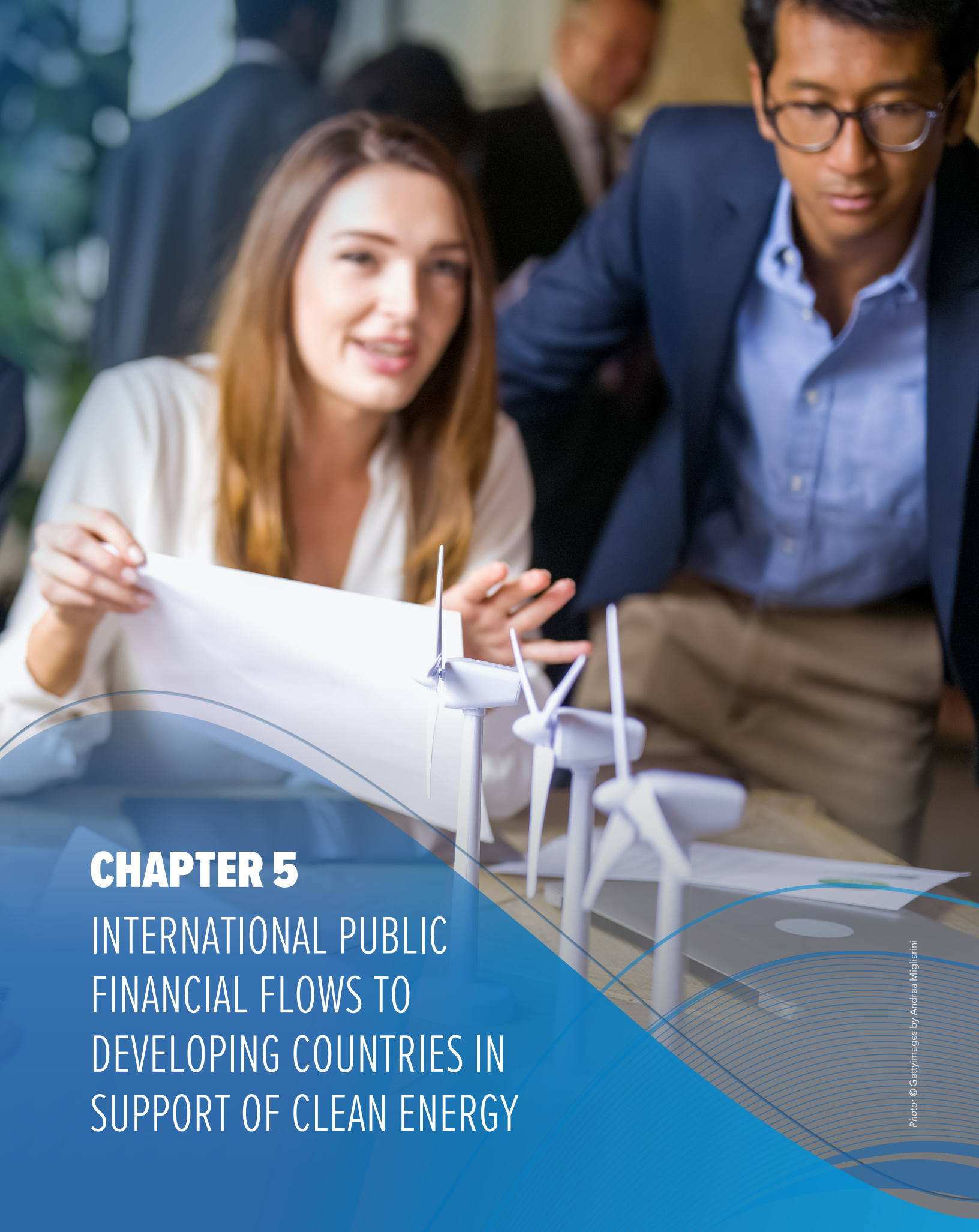


CHAPTER 5

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

Photo: © Gettyimages by Andrea Migliarini

Main Messages

- **Global trends.** Tracking of Sustainable Development Goal (SDG) indicator 7.a.1 reveals that international public financial flows in support of clean energy in developing countries started decreasing before the COVID-19 pandemic and continued to do so through 2021. In 2021, these flows amounted to USD 10.8 billion, an 11.4 percent drop from 2020, 35 percent less than the 2010–19 average, and only about 40 percent of the 2017 peak of USD 26.4 billion. The downward trend in public investments is expected to have continued in 2022; data released in 2023 will provide a clearer picture of the impacts of the energy crisis in Europe sparked by the war in Ukraine on public financial flows. The decreasing trend in international public financial flows may delay achievement of SDG 7, especially for least-developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing states (SIDS).
- **The target for 2030.** There is no quantitative target for international public financial flows under indicator 7.a.1, but the declining trend in flows indicates that the world is not on track to meet the goal of enhancing international cooperation to facilitate access to clean energy research and technologies for countries in need. Given the role of financing for progress toward SDG 7 (as outlined in chapter 6, which discusses investment needs in more detail), international public flows must increase substantially and be targeted to countries most in need of financial aid. Directing international public flows toward clean energy solutions has become more difficult since 2020 because of the reallocation of public resources to recovery from the COVID-19 pandemic, especially since the war in Ukraine.
- **Technology highlights.** Commitments continued to shift from hydropower to solar energy in 2021. Solar attracted the largest share of flows (43 percent), followed by multiple/other renewables (33 percent) and hydropower (16 percent); wind and geothermal energy received less than 10 percent of total flows. Since 2018, an increasing share of commitments has fallen into the multiple/other renewables category, which includes energy funds, green bonds, and other government-led programs to support renewables, energy efficiency, and electricity access. This category is growing in importance as interest in funding mechanisms that target multiple energy technologies at once increases.
- **Regional highlights.** International public flows declined by 13 percent in 2020 and by another 11.4 percent in 2021, but several regions saw increases in 2021. In 2021, Northern America and Europe received 81 percent more funding than in 2020 (an increase of USD 180 million); flows to Sub-Saharan Africa rose 45 percent (an increase of USD 1,213 million); and flows to Eastern Asia and South-eastern Asia increased 23 percent (an increase of USD 251 million). In other regions, flows declined. Latin America and the Caribbean experienced the largest drop in international public finance, at 62 percent (a decline of USD 2,295 million). Flows declined by about 59 percent (USD 582 million) in Western Asia and Northern Africa, 42 percent (USD 9 million) in Oceania, and 8 percent (USD 232 million) in Central Asia and Southern Asia.

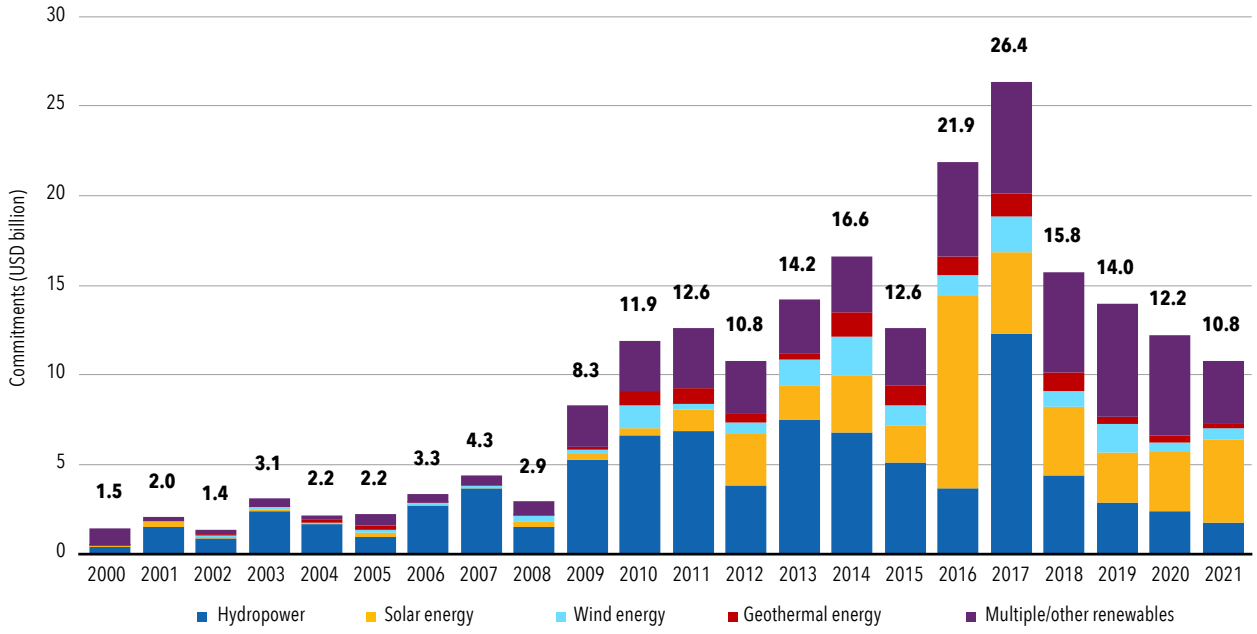
- **Country highlights and regional per capita flow distribution.** Commitments are becoming marginally more widely distributed, although they remain heavily concentrated. During 2010–19, 36 countries received 80 percent of all commitments; over the longer period of 2010–21, the number increases slightly to 38, including commitments to unspecified countries and subregions without allocations.[60] The share of countries that received no commitments fell to less than 20 percent in 2021; over the past decade, only three countries received no international commitments. Flows to the countries most in need (LDCs, LLDCs, and SIDS) fell in 2021, and these countries had lower flows in absolute terms than others. Their per capita allocations, however, were 1.85, 2.39 and 3.23 USD per capita, all larger than the developing country average of 1.24 USD per capita.
- **Financing instrument highlights.** The share of debt instruments in international public financing sources declined steadily after 2018; in 2021, it stood at two-thirds of flows, down from nearly 90 percent in 2018. The share of grants, equity, and guarantees increased. The increase in grants is a boon to recipient countries, as these instruments do not carry the burden of future repayment. At the same time, the absolute decline in loan flows—which typically make up a substantial portion of public financial flows for projects—makes it harder to secure finance for both larger, commercially viable projects and start-ups with limited resources.

60 Such investments are termed "residual/unallocated" or "unspecified countries" when they are not specifically directed to countries. When commitments are residual/unallocated for a specific region, they are considered as part of the regional totals. When they are directed to unspecified countries, this category is treated separately at the regional level.

Are We on Track?

The volume of public international financial flows to developing countries in support of clean energy research and development and renewable energy production (together referred to as renewables throughout this chapter) decreased in 2020 and 2021.[61] In 2021, these flows totalled USD 10.8 billion, down 11.4 percent from 2020 (figure 5.1). This level matched the investment levels of 2012, the lowest investment levels recorded over the last 10 years. It is 35 percent lower than the average of USD 16.7 billion for 2010–19 and only about 40 percent of the 2017 peak of USD 26.4 billion.[62] The trend of decreasing financial flows to support clean energy started before the COVID-19 pandemic and continued through 2021.

Figure 5.1 • Annual international public financial flows toward renewables in developing countries, by technology, 2000–21



Source: IRENA and OECD 2023.
Note: The "multiple/other renewables" category is further explained on page 5 and in the methodology section at the end of this chapter.

Three main factors account for this decline. First, flows from specific donors are cyclical and variable. Second, large shifts in public funds took place because of the COVID-19 pandemic. Third, methodological factors—such as changes in exchange rates and prices, updates to the methodology used to measure the indicator, and challenges in classifying certain technologies—affect the value of commitments.

