TRACKING SDG7

THE ENERGY PROGRESS REPORT 2021

A joint report of the custodian agencies

IEA International Energy Agency

IRENA International Renewable Energy Agency

United Nations Statistics Division

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

World Health Organization

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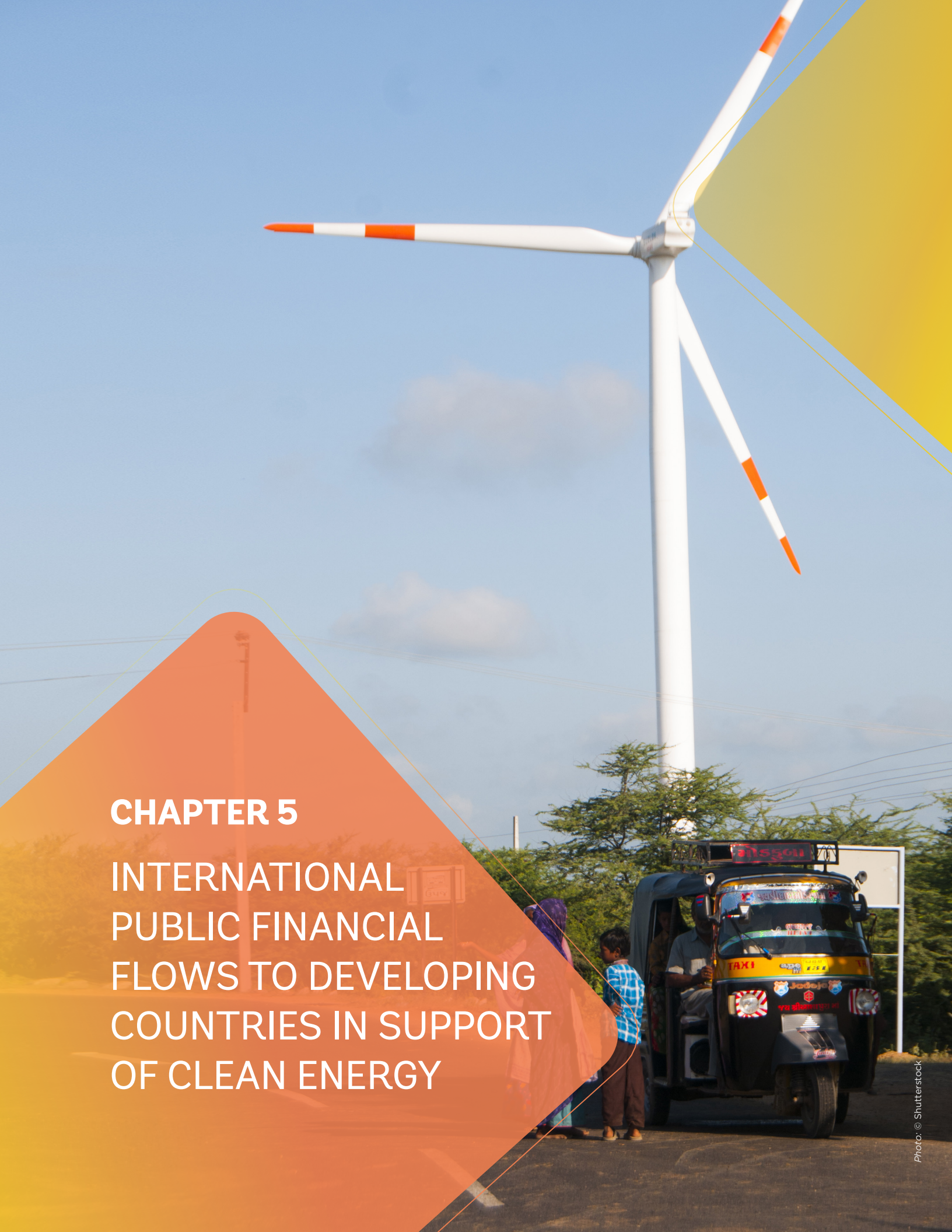

CHAPTER 5

INTERNATIONAL PUBLIC FINANCIAL FLOWS TO DEVELOPING COUNTRIES IN SUPPORT OF CLEAN ENERGY

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MAIN MESSAGES

- **Global trends:** Although renewable energy investments continue to be sourced primarily from the private sector, the public sector remains a major source of financing and is central in leveraging private capital, particularly in developing countries. Tracking of SDG indicator 7.a.1 by the custodian agencies shows that international public financial flows to developing countries in support of clean energy amounted to USD 14 billion in 2018, a 35 percent decrease from an all-time high of USD 21.9 billion in 2017 (box 5.1). Overall, however, the trend in international public financial flows has been positive over the past decade, with a threefold increase in the 2010–18 period when considering a five-year moving average. Combined with a 59 percent increase in active donors between 2010 and 2018, this trend demonstrates growing support from international donors for renewable energy in developing countries. Yet the level of financing remains below what is needed to reach SDG 7, in particular for the least developed countries (LDCs) and in a post-pandemic context.
- **The target for 2030:** Although there is no quantitative target for international public financial flows to developing countries under indicator 7.a.1, the overarching target of SDG 7.a points to the importance of enhancing international cooperation. In light of the pandemic and the urgent need to scale up overall investment in renewable energy, financial flows to developing countries must surge, especially toward those countries falling farthest behind—notably the LDCs. The pandemic has exacerbated the existing vulnerabilities of these countries, including: declining investments, growing debt burdens, and severely reduced fiscal space. In 2020, donors deployed sizeable capital for emergency responses, focusing first on protecting lives and livelihoods while reducing debt loads. In the post-COVID recovery phase, aligning public financial flows with low-carbon and climate-resilient development will be critical to accelerate progress toward SDG 7 while simultaneously stimulating economic development and employment. Several development finance institutions (DFIs) and governments have issued promising announcements in support of such efforts—but more is needed.
- **Technology highlights:** International public financial flows plummeted across all renewable energy technologies between 2017 and 2018, with the largest declines in hydropower and wind, which both fell by 61 percent. While hydropower has received the largest share of commitments over the period 2010–18, recent years have seen public financial flows redirected toward solar energy, which received 20–25 percent of commitments in 2016–18. A larger share of commitments has also been targeted toward "multiple/other renewables," including non-technology-specific support for multipurpose green funds and supporting infrastructure, such as grids and storage, among others. Altogether, these have amounted to some 20 percent of total commitments in recent years.
- **Regional highlights:** Except for Eastern and South-eastern Asia, international financial flows to all regions slowed between 2017 and 2018. Over the period 2010–18, however, flows to all regions followed a positive trend. The steepest rises were observed in Central and Southern Asia and Oceania—which saw six- and fourfold increases, respectively, during the period 2010–18 (using a five-year moving average). Although flows doubled from 2010 to 2018, Sub-Saharan Africa saw less growth than other regions in public financial flows. Nevertheless, the region has attracted more commitments to off-grid renewable energy, and targeted efforts have been launched during the pandemic to protect this important sector (box 5.2).

- **Country highlights and distribution:** Public financial flows continue to be concentrated in a few countries, although distribution by population improved between 2010 and 2018. Top receiving countries in absolute terms over the period 2010–18 were emerging economies and some of the countries with the largest access deficits—including India, Pakistan, Nigeria, Argentina, and Turkey. Together, these five countries received 30 percent of total commitments. In 2018 the 46 LDCs received 20 percent of commitments, the same level as in 2017 in absolute terms but less than in 2016 and 2015. On a per capita basis, most LDCs received less than the average across developing countries —most of these are in Sub-Saharan Africa, home to several of the world's top access-deficit countries.
- **Financing instruments highlights:** The most commonly used financial instruments were concessional loans, representing on average 65 percent of annual financial commitments over the 2010–18 period. A rising trend in use of risk-mitigation instruments (including guarantees and insurance) began in 2010, particularly for wind and solar projects. These instruments can help mobilize private capital as they effectively reduce actual and perceived risks and the cost of capital. Growing use of risk-mitigation instruments will also be critical in the post-pandemic phase, given that recent market uncertainty, including increased off-taker risk and volatility in financial markets, have made investors more risk averse.

BOX 5.1 • IN THIS EDITION, A NEW CHAPTER ON SDG INDICATOR 7.A.1

The 2021 edition of the report for the first time features a full chapter on SDG indicator 7.a.1. Designed to enhance international collaboration, this indicator measures the amount of international public finance being deployed to support clean energy in developing countries under SDG 7.a. For purposes of the indicator, clean energy is understood to mean renewable energy, including bioenergy, geothermal, hydropower, ocean, solar, and wind energy, as well as hybrid systems.

The indicator covers official loans, grants, and equity investments received by countries on the Development Assistance Committee's (DAC) list of recipients of official development assistance (ODA), as well as any additional developing countries that are recipients of assistance in support of clean energy from foreign governments, multilateral agencies, and other development finance institutions. The indicator does not track private finance leveraged through these international public financial flows, although such finance is certainly relevant.

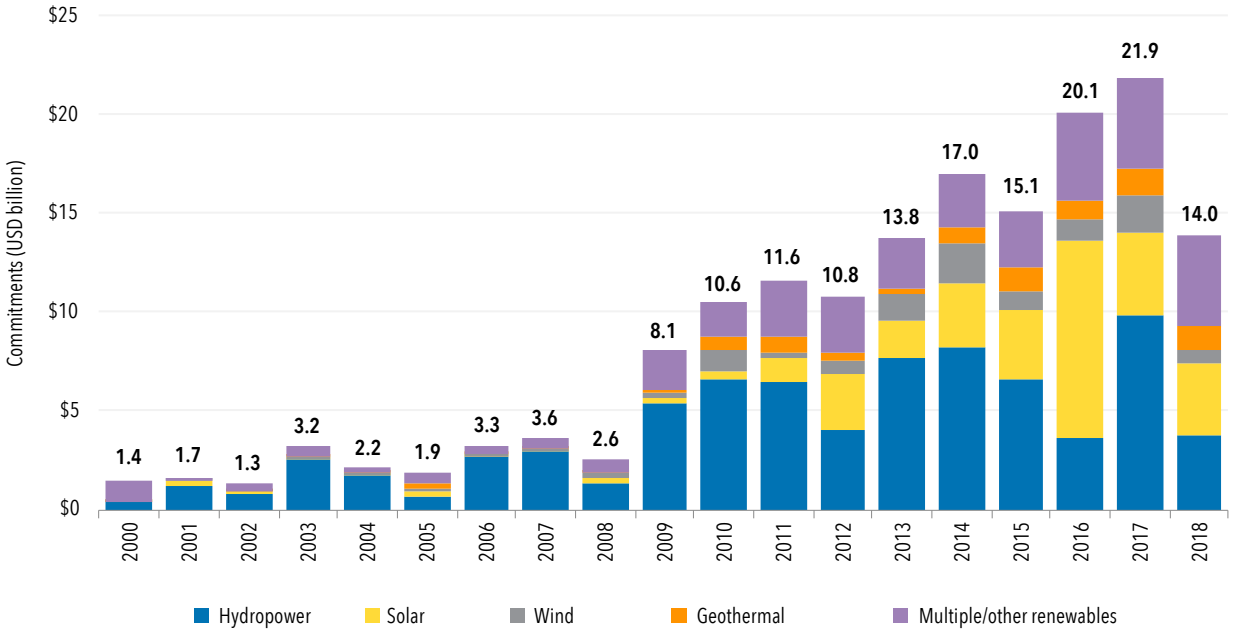
For this indicator, international public financial flows are recorded as the financial commitments made by donors, irrespective of the time required to complete disbursements. It should be noted that financial disbursements may spool out over weeks, months, or years. The focus on commitments allows for a more comprehensive and granular analysis of financial flows and ensures methodological consistency across data sources.

