables as opposed to fossil fuel-based installations. When comparing the cost of electricity for different technologies, renewable technologies are generally more competitive than non-renewable ones (figure IV.5). Despite the higher capital costs, renewable technologies entail lower operating costs and, by definition, do not involve fuel costs.

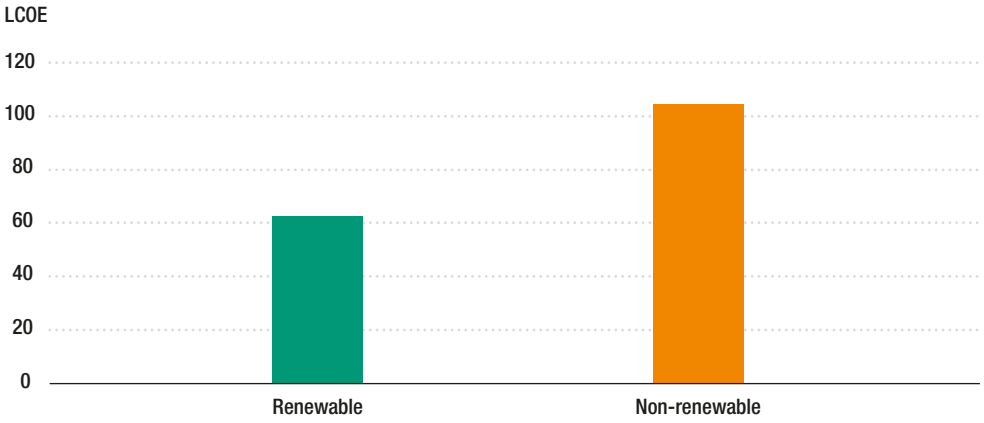
Table IV.8. Levelized cost of electricity: component variables

Variable	**Relation to the levelized cost of electricity** (LCOE)
Capacity factor (load factor)	Determines the actual amount of electrical energy generated
Decommissioning and waste management costs	Can be included in the LCOE for a more accurate estimation of the overall project cost
Expected asset lifetime	Can significantly reduce the LCOE if the lifetime of a project is increased, but only if the levelized capital cost remains higher than the average annual operating cost
Fixed operation and maintenance costs ($ per kilowatt)	Part of operating expenditure, implying higher costs in the LCOE
Fuel price ($ per gigajoule)	Only considered in the LCOE of non-renewable technologies
Investment costs ($ per kilowatt)	Initial investment required for the set-up of a plant, inputs higher costs in the LCOE
Variable operation and maintenance costs ($ per megawatt-hour)	Part of operating expenditure, implying higher costs in the LCOE
Weighted average cost of capital	Used as the discount rate in the LCOE to bring values back to the present year; higher costs of capital imply a higher discount rate and higher LCOE

Source: UNCTAD.

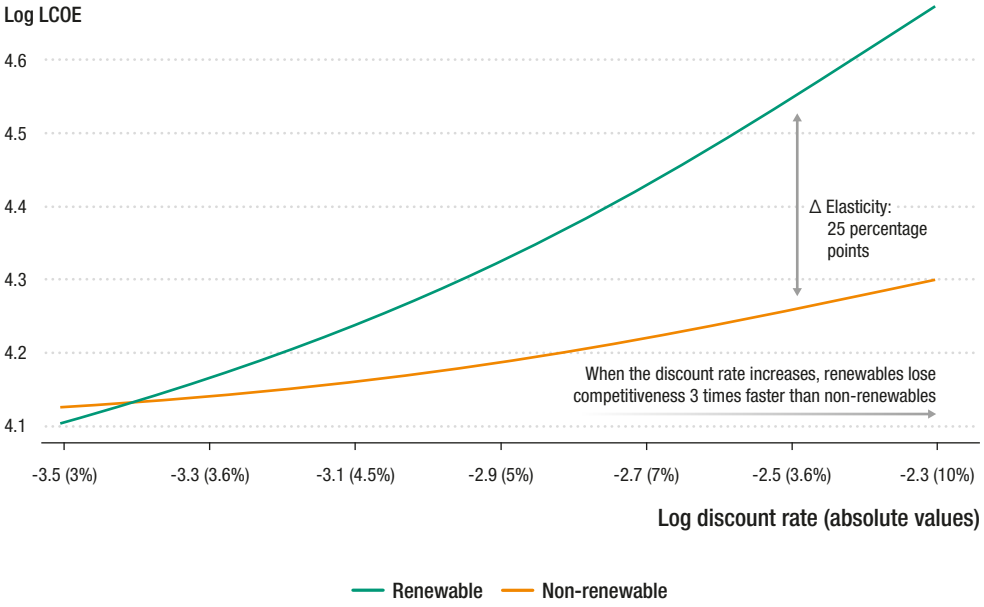
The sensitivity of the LCOE to discount rates is significant (figure IV.6). According to the IEA, the cost of capital can determine up to 50 per cent of the LCOE in solar energy installations. The attractiveness of renewables investment decreases three times faster than that of gas-fired power plants for each percentage point increase in the cost of capital. This effect can be important; on average across developing countries, the cost of capital for energy projects in 2022 was almost three times higher than that in developed countries.

Figure IV.5. **Levelized cost of electricity of renewable and non-renewable technologies in selected economies, 2022** (Dollars per megawatt-hour, average)



Source: UNCTAD, based on World Energy Outlook, IEA (2022b).
Note: Based on representative projects in the United States, the European Union, China, and India. Renewable technologies include wind (offshore and onshore) and solar energy. Non-renewable technologies include oil, gas and coal.

Figure IV.6. **Sensitivity of the levelized cost of electricity to the discount rate, by generation source, 2020** (Dollars per megawatt-hour, log)



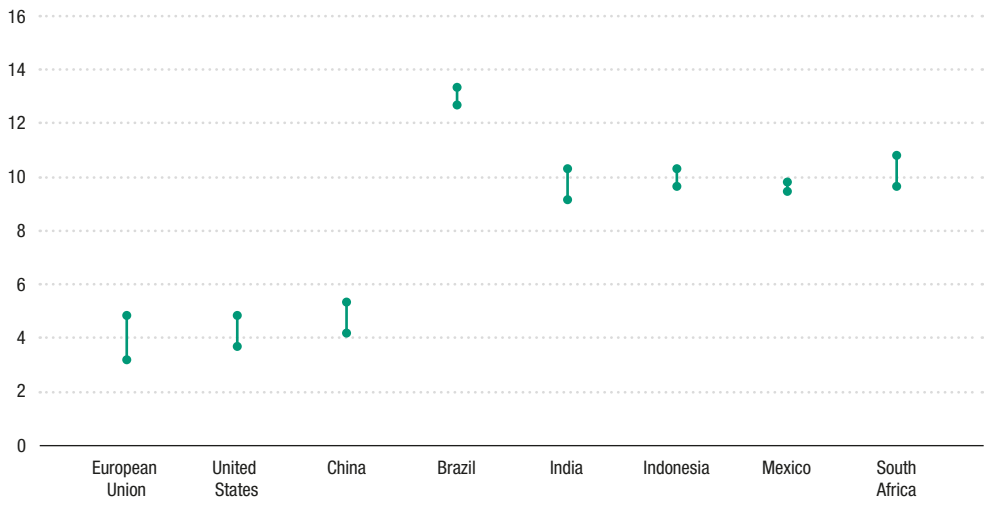
Source: UNCTAD, based on IEA, Levelised Cost of Electricity Calculator (2020).
Note: Estimations are based on a sample of 243 power plants in 24 countries. Figures in parentheses are the absolute value of the discount rates. Renewables include biomass, concentrated solar power, geothermal, hydropower, solar photovoltaic, wind offshore and wind onshore. Non-renewables include oil, coal, gas combined cycle and gas turbine.

And the total cost of capital in developing countries can be up to seven times that in developed markets (IEA, 2021b). This represents a significant disincentive for the transition away from fossil fuels. The ability of international investors to potentially access lower costs of finance could thus be an important contributor to accelerating the energy transition, especially in countries with relatively higher costs of capital.

For a given energy generation technology, the LCOE fluctuates significantly across regions, depending on the cost of fuel, (renewable) energy resources, capacity factors and interest rates. For onshore wind power generation, for example, the cost of energy is highest in Africa and the Middle East, and lower in North America, Europe and Asia. In contrast, Asia and Europe have the highest costs for solar energy. More in general, the cost of generating electricity is expected to be higher in developing economies because of higher interest rates and higher challenges associated with investment. Because the computation of the LCOE is sensitive to expected prices for fuel, uncertainties related to future fuel prices and exchange-rate fluctuations increase the cost of energy for developing countries, many of which depend on fossil fuel imports for their power generation. Currency uncertainties and exchange rate fluctuations also constitute one of the main sources of risks faced by foreign investors.

High financing costs are the major obstacle to attracting investment in renewable energy (IRENA 2022e; IEA, 2022b) in developing countries, and depend on both country-specific and project-specific factors, including the project sponsor and off-taker. The cost of capital also varies significantly, not only across technologies but also within a market for a given technology (IRENA, 2023). Across regions, the cost of capital for projects in renewable energy is 200 to 300 basis points above the country risk (IRENA, 2023). On average, in 2022 the economy-wide cost of capital in developing countries was almost three times higher than that in developed countries for debt, and two times higher for equity, but with large heterogeneity across countries. The highest value for the cost of capital (debt-based) in developing countries is almost 60 times higher than the lowest value in developed countries (IEA, 2022). Looking at data for actual renewable projects, the cost of capital for a solar photovoltaic plant in 2021 in large developing economies was between two and three times higher than in developed economies and China (figure IV.7).

Figure IV.7. Indicative weighted average cost of capital of utility-scale solar photovoltaic projects, 2021 (Per cent)



Source: UNCTAD, based on information from IEA (2022b).

The perception of higher investment risks in developing countries is reflected in sovereign credit scores and ratings and exacerbated by insufficient concessional finance and credit guarantees. The higher cost of capital in developing countries is at the heart of the dilemma facing the international community with regard to climate change mitigation in developing countries.

Today's rising cost of capital could intensify the financing challenges of investing in renewable projects, despite their competitive underlying operating costs. As such, financing costs need to be mitigated to attract funds and private capital. In addition, many existing high-emissions assets in developing countries are still relatively nascent, further reducing the incentive to undertake new investment in support of the energy transition.

3. Project characteristics and the cost of finance

International project finance is a key mechanism for foreign investors to fund energy infrastructure around the world. Financing costs in international project finance are driven by country risks, industry risks and project risks. Each of these will affect the choices made by investors and the potential for infrastructure projects to attract international capital.

In project finance, private and public partners share risks and develop projects using a financially and legally independent special-purpose vehicle that isolates the risks of the project in a tailor-made and self-sustained financial structure. This is particularly relevant for large infrastructure projects – including utility-sized renewable energy installations – in developing countries.

In assessing risk factors, the project's characteristics are seen as a combination of (i) host country-specific risks and factors, including institutional and macroeconomic factors (e.g. available infrastructure, time to get permits, financing conditions, national incentives, currency risks), (ii) factors related to the project's industry (e.g. unmet power demand, availability of workers with specific skills, technology-specific risks) and (iii) idioyncratic factors linked to the investor and the project (e.g. sponsor credibility, financing conditions, expected returns).

These risks shape the structure and the cost of financing projects. This cascade of risks and impediments, if unmanaged, can lead to a significant escalation of the cost of capital, especially in developing economies (Bhattacharya et al., 2022). Project negotiations to close the financing package last longer in countries where the policy and economic environments are more volatile (James and Vaaler, 2022). Credit ratings of host countries, sponsors and, if available, project companies significantly influence the availability of financing and its cost. When banks provide non-recourse debt, they account for potential cash-flow risks by (i) increasing the required equity share from sponsors, (ii) increasing the premium, or spread, on the interest rate and (iii) shortening the maturity of the loan (*WIR21*).

(i) Host-country risk

Host-country risks are related to political and economic circumstances (political instability, conflicts, expropriation risks, currency and default risks) and to the institutional framework (legal and regulatory policies, financial market development).

Some of these risks are captured by sovereign credit ratings assigned by credit rating agencies. Country risk ratings are a key factor in determining the cost of capital for project finance. The average rating is typically at the top of the investment grade for developed countries and still in the investment grade for developing countries (excluding LDCs), while, with a few exceptions such as Bangladesh, it is non-investment grade for LDCs. This directly affects the cost of financing and – critically for LDCs – the amount of financing for projects.

Most banks have internal or regulatory limits (Basel III) that restrict their non-recourse lending volumes to non-investment-grade countries (*WIR21*).

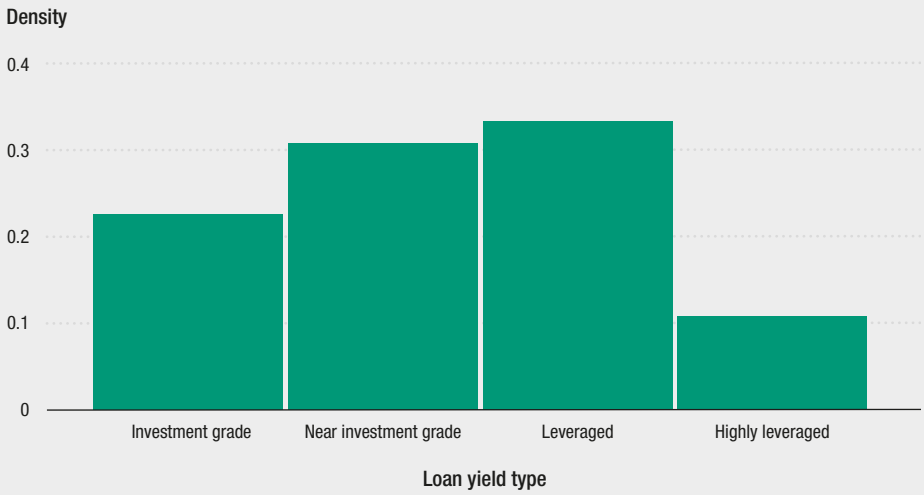
The development status of economies affects debt ratios on projects (the amount of debt that can be raised for a given amount of relatively expensive equity), the complexity or time it takes to obtain financing, and the spread or relative cost of debt (box IV.2). Maturities in poorer countries also tend to be shorter, reflecting lenders' risk aversion. Differences between developed and middle-income developing economies are relatively limited, at least for those developing countries that have been able to attract significant amounts of international finance. For LDCs, however, the challenges in obtaining project debt finance are sizeable (figure IV.8).