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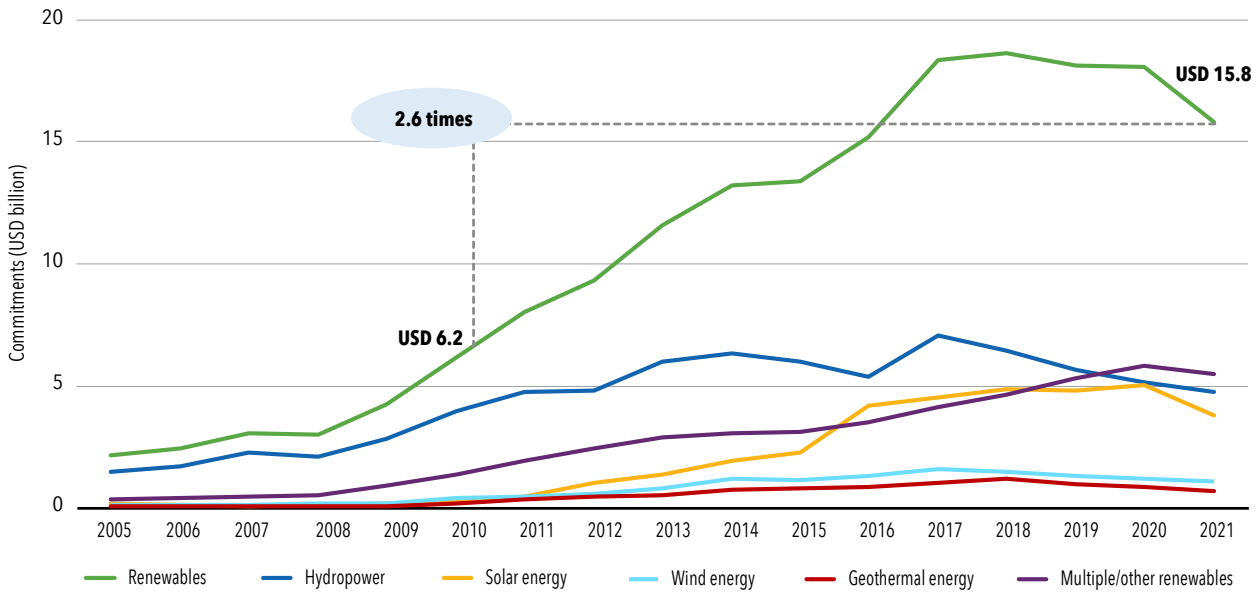
61 International public financial flows include official development assistance and other official flows that are transferred internationally to other countries. They are referred to as flows, commitments, and financing in this chapter. These flows are reported at the time they were officially committed, not at the time they were disbursed. Sixty-eight institutions or donors made commitments during the 2000–21, through 236 agencies. For more information, see the methodology section of this chapter.

62 Unless stated otherwise, all commitment amounts are expressed in US dollars (USD) in 2020 constant prices and exchange rates. Constant amounts are adjusted for inflation rate changes in commitment provider countries as well as changes in exchange rates between the provider currency and the USD over the same period. For more information, see the methodology section of this chapter.

Change in the investment landscape for hydropower is one of the drivers behind the decline in international flow of public finance. Historically, hydropower investments made up about a third of all public investments. Except for three major commitments from China in 2017, the number of investments in hydropower projects has been declining since 2013. Over the past decade, excluding the exceptional flows in 2016 and 2017, annual commitments for hydropower investments ranged from USD 10 to USD 17 billion.

Public investment flows fluctuate widely, with hundreds of commitments, including multibillion-dollar ones, in some years and fewer and smaller commitments in others. For this reason, a five-year moving average provides a more meaningful analysis of the trend over time (figure 5.2).

Figure 5.2 • Five-year moving average of international public financial flows to renewable energy, by technology, 2010–21



Source: IRENA and OECD 2023.

The moving average for the five years ending in 2021 was USD 15.8 billion, 2.6 times larger than the moving average for the five years ending in 2010 of USD 6.2 billion. In 2021, it dropped by 12 percent, from USD 18 billion in 2020. The trend toward smaller investments per commitment is reflected by the five-year moving average of USD 8.5 million per commitment in 2021, down from USD11.4 million in 2020. The average commitment in 2021 was as low as it was in 2008, during the global financial crisis.

The downward trend in public investments is expected to continue in 2022. The five-year moving average in 2022 will not include the all-time high of 2017, making it unlikely that 2022 flows will equal or surpass the USD 26.4 billion five-year average of 2017. Flows might still outpace expectations and show resilience against the downward trend, however, revitalizing public investment in countries in need of financial support. As a growing number of donor countries and institutions are committing to ending support for fossil fuels, there is a chance for these resources to be channelled into enhanced support for renewable energy in developing countries (COP26 Presidency 2021).

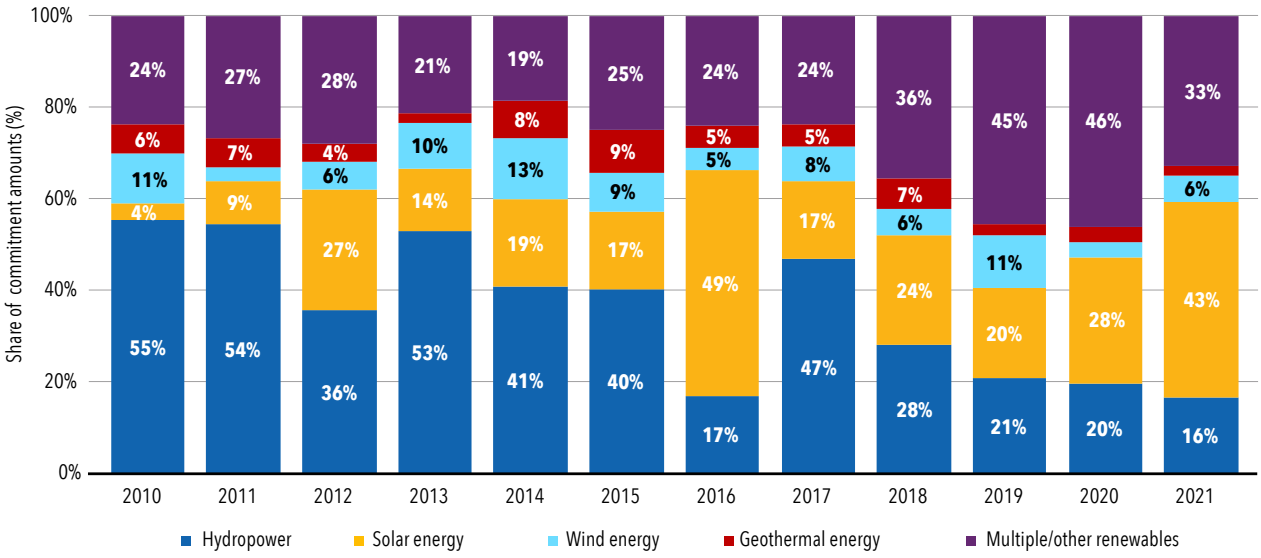
Looking Beyond the Main Indicators

Looking at the 7.a.1 indicator in multiple ways helps identify the directions of international public flows in terms of technologies, geographical regions, countries,[63] and financial mechanisms, as summarized below.

TECHNOLOGY TRENDS

International public investors categorize international public flows to clean energy by the type of renewable energy involved: hydropower, solar, wind, geothermal, and multiple/other (figure 5.3).[64] The categorization of multiple/other renewables is more complex because of unclear commitment descriptions in financial databases and a lack of detail on the financial breakdown for each technology. This category also includes bioenergy commitments which are almost negligible; multipurpose financial instruments, such as green bonds and investment funds; and commitments targeting a broader range of technologies, such as renewable energy and electrification programs, technical assistance activities, energy efficiency programs, and other infrastructure-supporting renewable energy.

Figure 5.3 • Share of international public financial flows to renewable energy, by type of energy, 2010–21



Source: IRENA and OECD 2023.

The multiple/other renewables category is growing in importance as there is increasing interest in funding mechanisms that target multiple energy technologies at once. Financing including public, private, international, and domestic flows and issuances of green, social, sustainable, and sustainability-linked (GSSS) bonds in developing countries tripled

63 In this chapter, the word country refers to a territory, area, or other unspecified location within the scope of SDG 7.a.1.

64 The "multiple/other renewables" category is further explained in the methodology section at the end of this chapter.

in 2021, reaching USD 159 billion (IRENA and CPI 2023).[65] Lack of consensus among governments, international organizations, and multilateral development banks on how to categorize climate financial flows based on technologies is causing diverging classifications (Shishlov and Censkowky 2022) and increasing the share of flows grouped under multiple/other renewables. This misalignment of classifications may exclude flows from this dataset altogether and reduce the accuracy of this tracking exercise. (This issue was briefly discussed in the 2020 edition of this report.)

The shift from hydropower to solar energy commitments continued in 2021. Solar energy attracted the largest share of flows (43 percent), followed by flows to multiple/other renewables (33 percent) and hydropower (16 percent). Wind and geothermal energy received less than 10 percent of flows. The dominance of solar power is also reflected across the broader landscape of renewable energy investments globally (public and private investments, including domestic flows across all countries). In 2021, solar technologies (mainly photovoltaic [PV]) accounted for 53 percent of global investments, followed by wind (41 percent), bioenergy (4 percent), and hydropower (2 percent) (IRENA and CPI 2023).

Substantial changes in the distribution of flows in 2016 and 2017 reflected abnormally large commitments and increases in the volume of investments. Since 2018, there have been no large single-project commitments to shift the technology mix and skew the flows. Trends since 2018 therefore provide clearer insights into annual investments across technologies: Flows to hydropower declined, overtaken by commitments to solar energy and multiple/other renewables.

The five-year averages are bell curve–shaped, with different time horizons. Wind energy and hydropower were the first to peak, in 2017, at USD 1.6 billion and USD 7.1 billion, respectively. The year after, geothermal energy peaked, at USD 1.2 billion. In 2020, solar energy and multiple/other renewables peaked at USD 5 billion and USD 5.8 billion, respectively. Unless large commitments manifest in the coming years, this pattern will continue, reflected by lower five-year averages for overall and technology-specific flows.

Some 675 million people still lack electricity access as highlighted in Chapter 1. Given the importance of off-grid renewable energy solutions in closing the energy access gap, it is encouraging to see donors and other actors increasing flows to these solutions. Although these investments still represent a small portion of the overall financing of energy access and renewables, they are a crucial, and cost-effective, part of closing the access deficit.

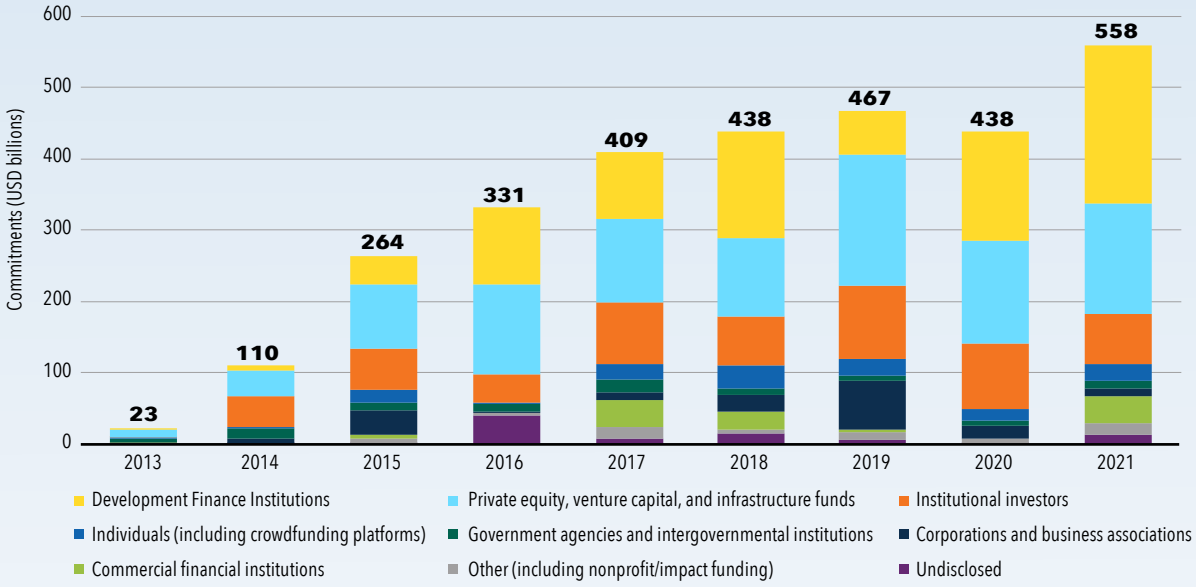
At the same time, current investment levels fall far short of the USD 15 billion needed in the sector each year between 2021 and 2030 (ESMAP 2022; ESMAP and others 2022). Support will be needed on the supply side for off-grid solar companies and on the demand side to enhance affordability for consumers (mainly through public funding). Box 5.1 provides an overview of investment trends in developing countries in the off-grid sector.