More details about the scope of the data and data limitations can be found in the methodology section at the end of this chapter.

ARE WE ON TRACK?

Findings suggest that important progress was made over 2010–18 in enhancing international financial flows to developing countries for clean energy, although commitments dropped from an all-time high of USD 21.9 billion in 2017 to USD 14.0 billion in 2018 (figure 5.1).[51] This decrease is primarily explained by the fluctuating nature of annual commitments[52] and to a few large outlier projects. The decline in 2018 was attributable chiefly to a 61 percent drop in hydropower commitments (from USD 9.8 billion in 2017 to USD 3.8 billion in 2018), following a large single-project commitment in 2017 of USD 5.2 billion to fund the Mambilla hydroelectric plant in Nigeria. The decline in financial flows in 2018 could partly also reflect the turbulence of this particular year for global economies (Jones 2018) and the trend of falling global investments in renewable energy technologies (box 5.4).

FIGURE 5.1 • Annual international public financial flows (commitments) to developing countries in support of clean energy research and development and renewable energy production, by technology (USD; 2000-18).



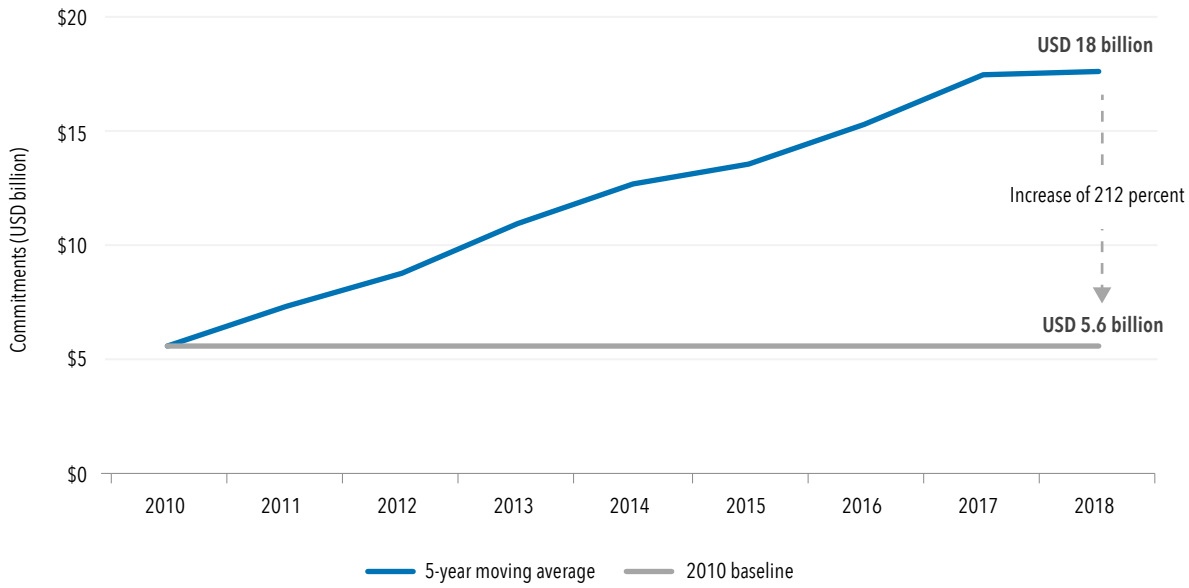
Source: IRENA and OECD 2021.

To better reflect the trend in financial flows, the analysis in this chapter also considers a five-year moving average showing that financial flows grew threefold between 2010 and 2018, from USD 5.6 billion to USD 17.6 billion (figure 5.2). While remaining stable in 2018, average financial flows rose steadily each year between 2010 and 2017, demonstrating progressively growing support from international donors for clean energy in developing countries. This growing support is further confirmed by the increase in active donors making financial commitments to clean energy, although flows continue to be heavily dominated by a handful of capital providers. The effects on the trend of the disruptions of the pandemic and changing priorities of DFIs and donor countries remain to be seen.

51 Except as otherwise indicated, the data underlying the figures and graphs in this chapter were drawn from the IRENA Renewable Energy Public Investments Database, a database based on OECD and IRENA data on international financial flows to developing countries in support of clean energy (https://www.irena.org/Statistics/View-Data-by-Topic/ Finance-and-Investment/Renewable-Energy-Finance-Flows). All USD amounts have been adjusted to constant prices and 2018 exchange rates.

52 Indicator 7.a.1 tracks international financial flows as annual commitments as opposed to disbursements. The methodology section at the end of the chapter offers further details.

FIGURE 5.2 • Commitments based on five-year moving average against 2010 baseline (USD; 2020-18).



Source: IRENA and OECD 2021.

Although there is no quantitative target under SDG indicator 7.a.1 on international financial flows to developing countries, it is clear that financial commitments to developing countries will have to increase, in light of the COVID-19 crisis and the need to boost renewable energy investment—from global levels of around USD 300 billion per year in the power sector alone, to USD 550-850 billion a year throughout 2019-30 (IEA 2020; IRENA 2020c).[53] Furthermore, the need to bolster financial support to developing countries has been identified as a central commitment under both the Paris Agreement and the Addis Ababa Action Agenda. Most important are efforts to direct financial flows toward those countries trailing farthest behind.

International financial flows to developing countries in support of clean energy advanced over 2010–18 and achieved a more even distribution across the population. But the overall numbers mask the disproportionate weight of a few countries and a few large commitments. Top receiving countries—namely, India, Pakistan, Nigeria, Argentina, and Turkey—accounted for 30 percent of total commitments in absolute terms over the period. Several of these top receiving countries have become donors themselves in recent years.

The 46 LDCs lie at the lower end of the recipient scale. LDCs received around 20 percent of commitments over the 2010–18 period and a total of USD 2.8 billion in 2018, the same level as in 2017 yet lower than in 2016 and 2015. Over half of LDCs (24 out of 46) received less than USD 2.5 per capita—lower than the average—leaving plenty of room for scaling up support. Many LDCs are in Sub-Saharan Africa, which is home to some of the top energy access-deficit countries in the world. Often underserved by the private sector, these countries are gravely in need of international support, as also demonstrated by other studies (e.g., SEforAll and CPI 2020).

53 See chapter 6 on investment levels needed to reach SDG 7.

LOOKING BEYOND THE MAIN INDICATOR

This section further explores the 2010–18 trends for public financial flows to developing countries in support of clean energy research and development and renewable energy production. It analyses trends across technologies, geographical contexts, and financial instruments. While international public financial flows are important to renewable energy finance, they represent only a portion of global renewable energy finance, which is further described in this section (box 5.4).

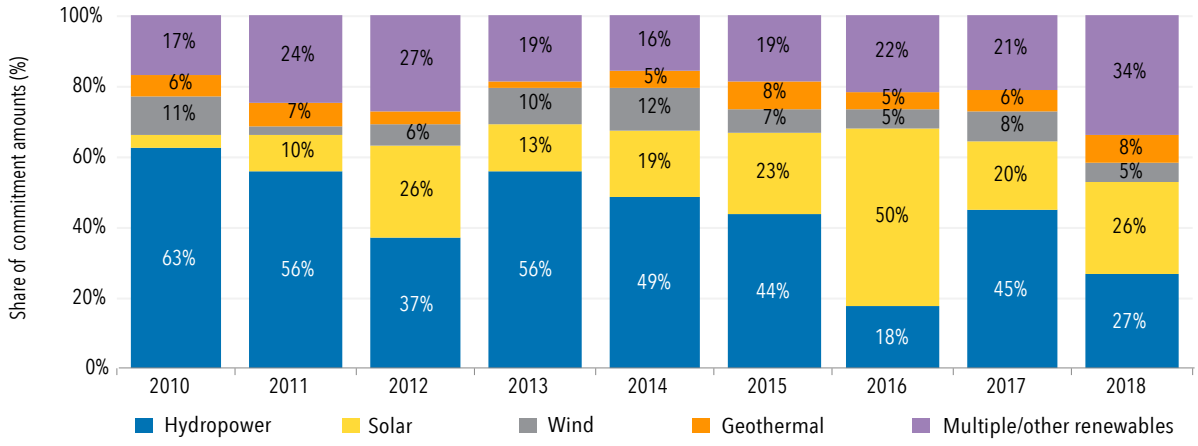
TECHNOLOGY TRENDS

The great majority of international financial flows to developing countries in support of clean energy is technology-specific, meaning that the donor has allocated the support (regardless of its type) to a specific renewable energy technology. Such technology-specific support may include, but is not limited to, project-level financing for feasibility studies, project development and production, supporting infrastructure, as well as research and technical assistance.

Between 2017 and 2018, international commitments decreased across all technologies under the SDG 7.a.1 indicator.[54] The largest drops were in flows for hydropower and wind, which each fell 61 percent—from USD 9.8 billion to USD 3.8 billion for hydropower and from USD 1.8 billion to USD 0.7 billion for wind. Meanwhile, financial commitments to geothermal and solar energy dropped, respectively, by 19 and 16 percent—from USD 1.4 billion to USD 1.1 billion for geothermal and from USD 4.3 billion to USD 3.6 billion for solar. The category "multiple/other renewables," including support not specific to any particular technology (e.g., dedicated to multipurpose green funds or underlying infrastructure) grew 3.9 percent, from USD 4.5 billion to USD 4.7 billion.

Of the USD 134.8 billion in total financial flows over the period 2010–18, hydropower attracted the largest share (42.2 percent on average) despite declines in 2016 and 2018 (figure 5.3). These commitments in support of hydropower were mainly concentrated in India (USD 10.7 billion), Pakistan (USD 9.9 billion) and Nigeria (USD 6.6 billion). Support for hydropower was followed by solar, multiple/other renewables, and wind, which attracted averages of 22.9 percent, 21.7 percent, and 7.6 percent, respectively, for the 2010–18 period.

FIGURE 5.3 • Share of annual commitments by technology (2010-18).



Source: IRENA and OECD 2021.

Note: "Multiple/other renewables" includes commitments that could not be categorized as support for a specific technology for various reasons: unclear commitment description; commitments directed to support more than one technology; technologies receiving insignificant commitments such as bioenergy; or multipurpose financial instruments such as green funds, renewable energy and electrification programs, technical assistance activities, and infrastructure supporting renewable energy.

54 Clean energy for this indicator takes into consideration support for renewable energy, including bioenergy, geothermal, hydropower, ocean, solar, and wind energy, as well as hybrid systems.

Disregarding the peak in commitments in 2017 (USD 21.9 billion), the share of financial flows going to support hydropower has declined since 2015 (sinking in 2016 to 18 percent of commitments and in 2018 to 27 percent) in favor of other technologies, such as solar, wind, and multiple/other renewables, including renewable energy infrastructure.