Box IV.2. The pricing of loans to finance infrastructure and energy projects

Data on pricing and cost of financing projects in developing countries is limited, especially for the least developed countries (LDCs). Information on the type of yield of the loans is relatively more available than that on the spread and can thus provide some additional indication about the cost of financing renewable energy projects.

The yield-type classification relies on data that ranks loans according to the spread, i.e. the amount that the borrower pays in basis points over the underlying pricing base. Investment-grade projects have a spread over the pricing base of up to 150 basis points, near-investment-grade up to 300 basis points, leveraged projects up to 400 and highly leveraged projects above 400. The analysis is based on 1,700 projects with yield-type information, about 69 per cent of them in developed economies. Box figure IV.2.1 presents the discrete frequency distribution of the yield-type categorization. The majority of projects are near investment grade or leveraged, but about 23 per cent are highly leveraged.

Box figure IV.2.1. Discrete frequency distribution of project loan spread, by yield type, 2011–2022 (Per cent)



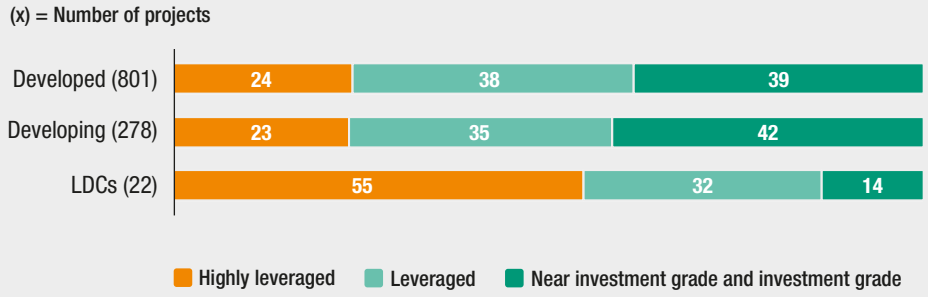
Source: UNCTAD, based on information from Refinitiv SA.

When analysing the conditional distribution of yield type across different regions and types of technology, the share of yield type by region (box figure IV.2.2) shows that financing costs are higher in LDCs than in developing and developed countries, where the share of highly leveraged loans is lower.

/...

Box IV.2. The pricing of loans to finance infrastructure and energy projects (Concluded)

Box figure IV.2.2. Yield type of investment projects, by economic grouping, 2011–2022 (Per cent)



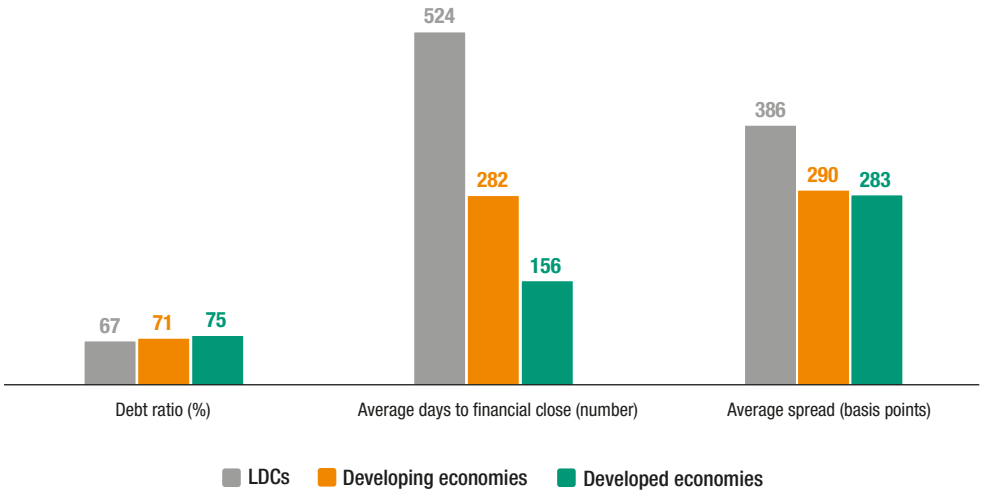
Source: UNCTAD, based on information from Refinitiv SA.

Whereas data on yield type is extensively available for all developed and developing countries, LDCs included, precise data on the cost of financing projects, as measured by the spread over the pricing base, is limited for LDCs. For this reason, to obtain an indication of the cost of capital in LDCs, the distribution of spread is estimated by predicting missing values within the observed yield categories. To predict missing information on the spread of LDCs, the estimation method assumes a normal distribution of the pricing data and uses as the explanatory variable information on project ownership (private versus public-private partnership), international financing (whether the sponsor is international or domestic), the participation of development banks, the country group of the project (developing, developed economies, LDCs), the technology (renewable, non-renewable or other) and the Moody's rating. Estimations are used in the analysis only for loans in LDCs, for which most of the yield information is missing.

Source: UNCTAD.

Figure IV.8. Key project finance indicators, energy sector projects, 2011–2022

(Per cent, number and basis points)



Source: UNCTAD, based on information from Refinitiv SA.
Note: Developing economies do not include LDCs. Spread data for LDCs is based on estimated values.

Lenders require a higher share of equity participation by sponsors whenever the project is deemed too risky. On average, projects in LDCs have less debt (-8 percentage points) which – by definition – implies more (costly) equity participation. It also takes significantly longer to find financiers, as captured by the average number of days to close a loan financing agreement. In LDCs, the amount of time between the announcement of a project and its financial close is almost double the amount of time in other developing economies and more than three times that in developed economies. This higher risk perception translates also into higher interest premiums, with spreads in LDCs being almost 100 basis points higher.

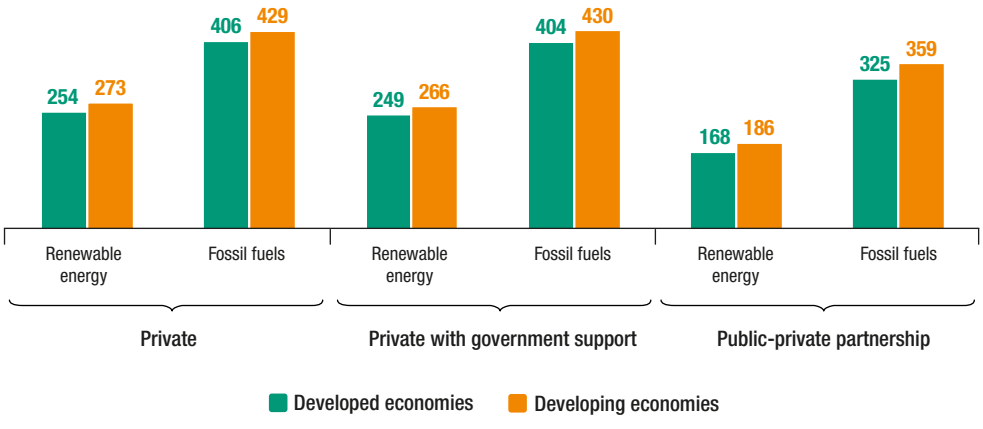
Government support in the form of a stake in the project can help lower the cost of debt by reducing the risk perceived by lenders through signalling government commitment to the project (figure IV.9). For projects in LDCs, government equity participation is a near-necessary condition for private investors to enter. Between 2011 and 2022, LDCs recorded only a few entirely privately financed projects in renewable power generation (figure IV.10). Furthermore, government participation lowers the average spread and loosens the project company's financial constraints, requiring lower debt ratios. At the same time, the government's stake increases complexity and often requires longer negotiations, explaining the significant increase in time to reach financial close. Majority stakes by governments can also raise concerns about a project's governance.

(ii) Industry risks

Industry risks are related to the technology used, its long-term performance and reliability, the unmet need for the service, industry-specific policies and regulations including licensing and permitting systems, land access, industry structure and renewable energy-specific aspects such as priority access to the grid (chapter II). Incentive policies specifically aimed at accelerating investment in renewables can have a favourable impact on both domestic and cross-border investments (Awate et al., 2015), by mitigating the institutional and economic risks.

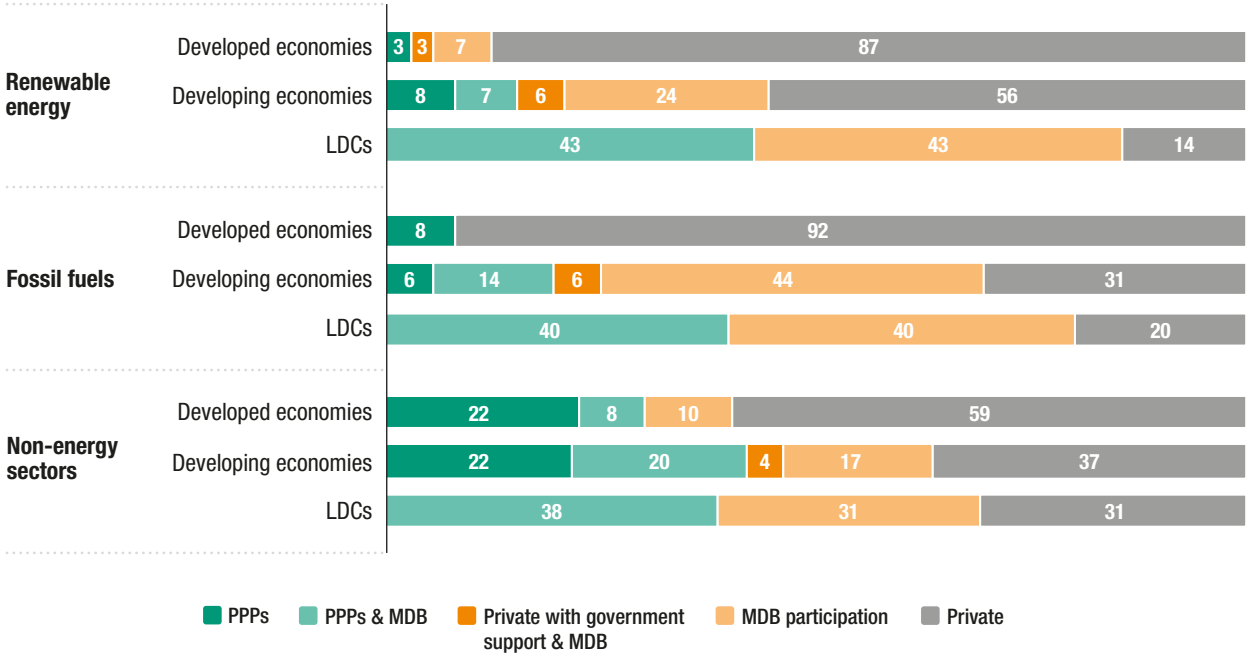
The regulatory risks, lack of support from multilateral agencies and risk of stranded assets associated with fossil fuel installations can explain the large difference (over 100 basis points) across countries in the cost of capital for projects in renewables and projects in fossil fuels (see figure IV.9). Some multilateral agencies have already stopped any form of support for projects in industries related to fossil fuels; others will follow suit.

Figure IV.9. Renewable energy and fossil fuel projects, average spread by investor type, 2011–2022 (Basis points)



Source: UNCTAD, based on information from Refinitiv SA.

Figure IV.10. **Energy projects: investor composition by sector and country grouping, 2011–2022** (Per cent)



Source: UNCTAD, based on information from Refinitiv SA.
Note: Projects are represented by region of the project country. MDB = multilateral development bank, PPP = public-private partnership. Developing economies do not include LDCs.

(iii) Project risks

Government stakes in projects are significantly more effective in lowering the cost of debt than non-equity forms of government support. Although incentives, subsidies, loans, guarantees and price guarantees are important for some critical factors in the investment decision, notably initial capital expenditures and project returns, they are less effective in improving risk perceptions among lenders. They lower interest rate premiums by only about 10 basis points, compared with almost 100 basis points for government equity involvement.

Idiosyncratic project-specific attributes can influence a project's company credit risk and capital structure. These risks relate to the different actors involved in the project, primarily the sponsors, the contractors, the power off-takers and the host-country administrators; it also relates to the size of the project (Vaaler et al., 2008) and to the expected stream of cash flows generated by the project. Larger projects represent harder-to-reverse commitments if poorly planned or implemented. Importantly, from the FDI perspective, the nationality of the main sponsors, their financial solvency and their expertise play a role in the cost and structure of loans.

Projects benefit from lead-sponsor credibility, local knowledge and relationships due to previous industry and host-country experience. Creditors and other stakeholders then have less uncertainty about how well the lead sponsor will direct the project (for example, in the case of Chile's Sol del Desierto project; box IV.3). Consequently, domestic projects should involve lower risk. However, for large infrastructure projects and especially in developing countries, large international investors have higher credibility, higher fiscal solvency and a lower risk profile than local sponsors. Their international experience and technical knowledge typically lower borrowing costs in both developed and developing countries.