65 IRENA and CPI (2023)'s analysis of the global landscape of renewable energy finance has a broader coverage than the main indicator of interest in this chapter under SDG 7.a.1. It covers renewable energy investments in both developed and developing economies and considers both (i) public and private investments, and (ii) domestic and international flows. International public financial flows (as analyzed in this report) therefore make up a small, although important portion of overall financial activity for renewable energy globally.

Box 5.1 • Off-grid renewable energy investments in developing countries, 2010–21

Despite the COVID-19 pandemic and its economic fallout, investments in the off-grid renewable energy sector continued to grow in the last three years, bringing electricity to millions of people. Annual investments in off-grid renewable energy reached a record high of USD 558 million in 2021 (Wood Mackenzie 2022). Recent growth has been driven by investments in Sub-Saharan Africa, particularly East Africa and more recently West Africa. The scope of investments has gradually expanded from residential to commercial and industrial applications.

Figure B5.1.1 • Annual financial flows to renewable energy, by instrument, 2010–21



Source: Adapted from Wood Mackenzie (2022a).

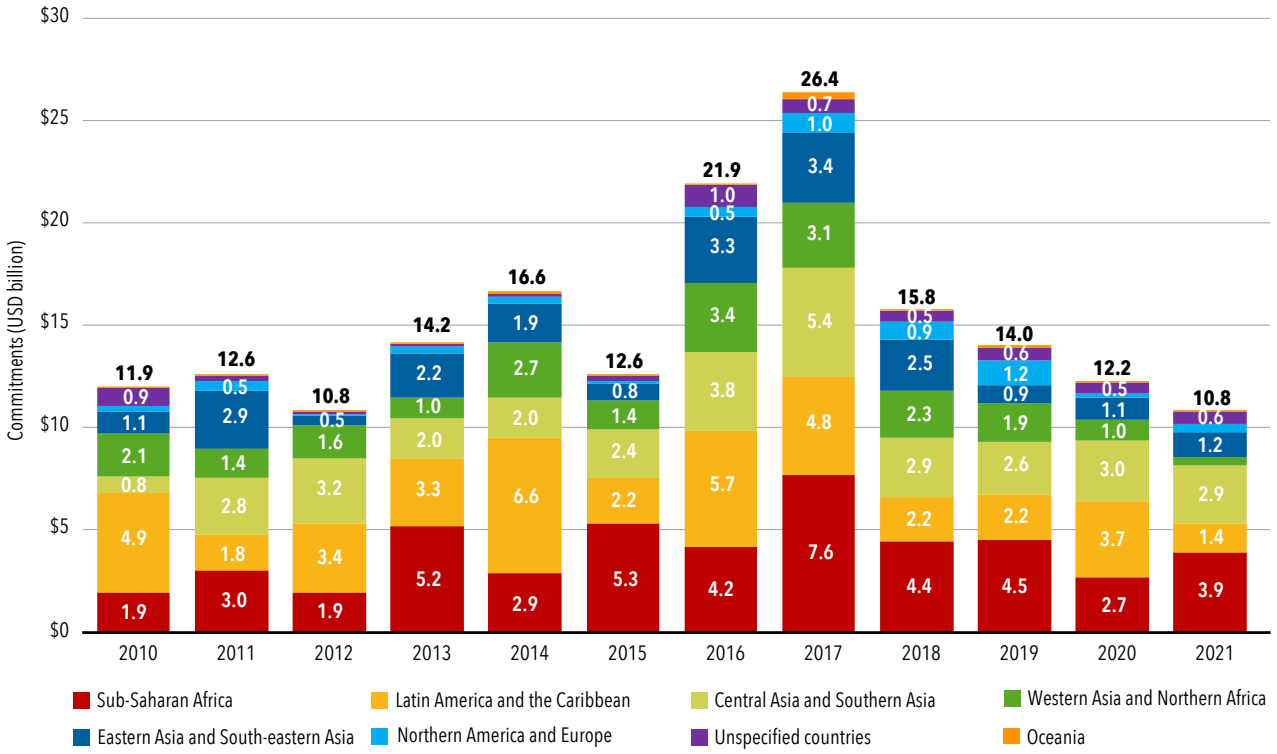
Support from international public financial institutions was vital for the sector in 2020–21, when the share of public financing climbed from 30 percent in 2015–19 to 44 percent, as public financial institutions provided USD 435 billion in support. Development finance institutions provided much of this capital. Their commitments exceeded those of private equity, venture capitalists, and infrastructure funds, which dominated the sector before the pandemic. More than 80 percent of the investments were international flows, highlighting the importance of this source of public financing for the off-grid sector.

Source: IRENA and CPI 2023.

REGIONAL TRENDS

International public flows decreased by 13 percent in 2020 and fell another 11.4 percent in 2021. Several regions saw increases in 2021, however (figure 5.4).

Figure 5.4 • Annual international public financial flows to renewable energy, by region, 2010–21



Source: IRENA and OECD 2023.

Regional changes from 2020 to 2021. In 2021, flows to Northern America and Europe[66] rose 81 percent (USD 180 million); flows to Sub-Saharan Africa rose 45 percent (USD 1,213 million); flows to Eastern Asia and South-eastern Asia rose 23 percent (USD 251 million); and flows to "unspecified countries"[67] rose 4 percent (USD 21 million).

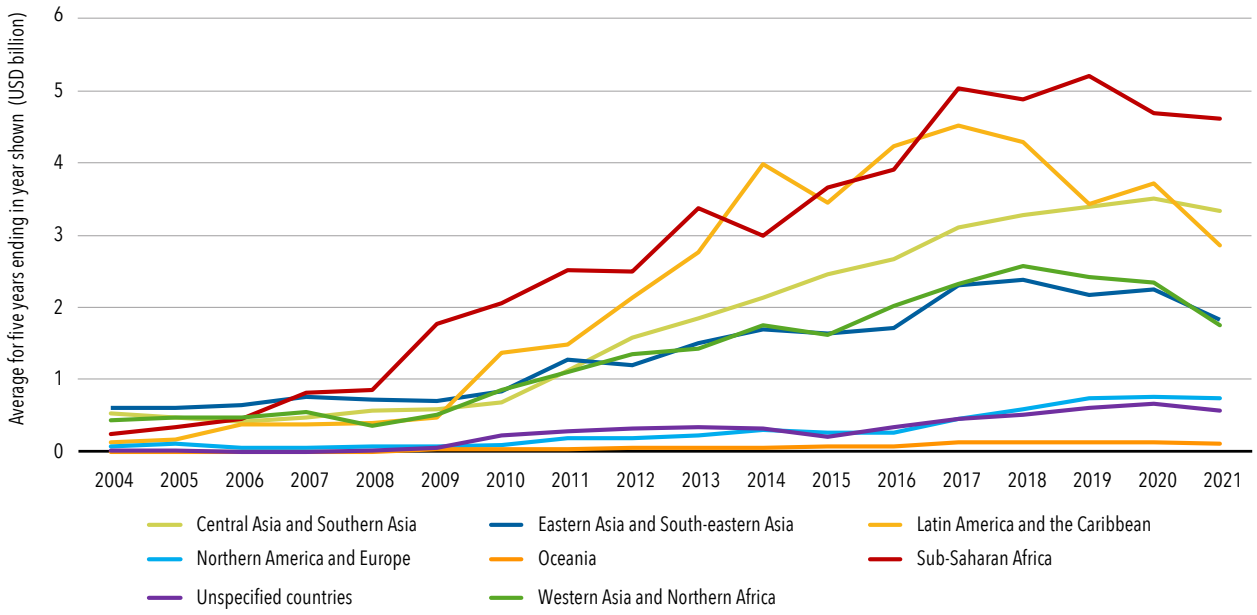
Flows to other regions declined. Latin America and the Caribbean experienced the largest drop in international public finance, with a decrease of 62 percent (USD 2,295 million). Flows to Western Asia and Northern Africa fell by about 59 percent (USD 582 million), flows to Oceania fell 42 percent (USD 9 million), and flows to Central Asia and Southern Asia fell 8 percent (USD 232 million).

66 "Northern America and Europe" is included as a region for the first time this year. It captures flows to eight countries in Europe (Albania, Belarus, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, Moldova, Serbia, and Ukraine). No data were recorded for Northern America. The region is nevertheless referred to as Northern America and Europe, following the United Nations' M49 regional classification.

67 "Unspecified countries" refers to commitments to multiple countries or commitments not directed to a specific region. Regional bonds and funds and umbrella loans for multiple projects usually fall into this category.

Given annual fluctuations, five-year averages provide a clearer picture of regional trends (figure 5.5)

Figure 5.5 • Five-year moving average of international public financial flows to renewable energy, by region, 2004–21



Source: IRENA and OECD 2023.

Sub-Saharan Africa was the top recipient in 2021, with a five-year average of USD 3.9 billion (36 percent of all commitments). Annual commitments decreased by 1.2 percent in 2021, but the decrease was significantly less than in other regions. The five-year average commitments to the region more than doubled between 2010 and 2021, with hydropower projects attracting significant investment, especially from China, and notable commitments to solar energy.

Funding for hydropower projects in Sub-Saharan Africa dropped to less than 10 percent of flows in 2021, and multiple/other flows reached 45 percent, revealing significant diversification of investments. About 43 percent of 2021 flows (USD 1.7 billion) were in the form of grants – which do not add to the existing burden of debt for the region; standard loans represented less than 15 percent of the total.

Considering the broader landscape of renewable energy investment (including both private and domestic flows across developed and developing economies), Sub-Saharan Africa attracted less than 1 percent of overall investments in 2021, despite its high renewable energy potential and unmet energy needs (IRENA and CPI 2023).

The five-year average for **Central Asia and Southern Asia** was USD 2.8 billion in 2021, more than any other region except Sub-Saharan Africa. The figure dipped for the first time since 2010, dropping by 5.9 percent (from USD 3.5 billion in 2020 to USD 3.3 billion in 2021). These five-year average flows were almost five times greater in 2021 than in 2010, thanks to steady increases in funding for solar and wind energy as well as occasional large hydropower projects. Growth in the region is largely dependent on standard and concessional loans, with only some small equity investments, however. The multimillion dollar debt agreements with banks, governments, and other development agencies could lead to debt sustainability issues.

Looking at the broader renewable energy investment (including both private and domestic flows across developed and developing economies), Central Asia and Southern Asia attracted less than 3.3 percent of global investments in 2021 (IRENA and CPI 2023).

Latin America and the Caribbean received commitments of USD 1.4 billion in 2021 (13 percent of the total), its lowest inflow since 2009. The region experienced the largest annual decrease of any region in the last several years. In 2021, public flows to the region were around one-third of the high of 2020 (USD 3.7 billion). In 2020, Latin America and the Caribbean was the only region to experience an increase in flows, driven by a USD 400 million credit line to Paraguay and a USD 300 million COVID-19 recovery package for Costa Rica.

The five-year average for the region decreased by over 23 percent, from USD 3.7 billion in 2020 to USD 2.9 billion in 2021, indicating that the slowdown in investment is worsening. The 108 percent growth in the five-year average over the period was also lower than the global average of 157 percent.

The region saw large investments in renewable energy auctions and hydropower projects over the past decade, but a global slowdown in these projects has reduced the interest of investors in targeting the region. Investors prefer to use standard and concessional loans in the region; provision of grants, equity, guarantees, and credit lines is limited.

Zooming out to the broader landscape of renewable energy investment (including both private and domestic flows across developed and developing economies), Latin America and the Caribbean attracted 5 percent of global investments in 2021 (IRENA and CPI 2023).

In 2021, **Western Asia and Northern Africa,** a region that has been experiencing a slowdown in international public flows over the last decade received USD 400 million in commitments, a 59 percent decline from the USD 983 million in 2020. In 2021, standard and concessional loans comprised the largest shares of flows. They went to solar energy (32 percent) and multiple/other renewables (67 percent). These flows took the form of credit lines to governments, combined renewable energy investments, government support programs, and unclassified or improperly classified commitments.