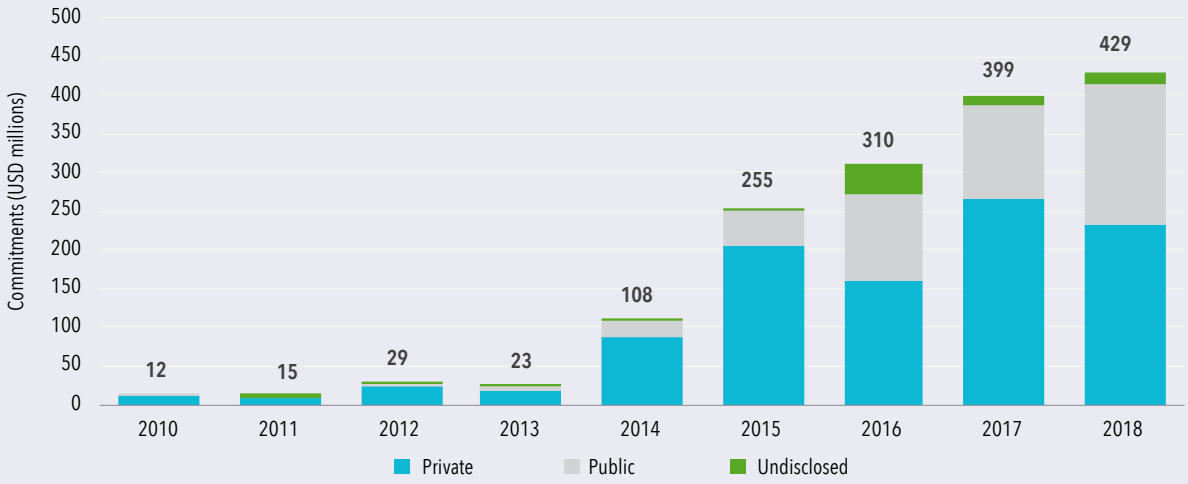
Since 2010, financial flows to developing countries have increasingly targeted solar energy, growing from shares of around 4 percent in 2010 to 20-50 percent in 2016–18. The increased interest of international donors in solar energy reflects a global trend. Solar installed capacity has undergone unprecedented growth over the past decade, partly because of technology cost reductions and market maturity (IRENA and CPI 2020). In addition, international donors have recently shown more interest in applications of solar technology in the off-grid renewable energy sector (for example, solar home systems and mini-grids), a key component to accelerate access to energy in developing countries (box 5.2 provides an overview of off-grid renewable energy financing trends).

From 2010 to 2018, international donors increased their financial commitments to what is categorized in this chapter as multiple/other renewables, attracting around 22 percent of yearly average commitments—a share comparable to that of solar. This category includes multipurpose green funds, which have multiplied in recent years, providing a convenient option for resource allocation for donors and financial institutions (United Nations 2020). These funds can be pooled to support smaller projects, which for some of the individual donors and other development partners might otherwise be difficult to support. The category further includes commitments to support infrastructure not specific to any particular technology, such as grids and battery storage. Multilateral development banks are moving increasingly towards supporting renewables by financing infrastructure, since investments in renewable power-generation assets can come directly from the private sector in many countries.

BOX 5.2 • OFF-GRID RENEWABLE ENERGY INVESTMENTS

Financing for off-grid renewable energy solutions in developing countries—both stand-alone systems and mini-grids—has grown considerably over time, albeit from a small base, from just USD 12 million in 2010 to nearly USD 430 million in 2018 (IRENA, based on Wood Mackenzie 2020) (figure B.5.2.1). During this period, off-grid renewables attracted more than USD 1.6 billion in commitments from private and public investors focused on solar home systems (accounting for 66 percent of the total), mini-grids (15 percent), and solar lights (12 percent).

FIGURE B.5.2.1. Annual public and private investments to off-grid renewable energy in developing countries, (USD; 2020-18)



Source: IRENA analysis based on Wood Mackenzie (2020).

Public financing has played a pivotal role in financing off-grid renewables, providing, on average, 32 percent of commitments during 2013–18—as compared to an average public share in total renewable energy investments of 14 percent (IRENA and CPI 2020). In the off-grid space, the role of public financing has also swelled over time—with shares growing from just 1–2 percent in 2010–11 to 30–42 percent in 2017–18—reflecting the increasing importance that public investors have attributed to these solutions for the provision of affordable, reliable, and sustainable energy services, as well as associated socioeconomic development. Meanwhile, the magnitude of private financing has also expanded, reflecting growing maturity and activity in the sector. Sub-Saharan Africa attracted the majority of public financial flows to off-grid renewable energy solutions in 2010–18 (69 percent). Public finance in the region was provided for the most part by international donors, including DFIs and government agencies, which provided 85 percent of total public commitments to off-grid renewables over the period. But the fact that finance is concentrated in a few countries (for example, Nigeria, the United Republic of Tanzania, and Rwanda) remains a key challenge, since many other countries are in need as well (IRENA, based on Wood Mackenzie 2020).

Even as investment in the off-grid renewable energy sector has grown, it still represents only about 1 percent of the total investment in energy access in deficit countries (IRENA and CPI 2020). Bankable business models are a key requirement for scaling up private sector participation. They would need appropriate risk-allocation frameworks and risk-mitigation instruments. An off-grid/mini-grid project is often perceived as nontraditional and risky, with the expected energy demand and associated ability to pay in the initial stages likely to produce uncertainty, in addition to other notable risks (such as licensing and permitting issues, lack of a track record, among others). As a result, access to affordable debt and project financing with appropriate tenors for off-grid projects remains challenging, leading most projects in the market to rely almost exclusively on grants or equity financing. Through the Solar Risk Mitigation Initiative (SRMI), the World Bank is proposing, in partnership with the Green Climate Fund, an innovative mechanism. It will mitigate minimum revenue payment risks, alleviating the demand risk and enhancing financial sustainability in the initial years of mini-grid projects. Also explored are additional coverage for financial risks, breach of contract, and provisions allocating risk if a law changes.

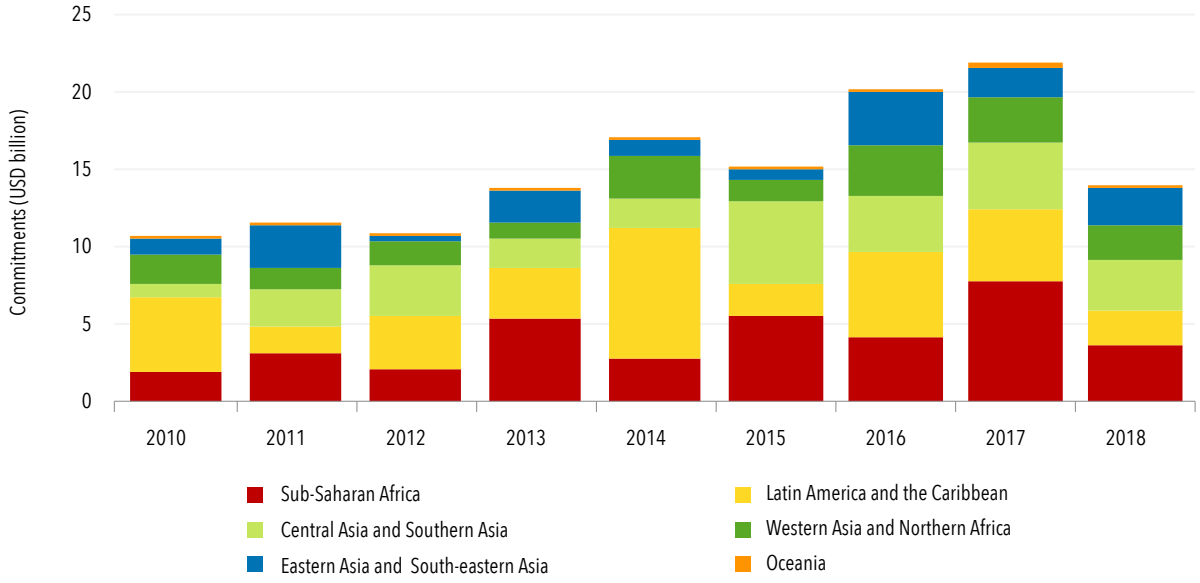
The COVID-19 pandemic has hit rural communities in developing countries especially hard, curtailing investments in energy access. Off-grid renewable energy solutions are key to the socioeconomic development and recovery of these communities, with stand-alone systems providing energy services to more than 420 million people globally (GOGLA 2020). Governments and donors have a key role to play in ensuring the survival and sustainable recovery of the sector. Some initiatives led by DFIs have been put in place in response to COVID-19.

For instance, the African Development Bank established the COVID-19 Off-Grid Recovery Platform to provide relief to energy access companies selling and deploying decentralized renewable energy solutions. As part of the initiative, the bank approved USD 20 million in concessional funding, which is expected to leverage USD 30–40 million in additional commercial investments (AfDB 2021). Similarly, under its Building Back Better approach, the World Bank is supporting the multistakeholder COVID-19 Energy Access Relief Fund. Established with USD 100 million in funding, it will provide concessional financing to small to medium-size enterprises in the energy-access sector (SIMA 2020). The World Bank has been scaling up electrification of health-care facilities (for example in Haiti), where a combined facility of USD 7.4 million from the Scaling-up Renewable Energy Program, the International Development Association, and the Energy Sector Management Assistance Program will electrify prioritized regional and district hospitals that lack reliable electricity and that currently have to rely on diesel. Countries such as Nigeria have also integrated investment plans in off-grid renewable energy solutions as part of their COVID-19 economic recovery plan (SEforAll 2020).

REGIONAL TRENDS

In 2018, international public financial flows in support of clean energy to developing countries not only dropped across all technologies but also across all regions, with the exception of Eastern and South-eastern Asia, where commitments grew by 43 percent over 2017 (figure 5.5).

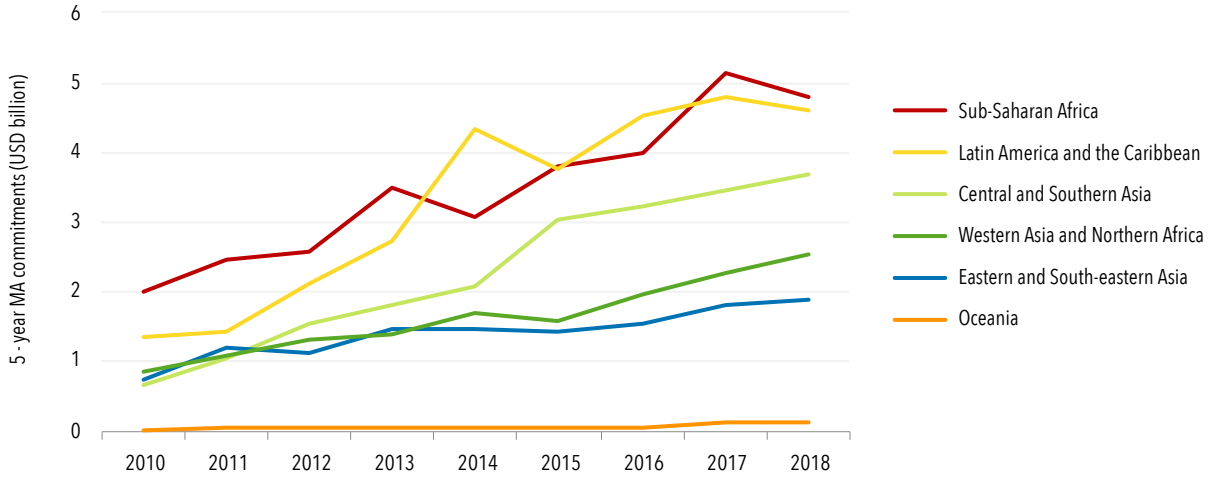
FIGURE 5.5 • Annual commitments by region, (USD, 2010-18)



Source: IRENA and OECD 2021.

Despite the decline in 2018, financial flows to all regions have grown steadily over the period 2010–18. The five-year moving average shows that Central and Southern Asia saw the largest average annual increase between 2010 and 2018, followed by Oceania, Latin America and the Caribbean, Western Asia and Northern Africa, and Eastern and South-eastern Asia (figure 5.6). Compared to other regions, Sub-Saharan Africa saw less growth in commitments when considering a five-year moving average. Nevertheless, the region attracted the highest total amount of public commitments over the period 2010-18, as well as the majority of public and private commitments in off-grid renewable energy. (box 5.2).

