CHAPTER 7

TRACKING PROGRESS TOWARD SDG 7 ACROSS TARGETS: INDICATORS AND DATA

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Leveraging national data efforts worldwide, this annual report is a joint effort of the five custodian agencies responsible for monitoring progress toward the targets of Sustainable Development Goal (SDG) 7—universal access to affordable, reliable, sustainable, and modern energy by 2030 (table 7.1). The World Bank and World Health Organization (WHO) are responsible for tracking progress toward SDG target 7.1 (universal access to modern energy services). The International Energy Agency (IEA), International Renewable Energy Agency (IRENA), and United Nations Statistics Division (UNSD) are responsible for tracking SDG target 7.2 (the share of renewable energy in the energy mix). The IEA and UNSD are responsible for tracking SDG target 7.3 (improvements in energy efficiency). IRENA is also responsible for tracking target 7.a (international cooperation)—with the Organisation for Economic Co-operation and Development (OECD)—and target 7.b (promotion of energy infrastructure). The World Bank's Energy Sector Management Assistance Program (ESMAP) produces and publishes the report.

This chapter provides a descriptive summary of the data for each indicator and the methodological challenges. Further details can be found in the United Nations' metadata repository for SDG indicators (https://unstats.un.org/sdgs/metadata/).

TABLE 7.1 • SDG 7 TARGETS, INDICATORS, AND CUSTODIAN AGENCIES

TARGET	INDICATOR	CUSTODIAN AGENCY OR AGENCIES	RELEVANT CHAPTER IN THIS REPORT
7.1—By 2030, ensure universal access to affordable, reliable, and modern energy services	7.1.1—Proportion of population with access to electricity	World Bank	**Chapter 1**
	7.1.2—Proportion of population with primary reliance on clean fuels and technology for cooking	World Health Organization	**Chapter 2**
7.2—By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1—Renewable energy share in total final energy consumption	International Energy Agency, International Renewable Energy Agency, UN Statistics Division	**Chapter 3**
7.b—By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular, least-developed countries, small island developing states, and landlocked developing countries, in accordance with their respective programs of support	7.b.1—Installed [renewables-based] generating capacity in developing and developed countries (in watts per capita)	International Renewable Energy Agency	
7.3—By 2030, double the global rate of improvement in energy efficiency	7.3.1—Energy intensity measured in terms of primary energy and GDP	International Energy Agency, UN Statistics Division	**Chapter 4**
7.a—By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1—International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems	International Renewable Energy Agency, Organisation for Economic Co-operation and Development	**Chapter 5**

Note: GDP = gross domestic product.

Access to electricity

Measuring access to electricity (SDG indicator 7.1.1) is not as straightforward as simply counting the number of people with electricity. It is a complex process involving data collection and validation efforts carried out by national and international players, including governments, energy utilities, private companies, and multilateral development organizations. Understanding the intricacies of electricity access in low-income countries and countries marked by fragility, conflict, or violence requires a comprehensive look at the multiple attributes of access in different settings.

While most microdata from household, enterprise, and agricultural surveys provide useful information to energy practitioners and ministries, they fail to capture the more nuanced aspects of electricity access in households—for example, the economic activities of a household's individual members. Further complexities arise when trying to account for the scale-up of decentralized energy solutions that are not typically distinguished in routine national surveys and energy statistics.

Because the concept of electricity access does not lend itself to easy definition, efforts are underway, through the World Bank's Multi-Tier Framework (MTF), to better capture the spectrum of energy services sought and used by households: capacity, availability, reliability, affordability, quality, formality, healthiness, and safety.[41] Such efforts can provide more precise, more detailed information about the number of people benefiting from interventions and the nature and magnitude of improvements in electrification. Such information is critical to inform policy and decision-making. Where data are not available for multi-tier metrics, country-level surveys or censuses complement data collection.