The five-year average confirms this trend. Although average annual commitments doubled between 2010 and 2021 (less than the average increase of 157 percent across regions), there was a 26 percent decrease in average commitments (the largest among regions), which fell from USD 2.3 billion in 2020 to USD 1.7 billion in 2021. This declining trend can be attributed to reduced commitments from top investors and the decline in interest in solar energy investments, which dominated between 2014 and 2019.

In 2021, countries in **Northern America and Europe** received USD 400 million, up from USD 221 million in 2020 but down from the all-time high of USD 1.2 billion in 2019. The five-year average declined by 1.5 percent, from USD 752 million in 2020 to USD 741 million in 2021. Most flows were directed to multiple/other renewables and wind energy, as the potential for renewable energy in these countries limits the attraction of flows to other technologies. Funded projects included government programs for technology scale-ups, governance, international cooperation, capacity building, and maintenance operations, as well as retro-fitting projects and various umbrella plans supporting renewables. Debt instruments and equity were the main forms of investment in this region.

Commitments to **Eastern Asia and South-eastern Asia** rose slightly to USD 1.3 billion, in 2021, up from USD 1.1 billion in 2020 and USD 912 million in 2019. This region received 12 percent of all investments in 2021, the same share it has received since 2010.

The five-year average trend declined by 17 percent in 2021 to USD 1.9 million, down from USD 2.2 billion in 2020. It has grown 121 percent since 2010.

Historically, the region attracted flows to hydropower projects. More recently, flows included more investments in solar, wind, and geothermal energy. The region's large hydropower and geothermal projects cause flows to vary widely from year to year. Standard and concessional loans continue to be the most common form of funding for this region.

Reviewing the broader landscape of renewable energy investment globally (including both private and domestic flows across developed and developing economies), the region attracted 56 percent of global investments in 2021 (IRENA and CPI 2023).

A total of USD 568 million went to **unspecified countries** in 2021, a 4 percent increase from the previous year but still lower than the USD 609 million in 2019. Because of the multi-technology, regional, or global nature of these flows, this category includes a larger proportion of equity investments (18 percent of flows in 2021 and 14 percent since 2000).

The five-year average of annual commitments to unspecified countries has been steady, at around USD 550 million, since 2017. Because of their underlying financial mechanisms (green bonds, regional funds, and international grants), these funds are often directed to multiple regions or countries. In recent years, some of these commitments have been directed to COVID-19 recovery packages for renewables and energy efficiency in multiple countries, as well as technical assistance and knowledge products.

Oceania received the least investment of all regions, at just USD 12 million in 2021 (0.5 percent of the total), down 42 percent from the USD 21 million received in 2020. It received USD 135 million in 2019.

The five-year average shows an annual decrease of 6.5 percent in commitments to the region. Historically, commitments were directed to solar energy and multiple/other renewables in the form of technical assistance and government support programmes. Oceania stands out for the type of financial instruments used, with almost two-thirds of historic commitments in the form of grants.

Box 5.2 describes the sources of international public flows by country and instrument, share of flows directed towards technologies, as well as recipients' share of flows.

Box 5.2 • International public flows to renewables: Who's funding what and to whom?

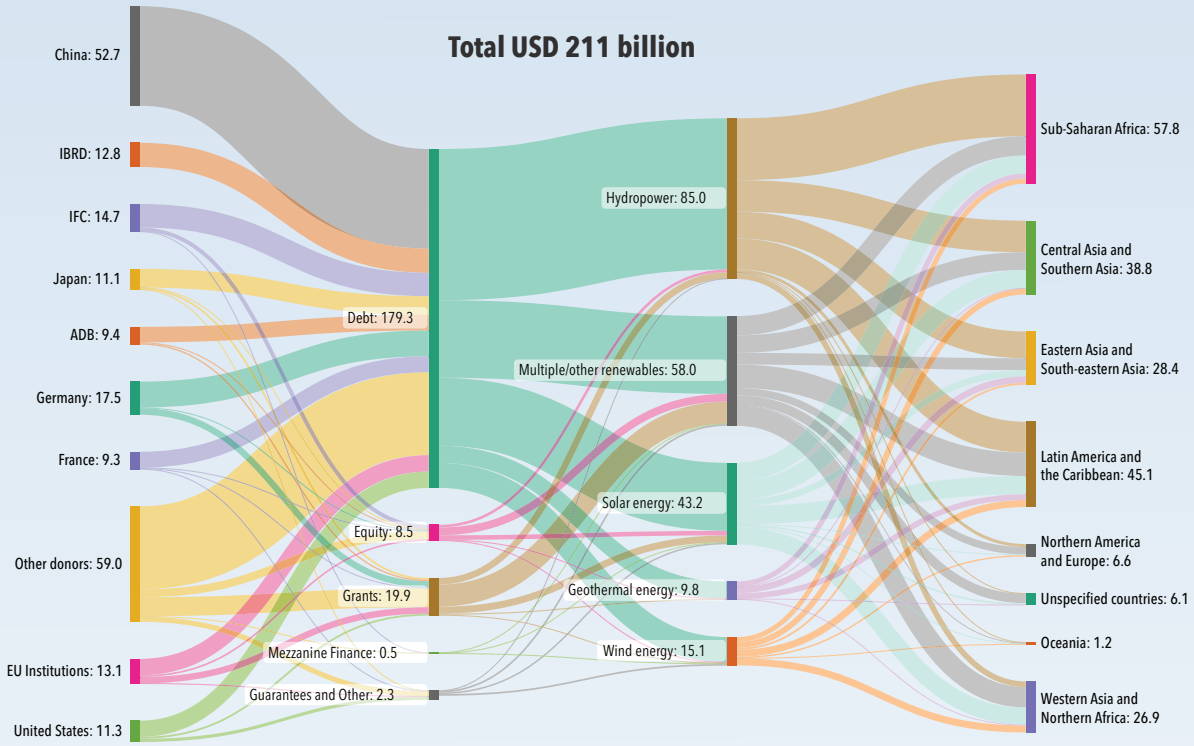
Donors. Most international public flows to renewables since 2000 have come from China, followed closely by Germany, the International Finance Corporation (IFC), EU institutions, the International Bank for Reconstruction and Development (IBRD), the United States, Japan, the Asian Development Bank, and France. Together, these nine investors account for three-fourths of all funding; another 59 institutions supplied the remaining funds.

Figure B5.2.1 shows how much money is flowing from donors, by financial instrument, type of renewable energy, and region. The sizes of the channels are proportional to the flow amounts, shown as values in 2020 USD billions.

Financial instruments. Debt instruments (including standard loans, concessional loans, bonds, reimbursable grants, and other debt securities) have been the primary financial instrument. Debt finance is also common, because investments tend to be capital-intensive, with a fixed element in the cost and revenue structure of the underlying asset. Renewable energy projects require high initial capital expenditure and are often underpinned by long-term power purchase agreements or regulated remuneration. Concerns about debt sustainability have increased in many countries, particularly since COVID-19.

Grants are the second-largest instrument. Although they make up less than 10 percent of flows, they play a key role in both funding projects and helping attract private capital. Going forward, grants; concessional debt financing (denominated in local currencies); and other innovative, non-debt funding mechanisms can help meet the funding needs of countries while ensuring that these flows do not increase their debt burden.

Figure B5.2.1 • International public flows to renewables by donors, financial instrument, technology, and recipient region, 2000–21



Source: IRENA and OECD 2023.

Technologies. Hydropower projects received the highest level of debt financing, followed by multiple/other renewables and solar energy. They did so partly because of the underwriting process of multilateral development banks, which assess project risks and profitability before approving loans so that commercial banks can underwrite development projects, which must follow specific guidelines. Most grants went to multiple/other renewables, as they targeted multi-technology funds, programs, and grant requirements. Countries can meet grant requirements with policy plans or programs to roll out multiple renewables.

Recipients. Over the last two decades, all regions received even amounts of commitments, except in the area of hydropower investment, which is more predominant for countries in Sub-Saharan Africa. Renewable technology choices for investment were also distributed equally across regions, except for hydropower.

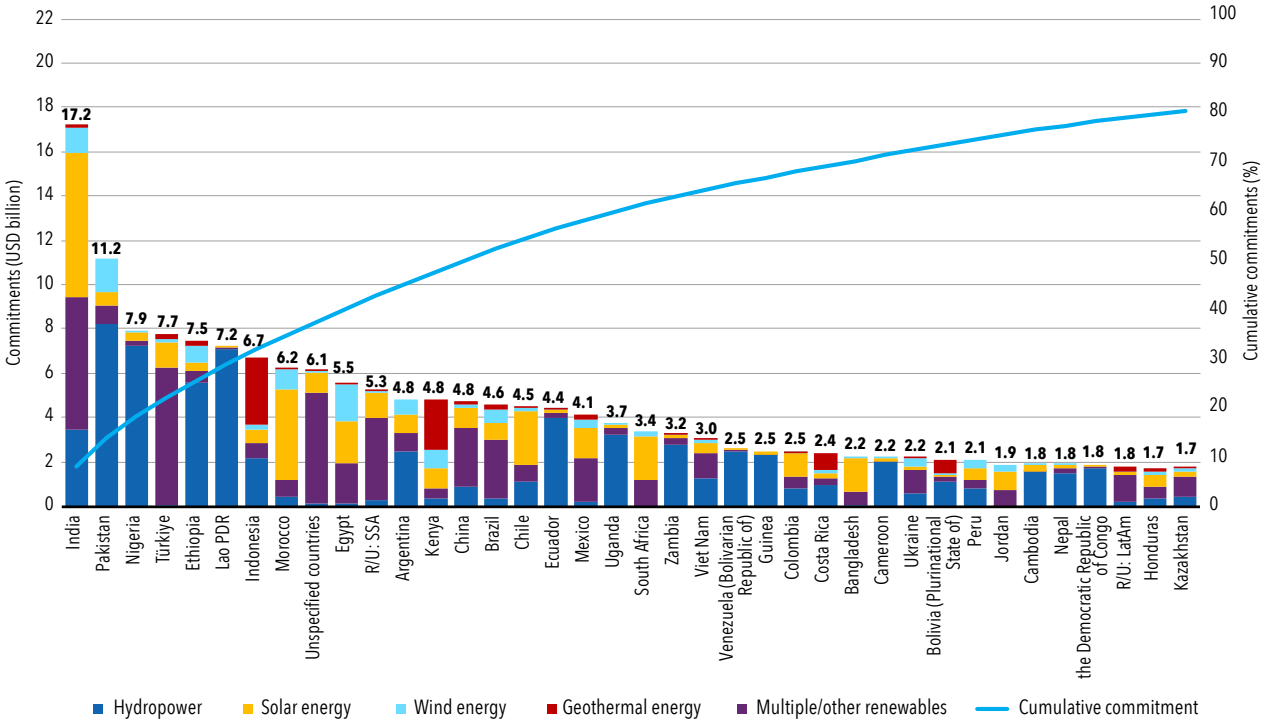
The data highlight the significant role of China and other top investors in financing renewable energy, as well as the dominance of debt as the preferred financial instrument.

COUNTRY TRENDS

During 2010–19, 36 countries received 80 percent of all commitments. Over 2010–21, the number was 38 (figure 5.7), including commitments to unspecified countries and subregions without allocations.

The slightly improved distribution is a result of several factors. First, fewer investments are now allocated to specific countries; signalling that more commitments are distributed to multiple countries. Second, expanding the analysis to cover a longer period flattens the variability of flows and reveals a more even distribution. Third, although the number of donors investing in renewables decreased in 2020–21, the top investors slightly increased the number of recipients they support.