Box IV.3. Chile – Sol Del Desierto solar farm project: the importance of sponsor credibility and local knowledge

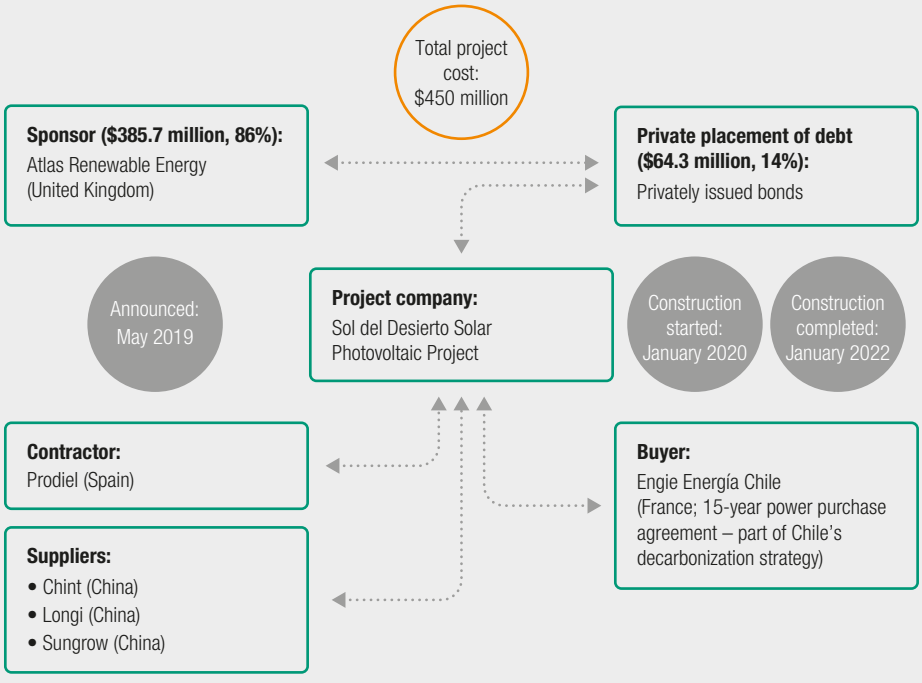
The Sol del Desierto project is an important part of the decarbonization plan of Chile's Ministry of Energy. The plan is to retire and or convert half of the coal-fired power plants in the country to renewables by 2025 (the project has already started operation).

Sol del Desierto is considered an innovative international project finance project. It comprises the construction of a $450 million 230 megawatt (MW) solar plant, expected to supply clean energy to nearly 350,000 houses. The technical efficiency of the solar park is improved by the use of a bifacial technology, which allows energy to be obtained from the back and front faces of each of its solar modules.

The project is secured by a long-term solar power purchase agreement (PPA) with Atlas Renewable Energy (United Kingdom) that, as sole sponsor, agreed to supply 550 gigawatt-hours per year of solar photovoltaic energy for a period of 15 years. The single sponsor was sufficiently credible to support the project without other equity providers and without the involvement of MDBs.

The plant, under a build-own-operate model, involved a financing arrangement through bond issuance (mostly green bonds) (box figure IV.3.1). The success of the green bonds was associated with three main factors: (i) the credibility of the sponsor, a lead actor in the sector with solid financial backing, (ii) the credibility of the Chilean energy transition agenda and (iii) the secured cash flows, thanks to a 15-year PPA with the off-taker (affiliated with a large MNE – Engie Energia Chile). The credit rating agency Fitch rated the private bond ($64 million) for this project as stable and creditworthy (BBB-), because of "the fixed-price inflation-adjusted PPA with creditworthy counterparties, significantly mitigating the project's exposure to limited merchant risk".

Box figure IV.3.1. Chile – Sol del Desierto financing



Source: UNCTAD.

For power infrastructure, of particular importance is the off-taking contract. A power purchase agreement (PPA) determines the future revenue stream and hence plays a key role in lowering liquidity risks and in facilitating finding creditors. PPAs can help hedge against currency and price risks by locking in a fixed price-per-unit of electricity over the duration of the contract (see boxes IV.3 and IV.4). Furthermore, they can contain specific clauses (e.g. put option, termination clause) that mitigate the risk of default or non-payment by the power off-taker (Lerner, 2020).

Box IV.4. Viet Nam – Quang Tri wind farm project: the role of MDBs in securing financing

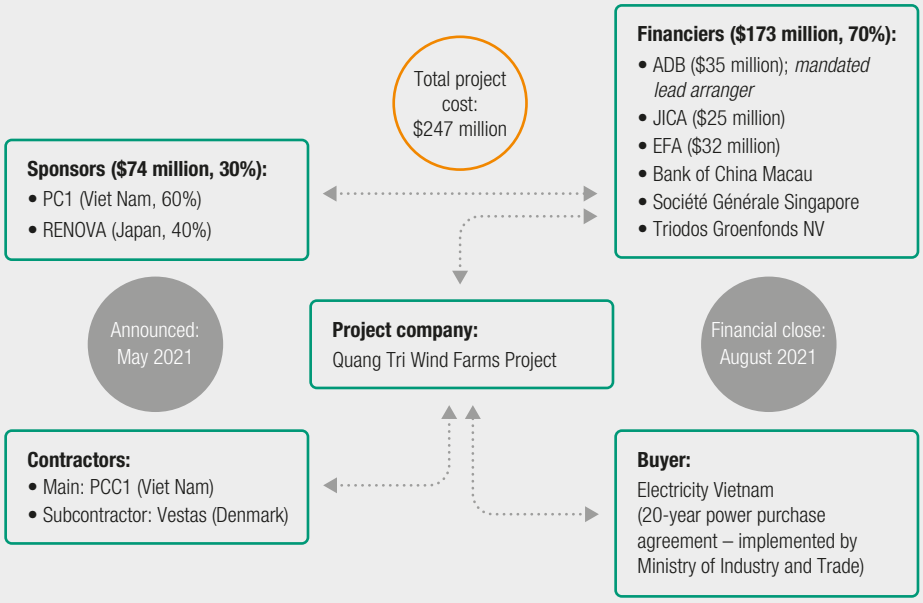
The attraction of investment in renewable energy, including wind energy, is a priority policy of Viet Nam. A core part of the strategy is turning the Quang Tri region into an energy pole by 2030, as part of the national energy transition agenda.

The 144 MW Lotus Onshore Wind Power Project, the first wind farm project in the country, is also the largest internationally project-financed wind-power project in the country. It was developed under a PPA arrangement, for $247 million, with financial closure reached in October 2021.

The project involved significant foreign participation through equity and debt financing but no government guarantee (box figure IV.4.1). It was formulated with viable risk allocation for international lenders. The project financing is 30 per cent equity, 60 per cent of it contributed by PCC1 (a local company) and the rest by Renova (Japan). The project was financially structured and arranged by the Asian Development Bank; other international stakeholders (e.g. advisors, equipment providers and energy purchasing contractors) also played a key role. The formal policy support of the State, as part of the national policy agenda, facilitated the financial closure and implementation of the project.

Although sponsors are key, financiers are also central to the project development. The financing for the project was secured through two fundamental means. First was the role of the Asian Development Bank in deal structuring, due diligence and loan syndications. The Bank mobilized long-term, limited-recourse financing in US dollars from commercial banks (so called B loans) and other development finance that was unavailable locally. Second was supportive national policy, including tax incentives applicable to wind power projects, a 20-year PPA with the State-owned energy company EVN covering energy production at a favourable price and other subsidies.

Box figure IV.4.1. Viet Nam – Quang Tri financing



Source: UNCTAD.

A sizeable risk in structuring PPAs is the currency of the contract. If the revenue a developer receives is in local currency, a local currency devaluation will affect the viability of the project. Also, when a currency devalues, it results in higher procurement costs (equipment and components are mostly purchased in dollars). PPAs need to be structured so as to provide a degree of revenue certainty and also the flexibility to adapt to changing technologies and economic circumstances.

MDBs and other international finance institutions (IFIs) play a crucial role in promoting and financing the energy transition, as they are instrumental in mobilizing financing and concessional and market-based funds, providing technical assistance, and facilitating knowledge-sharing and capacity-building among countries (box IV.5). MDBs provide a sizeable source of long-term and reliable finance. In the last decade, top donors in the renewable energy sector include government and intergovernmental donors from China (Ex-Im Bank of China), Brazil (Brazilian Development Bank), the European Union (EU Investment Bank), the International Finance Corporation, Germany (KfW Development Bank) and the United States (US International Development Finance Corporation) (IRENA, 2022c).

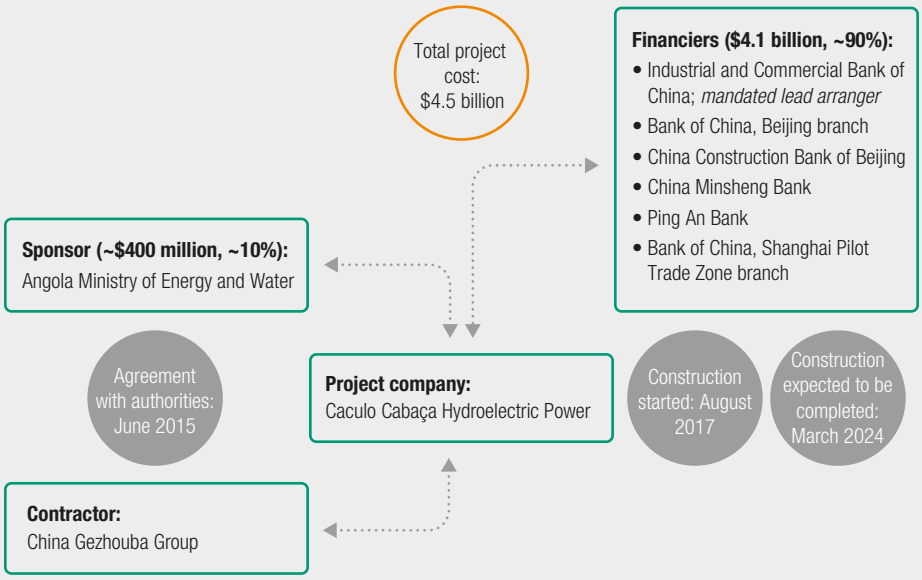
Recently, they have been urged to contribute more by focusing their support on the energy transition challenges. Some institutions or support programmes have stopped or are planning to stop supporting fossil fuel-related assets. Given the size, nature and risks associated with the energy transition, and the challenges to attract investment in renewable energy, MDBs and IFIs have increased their provision of investment guarantees and blended finance mechanisms for investment in sustainable infrastructure, including climate action and energy-related finance.

One of the primary ways in which MDBs and other IFIs facilitate financing for renewable energy and energy efficiency projects is by providing loans or grants to governments, private sector entities and other organizations to support the development and deployment of renewable energy technologies. In particular, MDBs' reputation for expertise, both technical

Box IV.5. Angola – Caculo Cabaça hydroelectric power project: the role of the Belt and Road Initiative

The Belt and Road Initiative (BRI) underpins many renewable projects in Africa, accounting for 10 to 15 per cent of international project finance deals in Sub-Saharan Africa in recent years. One, the Caculo Cabaça hydroelectric project, promoted by Angola's Ministry of Energy and Water, aims to reduce the supply gap for electricity by generating additional capacity of 2,171 MW, and to promote economic and social development. The cost is estimated at $4.5 billion. The equity share retained by the Government of Angola is minimal, at about 10 per cent. The main loan was provided by the Industrial and Commercial Bank of China and other Chinese financiers (box figure IV.5.1). The project does not involve a PPA or a similar financial arrangement. Instead, the developer, China Gezhouba Group, will operate and maintain the power facility for the first four years and train Angolan technicians.

Box figure IV.5.1. Angola – Caculo Cabaça financing



Source: UNCTAD.

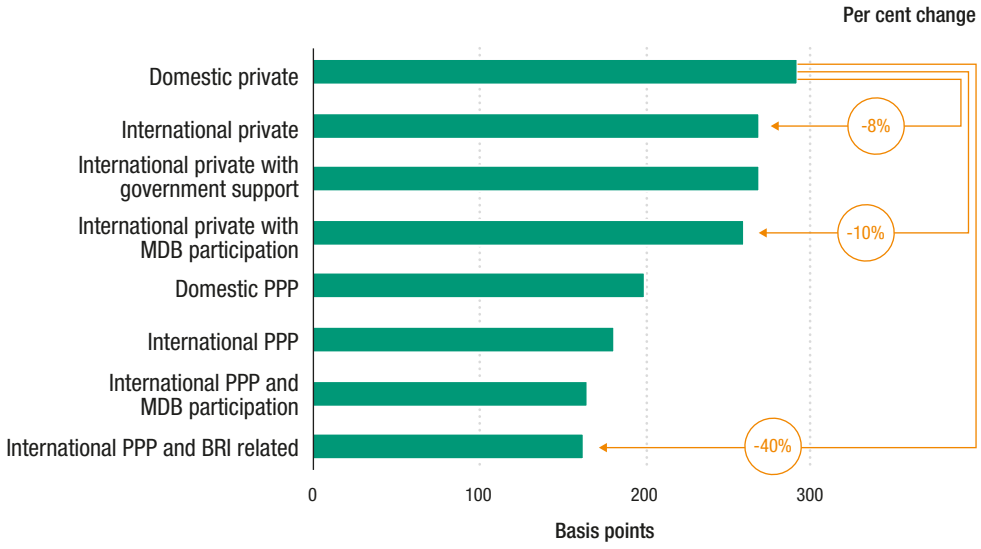
and financial, lowers lenders' perception of risk. They can also facilitate national banks' lending in local currency, thus lowering currency risks and strengthening local participation. They intervene where the host-country risk is high and commercial lenders need more guarantees to finance projects and to overcome institutional constraints.