FIGURE 5.6 • Annual commitments by region based on a five-year moving average, (USD; 2020-18)



Source: IRENA and OECD 2021.

Central and Southern Asia saw a decrease in international financial flows, landing at USD 3.1 billion in 2018—down from USD 4.3 billion in 2017. Nevertheless, over the period 2010–18, financial commitments to the region grew steadily; in fact, Central and Southern Asia is the region that has seen the largest growth in annual average financial flows, with a close to sixfold increase according to the five-year moving average. In total, Central and Southern Asia received USD 26.9 billion in international public financial flows over the period 2010–18. Increased commitments in solar and wind energy starting in 2011 drove the growth—particularly in **India**, **Pakistan**, and **Bangladesh**—along with occasional large commitments to hydropower. The drop in 2018 may be ascribed to the fact that hydropower commitments reached only USD 492 million—the lowest value recorded in the region since 2010—down from USD 2.2 billion in 2017.

Financial flows to **Eastern and South-eastern Asia** reached a total of USD 2.5 billion in 2018, up from 1.8 billion in 2017. In total, the region received USD 15.8 billion in international public financial flows over the period 2010–18. The five-year moving average confirms a positive trend in the region, with average annual commitments more than doubling between 2010 and 2018. From a focus on hydropower projects prior to 2010, the region has seen increased commitments to various technologies—including wind, geothermal and solar—reaching shares of 28-48 percent between 2016 and 2018. The year 2018 was characterized by a rise in geothermal energy commitments, totaling USD 924 million and spread out among projects in **Indonesia**, **Philippines**, and **China**.

Latin America and the Caribbean saw international public financial flows fall to USD 2.3 billion in 2018—half of the USD 4.7 billion in 2017 commitments. In total, Latin America and the Caribbean received USD 36.2 billion in international public financial flows over the period 2010–18. While the trend based on the five-year moving average shows annual commitments tripling in 2018 compared with 2010, these annual commitments have stabilized since 2016. The technology mix of commitments has changed in the region from predominantly hydropower prior to 2010, to greater shares of solar and geothermal in recent years. Solar energy commitments, in particular, grew from a share of 1 percent in 2010 to between 25 and 50 percent in the 2016–18 period. Over time, the region has also seen increasing commitments to multi-technology projects and programs, which accounted for more than half of commitments in 2018.

For **Oceania**, financial flows amounted to USD 79 million in 2018—a significant drop from an all time high of USD 323 million in 2017. In total, Oceania received USD 800 million in international public financial flows over the period 2010–18. While commitments fluctuated greatly over the period 2010–18, the trend when looking at a five-year moving average shows an increase of almost four times in annual average investments between 2010 and 2018. Because the region attracts relatively small investments per commitment compared with other regions, any single year may vary considerably in the technology mix of commitments. Solar energy predominated in earlier years, with investments directed to small solar PV projects like rural electrification programs. The most substantial commitments were in hydropower projects. The drop in financial flows in 2018 followed a considerable commitment of USD 122 million to the Tina River Hydropower Development project in the **Solomon Islands** in 2017.

A drop in financial flows was seen in **Sub-Saharan Africa**, where commitments landed at a total of USD 3.7 billion in 2018—less than half of the record-high financial flows of USD 7.8 billion in 2017. In total, Sub-Saharan Africa received USD 36.5 billion over the period 2010-18, the highest total amount of all regions. There is a clear trend of increasing financial flows to the region—although lower growth than in the other regions—with average annual commitments doubling when looking at the five-year moving average. These flows have been channeled primarily to hydropower, which attracted less than 40 percent of financial commitments in 2010 but 72 percent in 2017 and 57 percent in 2018. The drop in financial flows in 2018 followed a record-high commitment of USD 5.2 billion to fund the Mambilla Hydroelectric Plant in **Nigeria**.

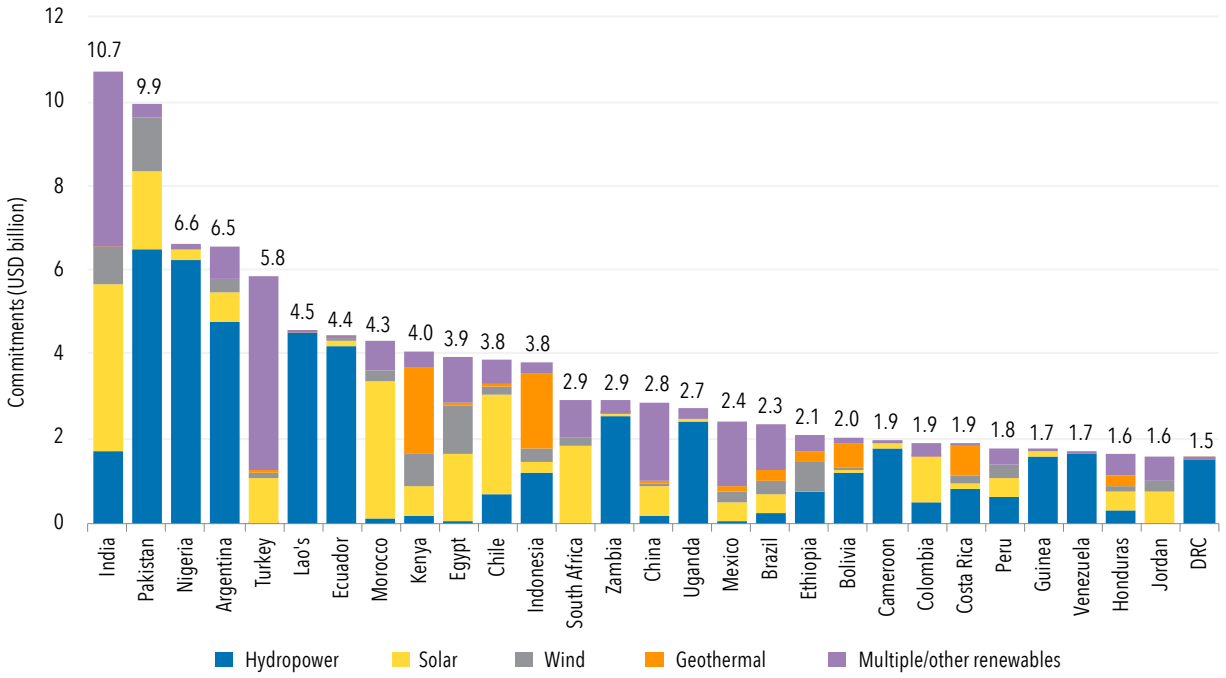
Financial flows to **Western Asia and Northern Africa** declined to USD 2.3 billion in 2018 from USD 3 billion in 2017. In total, Western Asia and Northern Africa received USD 18.5 billion in international public financial flows over the period 2010–18. The trend since 2010 has been positive, with average annual financial flows more than doubling between 2010 and 2018 when viewed through a five-year moving average. In recent years, the region saw an increase in solar energy investments, particularly in solar PV farms and distributed generation installations for buildings. In 2018, a considerable single-project commitment of USD 708 million was made to the 580 MW Noor Midelt I solar hybrid farm in **Morocco**.

COUNTRY TRENDS

While international financial flows to developing countries in support of clean energy increased over the period 2010–18 across all regions, a closer look at the data reveals that investments were concentrated in a small number of countries,[55] although the distribution across population has improved since 2010. Over the period 2010–18, 29 developing countries—representing 73 percent of the population in developing countries—attracted 80 percent of total financial flows (or USD 104 billion) (figure 5.7).

This concentration of flows largely reflects the operational policies and lending criteria of DFIs and donor countries. It should be noted that some of the recipient countries, having received very low financial flows, may not be eligible for or reliant on international public funding for clean energy investments. More and more developing countries are able to attract large amounts of private financing—especially some of the more mature clean energy markets or high-income developing countries. With that said, many developing countries continue to be underserved by the private sector as well as international public finance and are therefore in need of greater financial inflows to develop their clean energy sources.

FIGURE 5.7 • Total commitments by top recipients, (USD; 2020-18)



Source: IRENA and OECD 2021.

DRC = Democratic Republic of Congo.

Top receiving countries

India, Guinea, Indonesia, Turkey, and Morocco were the top receiving countries in 2018, accounting for close to 50 percent of total financial commitments that year. Guinea stands out in this group of emerging economies, based on a single commitment of USD 1.2 billion to a hydropower project, an amount that represents the great majority of what the country has received in financial commitments since 2010. The other four countries were steadily among the top receiving countries over the period 2010–18. Considering total commitments over the period 2010–18, top receiving countries were **India, Pakistan, Nigeria, Argentina,** and **Turkey**, together receiving 30 percent of total financial flows.

On the other end of the scale are developing countries that did not receive any international public financial flows in the entire 2010–18 period. Many of these are small territories or high-income economies such as **Bahrain, Singapore,** and the **United Arab Emirates**.[56]

55 "Country" as used in this chapter also refers, as appropriate, to territories or areas.

56 Countries with a per capita GNI of USD 12,536 or more are classified as high-income economies (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).

India attracted the highest investment volumes, receiving USD 10.7 billion during the 2010–18 period. In 2018 alone, the country was the top recipient, at USD 2.1 billion (representing 15 percent of the total financial flows for the year). This is an increase of USD 1.3 billion from the USD 834 million received in 2017. Over time, commitments in India have transitioned from focusing on hydropower to solar energy, which reached an all-time peak investment of USD 1.5 billion in 2016. As one of the top top energy access-deficit countries in the world, India is receiving public financial flows from European institutions and governments, several multinational donors, and region-specific donors.

Pakistan was the second-largest recipient country, attracting USD 9.9 billion between 2010 and 2018—mostly in hydropower (USD 6.5 billion). In 2018, Pakistan saw a 95 percent drop in financial flows, sinking to USD 101 million from a high of nearly USD 2.1 billion in 2017. The decrease was due to a substantial drop in hydropower and wind energy commitments. Since 2013, wind and solar energy technologies have become more attractive to funders. While the steadiest donors in Pakistan are international development banks and European institutions and governments, the largest donors over 2010–18 were China Development Bank and the Ex-Im Bank of China focusing on large-project funding.

As the third-largest recipient country, **Nigeria** attracted USD 6.6 billion in 2010–18. Following the record-high financial flows in 2017, commitments decreased to USD 97 million in 2018. These year-on-year fluctuations are explained by commitments to hydropower plants—representing 94 percent of total investments in 2010–18. These commitments overshadow the trend of increasing solar energy commitments in the country, which has increased from a total of less than USD 10 million in 2015 to almost USD 100 million in 2018. Most of these financial commitments came from the Ex-Im Bank of China.

Argentina attracted USD 6.5 billion of total investments during the 2010–18 period. In 2018, commitments dropped to USD 498 million from USD 516 million in 2017. Throughout the 2010–18 period, Argentina received several investments to large solar PV plants and wind power. In many cases projects were backed up by renewable energy auctions such as the RenovAr rounds. Significant investors in the country are China Development Bank, the International Finance Corporation, the U.S. International Development Finance Corporation, and the Development Bank of Latin America.