Figure 5.6 • International public financial flows to renewable energy by top recipients, by type of energy, 2010–21



Source: IRENA and OECD 2023.
Note: R/U = residual/unallocated official development assistance; SSA = Sub-Saharan Africa; LatAm = Latin America and the Caribbean; Lao PDR = the Lao People's Democratic Republic"

TOP RECEIVING COUNTRIES IN RECENT YEARS

Although the distribution of flows is wider when averaged over several years, international public financial flows remain highly concentrated among a small group of countries, with 23 countries receiving 80 percent of all commitments in 2020. In 2021, the number of countries receiving most of the commitments was even smaller, with only 19 countries receiving the bulk of flows. India was the top recipient of international flows for the past two years, followed by Pakistan, Brazil, and Mexico.[68]

68 The UN system does not define "developing country." This chapter is based on a list of developing countries that the UN Statistics Division uses for statistical uses (UNSD 2022). This report adapts that list to exclude countries that are not targeted by international aid and territorial entities associated with high-income countries.

India received USD 2.9 billion in 2020–21, or more than 8 percent of all commitments in the past two years. Its consistent pipeline of a vast array of smaller projects reduces the volatility of flows from one year to another. India has been the top recipient for 6 out of 22 years, more than any other country. The United States, the Asian Development Bank (ADB), and Germany were the top donors. Solar energy received more than two-thirds of inflows. During 2020–21, 90 percent of flows were debt, of which 76 percent were standard loans. This growing market for renewables attracts large volumes of loans for project development, particularly on-grid solar PV (USD 1,093 million) and off-grid solar PV (USD 616 million).

Pakistan was the second-largest recipient, with USD 1.7 billion in 2020–21. In 2020, 70 percent of commitments to Pakistan went to hydropower, which increased to 82 percent in 2021. Debt instruments made up more than 90 percent of commitments between 2010 and 2021. During this period, various multilateral development banks, including the IBRD, the ADB, the Asian Infrastructure Investment Bank (AIIB), and the Islamic Development Bank, were the top providers of funds.

Brazil is not typically a top recipient of international public financing, because its own development bank, BNDES, channels significant domestic public flows to renewable energy projects. Nonetheless, the country received USD 1.4 billion in international public financial flows, in the form of concessional loans, in 2020–21. As Brazil's development bank already funds many infrastructural projects, the majority of international public flows support government programs or are used to capitalize climate action funds. Some international public money did flow to specific projects, such as the Casablanca PV Bifacial Solar Power Project and the Neoenergia Green Renewable Energy Generation Framework Loan. During 2020–21, the European Investment Bank (EIB), Japan, and the Inter-American Investment Corporation (IDB Invest) were the top international donors in Brazil.

Mexico has attracted increasing flows (predominantly loans) since 2010. Many fund new solar PV projects, likely driven by the 2013 energy reform, which allowed more international developers into the country, and the subsequent rounds of successful renewable energy auctions. Notable flows during 2020–21 included a USD 241 million loan from the US International Development Finance Corporation to finance half of the cost of 426 MW of solar PV, a USD 100 million concessional loan from the Japan International Co-operation Agency to support a solar PV power plant, and a USD 226 million loan from the French Development Agency for the modernization and rehabilitation of hydropower plants.

Reaching those farthest behind

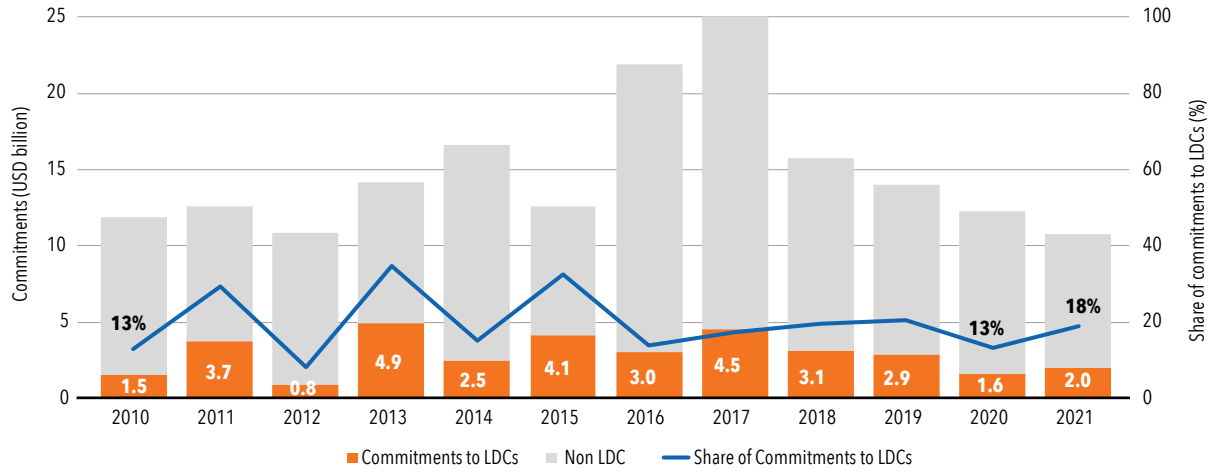
Analyzing the flow of international public finance to support renewable energy in the 46 LDCs, 32 LLDCs, and 40 SIDS[69] yields insights into flows to the poorest countries.[70]

Historically, LDCs received a small share of international public flows (figure 5.7). Flows to LDCs decreased in the past two years, dropping to USD 1.6 billion in 2020 and USD 2 billion in 2021.

69 The United Nations' M49 regional classification includes 53 SIDS; this report excludes 13 of them from the SDG 7.a.1 classification, as explained in the methodology section at the end of the chapter. The exclusion has a negligible effect on the analysis, as only Saint Kitts received financial flows (totaling to USD 19 million, or less than 0.6 percent of all flows received by SIDS since 2000).

70 The country categories are regularly updated in line with the United Nations' latest M49 classification. There were no changes during 2022. Some countries appear in more than one category.

Figure 5.7 • International public financial flows to renewable energy in least-developed and non-least-developed countries, 2010–21

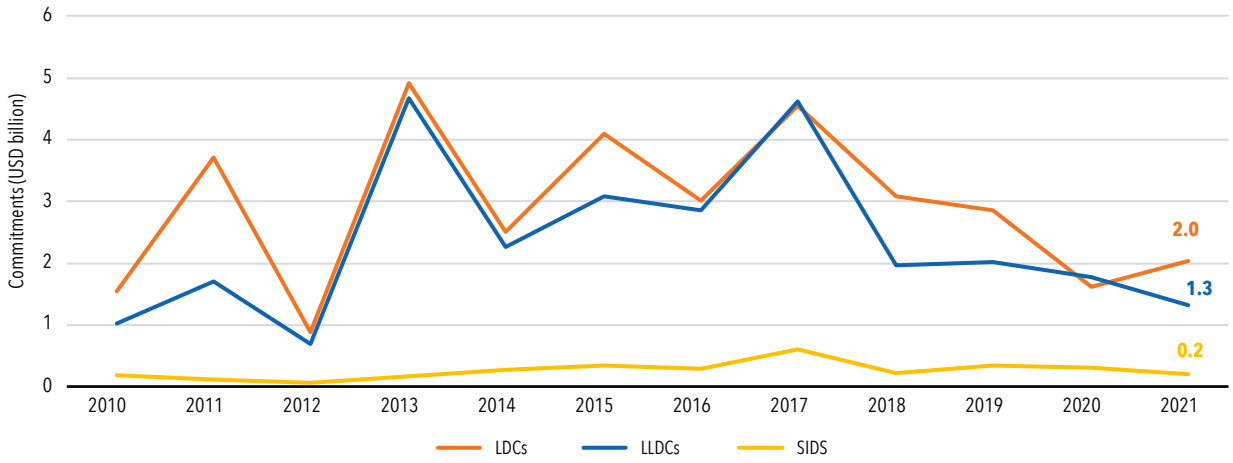


Source: IRENA and OECD 2023.

For the first time, all 46 LDCs received international public flows in 2020 (although 5 of them did not receive any flows in 2021). These flows have been increasingly concentrated in a few countries, with the Lao People's Democratic Republic, Uganda, Zambia, Guinea, and Ethiopia attracting half of the flows in 2021, despite being home to just 19 percent of the people living in LDCs.

LLDCs and SIDS receive even less financial support than LDCs (figure 5.8). The 32 LLDCs face trade and development challenges because of their lack of sea access and geographical remoteness. There has been a declining trend in standard loans, from 83 percent in 2015 to 19 percent in 2021, and a concomitant rise in concessional loans, grants, and equity investments. The share of flows to LLDCs increased slightly in 2020 before falling to 12 percent in 2021. All LLDCs except Burundi and the Central African Republic received commitments in 2020 or 2021.

Figure 5.8 • International public financial flows to least-developed countries, landlocked developing countries, and small island developing states, 2010–21



Source: IRENA and OECD 2023.

The 40 SIDS are geographically remote, depend heavily on external markets, and are particularly vulnerable to climate change. Historically, they received less than 2 percent of international public commitments. This share increased slightly to 2.4 percent in 2020 and 2.5 percent in 2021. However, this relative increase hides an absolute decrease in flows from USD 338 million in 2019 to USD 300 million in 2020 and USD 198 million in 2021.

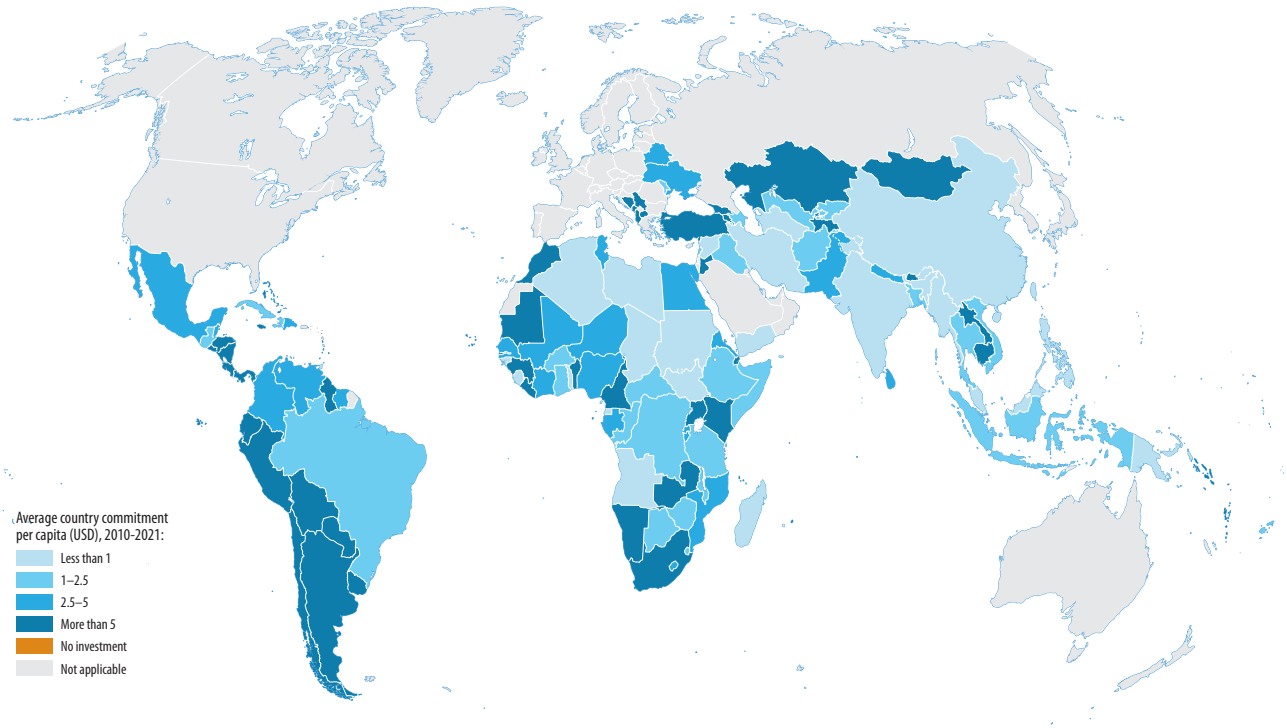
Flows to SIDS reflect an even distribution to the population, with 70 percent of flows going to countries where 70 percent of the population lives. However, four SIDS (Grenada, Seychelles, Trinidad and Tobago, and French Polynesia) have not received more than USD 10 million of international public flows since the start of the millennium. Positively, 45 percent of flows to SIDS since 2000 have been in the form of grants.