Typically, MDBs intervene by complementing government support to make PPP projects viable. They do so as direct lenders or technical advisors, providing concessional finance, grants or guarantees. For projects in LDCs, the participation of the State and multilateral agencies is a common feature (see figure IV.10). On average, MDB participation in international project finance reduces the spread on project loans by 10 to 20 per cent.

In recent years, in addition to MDBs, a large infrastructure programme has had a big impact in developing countries and especially LDCs: China's Belt and Road Initiative (BRI). Many African countries, for example, participate in BRI-related joint ventures or partnerships, and in many instances, the BRI is credited with building valuable infrastructure, although significant drawbacks in relation to debt incurred have also been noted. On average, the cost of capital for these projects has been relatively low (box IV.5). Financing costs for energy projects can vary significantly depending on the equity stakeholders involved and on the degree of public support. On average, projects with international sponsors have lower interest rate premiums. Non-equity support on the part of governments does not seem to significantly affect interest rate premiums on international projects. International projects with government minority stakes and MDB participation have the cheapest debt by a significant margin. MDB participation appears to make the biggest difference in lowering the cost of debt for international project finance (figure IV.11).

The participation of development finance institutions through blended finance structures typically reduces the perceived risk of third-party investors and lowers the overall cost of capital. Such mechanisms can also be coupled with risk-mitigation instruments provided by those institutions to boost risk-adjusted returns and the bankability of projects. MDBs are thus uniquely positioned to finance projects with long-term horizons where private investors are reluctant or the risks are too high (see UNCTAD, 2019, 2021 and 2022).

Figure IV.11. **Renewable energy: average spread on debt financing, by actors involved, developing economies, 2011–2022** (Basis points and per cent)



Source: UNCTAD, based on information from Refinitiv SA.
Note: BRI = Belt and Road Initiative, MDB = multilateral development bank, PPP = public-private partnership.

C. COUNTRY PERSPECTIVE: INVESTMENT AND ENERGY TRANSITION PLANS

This section discusses how investment planning processes and investment policy measures at the country level connect with NDCs and energy transition strategies. It adds to the analysis of clean energy-related investment policy measures in chapter II.

Conceptually, investment policymaking in the context of the energy transition typically takes place at three levels:

- *Nationally determined contributions* set targets for emission reductions and other climate change mitigation and adaptation goals. They include high-level estimates for funding requirements and prospective financing mechanisms and constitute a government obligation under the Paris Agreement.
- *Energy transition investment plans* explain how the shift from traditional energy sources to sustainable and renewable sources will take place, drawing the path from the existing to the future energy mix with the implied changes in the asset base and the infrastructure gaps to be filled, allowing for full detail on funding requirements and financing mechanisms.
- *Energy transition investment policy measures* implement the energy transition investment plans, putting in place the necessary regulatory changes, incentives and investment promotion and facilitation initiatives.

These three levels guide the discussion in this section.

1. Nationally determined contributions and energy transition strategies

Most developing countries have adopted NDCs that set targets for climate change mitigation and adaptation. Relatively few contain details on investment requirements and prospective sources of finance.

Almost all developed and developing economies have adopted NDCs that address the energy transition imperative, the need to provide long-term solutions for energy security and the need to pursue SDG 7 – affordable, clean and reliable access to energy for all. Since the Paris Agreement in 2015, countries have established road maps to achieve carbon neutrality. Under the Paris Agreement, each signatory is required to establish an NDC, propose an action plan to cut emissions and adapt to climate impact, and update the plan every five years. The national plans and NDCs define how climate targets will be reached and elaborate systems to monitor and verify progress. In 2023, the UN High-Level Political Forum is expected to review the progress of the 2030 Agenda and the SDGs at all levels, including SDG 7, exploring actionable policy guidance for its full implementation.

The most important outcome of COP27 was the establishment of new funding arrangements and a dedicated “loss and damage” fund to assist vulnerable developing countries that are disproportionately affected by climate change (UNFCCC, 2022). Member States agreed on a package of decisions that reaffirmed their commitment to limiting the global temperature rise to 1.5°C above pre-industrial levels. They also agreed to cut greenhouse gas emissions and adapt to the inevitable impacts of climate change, as well as boosting their support of

the finance, technology and capacity-building needed by developing countries. For the first time, developed countries will be providing finance towards the recovery and rebuilding of poorer countries affected by climate-related disasters. In the initial flurry, more than $300 million has been pledged by European nations. The fund will support the most vulnerable countries and middle-income economies that are highly exposed to climate-related shocks. A transitional committee with members from 24 countries will make recommendations for recipient countries to adopt at the COP28 summit in November 2023.

Many advanced economies have established energy transition strategies to achieve the 2030 climate targets, with regional and international support to assist companies and countries in decarbonizing. Following climate talks, large public and private investment support packages have been established in advanced economies, with billions destined for energy transition priorities. These packages have sparked the development of new green technologies and accelerated the reduction of costs related to the global energy transition.

In the European Union, development of National Energy and Climate Plans is a legal requirement under the Governance Regulation adopted in December 2018. For example, the Just Transition Mechanism, as part of the European Green Deal, entails a comprehensive plan to provide targeted support to the most vulnerable sectors and regions in navigating the energy transition. The Just Transition Mechanism supports those most affected by the transition, because of their dependence on fossil fuels and carbon-intensive industrial processes, through four main tools: the Just Transition Fund, a targeted investment scheme (InvestEU), a public sector loan facility and the Just Transition Platform.

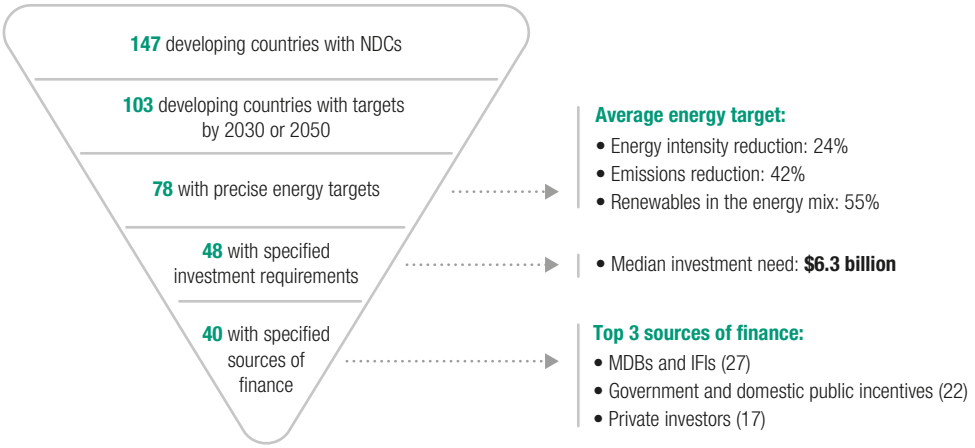
Similarly, the US Inflation Reduction Act directed new government spending towards reducing carbon emissions. Through a combination of grants, loans, loan guarantees, rebates, incentives and other investments, the United States aims to build a clean energy economy (The White House, 2023). Of the nearly $400 billion in spending for energy security and climate change adaptation and mitigation, nearly two thirds will target clean energy (64 per cent), followed by four other sectors: manufacturing, green financing, clean transportation and electric vehicles, and agriculture.

In Japan, the Green Growth Strategy aims to achieve carbon neutrality by 2050 by bolstering nuclear power generation, expanding renewable energy, generating energy efficiency gains and reducing the need for imported fossil fuels. The strategy also aims to stimulate innovation through regulatory reforms and the establishment of an $18 billion Green Innovation Fund.

These initiatives in developed economies show that there is an important industrial policy component to the energy transition. NDCs and energy transition strategies should take into account industrial development opportunities and links to broader economic development strategies also – or especially so – in developing countries, which do not have the financial resources to adopt grand schemes like those in developed markets. Developing countries are faced with the challenges of ensuring energy security and meeting the energy needs of their growing economies, while simultaneously speeding up mitigation solutions and cutting carbon emissions. But despite the huge challenges they face in financing the energy transition – an objective that competes with many other, often more pressing, development goals – in the long term, exploiting renewable energy can enable developing countries to achieve vast cost savings, which could result in lower prices to end-users than for power generated from fossil fuels.

Despite the large number of NDCs for climate change adaptation and mitigation, few developing economies have clear mechanisms and policy guidance to attract international investment in the energy transition (figure IV.12). Some have developed energy transition strategies outlining policies to shift from traditional to renewable energy sources with outside support (see also chapter II).[3]

Figure IV.12. Investment focus in nationally determined contributions and energy transition strategies in developing countries



Source: UNCTAD, based on information from the United Nations Framework Convention on Climate Change, https://unfccc.int/NDCREG; London School of Economics, Climate Change Laws of the World, https://climate-laws.org.
Note: Averages are computed based on countries that reported comparable statistics.

As of COP26, 151 of the 193 parties to the Paris Agreement had communicated new or updated NDCs; among them, 147 are developing countries. Coverage varies among countries, with only 78 developing countries having precise energy targets and energy transition plans. According to these targets, countries aim to, on average, reduce energy intensity by 24 per cent, cut emissions by 42 per cent and expand the share of renewables in the energy mix to 55 per cent. However, only a minority outline clear energy investment plans to attain these objectives. Only 48 developing countries have specified clear investment requirements or needs for the energy sector by 2030 or 2050, and even fewer (40 countries) have indicated possible sources of finance for the transition (figure IV.12). When specified, investment needs are usually embedded in NDCs rather than in national energy transition plans, with large variations in value across countries and plans. The most cited sources of finance are MDBs and IFIs, followed by domestic public funds and international private investment.

2. Energy transition investment planning

Among developing countries the degree to which broad targets in NDCs are translated into detailed energy transition plans varies. Some countries provide detailed demand assessments, asset planning, and technical and economic analyses. A few elaborate on ways to connect the energy transition with industrial development strategies and other policy areas. These elements are important for attracting international investment.

As documented in chapter II, many countries have moved from the strategic planning stage to concrete policy measures to promote investment in clean energy, such as providing fiscal and financial incentives. However, relatively few countries explicitly connect those measures to individual aspects of their energy transition plans. This is because, in most cases, those plans address broad investment requirements without detailing specific assets in need of construction, or the ways in which those assets could be packaged as bankable projects and marketed to investors. Even where needs are spelled out, plans often jump immediately to policy measures establishing incentives or other investment promotion mechanisms,

without the requisite detail on assets required, renewables potential, infrastructure gaps, potential locations and other details necessary to provide certainty to investors and to package development projects.

Energy transition investment planning requires a comprehensive analysis of energy demand and assessment of assets and technical requirements. Other important considerations include a future-facing energy mix (in line with renewable energy goals), an estimation of the investment needs and an impact analysis of the electrical generation, transmission and distribution infrastructure, as well as the governance structure.

Some developing economies are more advanced than others in conceptualizing and charting the energy transition. For example, Cambodia, the Lao People's Democratic Republic, Mongolia, Nepal and Viet Nam in Asia, as well as Chile, Colombia and Mexico in Latin America, have published data-driven and reform-focused energy transition plans to integrate renewable energy and energy efficiency into national strategies while shifting away from fossil fuels. These plans are aligned with other productive sectors that are key for the energy transition. They are also anchored in strategic planning and business models for attracting investment in new infrastructure.

To generate employment and economic growth, some developing economies have been successful in attracting investment in renewable energy in synergy with action towards other economic objectives, such as (electricity) export generation (box IV.6), industrial development through special economic zones and logistics hubs, or the development of the tourism industry (box IV.7).

Energy transition investment planning varies across countries and regions, but some important commonalities exist in countries that have successfully translated high-level NDC target-setting into coherent investment policy measures, as follows.

Detailed electricity demand projections. Forward projections are normally based on population growth, access to electricity, industry and residential needs, and urban and rural needs, including a connection with development plans and transition strategies for priority industries. For example, in Ghana, the energy demand projection for the National Energy Transition Framework (2022–2070) is based on annual GDP growth of 5 per cent, population growth of 2 per cent and urban-rural growth of 1 per cent between 2021 and 2070. In Angola, the electricity demand projection in the Angola Energy 2025 plan draws on a technical assessment of the national electrification rate, residential and services consumption per inhabitant, the correlation between national wealth (GDP) and energy consumption, and industrialization. Similarly, the Pakistan Energy Demand Forecast (2021–2030) forecasts energy growth on the basis of key variables such as GDP, population, urbanization and energy prices.

The example of the Dominican Republic shows how demand planning can be integrated with pillars of economic growth prioritized in the national development strategy (see box IV.7). In several other countries, long-term development strategies include green industrial policy linked with the transition plan, which can broaden the cross-sector partnership for transition. For example, China's green industrial policy has resulted in a manufacturing expansion and in R&D that has driven down costs and increased the deployment of clean energy technologies.[4]

Renewable energy potential. Assessments of renewable energy potential look at irradiation levels, wind levels, hydro potential and similar factors. For example, the first step of the Energy Transition Road Map developed by the US Virgin Islands entailed consistent exploration of potential electricity production and consumption options. Indonesia's Net Zero Emission Plan presents detailed technical estimations for utility-scale solar photovoltaics and onshore wind power. Under the Vision 2030 strategy, Kenya launched a range of policy interventions to mobilize resources and investment within the renewable energy sector.[5]

Box IV.6. Energy transition investment and regional electricity trade – the Lao People's Democratic Republic

Renewable power generation and the export of electricity are key features of the economy of the Lao People's Democratic Republic, underpinned by policy that promotes energy development and the attraction of hydropower FDI. About 80 per cent of installed energy capacity in 2021 in the country is from hydropower. International companies play a significant role in the energy value chain, from energy sources to generation, installation and transmission, and as technology solutions and equipment suppliers. Multilateral institutions and banks are active in international project finance.