Advancing capacity-building activities, such as the training of energy statisticians through bilateral and regional programs, will improve the tracking of electricity access by building the skills needed for effective data collection and analysis. More user-friendly and more comparable data sets will, in turn, help governments and energy practitioners apply new technologies and leverage data analytics to inform policy and implementation. Resources like the World Bank's online Atlas of Sustainable Development Goals,[42] which features interactive storytelling and graphical representations of electricity access trends, demonstrate how accessible data can enhance insights relevant to key SDG indicators. Also, the use of large-scale, open databases that provide real-time information based on satellite data will clarify where and how electricity is being used, while also revealing socioeconomic trends related to energy consumption. Ongoing efforts to improve data quality and granularity are critical, as is sustained investment in both data collection and capacity building. In 2021, ESMAP, the Living Standard Measurement Study (LSMS), and WHO collaborated to publish the "Core Questions on Household Energy Use," providing detailed guidelines for fieldwork and data tabulation, including on electricity quality. These standardized modules are being integrated into national surveys so that they provide more timely and actionable insights in support of universal access, rather than merely serving as retrospective assessments. The World Bank has also partnered with national statistical offices to deepen their understanding of energy indicators and improve survey methodologies. ESMAP's MTF survey has been implemented in 25 countries, with the aim of establishing a baseline for energy access in over 35 countries by 2025, while a recent ESMAP-LSMS initiative plans to conduct household surveys in 15 countries aligned with the Mission 300 goals. Strengthening these initiatives will ensure a more precise and detailed understanding of electricity access, ultimately supporting more effective policy making and accelerating progress toward the SDGs.

41 Information on the MTF can be found at https://mtfenergyaccess.esmap.org/.

42 https://datatopics.worldbank.org/sdgatlas?lang=en.

Access to clean cooking fuels and technologies for cooking

SDG indicator 7.1.2 measures the number of people using clean fuels and technologies as their primary energy source for cooking in the household. Households considered to have access to clean cooking are those that primarily rely on electricity, biogas, solar, alcohol fuels, natural gas, and liquefied petroleum gas for household cooking purposes. Here, "clean" refers to the combinations of fuels and technologies that meet the emissions targets set out in the WHO guidelines for indoor air quality and household fuel combustion (2014). Improving the collection of data on the parallel use of multiple cooking solutions (also known as "stove stacking") in low- and middle-income countries would allow a more complete picture of the population exposed to pollution and resultant diseases. Presently, however, such data are too limited in geographic coverage to be used in global tracking efforts.

Household surveys and censuses are the primary data sources for global estimates. Using their data as the main inputs, the Global Household Energy Model is applied to estimate the use of clean cooking fuels and technologies. Knowing the extent to which household surveys capture modes and duration of use is therefore vital for designing, implementing, and monitoring the effectiveness and outcomes of clean cooking policies and programs.

By refining household surveys and censuses, countries can gain a more complete picture of household energy use; access to clean cooking fuels and technologies; and the effects of cooking practices on air pollution, gender, climate, and other impacts. The WHO and World Bank developed the guidebook *Measuring Energy Access* and a harmonized set of "Core Questions on Household Energy Use" (World Bank and WHO 2021). The questions improve upon previous surveys by not only establishing whether a household has electricity access and what its primary cooking fuel is, but also by assessing the type of electricity access; the quality of access; impediments to access; the types of fuels and devices used for cooking, heating, and lighting; and important safety and livelihood impacts of household energy use.[43]

Beyond the SDG 7 indicators, including additional and more comprehensive questions in surveys will also help monitor trends in and broader outcomes of access to clean cooking. At the moment, most energy-related data collected by national household surveys do not capture everything needed to understand the role of household energy services in mitigating poverty and other impacts; hence, they do not permit extensive energy policy analysis. Including questions on cooking time, fuel collection, and health implications would make clean cooking estimates more granular and aid in the formulation of better national and global policies (World Bank and WHO 2021).

43 More information on CHEST can be found at https://www.who.int/tools/clean-household-energy-solutions-toolkit.

Renewable energy

Progress toward SDG target 7.2—substantially increasing the share of renewable energy in the global energy mix—is tracked using renewable energy's share of total final energy consumption as the key indicator. Here, too, accurate tracking requires comprehensive data across all energy sources (renewable and nonrenewable) and across supply, transformation, and final consumption. The methodology used to derive total final energy consumption, total energy supply, and energy balances is detailed in United Nations (2018).

To increase the accuracy of tracking renewables, two methodological challenges must be met: (1) monitoring the rapid development of geographically distributed energy sources, such as off-grid and micro-grid solar photovoltaic and wind; and (2) enhancing countries' capacity to measure traditional uses of biomass (solid biofuels) among households. Biomass is the largest source of renewable (if not clean) energy in low- and middle-income countries.