LDCs, LLDCs, and SIDS struggle with high debt burdens, which limit their capacity to develop and mitigate the challenges posed by climate change (box 5.3).

Distribution of financial flows among countries

Figure 5.9 shows the average distribution of per capita international public financial flows across countries between 2010 and 2021. The number of countries that did not receive any commitments decreased to less than 20 percent in 2021. Over the past decade, only three countries received no international public commitments. Most countries receiving more than USD 5 per capita are island countries in Oceania.

Figure 5.9 • Average per capita international public financial flows for renewable energy, by country, 2010–21



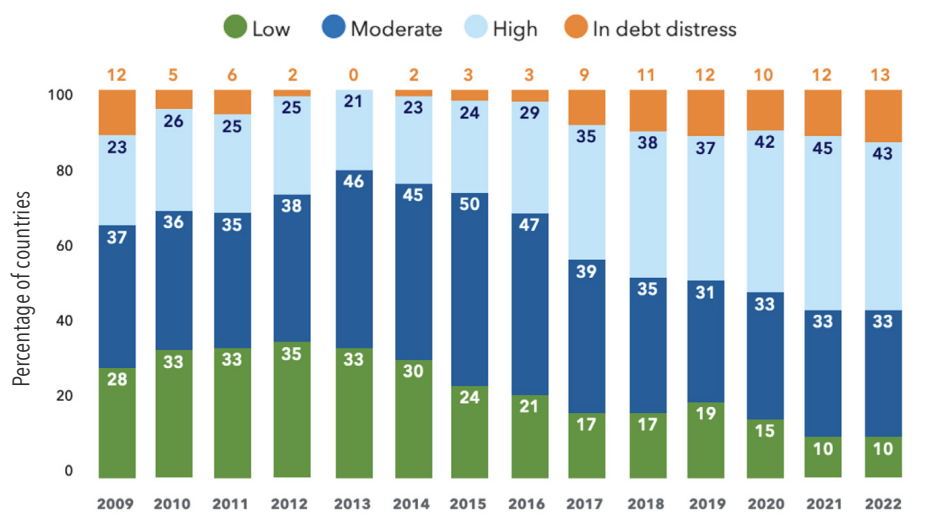
Source: The data on international public financial flows to developing countries supporting clean energy underlying this map were drawn from IRENA and OECD (2023).
Disclaimer: This map was produced by the Geospatial Operations Support Team of the World Bank based on the Cartography Unit of the World Bank. The boundaries, colors, denominations, and other information shown 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.

Box 5.3 • International public financial flows to countries most in need and least capable of paying back debt

The countries most in need of international financial flows are LDCs, LLDCs, and SIDS. They need debt-free instruments to ease financial stress, especially post-COVID (Volz and others 2020).

The proportion of countries in or at high risk of debt distress more than doubled between 2015 and 2022 (figure 5B.3.1). With debt risks increasing in low-income countries, vulnerabilities will affect both debtors and creditors and the overall global economy.[a]

Figure 5B.3.1 Percent of countries in or at high risk of debt distress, 2009–22



Source: IMF 2022.

Around 80 percent of debt in lower-income countries is denominated in foreign currencies, making these countries highly vulnerable to currency and international trade shocks. In many countries, expenditures for debt servicing exceed expenditures for health, education, and other social services (UN 2021). Middle-income economies allocated a median of 41 percent of their government revenues to debt servicing in 2021; low-income economies spent 28 percent of their revenues on repaying debt (Steinhauser 2022).

Support for increased public finance is particularly important for LDCs in Sub-Saharan Africa, which are eligible for debt-free assistance from the IMF and the World Bank. However, LDCs have historically received more than 80 percent of flows in the form of loans and concessional loans; only 16 percent have been in grants. The international public financing architecture must change to avoid stressing governments even more with unsustainable debt.

a. The World Bank and IMF classify low-income countries for fiscal year 2023 as countries with a per capita GNI of $1,085 or less based on the World Bank Atlas method. They include Afghanistan, Burkina Faso, Burundi, the Central African Republic, Chad, the Democratic Republic of Congo, Eritrea, Ethiopia, The Gambia, Guinea, Guinea-Bissau, the Democratic People's Republic of Korea, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, the Syrian Arab Republic, Togo, Uganda, Yemen, and Zambia.

This year's methodological change for inclusion and exclusion of countries from the list of recipients yields a more accurate reflection of the international distribution of public flows, weighted by population to compare investments across countries.[71] The global average per capita investment was USD 2.24 during 2010–21, a value in line with the last two editions of this report.

These distributions highlight the fluctuating nature of international public financial flows, as one year may bring millions to a particular country and the next year may bring none. Only by reviewing multiple years can one accurately assess the distributions of these flows. Table 5.1 provides a summary of the decade-long flow distribution across countries, groups of countries, and geographical regions.

Table 5.1 • Distribution of international public financial flows by country group

	USD PER CAPITA			PERCENTAGE CHANGE	
COUNTRY GROUP	2010–21	2020	2021	2010–21	2020–21
All recipients	2.24	1.67	1.24	–45	–26
Country grouping					
LDC	3.00	1.50	1.85	–38	–23
LLDC	4.81	3.31	2.39	–50	–38
SIDS	4.49	4.94	3.23	–28	–53
Region					
Sub-Saharan Africa	3.59	1.99	1.90	–47	–4
Latin America and the Caribbean	5.45	5.50	2.04	–63	–63
Central Asia and Southern Asia	1.44	1.46	1.34	–7	–9
Western Asia and Northern Africa	4.21	2.09	0.83	–80	–60
Eastern Asia and South-eastern Asia	0.84	0.45	0.50	–40	–11
Northern America and Europe	4.95	1.28	5.09	3	298
Oceania	6.64	1.62	0.91	–86	–44

Source: IRENA and OECD 2023.

On average, recipients received USD 2.24 per capita during 2010–21. Oceania was the top regional recipient, at USD 6.64 per capita. Central Asia and Southern Asia received USD 1.44 per capita and Eastern Asia and South-Eastern Asia USD 0.84 per capita.

Looking at trends in the distribution of flows by population, a continuation of the decreasing trend in flows can be observed over the past two years, with all recipient countries receiving on average USD 1.67 and USD 1.24 per capita, respectively, during 2020 and 2021. Unfortunately, the countries most in need (LDCs, LLDCs, and SIDS) received smaller shares of flows in 2021 than in 2020. SIDS experienced the largest decrease in per capita flows, receiving USD 3.23 per capita, a 53 percent drop from USD 4.94 per capita in 2020. LLDCs received USD 2.39 per capita in 2021 and LDCs USD 1.85 per capita. Per capita flows declined by 38 percent in LLDCs and 23 percent in LDCs in 2002. All three country groups received a distribution of flows across populations that was more even than other regions or than the developing countries average. But investments are reaching fewer people, because of a decrease in overall flows; a larger share of commitments targeting entire regions; and, to a lesser degree, an increase in regional populations.

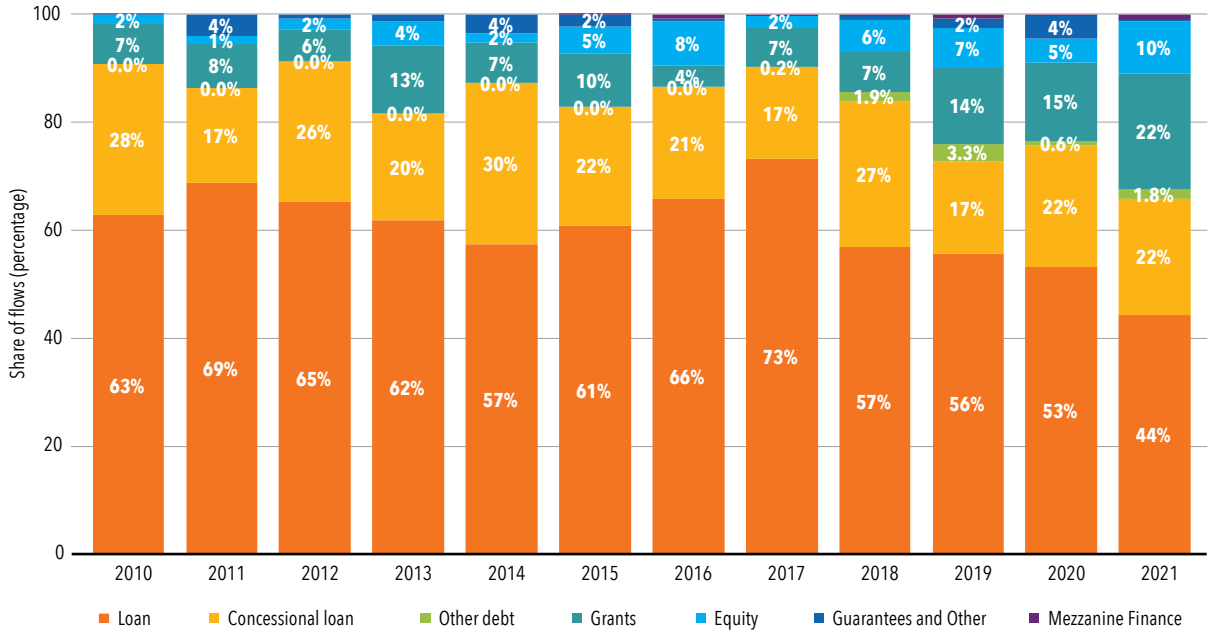
71 See the methodology section of this chapter for more information about the inclusion and exclusion of countries from the list of recipients.

INVESTMENTS BY FINANCING INSTRUMENTS

The flows of international public financing to recipient countries have been declining since 2019, with a mixed impact. On the one hand, the flow of grants has remained strong—a boon to recipient countries, as grant instruments do not carry the obligation of future repayment. On the other hand, an absolute decline in total flows presents a serious concern for countries that urgently need funds to bring renewable energy projects online.

Figure 5.10 shows the main instruments used to finance international public flows. It shows that the mix of financial instruments supporting renewable energy has been evolving in recent years. The proportion of debt instruments from public financing sources has declined to two-thirds of flows in 2021 from nearly 90 percent in 2018. At the same time, the share of grants, equity, and guarantees has increased.

Figure 5.10 • International public financial flows to renewable energy, by instrument, 2010–21



Source: IRENA and OECD 2023.

In 2021, standard loans totalled USD 4.7 billion, down from USD 6.5 billion in 2020. They accounted for 44 percent of all flows, the smallest share recorded during the last decade, down from an average of 64 percent between 2010 and 2020. The largest loan in 2021 was a USD 520 million loan to fund the Balakot Hydropower Development Project in Pakistan. Other large loans focused on solar energy projects and programs.

Half of all loans went to solar energy, 20 percent to hydropower, 13 percent to multiple/other renewables, 10 percent to wind energy, and 2 percent to geothermal energy. The distribution favored solar energy over hydropower. China did not fund any hydropower projects in 2021. There are concerns about using loans to fund renewables in a post-pandemic recovery, especially in LDCs, LLDCs, and SIDS, as overuse of loans could push these countries further into unsustainable external debt situations (IMF 2022).

Concessional loans reached USD 2.3 billion in 2021, a 15 percent decrease from USD 2.7 billion in 2020; these loans represented 22 percent of all flows in 2021. The distribution of concessional loans was similar to the distribution of standard loans, with 44 percent going to solar energy, 27 percent to multiple/other renewables, 22 percent to

hydropower, and the rest to geothermal and wind energy. Among the top concessional loans are USD 369 million to fund solar energy access and lighting in Ethiopia, USD 226 million to modernize and rehabilitate hydropower plants in Mexico, and USD 166 million for a Germany-India solar partnership program.

Grants reached USD 2.3 billion in 2021, up 30 percent from USD 1.8 billion in 2020. This increase was greater than that of other flows, raising the share of grants from 15 percent of commitments in 2020 to 22 percent in 2021. Grants during 2020–21 went primarily to multiple/other renewables and solar energy. The largest grant in 2021 was USD 585 million for the Common Provisioning Fund, a component of the European Fund for Sustainable Development Programme Plus (EFSD+). It funds activities in Sub-Saharan Africa. It was followed by USD 168 million of investments in regional Sub-Saharan Africa infrastructure, a USD 142 million Somali Electricity Sector Recovery Project, and USD 120 million for accelerating electricity access in Niger. Grants are essential for countries in need of public finance, because they do not add to the existing burden of debt, help prove project viability, and reduce the perception of risk for international private finance actors (Polzin and Sanders 2020) and engage smaller local private investors in certain contexts (Curtin, McInerney, and Gallachóir 2017).