Foreign investment and robust MNE participation in energy development have helped the Lao People's Democratic Republic transform into the biggest electricity exporter among the LDCs. Electricity exports generated more than $2 billion in revenue in 2021, contributing more than 15 per cent of GDP. About 65 per cent of the total 11 GW of installed capacity is exported to neighbouring countries under a web of PPAs and concession arrangements.

In 2021, more than 80 per cent of the 90 power plants in the country were wholly owned by, or involved in joint ventures with, foreign MNEs. Investment in power generation led to 100 per cent electrification in 2020, up from 70 per cent in 2010. The hydropower industry is a major FDI recipient in the country. Favourable regulatory frameworks and investment incentives support the promotion of FDI in hydropower and other renewable power plants (box table IV.6.1). The ASEAN power grid arrangement has further facilitated renewable power export from the Lao People's Democratic Republic to Singapore over the transmission lines of Thailand and Malaysia.

Box table IV.6.1. Lao People's Democratic Republic: key policies promoting FDI in renewable energy development

Policy	Selected elements
Policy on Sustainable Hydropower Development and Policy Guidelines (2015)	• Allows private sector participation in hydropower plant development through concessions (e.g. build-own-operate-transfer, build-operate-own schemes)
	• Promotes independent power producers
	• Facilitates transfer of concession right
	• Guarantees stability of electricity prices (under the power purchase agreement between the hydropower plant developer and the government)
	• Permits export of electricity generated by hydropower
Law on Investment Promotion (2016)	• Permits 100 per cent foreign equity and/or joint ventures with State-owned enterprises
	• Permits foreign investment in public-private projects
	• Provides incentives (e.g. tax holidays, customs and duty-free tax, 0 per cent value added tax rate) for infrastructure in promoted areas such as remote areas and in special economic zones, i.e. in hydropower development.
	• Encourages investment in concession activities such as development of electric energy and development of special economic zones.

Source: UNCTAD.

Public-private partnerships have facilitated investment in electricity generation and transmission in the country. Asian investors from ASEAN (mostly Thai companies) and China are the largest investor group in energy generation. China Southern Power Grid manages a large part of the country's transmission grid under a 25-year concession, through a joint-venture company in which it holds a majority stake. MNEs from Japan and the Republic of Korea are also active investors in power generation, mainly in hydropower and in plants linked with export markets.

In addition to energy and utility MNEs, IFIs and banks are playing a major role in power development in the country. They provide international project finance to support power projects sponsored by MNEs. These banks include Bangkok Bank (Thailand), Export-Import Bank of China, EXIM Thailand, Siam Commercial Bank (Thailand) and EXIMbank Viet Nam. Chinese banks are also providing financing facilities to power plants linked with the BRI.

Source: UNCTAD, based on Open Development Mekong, https://policy.asiapacificenergy.org/node/2823 and https://investlaos.gov.la.

Box IV.7. Energy transition investment and tourism development – the Dominican Republic

The Dominican Republic aims to diversify its energy supply, reduce dependency on fossil fuel imports, promote private investment, mitigate the environmental impacts of fossil fuels, contribute to decentralization of power and biofuel production and increase competition between providers. To achieve these goals, it aims to attract more than $2.5 billion in foreign investment over the next three years.

Following the Paris Agreement, the country launched the National Energy Plan 2021–2036, which created the National Energy Commission. The plan lays out short- and long-term goals, technical assessments and a road map for expanding the energy supply and upgrading the electricity transmission and distribution infrastructure. The plan also outlines fuel storage and management of infrastructure until 2036. Its implementation will create a platform not only for the improvement of energy efficiency but also for the economic development of the country.

The National Energy Plan links the goals of the energy transition to the most dynamic sectors with the greatest potential contribution to the change in the country's productive structure: (i) those linked to the communication and transportation infrastructure, energy supply and distribution, and international tourism; (ii) special economic zones and free trade zones (other than for textiles) and the manufacturing industry; and (iii) other infrastructure (mainly electricity and water).

To connect its transition planning with specific industrial needs, the government is partnering with the private sector. InterEnergy Holdings (United Kingdom) provides an illustrative case for how public and private transition planning can add value to the development of key industries, such as tourism. InterEnergy invests in three energy sources – carbon, fossil fuels and renewables – in the Dominican Republic and other countries in Latin America and the Caribbean. Its investment portfolio includes one vertically integrated utility, seven power generation plants, one technology business and one electric mobility business spread across four countries (Chile, the Dominican Republic, Jamaica and Panama). In addition, the company supports constructing and operating eligible renewable energy and clean transportation assets.

In the Dominican Republic, InterEnergy's subsidiary, CEPM, powers approximately 66 per cent of the tourism sector, including the leading resort areas of Punta Cana and Bavaro. CEPM's investment projects include solar and wind power generation through a combination of greenfield investment and mergers and acquisitions (M&As) – such as the acquisition of a 40 MW photovoltaic solar project and two 50 MW wind farms in 2021 and the more recent acquisition of the Matafongo wind farm (for $52 million). In addition, CEPM has contributed to clean transportation through electric mobility, adding 500 charging points throughout the island and launching a residential solution for electric vehicles. Future investment phases will finance additional technologies, including battery storage, wind generation, biomass and green hydrogen.

At the end of December 2022, CEPM concluded the electrification of Saona Island by developing a photovoltaic generation park with a storage capacity of 5 megawatt-hours (MWh). The island, in the eastern part of the country, is a prime tourism destination. The project enables the island's 600 inhabitants to access continuous power for tourist concessions and businesses, which receive more than 1 million tourists a year, all from a renewable energy source connected to a smart grid. This system has made the island the first in the Americas to operate 100 per cent on renewable energy.

Source: UNCTAD.

Meanwhile, the pipeline of Namibia's renewable energy projects include biomass, solar, wind and battery storage as well as a large-scale green hydrogen project worth $10 billion, to be completed by 2026.

Energy infrastructure gaps. National evaluations of energy infrastructure gaps involve documenting shortfalls in adjacent infrastructure of grids, storage, distribution and transmission lines, and interconnections. In the US Virgin Islands' Energy Transition Road Map, the technical assessment included a comprehensive study of the energy transmission system, and how to safely distribute the greater amounts of electricity generated, assess the

capacity limits of the transmission system and indicate how much capacity is available at each of the main substations for interconnection of new-generation resources. If interregional energy storage and transmission infrastructure is improved, energy security in developing countries could be significantly enhanced across regions by increasing cross-border electricity trade.[6]

Decommissioning paths for fossil fuel assets. Reducing dependency on fossil fuels must include long-term planning for replacement and decommissioning of coal- and gas-fired power plants, whether alone or in collaboration with other countries. For example, the Government of the Philippines plans to repurpose coal plants in Mindanao into renewable energy power stations. Indonesia has identified 2,130 diesel generators across the country, all of which will be replaced with a combination of renewable sources and energy storage. Chile has pledged to achieve net zero by 2050, which includes the closure of two thirds of its coal plants by 2025, and all of them by 2040. Viet Nam signed a Just Energy Transition Partnership in 2022 with the G7 countries plus Norway and Denmark, to accelerate the energy transition from coal to renewable sources.

Efficiency and carbon capture and storage needs. Investment planning should include the costing of strategies that reduce the carbon intensity of fossil fuel-based installations. Notable examples include South Africa's JET framework, which comprises a set of strategies for demand-side management measures between the public and the private sectors, and the evaluation of new capacity options for carbon capture and storage in new power plants and technologies. Similarly, in 2022, India prepared an analytical policy framework and deployment mechanism on the pivotal role of carbon capture, usage and storage in the country's decarbonization efforts.

Energy mix. The end-state of energy sources and technologies is key to defining asset requirements over time. For example, Ghana has outlined a plan for a diversified energy mix in its Energy Transition Framework, with a model based on available technologies and updated needs (including solar photovoltaics, onshore wind and green hydrogen). The plan entails the development of a medium- to long-term set of policies and targets for 2070. In Barbados the National Energy Policy details the energy sources (solar, wind, biomass, waste-to-energy and energy storage) to eliminate the consumption of fossil fuels by 2030. It also includes provisions for the contribution of technologies not yet considered viable in its energy mix.

Location and installation sites. Location and installation plans involve the assessment of suitable locations for renewable energy installations, including the expected capacity factor, an environmental impact assessment and other elements. For example, in Mongolia, the Scaling-up Renewable Energy Programme model identifies the best locations for solar power plants and onshore wind energy production and facilities. It also paves the way for testing the viability of new locations for solar power generation. In Ghana, such calculations have found that the energy transition will require nearly 120,500 acres (about 0.17 per cent) of the country's agricultural land area.

Packages of bankable projects. Ultimately, the detailed elements of energy transition investment plans are all prerequisites for the packaging of bankable projects that can be marketed as investment opportunities. For example, Nigeria's energy transition strategy includes a specific energy investment opportunity plan that provides a clear investment road map (with an investor presentation deck) based on current in-country programmes and projects that are directly related to the energy transition, including the large-scale financing (and potential) of hydropower and the facilitation of its solar photovoltaics market.

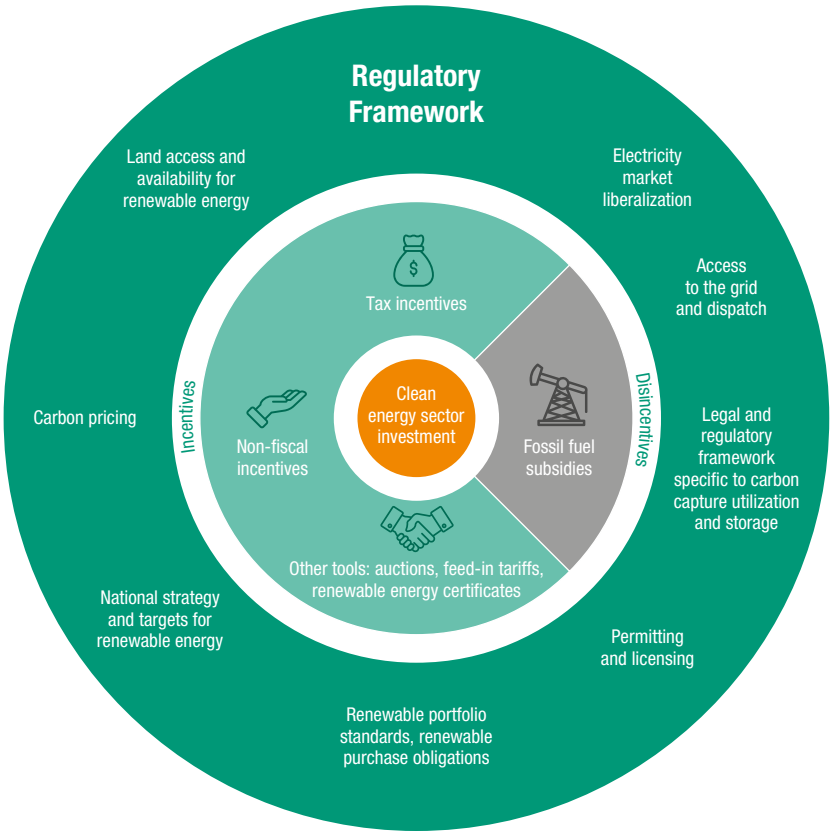
3. Energy transition investment policy measures

In developing countries, investment policy measures to support the energy transition often mirror those in other sectors. That means they come with the same potential downsides and do not always address the key barriers to attracting investment in the energy sector.

Energy transition investment policy measures do not work in isolation. They operate within a broader regulatory framework for the energy sector that entails both public incentives for investment in clean energy and disincentives for emission-intensive production of fossil fuels (figure IV.13). In developing countries, the incentives most often used to attract private investment in renewable energy are fiscal incentives, including profit-based and expenditure-based tax incentives, indirect tax exemptions and production-based tax credits (chapter II). In developed economies, instruments to attract investment are typically more complex, encompassing feed-in tariffs and auctions, renewable portfolio standards and guarantee schemes.

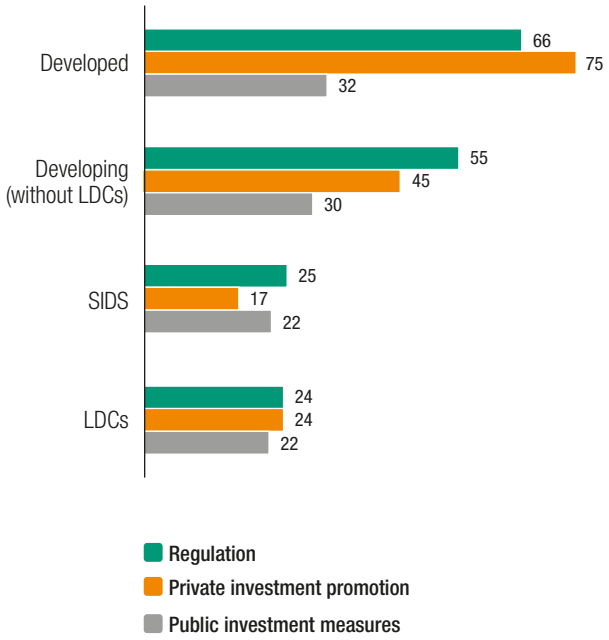
The broader regulatory framework within which these incentives operate encompasses a wide range of policy areas, including licensing and system permissions, land access, industry structure and areas specific to renewable energy, such as priority access to the grid. They also include policies aimed at achieving emission reduction targets or promoting access to energy that align with climate goals or energy-related SDGs. Such targets provide long-term vision and certainty, which are crucial for attracting investment.

Figure IV.13. Key elements of the regulatory framework for investment in the energy transition



Source: UNCTAD.

Figure IV.14. Renewable energy policies, by type and country group
(Per cent of countries)



Source: UNCTAD, based on information from the Climate Change Laws of the World database.