National-level household and industry surveys could do more to make renewable energy statistics more reliable. For example, a broader range of questions on biomass use in households and organizations could help determine to what extent it can be considered a sustainable energy source. Traditional fuelwood harvesting is associated with deforestation and habitat loss, yet fuelwood is still assumed to be a renewable energy source for lack of an agreed definition of sustainable harvesting, or accurate measures of fuelwood harvests. Survey-based data could help better quantify the "renewable" fraction of biomass use, and perhaps prompt significant revisions of earlier estimates. Remote sensing might help measure it, but still a long time will be needed to calibrate it against well-run household surveys.

Energy efficiency

Energy intensity, defined as the ratio of total energy supply and economic output, is used to track progress toward SDG target 7.3—doubling the global rate of improvement in energy efficiency (UN 2018). Measuring the total energy supply requires credible information on, among others, primary energy production across all sources, as well as trade in all energy products. Supply-related information is collected from administrative sources or via surveys of higher-level players, such as energy suppliers.[44] This information includes commercially traded energy sources and is of fairly good quality in most countries.

To improve the tracking of energy intensity it will be important to analyze the drivers of demand across sectors, such as industry, transport, and buildings (both residential and commercial/industrial). Collecting demand-side data is much more complex, time consuming, and expensive than collecting supply-side data, because end users are diverse. Consumer surveys can complement data collection efforts when energy suppliers have limited or no information on how much energy is consumed by different types of users.

Analyzing energy efficiency within sectors requires countries to monitor energy intensities at the end-use level. Efficiency indicators might include energy expended per passenger-kilometer by vehicle type for passenger transport (tonne-kilometer for freight transport); energy for space heating and cooling, by unit of area, for buildings; or, for industry, energy used in the physical production of each unit of a particular good. More details on a methodological framework for energy efficiency indicators, as well as country experiences, can be found in IEA (2014).

Besides finer disaggregation of data, better energy efficiency indicators will depend on greater cross-organizational coordination in activities beyond the energy sector, including, among others, building records, vehicle registration, and industrial reports. Many countries have already begun to collect end-use data and compile energy efficiency indicators to support their policy making and planning.[45]

44 Data collected by various agencies in response to legislation or regulation (not necessarily for statistical purposes) may be used to compile energy statistics after ensuring their quality and addressing limitations related to their purpose.

45 An example, besides the IEA energy efficiency indicators themselves (IEA 2014), is the Odyssee database for Europe (https://www.indicators.odyssee-mure.eu/).

International financial flows to developing countries in support of clean and renewable energy

Indicator 7.a.1 measures international public financial flows to developing countries in support of clean energy research and development, and renewable energy production, including in hybrid systems. The measurement utilizes data from IRENA and the OECD.

Good measurement of international public investment flows has four components: (1) tracking financial flows, (2) standardizing commitment details, (3) centralizing data collection, and (4) presenting flows in a consistent way.

Tracking public financial flows requires an understanding of how recipients intend to spend aid and other investments for end-use projects and programs. Recipients are defined as end-use organizations and projects run by public investors. The amount of private finance leveraged through public funds, which the OECD already monitors in its data on private finance mobilization, provides valuable supplementary information to analyses of public flows. International financial flows are typically disbursed in multiple phases and through multiple stakeholders (local governments, ventures, or funds). Some commitments may also be canceled or modified after data have been gathered. Thus, where reporting institutions revise financial investment figures, historical investment information covering multiple years should be considered to reveal changes in amounts.

Standardizing commitment details by sharing best practices among public investors and donors, refining reporting directives, and encouraging public investors and donors helps ensure that collected data comply with international standards. The standardization process also makes data more accurate and granular. For example, commitment data may specify, among other attributes, technology, type of finance (project-level finance, infrastructure, research, or technical assistance), and type of financial mechanism.

Energy-related details are often excluded while collecting investment data. Most data on public investments in clean energy and renewables continue to be collected in a decentralized manner, adversely affecting consistency. For comparability across public donors, data collection must be centralized, using online data entry portals and questionnaires prefilled to the extent possible with data from other agencies. The OECD/Development Assistance Committee Creditor Reporting System database is exemplary in this regard and also allows self-reporting by donors.

Exchange rates and inflation must be taken into account when comparing international commitments across countries. The OECD methodology is used in this report to deflate international flows, by adjusting for inflation from the year the flows occurred to a baseline year (2022) and by converting local currency values to US dollars using exchange rates from the baseline year (2022).

Installed renewable electricity: Generating capacity in developing and developed countries

Indicator 7.b.1 tracks the installed capacity of power plants generating electricity from renewable energy sources (expressed in watts per capita). The 36 energy types disaggregated by IRENA as renewable fall into six broad categories: hydropower, marine energy (ocean, tidal, and wave energy), wind energy, solar energy (photovoltaic and thermal energy), bioenergy, and geothermal energy.