Equity reached USD 1 billion in 2021, up 46 percent from USD 564 million in 2020; it represented 10 percent of all flows in 2021. In 2021, half of equity investment went to funds targeting multiple renewable energy technologies, with the rest equally distributed between solar and hydropower energy. Equity is subdivided into two main instruments: common equity and shares in collective investment vehicles. Common equity is normally directed to specific energy sources; shares in collective investment vehicles normally target multiple renewables. The largest investments were a USD 147 million stake in Klinchenberg, a vehicle for Norfund's joint venture with Scatec to develop hydropower in Africa; USD 83 million to the UK Climate Investments (UKCI) fund; and a USD 80 million stake in Fourth Partner Energy in India.

Guarantees and credit lines reached less than USD 10 million in 2021, a 98 percent decrease from USD 500 million in 2020. They represented a negligible share of flows in 2021. In 2020, the credit line to promote sustainable energy in Paraguay was the most prominent use of this financial instrument. In 2021, there was only one guarantee, worth USD 9.6 million, for a loan to Punjab Renewable Energy Systems in India for the construction of seven biomass briquetting plants.

Mezzanine finance reached USD 121 million in 2021, a 175 percent increase from USD 44 million in 2020.[72] It represented 1 percent of flows in 2021. Mezzanine finance allows for the conversion of debt into equity in certain cases.

72 Mezzanine finance includes three instruments: subordinated loans, preferred equity, and other hybrid instruments, including convertible debt or equity. In case of default, subordinated loans are repaid only after all senior obligations have been satisfied. For the increased risk, mezzanine debt holders require a higher return for their investment than secured or more senior lenders. In the event of a default, preferred equity is repaid after all senior obligations and subordinated loans have been satisfied and before common equity holders are paid. It is a more expensive source of finance than senior debt but a less expensive source than equity.

Policy Insights

International public flows decreased in the past few years, jeopardizing efforts to achieve SDG 7 and implement the broader 2030 Sustainable Development Agenda (United Nations, 2015). Notwithstanding international initiatives to revamp these flows, the underlying issues in the global public finance landscape are complex and require increased efforts to understand and address them.

The international public flows presented in this chapter represent just a fraction of the total global financial flows supporting renewables. Domestic public flows, domestic and international private flows, and flows directed to countries that are not included in the scope of indicator 7.a.1 must be added to the figures document here. In 2021, these flows for renewables reached an estimated USD 430 billion (IRENA and CPI 2023).

Even with these flows, the current pace of investment falls far short of the investments required to limit the global temperature increase to 1.5°C while closing the energy gap and advancing development imperatives. Scenarios suggest that we may need investments of at least around USD 1.3 trillion a year (in current prices) must be directed to renewable power and the direct use of renewables between 2021 and 2030, and at least USD 2 trillion a year is needed for broader power sector investments, including power grids and flexibility (IRENA 2022; IEA 2022). Chapter 6 discusses investment needs across indicators in more detail.

The following recommendations identify actions policy makers could consider to narrow the financing gap in the energy transition in a way that reaches those farthest behind.

Enhance international collaboration among countries, international donors, and private investors to address economic challenges and drive systemic reforms.

The uncertain macroeconomic outlook, high inflation levels, currency fluctuations, and tighter fiscal circumstances around the world are stymying the energy transition. Given the high upfront cost of renewable energy projects, higher costs of capital may also slow the transition, particularly for lower-income countries, which already have growing debt vulnerabilities and low sovereign credit ratings. International collaboration will be key to achieve equitable, inclusive, and resilient economies; realize SDG 7; and help countries recover from the economic shocks of the COVID-19 pandemic.

Increase donor flows to regions and countries with vast untapped potential and immense needs, as well as reevaluate their portfolios and disbursement processes.

The contraction, for the third year in a row, of international public flows to developing countries in support of clean energy is concerning, as is its concentration in a small number of countries. International public flows in 2021 were 35 percent below the 2010–19 average. In 2000–21, three-quarters of international flows were from nine investors (a mix of countries and MDBs) and fewer than 40 countries out of 151 received 80% of all commitments. High-income countries should honor existing ODA obligations, significantly increase their international public flows, and ensure that these flows are fairly distributed to countries in need. This also means a larger push for portfolio diversification with more grants, mezzanine finance, concessional debt, and export credits. Capitalization of multilateral and UN-linked funds or programs from international organizations could improve fund allocation.

Redirect funds from fossil fuels to renewables.

About half of all international public flows during 2010–19 went to nonrenewable technologies, as highlighted in last year's report. Donors must accelerate switching their investments from fossil fuels to renewables. As the urgency of such a transition becomes more apparent, more investors—public and private—should pledge to stop funding fossil fuels. Doing so is urgently needed given the global rebound in fossil fuels subsidies in 2021 (IRENA and CPI 2023). One way to increase flows to renewables would be to redirect fossil fuel funds, while simultaneously providing a safety net to ensure adequate standards of living for vulnerable populations. IRENA (2022) scenarios suggest that almost USD 1 trillion in annual investments in fossil fuel–based technologies currently planned by governments should be redirected toward energy transition technologies and infrastructure.

Transform lending to developing countries, including by enhancing collaboration through development finance institutions and multilateral development banks, developing innovative products, and assessing risk appetites.

Many developing countries need both an increase in public finance for renewables and an increase the share of non-debt instruments. Debt burdens are rising, leading to distressed situations in low-income countries, stretching many to the breaking point (see box 5.3). This makes non-debt instruments a preferred option for funding renewable energy infrastructure in some contexts as they may carry the benefit of not adding to the existing debt-burden of countries. The international public financing architecture must thus change. The Bridgetown Initiative, spearheaded by Barbados, calls for providing emergency liquidity, changing some terms regarding how funding to developing countries is made and repaid, and expanding multilateral lending to governments to address systemic challenges that are at the heart of the crises. A wide range of other options includes boosting multilateral development banks' investing capacity (Léautier 2022) and developing innovative frameworks, such as liquidity facilities, to mobilize capital and mitigate risks (IRENA and CPI 2023).

Encourage governments and international donors to rethink the way renewable energy investment risk is defined, in order to increase the pool of public funds available to support renewables.

Private investments accounted for almost 70 percent of global renewable energy investment in 2020, most of it directed to richer economies. This trend reflects the preference of mainstream private capital for lower-risk investments that prioritize financial returns over social, environmental, and climate-related gains. As a result, private capital tends to go to countries with lower real or perceived risks or to frontier markets only if risk-mitigation facilities are provided.

The current financing architecture needs a more comprehensive way to define risk to account for environmental, planetary, and social risks. It should include the risk of leaving a large part of the population out of the energy transition and locked into underdevelopment and the risk of failing to meet the SDGs (IRENA and CPI 2023). At the same time, public funds should continue to be used to mobilize private capital, when possible. National governments can take a range of actions to attract more private sector investments, including regulatory interventions, making it easier to do business and ensuring policy consistency in support of renewables.

Efforts like the Sustainable Renewables Risk Mitigation Initiative can help mobilize more investments by providing a toolkit that shows countries how to methodically address critical risks perceived by the private sector while increasing socioeconomic benefits.

Encourage donors to assess how to best leverage limited public resources, review risk-management practices, and introduce innovative financing instruments.

Public funds are limited, so governments have been focusing on what is available on de-risking projects and improving their risk-return profiles to attract private capital. Among risk-mitigation instruments, sovereign guarantees have dominated. Regulators, credit-rating agencies, and international institutions such as the IMF treat such guarantees as contingent liabilities, however, possibly hampering a country's ability to take on additional debt for critical infrastructure development and other investments (IRENA 2020a). Moreover, sovereign debt is already stressed to the breaking point in many developing countries grappling with high inflation and currency fluctuations or devaluations in the wake of the COVID-19 pandemic. In this macroeconomic environment, many countries cannot access affordable capital in international financial markets or provide sovereign guarantees as a risk-mitigation instrument.

Given the urgent need to step up the pace and geographic spread of the energy transition, and to capture its full potential in achieving socio-economic development goals, more innovative instruments such as blended finance instruments are needed that help underinvested countries reap the long-term benefits of the energy transition without putting their fiscally constrained economies at a further disadvantage (IRENA and CPI 2023).

Use public flows to continue to expand beyond project investments, with a view to increasing their effectiveness to support a just energy transition, including closing energy access gaps.

Priority focus areas should include supporting areas such as education, awareness, and planning, as well as putting in place a policy framework to enable the energy transition and close the energy access gap. Most assessments of investment needs for the energy transition focus on the financing of technological avenues, overlooking the fact that policy interventions and frameworks also require funding. A holistic framework encompasses not only deployment policies that include direct investments in government-owned energy transition assets or policies to attract private investments but also policies that support the integration of renewables into the energy system and the economy as a whole, including capacity building, training, structural change, and just transition policies. Governments need fiscal space to enact such policies; international public flows in support of these policies will be crucial (IRENA and CPI 2023).

Develop a standardized and more granular system for reporting on and tracking renewable energy investments to better track public international flows, including disbursements.

One reason behind the growing share of commitments under the multiple/other renewables category is methodological: unclear commitment descriptions in financial databases and a lack of detail on the financial breakdown for each technology. The prevalence of multi-technology commitments, such as green bonds and investment funds, and technical/policy assistance activities reduce the classification accuracy of financial flows for the energy sector.

A standardized system for reporting on and tracking renewable energy investments would help better track commitments. Such a system could include categories and subcategories identifying renewable energy technologies, energy access initiatives (off-grid solutions for rural communities, mini-grids); project capacities (in energy units); and socioeconomic impacts. Such a system would require collaboration between international organizations, governments, private sector developers, and multilateral development banks to build guidelines, frameworks, and energy-based classification criteria (NGFS, 2019) In many cases, commitments do not translate to disbursements (SEforALL, 2020). Disbursements are more difficult to track and compare against commitments, further complicating analyses.

International public finance stakeholders could do a better job of tracking disbursements, thereby deepening the understanding of gaps between commitments and disbursements. Detailed and transparent data should be compiled and published to facilitate well-informed financing decisions, increase donor accountability, and help identify funding gaps (Michaelowa and Namhata 2022).

Overall, achieving SDG7 by 2030 will require substantial investments in renewable energy. Redirecting investments from fossil fuels, increasing ODA commitments, innovating funding mechanisms, making commitment reporting more transparent through robust international collaboration, and introducing structural reforms in international public finance are all necessary steps. This will require strong political will and collaboration among global stakeholders. With consistent and concerted effort, we have the tools to achieve the needed investments and meet the SDG7 targets.

Methodological Notes

DATA SOURCES

SDG indicator 7.a.1 relies on two databases to track international public financial flows: the Creditor Reporting System (CRS) of the OECD's Development Assistance Committee (DAC) and IRENA's Renewable Energy Public Finance Database.

The CRS database includes ODA and other official flows provided by investors to countries for renewable energy.[73] These flows include official loans, grants, and equity investments that DAC countries receive from foreign governments and multilateral agencies to support renewable energy research and production, including hybrid systems. Investors self-report these figures, which the OECD consolidates and categorizes. We extracted this data from the OECD/DAC CRS from 2000 onward; removed private donor flows, mostly from philanthropic organizations; and filtered it to include clean energy investments per the following codes:

- 23210: Energy generation, renewable sources from multiple technologies, renewable energy generation programs that cannot be attributed to a single technology (codes 23220–23280 below); fuelwood/charcoal production should be included under code 31261
- 23220: Hydroelectric power plants, including energy-generating river barges
- 23230: Solar energy for centralized grids
- 23231: Solar energy for isolated grids and standalone systems
- 23232: Solar energy thermal applications
- 23240: Wind energy for water lifting and electric power generation
- 23250: Marine energy, including ocean thermal energy conversion and tidal and wave power
- 23260: Geothermal energy for generating electric power or directly as heat for agriculture or other purposes
- 23270: Biofuel-fired power plants, including the use of solids and liquids produced from biomass for direct power generation. Also includes biogases from anaerobic fermentation (such as landfill gas, sewage sludge gas, fermentation of energy crops and manure) and thermal processes (also known as syngas); waste-fired power plants making use of biodegradable municipal waste (household waste and waste from companies and public services that resembles household waste, collected at installations specifically designed for their disposal with recovery of combustible liquids, gases, or heat). See code 23360 for nonrenewable waste-fired power plants.
- 23410: Hybrid energy electric power plants
- 23631: Electric power transmission and distribution (isolated mini-grids).