The universe of renewable energy policy measures is complex and depends on legal and regulatory systems in countries at various levels of development.[7] Policies in renewable energy typically focus on three main aspects: regulation, private investment promotion and public investment measures (figure IV.14). Private investment promotion measures embrace all types of incentives and risk reduction mechanisms aimed at attracting investment to the sector. Public investment promotion mechanisms include direct investment by the State in generation capacity, through public enterprises and PPPs as well as direct investment in R&D in the sector.

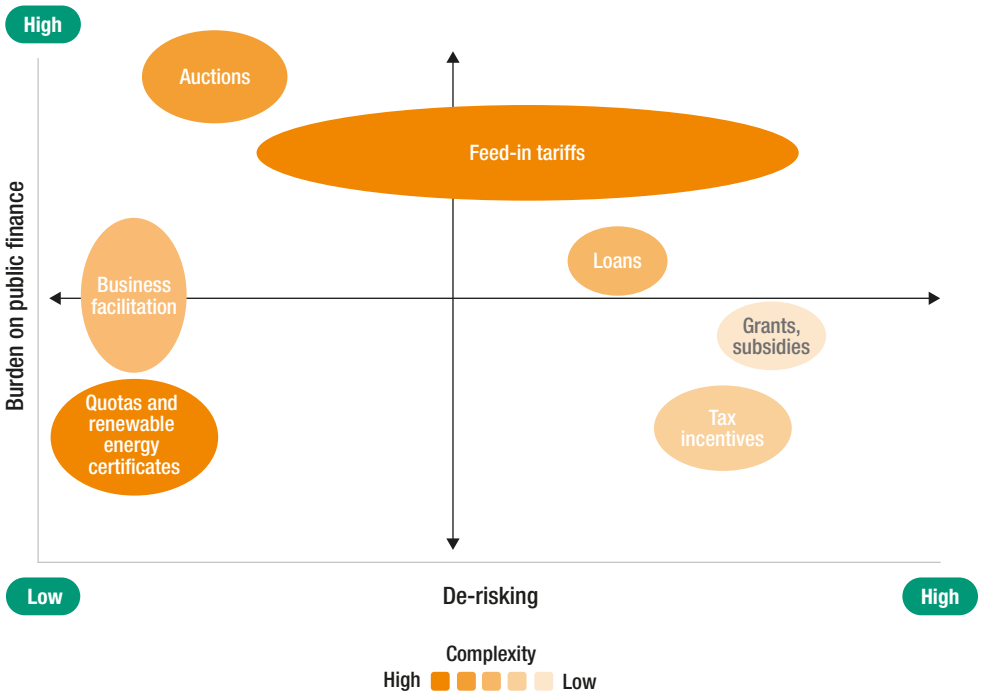
The use of these policy aspects varies across country groups. Whereas two thirds of developed economies prioritize improving the regulatory framework and promoting private investment in their renewable energy policies, only 24 per cent of LDCs and 25 per cent of SIDS do the same. Similarly, private investment promotion is a policy focus for more than 75 per cent of developed countries, but less than 30 per cent of LDCs and SIDS. About a third of developed and developing economies emphasize the role of public investment, but only 22 per cent of LDCs and SIDS do the same.

Many developing countries fast-forward to the implementation of investment policy measures to promote energy transition investment – or to the application of existing measures – often without a stepwise process or link to NDCs or national planning frameworks for energy transition investment. As a result, developing countries and LDCs tend to rely more on generic promotion instruments, such as profit-based tax incentives, because of familiarity with those tools, their lower level of complexity and the fact that they do not require upfront expenditure of public funds. However, these instruments can be expensive in the long run (in terms of forgone government revenues), and their effectiveness in the promotion of renewable energy investment is often low because they do not directly tackle the key challenges for investors in the sector. Advanced economies tend to use more complex and targeted mechanisms to promote investment in the renewables and energy infrastructure sectors (e.g. feed-in tariffs and auctions).

The relative complexity and impact on public finances of the different instruments available depends on multiple factors and varies over time (figure IV.15). Feed-in tariffs effectively support projects by ensuring a predictable revenue stream for renewable energy investors. Their impact on public finances is spread over time but can be substantial and can involve a degree of uncertainty for governments. Grants and subsidies entail significant upfront financial disbursements for governments but are certain and finite.

UNCTAD's annual survey of investment promotion agencies (IPAs) provides insights on the extent to which they are involved in the promotion and facilitation of renewable energy projects and other activities to support energy transition.[8] Their level of engagement has been mixed, with varying levels of success in attracting renewable energy projects. Some IPAs have been actively engaged, and others have not yet seen projects materializing or have seen them come in without their involvement. Almost 60 per cent of respondents stated that their countries had attracted numerous renewable energy projects, with various degrees of

Figure IV.15. **Energy transition investment promotion and complexity of policy instruments**



Source: UNCTAD.

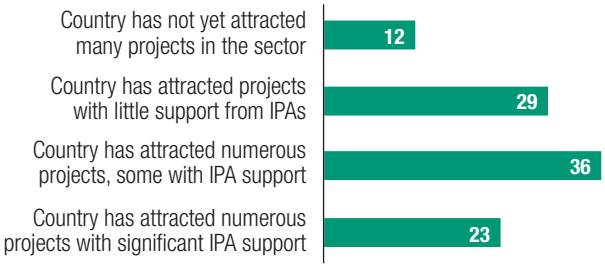
IPA support (figure IV.16). Almost all IPAs (more than 90 per cent) include renewable energy projects among their priority targets, including wind, solar and hydropower, as well as investment in energy efficiency, energy storage, and other technologies and infrastructure.

The promotion instruments that IPAs report using most are similar to those for projects in other industries, confirming the earlier finding that investment incentives for renewable energy projects are often generic. Fiscal incentives are the most common instrument, followed by business facilitation, including fast-track permitting and dedicated windows. More than half of the IPAs indicated that their respective countries offer financial incentives such as grants, subsidies and loans.

IPAs tend to be "policy takers" when it comes to promoting investment in the energy transition. Few are involved in formulating NDCs or energy transition strategies (12 per cent of respondents), and NDCs rarely refer to them. However, almost 40 per cent of IPAs indicated that their investment promotion strategy has been adjusted to reflect the country's NDC and/or energy transition strategy, and 29 per cent stated that the IPA has taken specific action to implement or support the NDC or energy transition strategy.

Major challenges in attracting investment in the energy transition identified by IPAs include a lack of appropriate policy tools, weak electricity infrastructure and a lack of policy coherence between the NDCs,

Figure IV.16. **The role of IPAs in attracting energy transition investment, 2023** (Per cent of respondents)



Source: UNCTAD.

Figure IV.17. **IPA challenges in attracting energy investment, 2023**
(Per cent of respondents)

Source: UNCTAD.

the energy transition strategy and the investment promotion strategy (each of these were ranked as top challenges by more than one third of IPAs; figure IV.17). Other challenges in promoting and facilitating investment for the energy transition include an unfavourable business environment, the lack of a pipeline of bankable projects and lack of internal expertise.

* * *

The process of planning the energy transition requires a logical path from NDCs to investment policy measures that address the specific challenges of promoting investment in the energy sector. Constructing energy transition investment plans to achieve this, working with a broad set of stakeholders in the planning and implementation phases, is critically important. In developing countries in general, and in small and vulnerable economies such as SIDS and LDCs in particular, transition plans serve as logical road maps that allow countries to move towards net-zero targets and energy inclusion goals.

D. CHALLENGES AND THE WAY FORWARD

1. Key challenges and policy priorities

The investment needs associated with the energy transition are enormous. To stay close to the goal of limiting global warming to 1.5°C the world needs about 1.5 times today's global GDP in investment between now and 2050.

This chapter has discussed the role that international private investment and FDI can play in supporting the energy transition in developing countries. It has highlighted the main drivers and determinants of such investment and analyzed a key aspect of international project finance in renewables, the cost of capital. And it has looked at the way governments in developing countries frame investment policies in support of the energy transition in the context of NDCs. In doing so, the chapter has identified several key challenges for the promotion of energy transition investment. The earlier chapters on trends in FDI, national and international investment policies, and capital markets have done the same (table IV.9).

Table IV.9. Investing in sustainable energy for all: key challenges

FDI trends	
Geographical concentration	Despite strong growth in international investment in renewable energy at the global level, many developing countries are lagging behind.
Sectoral and supply chain concentration	International investment focuses very much on renewable energy generation and much less on other sectors that are crucial for the energy transition.
Investment paradoxes	The pipeline of new investment projects in fossil fuels is still flowing and will for another two decades or more, with asset lifetimes exceeding 30 years.
Project finance trends	
Reliance on international investors	FDI plays a significant role in renewables projects worldwide, but more so in those countries most in need of and least attractive to international investors.
Cost of capital constraints	The high cost of capital in countries in debt distress or with high risk ratings is a strong disincentive for investors to shift towards renewable energy assets.
Insufficient and unbalanced support	International support mechanisms are crucial to catalyse investment; a relatively low share of support reaches countries with low access to electricity.
Investment policy trends	
Weak investment planning in NDCs	Nationally determined contributions and energy transition strategies in many countries do not provide a sufficient basis for effective investment promotion.
Generic investment promotion tools	Developing countries and especially LDCs rely to a large degree on investment promotion tools not designed specifically to support the energy transition.
Old-generation IIAs	Unreformed IIAs can hinder the implementation of measures needed for the energy transition.
Capital market and sustainable finance trends	
Sustainable finance momentum	Climate finance slowed in 2022, trends in energy markets caused a shift in investment portfolios back to fossil fuels and greenwashing concerns remain.
Institutional investor inertia	A majority of the world's largest funds do not yet disclose or commit to net zero in their investment strategies.
Low coverage of carbon markets	More than three quarters of global emissions are not yet covered by carbon markets, and the spread in the price of carbon across markets is too wide.

Source: UNCTAD.

a. Enhancing the role of FDI in the energy transition in developing countries

Investment needs are daunting in both developed countries and developing countries that already have significant energy assets. They are much lower in absolute terms in countries where a significant share of the population does not yet have access to electricity, but much higher relative to the existing asset base and to the capacity to finance and support such assets. That is important, because energy investment is needed not only for the transition, but also to ensure access to sustainable and affordable energy for all. Renewable energy capacity needs to increase by a factor of 2.5 in the most advanced economies, but by a factor closer to 25 in LDCs.

Investment requirements are not limited to renewable energy generation. They extend to energy efficiency in buildings, industry and transportation; energy infrastructure such as power grids and storage capacity; clean and low-emission fuels; the renewables supply chain including R&D activities, critical minerals extraction and manufacturing of solar panels or wind turbines; and carbon capture and storage. In addition, as documented in chapter I of this report, investment in fossil fuel assets is continuing. Investment in these assets will remain necessary for some time to supply complementary capacity; investment will also be needed to improve efficiency and to mitigate the impact of such assets, and ultimately to decommission them.

International investment in the renewable energy sector has seen rapid growth in the past few years – although the growth was unbalanced, with much of it concentrated in developed countries. Several other sectors relevant for the transition, most notably energy infrastructure, still see much lower involvement of international investors. This is because electricity distribution is traditionally a highly regulated utility function with predominantly domestic, and often public equity involvement. However, with the clear interest on the part of international investors to finance renewable energy assets and with the connecting infrastructure often a bottleneck for new investments, the motivation for governments to accelerate energy sector reforms should strengthen significantly.

Investment in sustainable energy can come from the public and private sectors, and from domestic and international sources. International private investment, or FDI, plays a significant role. In the renewable energy sector, international project finance accounts for 55 per cent of total project finance values. This share increases for developing countries, exceeding 75 per cent in LDCs. For the poorest countries, attracting international investment is therefore a crucial prerequisite for a timely energy transition. This is a concern, because many of these countries continue to be unsuccessful in attracting significant amounts of FDI outside the extractive sector. To date, 31 developing countries, including 13 LDCs, have not registered a single international investment project in renewables or other energy transition sectors since 2015.

International investors also continue to be involved in fossil fuel-related investments, such as coal- or gas-fired power plants and extractive or refining activities, although many are shifting their portfolios to renewable or lower-emission assets. Major oil and gas multinationals, for example, have already been selling off some upstream fossil fuel assets. However, there are concerns that this process can be detrimental to the energy transition, as buyers of these assets – often private investment funds – face less pressure to disclose climate impacts and may look to maximize returns by ramping up production before these assets become stranded. Policy action to establish the continued responsibilities of both buyers and sellers of fossil fuel assets is overdue.

Despite the gradually shifting interest of international investors, at the current rate of decline new project announcements in fossil fuel extraction, processing and energy generation will continue to enter the pipeline for at least another two decades. International policy support for such investment, and lending by development banks, is waning. However, this policy

shift may not be optimal in all cases. International engagement and support may, under strict conditions, result in higher standards and relatively lower-emission assets, and can be instrumental in guaranteeing timely decommissioning.

In addition to building downstream renewable energy assets, international investors are scrambling to build up production capacity in key renewables technologies and to secure the supply of critical minerals. Investor home countries – both for the main producers of renewable energy equipment and for mining – are relatively few and almost all developed. Host countries where resources are located are more diverse – although some key mineral deposits are more concentrated – and almost all developing. As supply chains come under increasing pressure because of the explosive growth of demand, international cooperation to apply appropriate standards will be critical to ensure that the extraction and trade of minerals are carried out sustainably and responsibly, and that the supply of energy transition materials and equipment remains uninterrupted. Renewable energy supply chains should also offer opportunities for developing countries to increase their participation in global value chains and their value added production in order to secure development benefits.

b. Realizing the full potential of international project finance for sustainable energy

From the perspective of investors, sustainable energy investment decisions involve multiple choices, including location, source of energy, type of installation and financing modalities. The factors influencing these choices – the drivers and determinants of investment decisions – are the economics of a project, the regulatory environment, the technological and environmental context, and political considerations. Most of the drivers and determinants affect domestic and international investors equally, but a few are more important or more binding for international investors, explaining the role of FDI and the potential specific contributions it can make. Critically, international investors can often access cheaper finance, lowering the cost of capital for projects.