Capacity is defined as the year-end net maximum installed electrical capacity. Assessing a country's electricity production capacity is a valuable way to track progress toward target 7.b because it is an actual reflection of efforts. For many nations, the focus on increasing electricity production, especially from renewable sources, is a crucial step in their journey toward sustainable and modernized services.

Data on renewable energy capacity are collected in the course of IRENA's annual questionnaire cycle. Countries receive questionnaires at the beginning of each year and report renewable energy data for the previous two years. To minimize the reporting burden, the questionnaires for some countries are prefilled with data collected by other agencies (e.g., Eurostat). The questionnaires are then sent to relevant national agencies, so they can provide any additional details requested by IRENA. Validated data, by country, are published each year in late June in IRENA's Renewable Energy Statistics (the most recent edition is that of 2024). Population data are extracted from the "World Population Prospects" (the most recent edition is UN Population Division 2023) and represent a country's population at midyear (July 1).

A measure of indicator 7.b.1 in watts per capita is computed by dividing a country's year-end renewable-electricity-generating capacity by its population in that year. Capacity data are drawn from this computation, and they account for the immense variations in needs between countries. Population data are used instead of gross domestic product, since population is the most basic indicator of the demand for modern and sustainable energy services in a country.

Importantly, the indicator's focus on electricity capacity does not capture trends in the modernization of technologies in important, energy-intense sectors such as heat production and transport. Overall, electricity accounts for only about a quarter of the energy used globally; the share is even smaller in most developing countries. With electricity access continuing to increase, however, the focus on electricity capacity will grow in relevance.

Conclusion

Since the first effort back in 2013, improvements in reporting, advances in countries' statistical capacities, and enhanced models have raised the quality, reliability, and consistency of data on progress toward SDG 7 targets. This progress should be seen as a reminder of the value of pursuing a common framework using standardized data collection and estimation methodologies. The common framework will be possible only through cooperation among national statistical offices and other national agencies compiling energy information, and among those offices and relevant international bodies. International cooperation in the compilation of global databases will harmonize estimates across regions and countries and raise awareness of the need for good data.

As the custodian agencies work together to track SDG 7 at a global level, they have found ways to refine their collaboration and strengthen their support to countries. For example, the custodian agencies responsible for this report host webinars for statistical agencies and energy authorities, produce statistical guidance and reports on data collection, and regularly consult with national statistical offices and other national agencies on the estimates they provide. Continuing efforts by the World Bank, the WHO, and other custodians to mainstream energy access questions into national household surveys are an important form of support to those offices. Programs to support national and regional data-collection efforts have also contributed to stronger capabilities. More such support is required to build national statistical capacities.

The IEA and UNSD have a long history of working together to build national reporting capacity. For instance, these agencies jointly organize workshops with the United Nations Framework Convention on Climate Change to help countries improve institutional coordination and, consequently, their compilation of energy balances, in turn improving the SDG 7 indicators. Recently, thanks to the IEA's Sub-Saharan Africa program funded by the European Union, Nigeria implemented a new household survey in 2024 and a survey for industry in March 2025.

The custodian agencies for SDG 7 highlight a need to strengthen resources for better collection of national-level data under current and planned international programs supporting the energy transition. Building on recent improvements in data collection for the SDGs, national statistical capacities must be further strengthened. National and international institutions interested in policy success should increase resources for this purpose.

Finally, the custodian agencies would like to express their appreciation of the work and dedication of the many colleagues who collect national-level data around the world. Without their efforts, no precise estimates could be produced, and no tracking would be possible. Their work underpins the international efforts culminating in this report and ensures that the SDG 7 targets are kept in full view.

ANNEX 1. Methodological Notes

Chapter 1. Access to electricity

The World Bank's Global Electrification Database

The World Bank's Global Electrification Database compiles data from nationally representative household surveys and from censuses for the period 1990–2023. It incorporates data from the Socio-Economic Database for Latin America and the Caribbean, the Middle East and North Africa Poverty Database, and the Europe and Central Asia Poverty Database—all of which are based on similar surveys. The database relies on the Bank's Multi-Tier Framework (MTF), which classifies access from Tier 0 (no access) to Tier 5 (the highest level of access). At the time of this analysis, the database had 1,438 surveys from 149 countries over 1990–2023.