IRENA's database includes additional loans, grants, and equity investments received by countries from all foreign governments, multilateral agencies, and development finance institutions for clean energy research and development and renewable energy production, including in hybrid systems. It covers the same technologies and activities as the CRS but excludes all flows extracted from the CRS to avoid duplication of data.

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73 Find the data here: https://stats.oecd.org/Index.aspx?DataSetCode=crs1.

DEFLATION OF NOMINAL USD PRICES TO CONSTANT PRICES AND EXCHANGE RATES

Commitments are measured in millions of US dollars at constant prices and an exchange rate for a base year. The base year is updated annually and usually reflects a two-year lag in the publication cycle (that is, the 2020 cycle will report 2018 constant prices).

International finance flows expressed in nominal terms are 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 US dollar in a recent year (2020 in this report). A combination of the OECD DAC deflators for DAC donors and deflators calculated by IRENA for other international donors not included in the CRS database is used. The formula below converts the nominal investment amounts in current USD to USD at constant prices and exchange rates:

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

where n is the current year (nominal) and m the constant year.

The OECD publishes DAC deflators for every donor. (For more information, see https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/informationnoteonthedacdeflators.htm.)

In some cases, IRENA tracks flows from donors that are not identified in the DAC list and that do not have an allocated DAC deflator. When this happens, IRENA follows the same methodology as the OECD to calculate country-specific DAC deflators.

REGIONAL AGGREGATIONS AND CLASSIFICATIONS

This year, the countries included in this indicator were modified in order to track international financial flows to countries in need of international financial assistance. The UN system does not define developing and developed countries (or areas), but its Statistical Division publishes a list of countries classified as "developing" or "developed" for statistical uses. In 2021, the UN discontinued this classification, raising questions about how to assign these countries to development groupings.

The eight countries added starting in the 2023 edition represented around USD 4.9 billion of new flows over the 2000–21 period. The 36 countries removed represented USD 404 million of flows, mostly from Qatar and Saudi Arabia. The eight added countries were historically excluded from the developing country list but are identified by the Organisation for Economic Co-operation and Development (OECD) as ODA recipients and thus tracked in their international public flows. It made sense to include them for this reason. Of the countries removed from the indicator, high-income countries are not generally targeted by donors or investors for international aid purposes, mainly because they have bountiful domestic resources. A second group no longer included are countries associated with high-income countries, as defined by the World Bank classification of countries by income levels. This group includes territories of other high-income countries (such as American Samoa) or areas highly influenced by another country's central budgeting and planning (such as French Guiana).

Table 5.1 Changes to country classification for the 7.a.1 indicator

COUNTRIES ADDED IN 2023 (NEW RECIPIENTS OF OFFICIAL DEVELOPMENT ASSISTANCE)	COUNTRIES REMOVED IN 2023 (BECAUSE PRIOR INCLUSION WAS EXCEPTIONAL)	TERRITORIES NO LONGER INCLUDED BECAUSE ASSOCIATED WITH HIGH-INCOME COUNTRIES
Albania, Belarus, Bosnia and Herzegovina, Montenegro, the Republic of Moldova, North Macedonia, Serbia, Ukraine.	Bahrain, Brunei Darussalam, Kuwait, Oman, Qatar, the Republic of Korea, Saudi Arabia, Singapore, the United Arab Emirates, Western Sahara.	American Samoa, Aruba, Bonaire, Sint Eustatius and Saba, British Indian Ocean Territory, British Virgin Islands, Cayman Islands, Curaçao, Falkland Islands (Malvinas), French Guiana, French Southern and Antarctic Territories, Guadeloupe, Guam, Martinique, Mayotte, Northern Mariana Islands, Pitcairn, Puerto Rico, Réunion, Saint Barthélemey, Saint Kitts and Nevis, Saint Martin (French Part), Sint Maarten (Dutch Part), South Georgia and the South Sandwich Islands, Turks and Caicos Islands, United States minor outlying islands, United States Virgin Islands.

This modification was driven by the lack of formality of the "developing country" classification, personalized appeals IRENA received over the years from countries requesting their exclusion from this indicator, and guidance by other custodian agencies.

The United Nations introduced a distinction for the "developing" classification in the standard country or area codes for statistical use (known as M49) in 1996. It removed it in December 2021 because it had become outdated and did not reflect the reality in many countries. The UN Statistical Division still refers to "developing countries" in the SDG indicators but notes that "the exact composition of the group may vary, depending on the mandate, membership or analytical interest of the custodian agency responsible for the particular indicator or use other available groupings such as by income-level" (UNSD 2022).

The developing country classification will continue to lose significance through the 2020s as countries self-identify as more developed and ask to be taken out of this classification. Over the past few years, IRENA received requests by country officials to remove their countries from the 7.a.1 indicator, mainly because these countries do not perceive themselves as needing international financial assistance to develop their renewable energy sectors.

After reviewing this situation with other custodian agencies of various SDG indicators that are designed for "developing countries" and the UN Statistics Division, IRENA decided to make the changes shown above. Where commitments could not be categorized under specific countries or territories, they were classified as "Residual/unallocated ODA," followed by the name of the region. Where the region was unclear, the commitment was classified under "Unspecified countries." (Last year this group was described as "Unspecified, developing countries."). In terms of data aggregation, residual flows to specific regions are aggregated under the geographical region aggregates. Residual flows to "unspecified countries" are aggregated directly under the totals, rather than under any region.

Chapter 7 discusses these classifications.

MEASUREMENT OF FINANCIAL FLOWS THROUGH COMMITMENTS

Financial flows 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 as the full number 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 various weeks, months, or years.

Tracking financial commitments can yield quite different results than approaches that consider financial disbursements. Although disbursement information would provide a more accurate picture of actual financial flows to renewable energy each year, 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, cancelled, or altered. Any changes must be reflected in annual values.

FINANCIAL INSTRUMENTS

The financial instruments used by public financial institutions were categorized based on the OECD list of financial types and the IRENA classifications for concessional loans and credit lines (table 5.2). This taxonomy excludes debt-relief mechanisms. Not all these instruments have commitments allocated to them yet.

Table 5.2 Instruments used to finance renewable energy

INSTRUMENT	DESCRIPTION
Debt	
Standard loan	Legal debt obligations assumed by the recipient comprising transfers in cash or in kind (the creditor also acknowledges the nontradability of obligations should any claim arise from nonpayment). As payment obligations on a standard loan are senior obligations (loans entitle creditors to receive payments against their claims before anyone else), they are referred to as senior loans. These loans have better lending terms than those provided by private financial institutions, including longer payment terms, lower interest rates, and low or negligible grant elements. These loans are not necessarily market-rate loans. In cases where no concessional information is available, they are categorized as loans, not concessional loans.
Concessional loan	Loans that meet ODA criteria of at least a 45 percent grant element for LDCs, LLDCs, and SIDS; 15 percent for lower-middle income countries; and 10 percent for upper-middle- income countries and multilateral development banks within the CRS database or when specified as "concessional" by the public donor itself in the IRENA Public Investments database. Concessional loans also incur external debt from recipients after receiving transfers in cash or in kind, albeit at a significantly lower interest rate than developed countries could get from commercial banks or private finance institutions.
Bonds	Fixed-interest debt instruments issued by governments, public utilities, banks, or companies that are tradable in financial markets.
Asset-backed securities	Securities whose value and income is backed by a pool of underlying assets.
Reimbursable grant	Contribution provided to a recipient institution for investment purposes with the expectation of long-term reflows at conditions specified in the financing agreement. The provider assumes the risk of total or partial failure of the investment; it can also decide when to reclaim its investment.
Other debt securities	These are financial instruments that represent a debt obligation, which are neither standard loans, concessional loans, bonds, nor asset-backed securities. They can be issued by various entities, including governments, corporations, or financial institutions. Other debt securities may include instruments such as promissory notes, commercial paper, or medium-term notes. These securities typically have varying maturities, interest rates, and risk profiles, and they may be traded in secondary markets, providing liquidity to investors. They serve as an alternative means of raising capital or financing projects, offering issuers and investors additional options for diversifying their portfolios and managing risk.
Grants	
Standard grant	Transfers in cash or in kind that create no legal debt for the recipient.
Interest subsidy	Payment to soften the terms of private export credits, loans, or credits by the banking sector.
Capital subscription on deposit basis	Payments to multilateral agencies in the form of notes and similar instruments, unconditionally cashable on sight by the recipient institutions.
Capital subscription on encashment basis	Payments to multilateral agencies in the form of notes and similar instruments, unconditionally cashable on sight by the recipient institutions.

Mezzanine finance	
Subordinated loan	A loan that, in the event of default, will be repaid only after all senior obligations have been satisfied. In return for this increased risk, mezzanine debt holders receive a higher return for their investment than secured or more senior lenders.
Preferred equity	Equity that, in the event of default, will be repaid only after all senior obligations and subordinated loans have been satisfied but before common equity holders are paid. It is a more expensive source of finance than senior debt, a less expensive source than equity.
Other hybrid instruments	Instruments include convertible debt or equity.
Equity	
Common equity	Share of the ownership of a corporation that gives the owner claims on the residual value of the corporation after the corporation meets creditors' claims.
Shares in collective investment vehicles	Collective undertakings through which investors pool funds for investment in financial and/or nonfinancial assets. These vehicles issue shares (for corporate structures) or units (for trust structures).
Reinvested earnings	Reinvested earnings are applicable only to foreign direct investment (FDI). Reinvested earnings on FDI consist of the retained earnings of a direct foreign investment enterprise that are treated as if they were distributed and remitted to foreign direct investors proportionally to their ownership of the equity of the enterprise and then reinvested by them in the enterprise.
Guarantees	
Guarantees/ insurance	Promise of indemnification up to a specified amount in the case of default or nonperformance of an asset (such as a failure to meet loan repayments or to redeem bonds or expropriation of an equity stake). Guarantees typically cover political and/or commercial (credit, regulatory/contractual) risks that investors are unwilling or unable to bear.
Credit line	Arrangement between a bank and a borrower establishing a maximum loan balance that the bank will permit the client to maintain. A credit line guarantees that funds will be available, but no financial assets exist until funds are advanced.

CHANGES TO THE DATA

Several revisions were made to this year's public investments database. Some commitments were cancelled, some were reclassified to different years, some recipient countries were removed from the dataset, and all figures were updated to reflect 2020 prices and exchange rates.

Table 5.3 • International public flows to renewable energy before and after the 2023 revisions, 2000–19

YEAR	BEFORE REVISION (2019 USD MILLIONS)	AFTER REVISION (2020 USD MILLIONS)	DIFFERENCE (2020 USD MILLIONS)
2000	1,424	1,469	45
2001	1,668	2,038	370
2002	1,321	1,381	60
2003	3,097	3,102	5
2004	2,116	2,166	50
2005	1,961	2,218	257
2006	3,238	3,327	89
2007	4,272	4,349	77
2008	2,778	2,919	141
2009	8,145	8,263	118

YEAR	BEFORE REVISION (2019 USD MILLIONS)	AFTER REVISION (2020 USD MILLIONS)	DIFFERENCE (2020 USD MILLIONS)
2010	11,171	11,912	741
2011	11,689	12,603	914
2012	10,294	10,808	514
2013	13,580	14,176	596
2014	15,691	16,626	935
2015	12,660	12,588	-72
2016	20,410	21,874	1,464
2017	24,657	26,365	1,708
2018	14,244	15,752	1,508
2019	12,526	13,987	1,461

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