An important indicator underpinning investor choices between different sources of energy and types of installation is the levelized cost of electricity (LCOE) to be generated by a prospective new power plant. The LCOE allows a comparison between different sources of energy on an equal footing. Between 30 and 50 per cent of the LCOE is determined by the cost of capital and by the discount rates applied to project cash flows. Low discount rates favour sustainable energy, because almost all capital expenditures for renewables installations are frontloaded. High discount rates favour fossil fuel-generated energy because the operating expenditures (fuel costs) over their lifetime are discounted. The high cost of capital in developing countries, and especially countries in or near debt distress, thus constitutes a significant economic disincentive for the energy transition. This means that debt relief is inextricably linked to progress on the energy transition. It also means that support in catalyzing international investment with lower financing costs is even more important.

Many countries with low rates of access to electricity, where building renewable energy installations would allow not only leapfrogging the transition phase but also making progress on the goal of access to sustainable energy for all, are among those that benefit least from international investment in renewable energy assets. Across these countries, a significant number of fossil fuel-related projects is still in the pipeline. Some may have access to low-cost local or regional fossil fuels, especially coal. But, typically, given their high country-risk ratings, the cost of capital is a disincentive to making the transition.

The cash flow analyses underpinning decisions on renewables and fossil fuel investment show very different patterns – high upfront capital expenditures for renewables; high (and

uncertain) fuel costs over the lifetime of coal- or gas-fired power plants; different recourse to incentives, subsidies and advance pricing agreements for the electricity generated; and different maintenance and decommissioning costs, among other aspects. Guaranteed electricity prices are a major factor in the investment decision. Such guarantees for fossil fuel plants can have a long-term negative effect on the energy transition. They result in LCOEs for potential new renewable energy projects that are always higher than the marginal costs of producing additional units of electricity with existing plants. Therefore, when commissioning new fossil fuel installations, it is important to build in a phase-out mechanism that establishes a decommissioning schedule and avoids lock-in effects. Provisions should further be made for energy efficiency and carbon capture.

Fiscal incentives and subsidies also feature prominently in cash flow analyses. As discussed in chapter II of this report, incentives for electricity generation should reward initial capital outlays rather than reduce rates over income generated over the lifetime of installations. This emphasis favours renewables over fossil fuel plants because of their high upfront investment costs and low operating and production costs. It is also in line with longstanding investment policy advice (as in UNCTAD's Investment Policy Framework for Sustainable Development) and with the implications for fiscal incentives of the prospective G20-OECD Base Erosion and Profit Shifting reforms that will introduce a global minimum tax affecting large investors (*WIR22*).

Financing decisions and borrowing costs for investors in sustainable energy projects depend on many factors and on country, industry and project risks. A key factor is the actual line-up of equity and non-equity stakeholders in a project. In developing countries, bringing in international sponsors as (part) project owners leads to a lower cost of capital than in purely domestic projects. Government policy support, while important insofar as it affects cash flow projections, does not appear to significantly affect borrowing costs. However, minority equity involvement by the public sector – such as through PPPs – does decrease borrowing costs substantially. International projects with both government and MDB participation have the lowest borrowing costs. This lends support for the planned shift in MDB lending priorities towards sustainable energy and infrastructure assets. Their involvement will be especially important in countries with higher costs of capital, to counter the disincentive that high discount rates constitute for the shift from fossil fuels to renewables assets.

c. Making investment policy more conducive to supporting the energy transition

Following the Paris Agreement, all countries set out their sustainable energy commitments in their NDCs and in national energy transition strategies. Not all of these show the same level of detailed planning. Of 147 NDCs submitted by developing countries, 78 provide precise targets for sustainable energy production. Of these, 48 provide information on investment requirements and 40 discuss prospective sources of investment.

Most countries have adopted specific policy measures for the promotion and regulation of sustainable energy investment (chapter II). These are often motivated directly by the targets set in NDCs and energy transition strategies. What is missing in many cases is the intermediate step, translating high-level targets for emission reductions into a transition path for the energy mix, implied asset requirements and infrastructure gaps, assessments of energy demand, potential and locations, and other elements that are crucial to provide investors with greater certainty about investment opportunities and that allow the construction and marketing of bankable projects. In many developing countries, and especially LDCs, capacity-building and technical assistance is crucial to move from NDCs to such detailed energy transition investment planning.

Because of the lack of detailed planning in many countries, the policy measures adopted for the promotion of international investment in the energy sector are often similar to those available for any industry. In developing countries, especially, traditional fiscal incentives (income tax reductions) abound, as do other common measures such as indirect tax reductions or exemptions on duties on the import of capital goods. Although these measures can work, approaches that specifically address the needs of the energy sector in transition have proven to be more effective. Feed-in tariffs and quota-based instruments such as renewable portfolio standards, renewable purchase obligations or renewable energy certificates, which are designed to increase the use of renewable energy, are increasingly common in more advanced energy markets. However, their effectiveness depends on a degree of forward planning for the availability of different sources of energy. Similarly, more sophisticated mechanisms to market renewable energy projects such as electricity price guarantees and auctions depend on adequate demand projections, asset planning and regulatory preparation. Jumping from high-level NDC target-setting straight to investment policy measures precludes the use of the most effective tools for promoting energy transition investment (table IV.10).

Better energy transition investment planning will also ensure that investment policy measures are better suited to country-specific situations. Taking into consideration the unique challenges faced by different types of countries in the development of renewable energy infrastructure is critical for selecting the appropriate promotion tools. For example, a large middle-income economy may consider a combination of tools such as auctions to develop generation capacities in specific technologies and locations, and market-based incentives such as renewable energy certificates to take advantage of its market size and regulatory capacities. With much smaller markets and important infrastructure and capacity gaps, LDCs may consider a mix of auctions to control the generation capacity needed and business facilitation and guarantee schemes to help investors assess opportunities in the country. These countries will also need to prioritize the promotion of investment in modern grid infrastructure to support new generation capacities and consider the use of specific subsidies or feed-in tariffs for off-grid and rural renewable energy development to take advantage of grid decentralization options offered by renewable energy technologies. SIDS may consider a mix of auctions to build the main power plants needed and targeted incentives to acquire decentralized and smaller units, such as net billing and net metering schemes, to adapt their infrastructure to their unique geography.

Table IV.10. Key elements of detailed energy transition investment planning

Detailed electricity demand projections	Forward projections based on population growth, access to electricity, industry and residential needs, urban and rural needs, and connections with industrial development plans
Renewable energy potential	Irradiation levels, wind levels and hydro potential
Energy infrastructure gaps	Gaps in adjacent infrastructure such as grids, storage, distribution and transmission lines, and interconnections
Decommissioning paths for fossil fuel assets	Long-term planning for coal- and gas-fired power plants, replacement and decommissioning options
Efficiency and carbon capture and storage needs	Options such as reducing the carbon intensity of fossil fuel-based installations, lowering methane emissions and expanding electrification
Energy mix	Detailed assessment of energy sources and technologies, over time, and end-state
Locations and installation sites	Assessment of suitable locations for renewable energy installations, including expected capacity factor, and environmental impact assessment
Packages of bankable projects	Bundled or individual projects that support the transition with full regulatory preparation, marketable to financiers

Source: UNCTAD.

Policy terrain that lies beyond the scope of investment policy but nonetheless affects international investment is fossil fuel subsidies. These subsidies are detrimental to climate change mitigation in and by themselves, and they are also a factor holding back renewables investment in some countries. They affect the incentive for firms to invest in clean energy, and they weigh heavily on government resources to support energy transition investment. Subsidies can amount to several percentage points of GDP in some developing countries and LDCs. Reallocating resources currently devoted to supporting traditional fossil fuel technologies can facilitate the adoption of targeted policies and regulations for promoting clean energy.

d. Making international investment treaties more conducive to the energy transition

International investment agreements (IIAs), and especially old-generation IIAs, are not aligned with energy transition objectives. In their current form IIAs largely lack clauses that proactively support low-carbon energy investment. Some exceptions exist, but the nascent approach is vastly underutilized. As documented in chapter II, many investor–State dispute settlement cases have challenged policy measures of direct relevance to climate action. Investors in the fossil fuel sector have been frequent claimants, initiating more than 200 cases.

Various options exist to transform IIAs into tools that are conducive to the promotion and facilitation of sustainable energy investment and climate concerns more generally. IIA reform actions should pursue a dual goal: (i) ensure that all provisions in IIAs appropriately safeguard the right and duty of States to regulate in the public interest, including in areas where frequent regulatory change is necessary, as in the case of an energy sector in transition, and (ii) enhance the ability of IIAs to positively contribute to the sustainable energy transition. The reform toolbox presented in chapter II focuses on four interacting action areas: the promotion and facilitation of sustainable energy investments, technology transfer, the right to regulate for climate action and the energy transition, and corporate social responsibility. For each action area, different policy options are provided (as summarized in table IV.11).

Table IV.11. IIA reform toolbox: promoting sustainable energy for all

Promotion and facilitation of sustainable energy investment	Incorporate IIA provisions aimed at actively promoting and facilitating sustainable energy investment
	Provide for preferential treatment of sustainable energy investment
	Establish institutional mechanisms for cooperation on R&D of sustainable technologies
	Commit to technical assistance on the adoption of investment facilitation measures for sustainable energy
Technology transfer and diffusion	Encourage technology transfer of low-carbon and sustainable technologies, including related know-how
	Make efforts to create an enabling environment to receive technology
	Allow certain kinds of performance requirements relevant to the energy transition
	Ensure that the protection of intellectual property rights does not unduly impede the diffusion of technology
Right to regulate for climate action and the energy transition	Refine the content of investment protection standards and reform investor–State dispute settlement with regard to energy investment
	Acknowledge the need for regulatory flexibility
	Include general exceptions related to climate change and the energy transition
	Clarify provisions on compensation and damages
Corporate social responsibility	Include binding obligations relating to corporate social responsibility
	Specifically oblige energy investors to comply with requirements for sustainable investment (e.g. by requiring environmental impact assessments and maintenance of an environmental management system)

Source: UNCTAD.

Since 2012, more than 90 countries and regional economic integration organizations have benefited from UNCTAD's support in developing reform-oriented model bilateral investment treaties and conducting IIA reviews. In 2022 and 2023, UNCTAD provided backstopping support on the Investment Protocol of the African Continental Free Trade Agreement, which promotes low-carbon and renewable energy investment while maintaining African countries' right to regulate.

e. Maintaining the momentum of sustainable finance and maximizing its impact

Global capital markets are the ultimate source for much of the investment needed for the energy transition. The growth rate of climate finance in those markets appears to have slowed and, despite the urgency of United Nations calls for immediate action, current financing levels remain inadequate. The trends in financial products, institutional investment, capital markets, and standards and regulations are by and large positive, but there is still room for improvement so that capital markets and sustainable finance can contribute further to sustainable energy for all.

The market for sustainable financial products needs continued surveillance to avoid greenwashing. The increase in the fossil fuel exposure of sustainable funds in 2022, a result of higher valuations of oil and gas companies, is not a positive step for the credibility and the growth of the market. In an environment of rising interest rates, sustainable fixed-income products such as green bonds need further support and wider availability, including in developing countries. The growing coverage of emissions trading and carbon pricing is positive, but still more than three quarters of global emissions are not covered and the spread in the price of carbon across different markets ranges from near $0 per tCO_2 to over $50 per tCO_2. Greater coordination and alignment are required, including a global or at the very least a benchmark price for carbon.

Institutional investors such as pension and sovereign wealth funds are ideally placed for helping finance sustainable energy. However, a majority of the world's largest funds have not yet committed to net zero in their investment strategies. They often lack access to investment opportunities. This especially affects funds from developing countries, which are often compelled to invest in developed-country assets instead of in assets in their own country. Policy action is needed to transform non-fiduciary investment opportunities in developing economies into fiduciary investment assets through international support for de-risking activities.

Stock markets play a crucial role in channeling capital to sustainable investment opportunities through listed companies or other products. Their public nature also makes them important sources of information about sustainability performance and compliance with a range of voluntary standards. There is growing concern that companies may opt to stay in the private market to avoid ever-expanding disclosure obligations. Policy action is necessary to enhance transparency and disclosure requirements in the private market.

Meanwhile, the proliferation of regulations on sustainability disclosure has led to other problems, including a lack of comparability and standardization across markets and sectors. However, as described in chapter III, standardization, comparability and interoperability are now improving, with efforts to align reporting standards on climate through the International Sustainability Standards Board as well as widespread mandatory use of the recommendations of the Task Force on Climate-Related Financial Disclosures and the standards of the Global Reporting Initiative.

UNCTAD will continue to monitor the sustainable and climate finance market to inform policymaking and discussions on investment in sustainable energy for all, including through the UN Global Sustainable Finance Observatory and the UN Sustainable Stock Exchanges Initiative, both housed in and managed by UNCTAD.

2. A Global Action Compact for Investment in Sustainable Energy for All

Since the adoption of the Paris Agreement, innumerable climate finance and investment strategies, road maps and action plans have been launched by multitudes of public and private stakeholders. The policies and instruments proposed by specialized agencies and development finance institutions are all important parts of the solution. PPPs, blended finance, investment guarantees and other de-risking mechanisms are fundamental to catalyze private investment in renewables and energy infrastructure. Enhancing the role of MDBs in energy transition investment, increasing concessional finance, expanding technical support to build pipelines of bankable projects and stimulating energy sector reforms to create a more conducive climate for private investment are recommendations of this and many other reports.