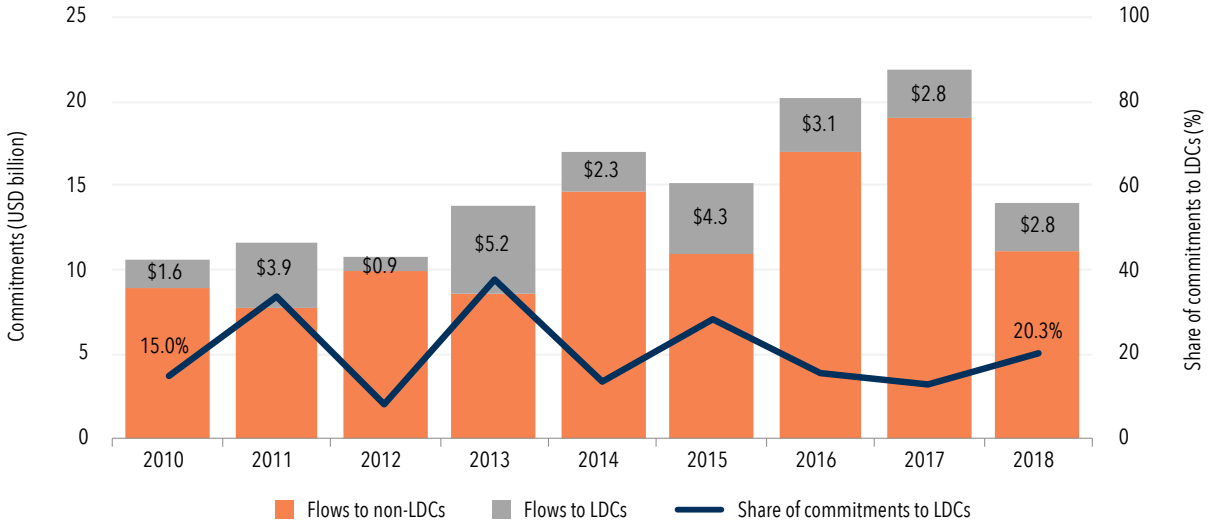
Turkey received USD 5.8 billion in public financial flows to clean energy in 2010–18. Commitments increased from USD 400 million in 2017 to USD 1 billion in 2018, mostly driven by investments to multi-technology projects and programs. In fact, these attracted most (77 percent) of the total investment in the 2010–18 period. Various donors targeted their commitments to Turkey, particularly the International Bank for Reconstruction and Development, the International Finance Corporation, institutions of the European Union (EU), the Islamic Development Bank, and KfW. For the first time in 2018, Turkey was also on the list of donor countries committing international public financial flows to clean energy.

Reaching those furthest behind

In 2020, the United Nations categorized 46 countries as LDCs - home to 1.06 billion people. Many of them are among the countries with the largest energy-access gaps and with limited progress toward attaining SDG 7. Lower levels of economic development, a less mature renewable energy sector, relatively weak financial markets, and political uncertainty make these countries particularly dependent on international public finance.

Over the period 2010–18, LDCs attracted 20 percent of total financial flows (USD 26.8 billion). That share has remained relatively stable. In 2018, they received a total of USD 2.8 billion, the same as in 2017, but lower than in 2016 and 2015 (figure 5.8). Decreased financial flows to LDCs risk leaving these countries even further behind on reaching SDG 7, but also on goals related to affordable, reliable, and modern energy (OECD 2019). This is even more relevant in light of the pandemic, which has hit these countries hard. The pandemic-induced recession may return millions of people to extreme poverty.

FIGURE 5.8 • Annual commitments to LDCs and non-LDCs in support of clean energy (USD; 2010-18)



Source: IRENA and OECD 2021.

On the positive side, all LDCs received financial flows at some point over the 2010–18 period and the number of LDCs receiving commitments annually increased from 33 countries in 2010 to 42 in 2018. Nevertheless, financial commitments are still concentrated in a few countries. The top receiving LDCs were **Lao People's Democratic Republic, Zambia, Uganda, Ethiopia,** and **Guinea,** which together attracted more than half of all commitments made in 2010–18. In 2018, **Guinea** and **Lao People's Democratic Republic** alone received 56 percent of commitments to LDCs. Those attracting the lowest financial commitments over this period were **São Tomé and Principe**, **Somalia,** and **Guinea-Bissau**.

Another group of vulnerable countries include the 53 small island developing states (SIDS), which face special circumstances and needs arising from the adverse impacts of climate change. In 2018, SIDS received a total of USD 220 million, down from an all-time high of USD 555 million in 2017. Over the period 2010–18, financial flows to SIDS more than tripled using a five-year moving average. Over this period, SIDS received a total of USD 2.2 billion—around 2 percent of total commitments to developing countries. The top receiving SIDS were **Cuba, Jamaica,** and **Solomon Islands,** which together attracted more than 31 percent of all commitments made to SIDS from 2010 to 2018. As further highlighted in the analysis below, many of the least-populated SIDS are among the top receivers per capita. Other SIDS—primarily high-income economies—received no commitments over the period.

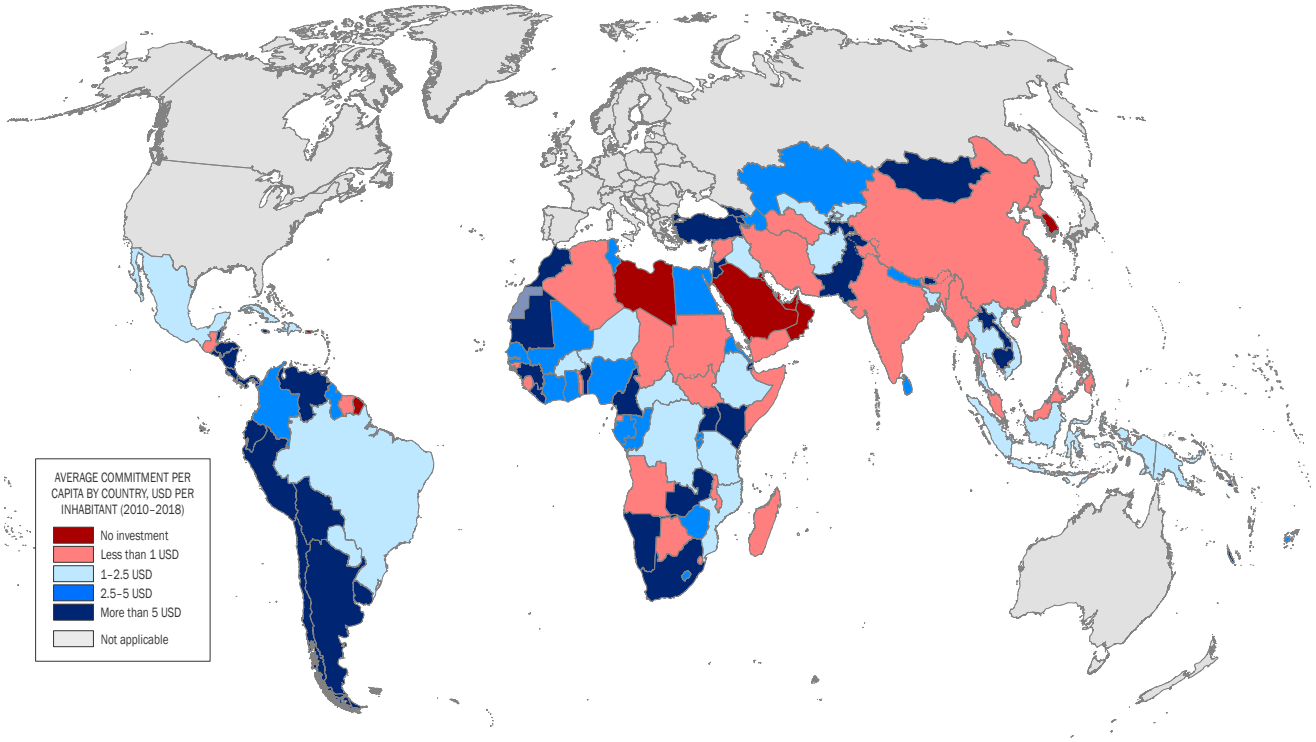
Special attention should also be directed to the 32 land-locked developing countries (LLDCs) facing trade and development challenges caused by their lack of sea access and their geographical remoteness[57]. In 2018, LLDCs received a total of USD 1.7 billion—a reduction of almost half compared with the USD 3.2 billion received in 2017. Over the 2010–18 period, LLDCs saw a 53 percent increase in commitments using a five-year moving average, a modest rise if compared with the tripling of financial flows to all developing countries. Still, LLDCs attracted commitments totaling USD 21.3 billion during the period, representing 16 percent of total commitments to developing countries. The top-receiving LLDCs were **Lao People's Democratic Republic, Zambia,** and **Uganda,** which together attracted almost half (47 percent) of total commitments made to LLDCs in 2010–18. The LLDCs that received the lowest commitments in the period were **Botswana, Turkmenistan**, and **Eswatini**.

57 While categorized as LLDCs, the Republic of North Macedonia and the Republic of Moldova are not considered "developing" by the United Nations and thus are excluded from the scope of the indicator and this analysis.

Distribution of financial flows to developing countries

The foregoing analysis of total financial flows showed that a large majority of total flows were concentrated in a small share of the developing countries. This section offers additional insights into the distribution of financial flows across population and how this has developed over the period 2010–18.

FIGURE 5.9 • Average commitment per capita by developing country (USD; 2020-18)



Source: IRENA and OECD 2021.

Note: The data on international public financial flows to developing countries in support of clean energy underlying this map were drawn from the IRENA Renewable Energy Public Investments Database, a database based on OECD and IRENA data (https://www.irena.org/Statistics/View-Data-by-Topic/Finance-and-Investment/Renewable-Energy-Finance-Flows). All USD amounts have been adjusted to constant prices and 2018 exchange rates.

Note/disclaimer: This map was produced by the Geospatial Operations Support Team of the World Bank based on the Cartography Unit of the World Bank. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the custodian agencies concerning the legal status of or sovereignty over any territory or the endorsement or acceptance of such boundaries.

On a per capita basis, public financial flows reached an average of USD 2.4 over the period 2010–18. This number hides important disparities across countries, as shown in figure 5.9. Most notable from the map is that the majority of LDCs (24 of 46) received less than the average per capita in developing countries—most of which can be found in Sub-Saharan Africa, where the world's top access-deficit countries are found. Thirteen of these countries were in the lowest bracket, receiving, on average, less than USD 1 per capita each year over the period 2010–18.

Among those countries that received more than the average of USD 2.4 per capita can be found the majority of lower- and upper-middle-income economies. Of the 61 countries that received more than USD 5 per capita, a majority were upper-middle or high-income economies (figure 5.9).

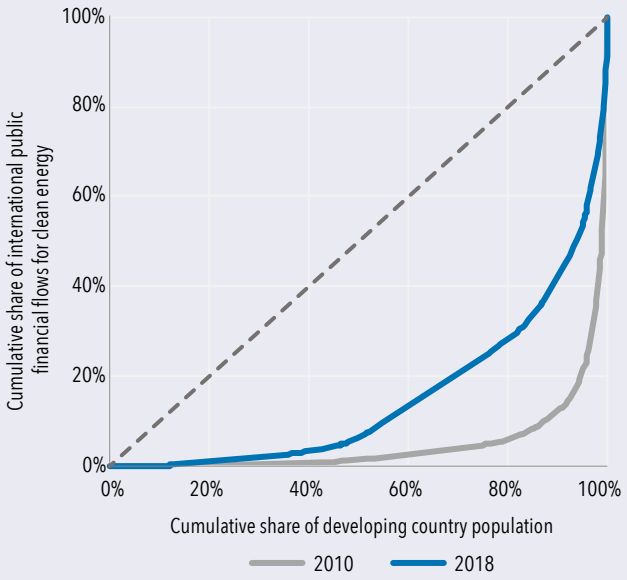
In addition to the operational and lending criteria of DFIs and donor countries, per capita numbers to some extent reflect country populations, with many of the least populous countries, for example, SIDS, receiving generous commitments per capita, while populous countries tend to attract lower levels. Although financial flows are concentrated in a few developing countries, commitments were more evenly distributed between developing countries in 2018 than in 2010—at least on a per capita basis (box 5.3).