A multilevel, nonparametric model is applied to extrapolate data for missing years (described below). The modeling approach, originally developed by the World Health Organization (WHO) to estimate clean fuel usage, was adapted to project electricity access and fill in missing data points.[46] Where data were available, access estimates were weighted by population. Multilevel, nonparametric modeling considers the hierarchical structure of data (at country and regional levels), using the regional classification of the United Nations.

The model was applied in all countries for which at least one data point was available. To use as much real data as possible, results based on survey data were reported in their original form for all the years for which they were available. The statistical model was used to fill in data for years in which data were otherwise missing and to conduct global and regional analyses. When survey data were not present for a given year, information from regional trends was used. The difference between real data points and estimated values is clearly identified in the database. High-income countries are assumed to have 100 percent electrification rates (for the years the countries belong to that income category).

For 1990–2010, the statistical model was based on insufficient data points or outdated household surveys. To avoid electrification trends in this period overshadowing efforts made since 2010, the model was run twice: once with survey data and assumptions for 1990–2023 (for model estimates for 1990–2023) and once with survey data and assumptions for 2010–23 (for model estimates for 2010–23). The first run extrapolated electrification trends for 1990–2023, given the available data points. The second run considered only real data collected since 2010 and estimated the historical evolution over the most recent years. The outputs from the two model runs were then combined to generate a final value for access to electricity. If survey data were available, the original observation remained in the final database. Otherwise, the larger value generated by the model runs was chosen as the final data point.

46 The model draws on the modeling of solid fuel use for household cooking presented in Bonjour et al. (2013).

Under the adapted WHO methodology, regional trends affect the estimation of yearly values for countries missing data points for certain years. Depending on the regional trend and the years elapsed since the last year in which data were available for a given country, the model can interpolate unrealistic access rates of 100 percent. To avoid reporting unrealistic rates, the country's latest survey data are extended. In this version of the report, this was done for Brazil, Bolivia, Jamaica, and Lao People's Democratic Republic.

The Multi-Tier Framework (MTF)[47] of the Energy Sector Management Assistance Program (ESMAP) further complements the Global Electrification Database's information through household surveys, primarily consumer questionnaires, which provide insights into the quality and reliability of the energy services received by people and also delve into affordability issues. To date, the MTF has conducted such surveys in over 25 countries, assessing electricity access across five tiers of service. ESMAP is looking to focus and expedite the use of such multisectoral surveys in countries where the access gaps are widest.

Night-Time Light (NTL) Satellite Imagery for Electrification Estimation is used to further validate and correct survey data. Gaps are filled where surveys were conducted several years ago or were disrupted—such as during the COVID-19 pandemic, or due to situations involving fragility, conflict, and violence (FCV). NTL satellite imagery works by measuring artificial light emissions from the Earth's surface. It helps track human activities such as urbanization, economic growth, and electrification. Satellites have been recording NTL emissions since 1992, with increasing spatial resolution and precision. Since 2012, the Visible Infrared Imaging Radiometer Suite (VIIRS) has provided global nightly NTL data. NTL imagery complements survey-based approaches with a remote sensing solution, especially for regions for which field data are limited. It provides high-resolution estimates of electrification at the village level, helping to track progress over time and identify access gaps. Repeated rounds of cross-checks and validation further enhance estimates and make data more reliable for policy makers, researchers, and stakeholders through the report series.

Comparison between demand- and supply-side data

While the Global Electrification Database collects data mainly from household surveys and censuses, the International Energy Agency's (IEA's) Energy Access Database draws from government reports on household electrification (usually based on connections reported by utilities). IEA considers a household to have access if it receives enough electricity to power a basic bundle of energy services.

The two approaches at times yield different estimates. Estimates based on household surveys are moderately higher than estimates based on energy sector data because they capture a wider range of phenomena, including off-grid access, "informal" connections (connections not made by or known to the utility), and self-supply systems.

A comparison of the two datasets in the previous edition of this report (updated in this edition) highlights their respective strengths. Household surveys, typically conducted by national statistical agencies, offer two advantages for measuring electrification. First, thanks to efforts to harmonize questionnaire designs, electrification questions are largely standardized across country surveys. Although not all surveys reveal detailed information on the forms of access, questionnaire designs capture emerging phenomena, such as off-grid solar access. Second, survey data convey user-centric perspectives on electrification. They capture all forms of access, painting a more complete picture than may be possible using data supplied by service providers. But a comprehensive and accurate survey-based understanding of electricity access requires greater investment in data collection and capacity building.