Based on an analysis of cross-border investment, international project finance, national investment policies and international investment treaties, this report has formulated several recommendations that are specific to international investment policy:

- The role of investment policymakers, authorities and promotion agencies in energy transition planning should be enhanced. Currently, they are mostly policy-takers, perceiving priorities for investment attraction from the needs formulated in NDCs and energy transition strategies. Their involvement as policymakers in formulating energy transition plans could help ensure that such plans provide a sufficient basis for the design, packaging, bundling and marketing of bankable projects.
- In many countries, and especially in developing countries, the general-purpose incentive mechanism applicable to investment across industries is also used for energy transition investment. Investment promotion instruments should consider the specific characteristics of energy investment, especially the high upfront capital expenditures and the need for long-term visibility on income and costs to facilitate debt financing.
- IIAs can hinder the implementation of policy measures needed for the transition to sustainable energy for all. IIA reforms should lower the risk of investor–State dispute settlement cases related to sustainable energy policies, prohibit the lowering of environmental standards to compete for investment and strengthen the promotion and facilitation dimension of measures.

Some of the policy actions called for in the previous section and the investment promotion mechanisms commonly recommended for the purpose of increasing finance and investment in the energy sector echo the proposals contained in UNCTAD's Investment Policy Framework for Sustainable Development, and specifically the Action Menu for Investment in the SDGs. That menu also aims to boost investment across a host of sectors in which governments generally have a public service responsibility – such as infrastructure, water and sanitation, health and education – and in which project finance is the prevalent form of international private sector participation.

Combining the recommendations above with existing SDG investment policy guidance, this report concludes with a proposal for a Global Action Compact for Investment in Sustainable Energy for All (figure IV.18). The design criteria for the Compact, for its guiding principles, advocate a balanced approach that considers all three objectives of the energy transition –

Figure IV.18. Global Action Compact for Investment in Sustainable Energy for All

Guiding principles

Design criteria for investment strategies, policies and treaties

Implementing a just transition to meet global climate goals	Achieving the goal of access to affordable and clean energy for all	Ensuring energy security and resilient energy supply

- Balancing the global energy transition imperative with the need for a differentiated approach in developing countries and especially LDCs
- Balancing the need for attractive risk-return rates with the need for accessible and affordable utility services
- Balancing short-term energy crisis responses with long-term transition and sustainable development goals
- Balancing the push for private funds with the fundamental role of public investment
- Balancing liberalization and regulation
- Balancing the need for policy space for sustainable energy measures with safeguards guarantees and protection for investors

Action packages

National Investment Policies
- Reorient general investment incentives to consider emissions performance
- Customize investment promotion mechanisms for energy transition investment
- Strengthen the capacity of investment promotion institutions to attract energy transition investment
- Leverage SEZs as energy transition models for the economy and to incubate sustainable energy investment

International Investment Policies
- Mainstream sustainable development as a core objective of IIAs
- Prohibit the lowering of environmental standards as a means to compete for investment
- Strengthen the promotion and facilitation dimension of IIAs
- Reform IIAs and investor–State dispute settlement to lower the risk of cases on sustainable energy policymaking

Global Partnerships
- Set up a one-stop shop for sustainable energy investment solutions, technical assistance and capacity-building
- Promote partnerships for support to groups of vulnerable economies with specific energy transition needs (e.g. LDCs, SIDS)
- Promote partnerships for developing investment initiatives in high-emissions/high-impact sectors (e.g. industry, agriculture, tourism)

Regional & South–South Cooperation
- Support regional industrial clusters and regional value chains in new strategic energy transition sectors
- Leverage regional economic cooperation in sustainable energy infrastructure development
- Factor in promotion of energy transition investment in regional trade, investment and industrial cooperation agreements

Financing Mechanisms & Tools
- Maximize the lending and de-risking capacity of DFIs, their focus on catalysing energy transition investment, and their weight in countries with low access to electricity
- Leverage PPPs, in combination with DFIs, to lower financing costs for private investors and to turn projects into fiduciary assets for institutional investors
- Increase deployment of blended finance to mobilize additional private capital

Capital Markets & Sustainable Finance
- Ensure adequate standards, disclosure requirements and monitoring capacity to eliminate greenwashing
- Expand requirements to private markets to minimize risks in the process of fossil fuel asset sell-offs
- Expand coverage of carbon markets and exploit cross-border impact potential of voluntary carbon markets
- Raise awareness and capacity to grow sustainable finance in emerging markets

Coherence & synergies with other policy areas

Energy policy:
Provide detailed energy transition investment planning, linked to NDCs, as a basis for bankable projects

Industrial policy:
Connect energy investment planning with development objectives and opportunities for strategic sectors

Trade policy:
Ensure responsible and resilient supply chains for critical minerals and environmental goods, and value chains that offer widespread development benefits

Science and technology policy:
Maximize the capacity of economies to effectively absorb advanced sustainable energy technologies in energy generation and in industry

Public finance:
Ensure responsible and targeted use of concessional loans, subsidies, fiscal incentives and other mechanisms for promoting energy transition investment

Source: UNCTAD.
Note: See UNCTAD's Investment Policy Framework for Sustainable Development for detailed national and international investment policy guidance and UNCTAD's Action Menu for Investment in the SDGs for more action packages. DFI = development finance institution, IIA = international investment agreement, LDCs = least developed countries, NDCs = nationally determined contributions, PPP = public-private partnership, SEZ = special economic zone, SIDS = small island developing States.

meeting climate goals, providing affordable energy for all and ensuring energy security – and recognizes the need to find an equilibrium in investment and energy policymaking between many alternative approaches.

The Compact puts forward six action packages. The national and international investment policy action packages contain the areas of intervention discussed above. A key priority should be the strengthening of IPAs and related institutions (including special economic zones) to improve their capacity to attract energy transition projects. This will require capacity-building and innovative solutions, such as the possibility for IPAs to participate in project preparation facilities for green finance, which provide financial and technical assistance for the preparation of project funding proposals, effectively transforming IPAs into investment development agencies – as first proposed in UNCTAD's Action Menu for Investment in the SDGs.

The Compact contains two action packages that emphasize the importance of strategic partnerships and international cooperation. Connected to the need to strengthen investment project development capabilities in developing countries, a first initiative is to bring together on a common platform the gamut of technical assistance and capacity-building solutions that are on offer from development institutions and international organizations. In 2022, UNCTAD took the initiative to establish the World Investment for Development Alliance, in which numerous UN agencies join hands with the World Bank, the Organisation for Economic Co-operation and Development, the World Association of Investment Promotion Agencies, and several knowledge partners and regional organizations, including the African Union, to tackle common investment policy challenges. The Alliance could work towards such a "one-stop shop" for sustainable energy investment capacity-building.

Other potential partnership initiatives could be built to support groups of countries that have specific investment needs or that are particularly vulnerable to the impact of climate change. For example, an initiative that brings together SIDS, development banks, financial institutions and energy firms could address the specific challenges that SIDS face in attracting investment in sustainable energy. The Investment Advisory Council, a joint initiative between UNCTAD and the International Chamber of Commerce created to leverage both business and policymaker perspectives on promoting investment in the LDCs, could consider initiatives to support the energy transition in those countries.

Partnerships could also be developed for sectors that have a specific energy-use profile or that are particularly energy-intensive. In certain developing countries, partnerships can also support the achievement of industrial development objectives, such as in the case of the tourism industry illustrated in this chapter. For industry, special economic zones could play an important coordinating role and act as a catalyst for action in manufacturing sectors that are not directly affected by the energy transition in the way that the energy or automotive sectors are. With their important function as export hubs for goods and services from developing countries to markets that are set to place increasing demands on emissions performance, special economic zones have the opportunity to provide value added services.

This important connection with trade policy is also the driver of another proposed action item, which is to factor energy transition investment promotion into international trade and investment cooperation frameworks. International trade and investment policy can contribute more to climate action by designing rules and proposing trade and investment facilitation methods that help improve the resilience of international supply chains to climate change, ensure responsible supply chains for critical minerals and environmental goods, and maximize the development benefits that countries can derive from participating in growing renewable-energy value chains. To support this, UNCTAD and the World Trade Organization announced a collaborative initiative at COP27 to jointly develop a set of principles for trade- and investment-related climate action.

The Compact's action package on financing mechanisms and tools to catalyse private investment in sustainable energy builds, as mentioned above, on common policy advice provided by all agencies and development finance institutions. This chapter has shown that de-risking investment through loans, guarantees, insurance instruments and equity participation of both the public sector – through PPPs and blended finance – and MDBs is an important prerequisite for achieving the investment levels required in developing countries that have high risk ratings, and necessary to mitigate the cost-of-capital disincentive to invest in renewable energy installations. Increasing the use of PPPs is fraught with challenges, given the negative experiences of the past in many developing countries, but their essential role in energy investment makes it imperative to put in place the necessary institutional capacity and safeguards to ensure they work in the common interest. As for MDBs, maximizing their capacity to catalyse investment for the energy transition, and ensuring that this capacity is deployed in the countries that need it the most, is urgent. The range of financing institutions that can support energy transition investment should also be considered as widely as possible. Export-import banks, for example, can create new facilities to support sustainable energy projects in developing countries. Guarantee schemes, such as those provided by the Multilateral Investment Guarantee Agency, also need scaling up to bring more projects to investment grade, which is a condition for greater participation by institutional investors.

That recommendation links to the final set of actions on sustainable finance in capital markets. Significant progress is being made in improving climate disclosure and harmonizing reporting standards. Expanding requirements to private markets is important across sectors, but it is particularly important in the energy sector, where listed companies, to avoid the risk of stranded assets, will continue to offload fossil fuel operations, often to private equity firms or smaller operators with less stringent reporting requirements. Ensuring the responsible behaviour of both sellers and buyers of assets, and enabling public scrutiny of that behaviour, should be a priority for markets, regulators and the industry itself.

* * *

This report has documented significant achievements over recent years, in the form of rapidly growing international investment in renewable energy, widespread policy action to promote and facilitate investment in the energy transition, and solid interest in sustainable finance in global capital markets. However, significant gaps remain. International investment is concentrated in renewables, while other energy infrastructure sectors that will be key to the transition receive much less attention. Nationally determined contributions and energy transition strategies in many countries do not provide a sufficient basis for investment planning, and investment promotion mechanisms in developing countries often fail to address the specific challenges of the energy sector. And while sustainable finance has reached mainstream status in developed markets, too little capital flows to projects in developing economies.

This report comes at the midpoint of the "SDG Era". Looking back at the period after the adoption of the SDGs and the Paris Agreement, it seems that – despite all the challenges and crises that the world has faced – the conditions for rapid growth of investment in sustainable energy infrastructure have been exceptionally conducive. The cost of finance has been extremely low – witness the boom in international project finance – and the cost of renewable energy technologies, especially solar installations, has been decreasing exponentially, to the point that renewables are now more competitive than fossil fuels.

This is now changing. Interest rates are rising, and inflation is driving up prices of the raw materials needed for renewable energy components. Moreover, the energy crisis and energy security concerns are leading to a degree of distraction from a singular focus on energy transition objectives in many countries. Therefore, now is the time to redouble efforts,

to bridge the gaps left to date in climate finance and investment, and to ensure that the momentum of energy transition investment is maintained despite emerging headwinds.

UNCTAD's World Investment Forum, which will take place in October this year in Abu Dhabi, will be an important opportunity in this respect. Taking place ahead of COP28, in the same location, the WIF2023 offers a platform for policymakers at the highest levels, and for the broadest possible constituency of investment-for-development stakeholders, to take forward the actions proposed in the Global Action Compact for Investment in Sustainable Energy for All.

NOTES

[1] Estimated on the basis of shares of foreign assets of major utilities companies and international flows of greenfield investment in renewables.

[2] Regulatory, technological and environmental factors are the core competency of specialized energy agencies, notably IRENA and the IEA.

[3] Countries can find support from international agencies in the development and definition of their energy transition plans. For example, IRENA's global renewable energy road map programme (REmap 2030) assists countries and regions in scaling up renewable energy use. REmap assesses renewable energy potential, starting with country analyses in collaboration with country experts, and then aggregating the findings to provide a global picture. The road map focuses not only on renewable power technologies, but also on technology options in heating, cooling and transport. Metrics in the technical analysis include technology, sector and system costs; investment needs; externalities relating to air pollution and climate; CO_2 emissions; and economic indicators such as employment and economic growth.

[4] For more on this aspect, see Allan, B., J.I. Lewis and T. Oatley (2021). "Green industrial policy and the global transformation of climate politics". *Global Environmental Politics*, 21, no. 4: 1–19.

[5] Rapid Transition Alliance (2022), "Doing development differently: How Kenya is rapidly emerging as Africa's renewable energy superpower", 17 November.

[6] See also Timilsina, G.R., and M. Toman (2016), "Potential gains from expanding regional electricity trade in South Asia". *Energy Economics*, 60: 6–14.

[7] This analysis is based on review of 798 renewable energy policies and laws, covering 192 economies, focusing on investment promotion instruments and incentives used around the world to foster private investment in the renewable energy sector. The database covers 192 economies, including 186 Member States of the United Nations. It does not cover the following Member States: Benin, the Central African Republic, Comoros, Sao Tome and Principe, and South Sudan. The database covers the following economic entities and non-member observer States: Cook Islands, Hong Kong (China), Kosovo (United Nations Administrative Region, Security Council resolution 1244 (1999)), Niue, State of Palestine and Taiwan Province of China.

[8] UNCTAD's annual World Investment Prospects survey, conducted in April–May 2023, received responses from 72 investment promotion agencies in 70 countries.

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