BOX 5.3 • UNDERSTANDING THE DISTRIBUTION OF PUBLIC FINANCIAL FLOWS ACROSS DEVELOPING COUNTRIES, 2010–18

Public investments were more evenly distributed across populations in 2018 than in 2010, but there is still plenty of room for improvement.

The two curves in the figure show the amount of funding going to different countries (using population as a measure of country size to scale the need for investments in clean energy). Countries are ranked along the horizontal axis from those receiving the least funding to those receiving the most (in USD per capita). This type of chart is a standard indicator of distribution across a population that is used to calculate measures such as the Gini coefficient of income distribution. The 45-degree line would indicate a perfectly even distribution of financial flows (with each country receiving a share of total financial flows proportional to its population). The farther the distribution is from the 45-degree line, the more uneven the distribution of investment funding.

FIGURE B.5.3.1 • Distribution of commitments across developing countries, 2010 and 2018



At the lower end of the distribution, about 100 countries accounting for 50 percent of the population in developing countries received only 1 percent of public financial flows in 2010. By 2018, their share of total funding had increased to 5 percent. While still a small share with plenty of room for improvement, it has jumped in size.

At the other end of the scale, half of all commitments in 2010 went to just eight countries accounting for less than 1 percent of the population living in developing countries. By 2018, the group of well-funded countries had expanded, with half of all commitments going to 35 countries accounting for 6 percent of the developing-country population. Again, the population of well-funded countries is still low, but the number of countries increased, and their share of population grew somewhat, suggesting that funding is not as narrowly focused on a few countries as it was in 2010.

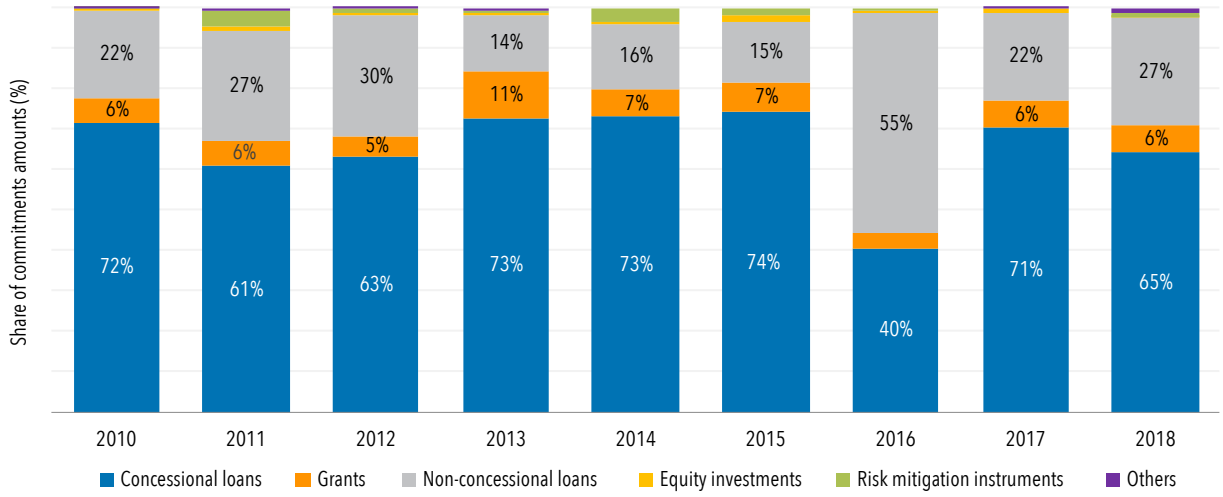
Apart from changes at the ends of the distribution, the most interesting development is in the middle of the distribution. The 2010 distribution shows a sudden change from poorly funded to well-funded countries at the 90th percentile of cumulative population, whereas, in 2018, the group of countries from the 50th to 90th population percentiles received about 40 percent of total funding. This is why the curve for 2018 appears much closer to the 45-degree line, indicating a more equal distribution of funding. With about 40 percent of total funding and 40 percent of developing-country population, this group of 25 countries may also be considered to be relatively well funded. Along with the 35 countries receiving the highest levels of funding, this group of 70 countries is much larger and more populous than the few countries that were in this position in 2010. Thus, it is reasonable to say that international public financial flows for clean energy are now reaching many more people than they were in 2010.

SOURCES OF FINANCING

International public financial flows to developing counties in support of clean energy came from 56 active donors in 2018, up from 36 in 2010, representing a surge of donor interest. In 2018, 14 of these donors committed 80 percent of the international public financial flows, led by Germany (USD 2.1 billion), the Ex-Im Bank of China (USD 1.8 billion), the International Finance Corporation (USD 1.4 billion), and the Asian Development Bank (USD 0.9 billion). New donors in 2018 included the governments of Turkey and Hungary.

These donors use a range of financial instruments to support clean energy in developing countries.[58] By far the most commonly used were **concessional loans**, which accounted on average for 65 percent of annual financial commitments from 2010 to 2018 (figure 5.10). Together with **grants**—which accounted for an average of 6 percent of commitments each year—concessional loans have an important role to play in renewable energy markets, with their pronounced benefits in emerging markets (IRENA 2016). By providing project developers with more favorable financing terms than those available in the commercial market (lower interest rates and extended grace periods) concessional loans can enhance the affordability of renewable energy finance in LDCs (IRENA and CPI 2020; IRENA 2016). Over time, international public donors have expanded their focus, including toward non-concessional instruments and mechanisms designed specifically to leverage public funds to mobilize private investors.

FIGURE 5.10 • Shares of annual commitments by financial instrument, (2010-18)



Source: IRENA and OECD 2021.

During the 2010–18 period, an average of 26 percent of annual commitments made to developing countries came in the form of **non-concessional loans.** The majority of non-concessional loans during the 2010–18 period was concentrated in eight relatively mature and large developing markets for renewables: India (USD 3.9 billion), Turkey (USD 3.8 billion), Pakistan (USD 2.3 billion), Egypt (USD 1.9 billion), China (USD 1.8 billion), Indonesia (USD 1.7 billion), Colombia (USD 1.6 billion), and Morocco (USD 1.6 billion). Non-concessional loans flows chiefly targeted solar energy and hydropower projects, with total commitments amounting to USD 13.5 billion and USD 7.9 billion, respectively, during 2010–18. For solar, this represented as much as 45 percent of total investments. The World Bank alone accounted for more than half of the non-concessional loans commitments to developing countries over the period 2010–18 (or USD 18.2 billion). **Equity investments** remained limited over the period, with shares below 1 percent per year. The use of equity was concentrated in Sub-Saharan Africa, which attracted USD 479 million during the period, and Central and Southern Asia, receiving a total of USD 326 million, more than 60 percent of which went to India.

An increased use of **risk-mitigation instruments** (including guarantees and insurance) was observed after 2010, in particular for wind and solar projects. During 2010–18, international donors committed a total of USD 1.7 billion in the form of risk-mitigation instruments (1.2 percent), of which 49 percent (or USD 872 million) went to wind projects (mainly in Kenya, Mexico, Pakistan, and Senegal), while 43 percent (or USD

58 The methodology section provides further information on these financial instruments.

725 million) went to solar projects (mainly in Thailand, South Africa, and Peru). These instruments have an important role to play in developing markets with limited track records on renewable energy projects, as they can reduce the risk perception and cost of capital while limiting capital requirements on international donors (IRENA 2020b). This approach allows these institutions to free up part of their financial resources for other renewable energy projects. In the context of risk mitigation, it is important not to de-risk specific transactions but rather to work with a country over a medium-term horizon to improve the viability of the energy sector through various risk-mitigation efforts. The following section on policy insights offers examples in this vein. The disruptions of the pandemic have made investors more risk averse, so risk-mitigation instruments will be of critical importance to attract investment in the hard-hit developing and emerging markets.

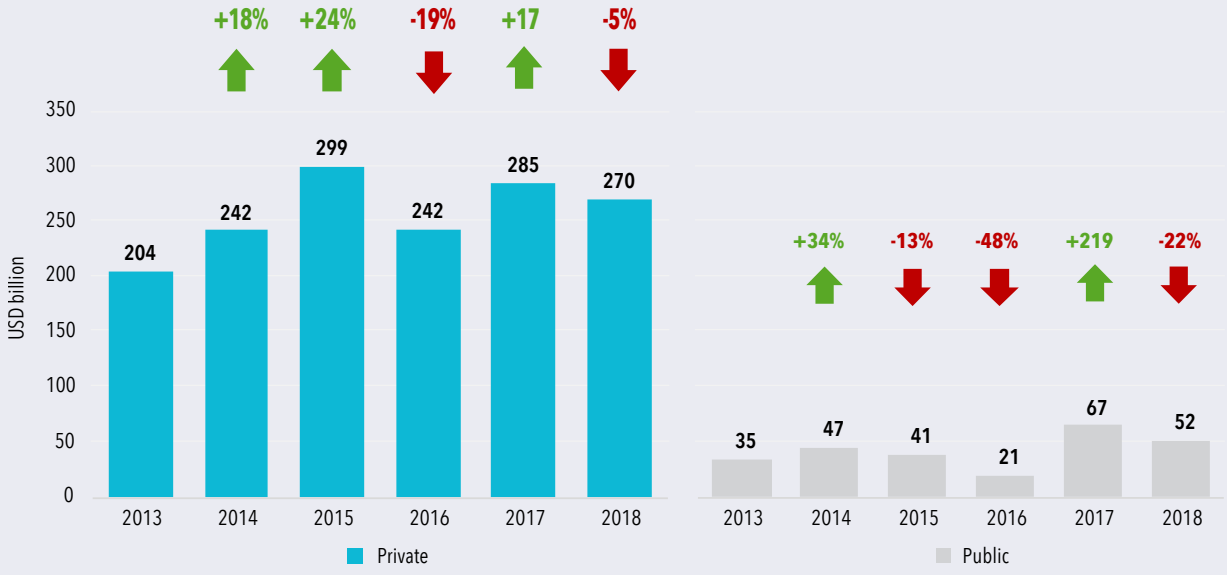
BOX 5.4 • GLOBAL RENEWABLE ENERGY INVESTMENTS AT A GLANCE

Going beyond the SDG 7.a.1 indicator on international public financial flows, this box provides an overview of global renewable energy investments, both public and private (IRENA and CPI 2020).

Global renewable energy investments have jumped from just USD 40 billion in 2004 to around USD 300 billion in recent years (Frankfurt School–UNEP Centre/BNEF 2020). Between 2013 and 2018, investments increased steadily, peaking at USD 351 billion in 2017, before dipping in 2018, albeit less than the decline in public renewable energy investments (IRENA and CPI 2018). Despite the impacts of the COVID pandemic on the global economy in 2020, data suggest that global investments in renewable energy resumed their growth in both 2019 and 2020 (BNEF 2021).

The private sector remained the main capital provider for renewables throughout the 2013–18 period, accounting for 86 percent of investments in the sector. Within the private sector, project developers provided 46 percent of investments, followed by commercial financial institutions at 22 percent. Public finance—including all domestic and international public financing flows—provided on average 14 percent of total investments from 2013 to 2018. Development finance institutions (domestic, bilateral, and multilateral) consistently provided the majority of public investment, or, on average, 85 percent between 2013 and 2018 (IRENA and CPI 2020) (figure B.5.4.1). It should be noted that these are global averages and that public finance plays a more important role in some markets than in others.

FIGURE B5.4.1 • Global annual public and private investments in renewable energy (USD; 2013-18)

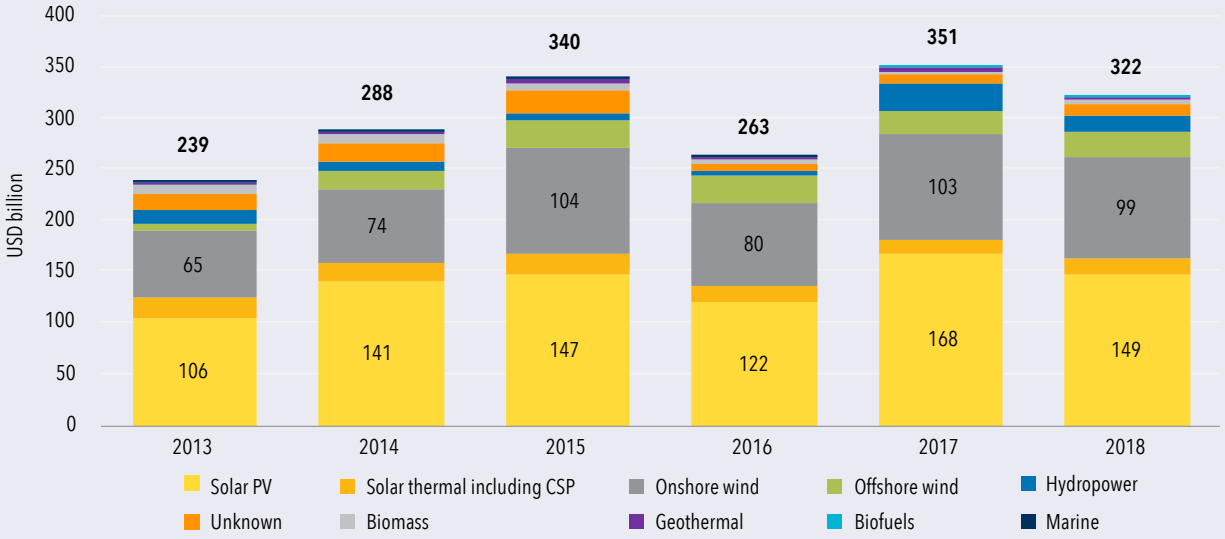


Source: IRENA and CPI 2020.

Note: investment figures are expressed in nominal (current) United States dollars (USD). Hence, they do not account for inflation or changes in exchange rates over time.

The majority of renewable energy investments in 2013–18 went to solar PV and onshore wind, which together attracted, on average, 75 percent of the total, reflecting these technologies' increasing appeal to investors. Other technologies accounted for minor shares of investments, including offshore wind (7 percent), solar thermal (6 percent) (figure B5.4.2). Hydropower investments represented only a small share (4 percent) of global renewable energy investments, a significant difference from its much larger share of public financial flows.

FIGURE B5.4.2 • Global annual public and private investments in renewable energy, by technology (USD; 2013-18)



Source: IRENA and CPI 2020.

Note: investment figures are expressed in nominal (current) United States dollars (USD). Hence, they do not account for inflation or changes in exchange rates over time.

Like public capital, total renewable energy investments were also concentrated in a handful of regions. East Asia and Pacific, led by China, attracted the largest share of renewable energy investments (32 percent) over 2013–18. Western Europe and OECD Americas followed, with 19 percent and 18 percent of the total, respectively. Regions dominated by developing economies remained consistently under-represented, attracting together only 15 percent of global investments in renewables in 2013–18.

POLICY INSIGHTS

This section draws on the analysis of international financial flows in support of clean energy in developing countries and provides insights into the role of public finance, international donors, and renewable energy policies to accelerate investments at scale.

SCALING UP PUBLIC FINANCE FOR RENEWABLES IN DEVELOPING COUNTRIES

Achieving international climate and development goals will require a massive scale-up of renewable energy investments, both in developed and developing countries. Investment in the power sector alone, would need to grow from around USD 300 billion to USD 550-850 billion a year throughout 2019-30. This would need to be supported by additional investments to an expanded and modernized electricity network and grid battery storage (IEA 2020; IRENA 2020c). Closing investment gaps in developing countries will require substantial and coordinated efforts from a variety of stakeholders.

At the global level, renewables have been financed primarily through private capital. Between 2013 and 2018, the public sector accounted for only 14 percent of global renewable energy investments (IRENA and CPI 2020) (box 5.4). While it is reasonable to assume that the bulk of global investments needed in renewable energy will continue to come from private sources, public finance institutions and international donors will have a key role to play to help mobilize private capital at scale. Especially in developing countries, where real or perceived risks result in a high cost of financing, public finance remains key to cover early-stage project development risks, to address barriers to attracting private capital, and to bring new markets to maturity. That said, it is critical that public finance be carefully used and targeted toward unlocking private investments in renewables.

The pandemic has intensified debt pressures in many developing countries, straining their financial resources. At the same time, market uncertainty and volatility due to the crisis have made investors more risk averse, reducing the capital available for renewables in developing countries. Hence, in a post-pandemic recovery period, international public finance flows in support of clean energy are key to developing the sector in these markets (box 5.5). Given their socioeconomic benefits (for example, on jobs and economic growth) and applications (for example, in health care and other critical infrastructure), renewables represent farsighted investments that can support developing countries in their post-pandemic recovery (IRENA 2020c).

BOX 5.5 • COVID-19 AND INTERNATIONAL PUBLIC FINANCIAL FLOWS TO DEVELOPING COUNTRIES IN SUPPORT OF RENEWABLE ENERGY

The COVID-19 pandemic has hit the world's low-income economies hard, causing a recession that could push more than 100 million people into extreme poverty and reverse progress made to date toward SDG 7. Public finance institutions—and international donors, in particular—have a key role to play in supporting the post-COVID economic recovery of developing countries.

In March 2020, the International Monetary Fund (IMF) and the World Bank Group called on bilateral creditors to suspend debt service payments by the poorest countries. The G20 responded to this call, agreeing to suspend repayment of official bilateral credit from the poorest countries until late June 2021 (IMF 2021). The Fund has also announced that in the immediate crisis-containment phase the scope for implementing green recovery plans may be limited, given the overriding priority of providing urgent relief to households and firms. However, as countries move from containment and stabilization to recovery, green recovery plans will likely be reflected in IMF-supported programs.

Beyond immediate relief measures, numerous financing institutions have announced actions centered on a green economic recovery with renewables at the core. Some initiatives include:

- **Public Development Banks for Green Recovery:** Some 450 public development banks joined a declaration delivered at the Finance in Common conference in November 2020 on a post-COVID "green recovery." Through this declaration, development banks—including the Asian Development Bank, the African Development Bank, the European Bank for Reconstruction and Development, and the World Bank—committed to shifting their investment strategies and activities toward renewable energy, energy efficiency, and clean technologies to accelerate progress toward universal access to clean energy and the energy transition. Notably, the banks also agreed to work together to foster the uptake of renewable energy in countries where there is little or no such development (Finance in Common 2020).

- **World Bank Group Green Recovery Initiative:** Together with the governments of Germany, the United Kingdom, and Austria, the World Bank Group launched the Green Recovery Initiative, which aims to help countries build a low-carbon, climate-resilient recovery from COVID-19. Funding will be provided through a new trust fund, the Climate Support Facility, which was launched in December 2020 with an initial investment of USD 52 million from the German Federal Ministry of Economic Cooperation and Development, the UK's Foreign, Commonwealth, and Development Office, and the Austrian Federal Ministry of Finance. One of the pillars of the fund is to improve conditions for renewable energy (World Bank 2020).

- **AfDB COVID-19 Off-Grid Recovery Platform:** In December 2020, the African Development Bank approved a USD 20 million concessional investment from the Sustainable Energy Fund for Africa to establish the COVID-19 Off-Grid Recovery Platform. The USD 50 million blended finance initiative will provide relief and recovery capital to energy access businesses, supporting them through and beyond the pandemic (AFDB 2021).

- **The European Commission post-pandemic recovery in Africa and EU neighboring countries:** In November 2020, the European Commission signed ten financial guarantee agreements with partner financial institutions to stimulate private investments (around EUR 10 billion) and a post-pandemic recovery in Africa and EU neighboring countries in November 2020. Among the agreements are a EUR 20 million guarantee provided by the Spanish development finance institution, COFIDES, for off-grid and mini-grid projects in Sub-Saharan Africa, and a EUR 62 million guarantee provided by the Agence Française de Développement and the Italian Cassa Depositi e Prestiti to reduce off-taker risk in energy projects (European Commission 2020).

On a country level, the trend for official development assistance post-COVID and its impact on public financial flows for clean energy are still not clear. While some countries (such as the United Kingdom) may reduce their aid commitments and focus on domestic recovery, others may increase the assistance they provide (for example, Sweden and France) and expand their green post-COVID recovery policies (Donor-tracker 2021).

According to a preliminary analysis conducted by the OECD Secretariat in August 2020, at least 30 OECD and key partner countries have included measures directed at supporting the transition to greener economies as part of their recovery programs or strategies. Such measures include grants, loans, and tax relief directed toward green transport; the circular economy; and clean energy research, development, and deployment (OECD 2020). These OECD countries, to some extent, may extend their green policies into their international assistance actions. For instance, the Republic of Korea's midterm aid strategy for 2021–25 has twelve priority goals, including promoting the country's Green New Deal, diversifying development finance, and strengthening partnerships with civil society. Korea will double its aid budget between 2019 and 2030 (Donor tracker 2021).

Among developing countries, the Indonesian government announced its post-COVID recovery plan, which includes USD 1 billion for the installation of solar rooftop panels over the next five years, a move that is expected to generate over 20,000 jobs in renewables (Ho 2020). Similarly, Nigeria's stimulus plan foresees the installation of 5 million solar home systems and mini-grids (Government of Nigeria 2020). Colombia plans to invest USD 4 billion in renewable energy and energy transmission projects to accelerate economic recovery (ISSD 2020). International donors can support the implementation of these recovery packages in developing countries by ensuring that financial flows for clean energy are maintained and ultimately increased.

Disruptions during the COVID-19 pandemic have led to greater interest in sustainable assets among private financiers. A pronounced relocation of capital is to be expected, with significant implications for financial markets. How this will affect international public financial flows for clean energy remains to be seen.

USING INTERNATIONAL PUBLIC FINANCE TO ATTRACT PRIVATE CAPITAL

When public resources are limited, they should be used strategically to crowd in additional private capital, especially in sectors and regions that private investors perceive as too risky to invest in. In less-mature renewable energy markets, **direct financing** for renewable energy projects from DFIs can pave the way for private commercial investors, establish a track record for investments, and support the development of a pipeline of bankable projects. In those markets where generating capacity can be financed directly by the private sector, many multilateral development banks are electing to finance supporting infrastructure such as grid integration and energy storage. Examples include public investments in solar and wind farm infrastructure to mitigate risks (particularly those associated with acquiring land and consent); to shorten the private sector's development timeline (so as to save costs and lower tariffs in power purchase agreements); and to provide comprehensive de-risking.

In order to further stimulate private demand and the creation of local renewable markets, DFIs can partner with international and local financial institutions to **co-finance** renewable energy projects, including supporting infrastructure such as grids or batteries. The participation of DFIs often reduces the perceived risk for third-party investors and therefore lowers the cost of financing (Climate Finance Leadership Initiative 2019). It can also result in an important skill transfers from DFIs to local private financiers.

On-lending structures allow international donors, particularly DFIs, to use their high credit rating and market access to borrow capital at low rates and on-lend such funds via credit lines to local financial institutions or public entities. The local financial institutions can access consultancy services and training to develop bankable renewable energy projects, thus **building capacity** and a track record. On-lending reduces the risk for local lenders in developing countries and can increase the availability of financing for project developers, usually on better terms than can be found in the local market (IRENA 2016). For example, in 2019 the Asian Infrastructure Investment Bank launched on-lending facilities for USD 300 million to support renewable energy projects in India and Turkey (AIIB 2019a; AIIB 2019b).

International public donors can also focus on **attracting large-scale investors** in renewable energy projects. These include, for example, institutional investors—pension funds, insurance companies, sovereign wealth funds, endowments, and foundations. While they represent one of the largest capital pools in the world, so far they have played a limited role in financing renewable energy (IRENA 2020d). Institutional investors are looking for post-pandemic investments offering good environmental, social, and governance performance. This trend is likely to boost their capital allocation to renewable energy infrastructure as a way to hedge their climate exposure. However, as many of these investors are new to renewables, especially in developing countries, support from DFIs through co-financing initiatives can expand know-how on financial and legal structuring and improve the risk/return profile for institutional investors.

DFIs can further address specific risks through the provision of **risk-mitigation instruments**, such as guarantees, currency-hedging instruments, and liquidity reserve facilities.[59] These can be particularly effective in mobilizing private investments while reducing capital requirements for public finance institutions (IRENA 2020b). Such instruments can cover a variety of risks. For example, in January 2020, Germany' KfW joined the African Energy Guarantee Facility launched by the European Investment Bank and the African Trade Insurance Agency to provide guarantees to reinsurers covering political and credit risk for energy projects in Africa (EIB 2020). In the context of the pandemic, risk mitigation has become even more important, as investors have become more risk averse, especially in developing countries.

In risk mitigation it is important to work with a country on a medium-term horizon to improve the viability of its energy sector. The World Bank—in partnership with the Agence Française de Développement, the International Solar Alliance, and the International Renewable Energy Agency—launched the Sustainable Renewables Risk Mitigation Initiative (previously known as Solar Risk Mitigation Initiative), which supports governments as they develop sustainable renewable energy programs. The initiative uses an a one-stop-shop approach to integrated risk mitigation that extends from upstream technical assistance to operationalization of bankable programs. The process ensures funding for the studies needed upfront, when countries are prioritizing scarce resources amid the emergency response to the pandemic. It also provides technical assistance to finance the critical public investments and the risk-mitigation coverage needed to enable private investments at scale.

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59 Guarantees are contracts that transfer agreed risks to reduce the risk of nonpayment of outstanding principal, interest, or other contractual payments to investors. Currency-hedging instruments are financial contracts that protect investors from negative financial impacts resulting from adverse changes in currency exchange rates. Liquidity reserve facilities are tools provided by third parties, usually banks, that offer a credit line from which special purpose vehicles can draw in the event of a cashflow shortfall (IRENA 2016).

In addition to directly providing risk-mitigation instruments, international institutions can support clean energy investments by **addressing specific barriers** for investors and project developers. An example of this is the Climate Investment Platform, a joint initiative of the United Nations Development Programme, the International Renewable Energy Agency (IRENA), and Sustainable Energy for All, developed in coordination with the Green Climate Fund. Specifically, the Climate Investment Platform facilitates access to risk-mitigation instruments and ensures bankable projects, matching project developers with investors and facilitating deals (CIP 2021).

Finally, the **standardization of project documentation** can can further attract investors by reducing transaction costs, simplifying the due diligence process, and reducing the time for projects to reach financial close. Standardized contracts can also facilitate the **aggregation of small-scale projects**, further reducing transaction and due diligence costs for large-scale investors (IRENA and CPI 2020). Efforts in this direction have already been made with regional and country initiatives. For example, standardized contracts are at the core of the World Bank's Scaling Solar program in Africa (World Bank 2018). In this context, IRENA and the Terrawatt Initiative have teamed up under the Open Solar Contracts initiative to standardize contract documentation for solar PV projects, streamline project development, accelerate finance processes, and reduce costs and barriers to entry for small-scale developers.

SUPPORTING THE ESTABLISHMENT OF AN EFFECTIVE POLICY FRAMEWORK TO ATTRACT FURTHER INVESTMENTS

While this chapter focuses on the need to scale up international public financial flows to developing countries, the ultimate objective should be to bring these markets to a level of maturity that attracts private capital at scale while helping to maximize local development. To this end, international public donors can play a key role in supporting developing countries by establishing a sustainable private capital market that encourages a just energy transition. This can be achieved if stable and coherent policy and regulatory frameworks for renewable energy are in place. The predictability and reliability of policies and regulations are vital for attracting private investors, as they reduce the risks of policy reversals or renegotiations.

Governments can signal their political will and long-term commitment to investors by establishing **ambitious renewable energy targets** that are both credible and in line with broader national energy and climate strategies. Establishing ambitious targets alone, however, is not enough to build confidence among investors. Targets need to be accompanied by clear and stable policy and regulatory frameworks in support of renewable energy deployment and integration, as well as by governments' capability to implement these targets and to ensure that the benefits of the energy transition are widely shared across society.

Any **deployment policies** used to accelerate the uptake of renewables ("push" policies such as quotas and mandates; "pull" policies such as feed-in tariffs and auctions; and fiscal and financial policies such as tax incentives, grants, and subsidies), must go hand-in-hand with enabling and integrating policies. **Enabling policies** strengthen coordination between the energy sector and the rest of the economy by leveling the playing field for renewables (for example, phasing out fossil fuel subsidies, introducing carbon pricing policies), building the skills and capabilities needed for renewables (education and training policies), and facilitating a just transition through labor mobility and job security (labor market and social protection policies). Finally, **integrating policies** promote the integration of renewables into the wider energy and economic system by, for example, improving transmission and distribution networks, building electric vehicle charging stations, and enhancing system flexibility (IRENA, IEA, REN21 2020; 2018).

Some examples of support programs that help establish coherent national policy frameworks include: the Climate Investment Platform and the GET FiT Program in Zambia. The first provides direct support to governments, helps set ambitious targets (including nationally determined contributions), and clean energy policies and regulations (CIP 2021). The second is implemented by KfW and aims to bolster institutional capacity and the policy and regulatory framework for independent power producers using renewable energy (GET FiT Zambia 2020).

To summarize, we need holistic policy frameworks, tailored to specific country contexts and objectives, in order to attract further investments that maximize socioeconomic benefits and opportunities along the renewable energy value chain. These policy frameworks need to link short-term measures, including recent stimulus packages for a post-pandemic recovery, to medium- and long-term objectives such as achieving SDG 7. To ensure a just transition, one that leaves no one behind, policy and regulatory frameworks for renewables should extend well beyond the energy sector. They should also attend to the transformative impacts that energy transitions will have on society, institutions, financing, ownership structures, and the wider economy.

METHODOLOGY

The 7.a.1 indicator focuses on public financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems. The indicator measures public financial flows ("public" here referring to the source of funds and not the recipients) in the form of financial commitments, and includes three categories of financial flows based on data extracted from IRENA and OECD databases.

DATABASES

From the OECD, official development assistance (ODA) and other official flows (OOF) to developing countries together comprise the public financial support that donors provide to developing countries for renewable energy. These flows are defined as the sum of official loans, grants, and equity investments that "DAC countries" (ODA recipients listed by the Development Assistance Committee) receive from foreign governments and multilateral agencies for clean energy research to develop and produce renewable energy (including in hybrid systems). The OECD consolidates and categorizes these figures as self-reported by donors; these figures are extracted from the OECD/DAC Creditor Reporting System (CRS) as bulk downloads starting in the year 2000 and then filtered to reflect public investments in clean energy by excluding commitments with blanks or zeroes. Then, purpose codes are filtered to include clean energy investments: energy generation, renewable sources (multiple technologies, hydroelectric power plants, solar energy for centralized grids, solar energy for isolated grids and stand-alone systems, solar energy), thermal applications, wind energy, marine energy, geothermal energy, and biofuel-fired power plants (between 23210 and 23290). Finally, private donor flows (mostly philanthropic organizations) are removed from the data (https://stats.oecd.org/Index.aspx?DataSetCode=crs1).

Data from IRENA capture additional flows to non-ODA recipients in developing regions and flows from countries and other public institutions not currently reporting to DAC. These flows are defined as all additional loans, grants, and equity investments that developing countries (defined as countries in developing regions, as listed in the United Nations' M49 composition of regions) receive from all foreign governments, multilateral agencies, and other DFIs for the purpose of clean energy research and development and renewable energy production (including in hybrid systems). These additional flows cover the same technologies and other activities (research and development, technical assistance, renewable electricity distribution infrastructure, and so forth) as listed above and, to avoid duplication of data, exclude all flows extracted from the CRS.

DEFLATING NOMINAL USD PRICES TO CONSTANT PRICES AND EXCHANGE RATES

International finance flows expressed in nominal terms have been deflated to remove the effects of inflation and exchange rate changes so that all flows, from all donors and years, are expressed as the purchasing power of a United States dollar in a recent year (2018 in this report). This is done using a combination of the OECD DAC deflators for the DAC donors and deflators calculated by IRENA for other international donors not included in the CRS database. The formula below converts the nominal investment amounts in current USD to USD at constant prices and exchange rates.

$$USD_{constant\ ,n,m} = \frac{USD_{Current\ ,n}}{DAC\ Deflator_{n,m}}$$

n – current year (nominal)
m – constant year (2018)

The OECD publishes DAC deflators for each donor. More information can be found at https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/informationnoteonthedacdeflators.htm.

MEASURING FINANCIAL FLOWS THROUGH COMMITMENTS

Financial flows in this context are recorded as donors' commitments. A commitment is defined as a firm obligation, expressed in writing and backed by the necessary funds. Bilateral commitments are recorded in the full amount of expected transfers for the year in which commitments are announced, irrespective of the time required for the completion of disbursements, which may occur over several weeks, months or years. Tracking financial commitments can yield very different results compared with approaches that consider financial disbursements. Although disbursement information would provide a more accurate picture of the actual financial flows to renewable energy each year, consistent data on disbursements are often limited or not available. The focus on commitments allows for a more comprehensive and granular analysis of financial flows and ensures methodological consistency across different data sources. Measuring commitments, however, may produce large annual fluctuations in financial flows when large projects are approved. In addition, financial commitments may not always translate into disbursements, as contracts may be voided, canceled, or altered. Any changes must be reflected in annual values.

FLUCTUATIONS IN FINANCIAL FLOWS AND METRICS TO ANALYZE TRENDS (FIVE-YEAR MOVING AVERAGE)

Given the fluctuating nature of commitments as outlined above, the analysis in this chapter uses a five-year moving average to capture the trend in financial flows. A five-year moving average may smooth peaks and valleys in annual commitments as well as deviations from an underlying trend, including in the business cycles of donor countries.

FINANCIAL INSTRUMENTS

The analysis in this chapter captures financial commitments made through the following financial instruments:

- **Concessional loans:** loans extended at terms more favorable than those prevailing on the market, either in terms of lower interest rates or grace periods.
- **Non-concessional loans:** loans extended under prevailing market terms and conditions.
- **Grants:** transfers made in cash, goods, or services for which no repayment is required.
- **Equity investments:** money invested in a company through the purchase of shares of that company, conferring upon the owner the right to be compensated according to his ownership percentage.
- **Risk-mitigation instruments,** such as guarantees and insurance products: contracts transferring agreed risks to reduce the risk of nonpayment of outstanding principal, interest, or other contractual payments to investors).
- **Investment funds;** supplies of capital belonging to numerous investors used to collectively purchase securities while each investor retains ownership and control of his own shares.
- **Bonds:** fixed-income instruments representing a loan made by an investor to a borrower (typically corporations or governments).

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