47 Information on the Multi-Tier Framework can be found at: https://mtfenergyaccess.esmap.org/.

Government-reported electrification data, as provided by the national ministries of energy, are supply-side data on utility connections. They offer two principal advantages over national surveys: first, administrative data are often available on an annual basis and may therefore be more up to date than surveys, which are conducted every two to three years. (Moreover, since 2010, about 34 percent of countries have published or updated their electricity data at intervals of two to three years, the recommended time frame for global data collection.) Second, administrative data are not subject to the challenges that can arise when conducting field surveys. Household surveys (particularly those implemented in remote and rural areas) may suffer from sampling errors, which may result in the access deficit being underestimated.

Measuring access to off-grid solar-based electricity

The rates and levels of access to off-grid solar energy presented in this chapter are based on data shared by affiliates in the biannual data collection undertaken by GOGLA, Lighting Global, and Efficiency for Access.

Off-grid solar lighting products eligible for inclusion include a solar panel, a battery, and at least one light point. Every six months, affiliate companies fill out a questionnaire on their product sales by country, system type/size, and business model; they also share product specifications and capacities. Although companies are ultimately responsible for the accuracy of the self-reported data they submit, an independent consultancy (Berenschot), as well as GOGLA, Lighting Global, and the Energy Savings Trust, check the data for quality.

Both off-grid solar product manufacturers and distributors report sales, but public reports cover only manufacturers' sales—which include business-to-business transactions (e.g., sales to distributors, governments, and nongovernmental organizations) as well as direct sales to customers—so that sales reported by both manufacturers and distributors are not double counted. The most recent *Market Trends Report* (Lighting Global/ESMAP et al. 2022) estimates that the sales of GOGLA affiliate companies represent 28 percent of the total off-grid solar market, although estimates of percentages by country, as well as by system size and business model, vary significantly.

In addition to using standardized impact metrics[48] created by the GOGLA Impact Working Group, additional steps are taken to calculate energy access tiers:

Tier 1. A "SEforALL factor" is applied to sales numbers.[49] This factor estimates the service-level impact of smaller technologies. This tool reviews the system size and capacity of each product and estimates whether it has helped unlock either partial or full Tier 1 access. It then calculates the number of people who have achieved either partial or full Tier 1 access.

Tier 2. Products that have capacity of more than 50 watts peak, or more than 20 watts peak and come packaged with a television, are deemed to provide Tier 2 energy access. This approach is designed to align product specifications or the energy service with the requirements for Tier 2 access. Products that have enabled a household to achieve Tier 2 access are not included in the final Tier 1 estimates.

48 The Global Impact Metrics are available at https://gogla.org/reports/standardised-impact-metrics-for-the-off-grid-solar-energy-sector-v4/.

49 Where a product provides partial Tier 1 access, a methodology devised by SEforALL can be applied to calculate how several products can be combined to reach Tier 1 equivalency. The methodology was designed to account for "energy stacking" and to thus prevent Tier 1 access from being underrepresented in calculations.

Measuring access to mini-grid–based electricity

The International Renewable Energy Agency (IRENA) collects off-grid capacity and generation data from a variety of sources, including from its own questionnaires; national and international databases; and unofficial sources, such as project reports, news articles, academic studies, and websites. For some countries, IRENA also estimates off-grid solar photovoltaic capacity, based on solar panel import statistics obtained from the United Nations' COMTRADE Database.

IRENA's 2024 decentralized energy database contains global data on off-grid renewable energy for Africa, Asia, South America, Central America and the Caribbean, and Oceania, covering off-grid renewable power capacity (in megawatts), biogas production (in cubic meters), and energy access (in numbers of inhabitants). This chapter uses energy access data estimated for people with access to hydropower, solar mini grids (Tiers 1 and 2), and biogas.

IRENA publishes off-grid statistics by the end of December each year. Details on the methodology used in this report are set forth in IRENA (2018).

Data from censuses for more than 200 countries, conducted at varying frequencies and over different periods, are used to track electricity access. Where anomalies are identified through internal validation, analysts use internal reviews, household survey–based validation, and satellite imagery. Where this occurs, corrections are made to access levels, using methodologies duly approved by technical experts, who are a key part of the guidance for the Tracking Report. While this is a robust approach, it has its challenges and limitations.

Challenges in measuring and reporting global electricity access fall under three broad topics: (1) data consistency, (2) frequency of data collection, and (3) challenges in data collection. Data inconsistencies in reported figures and difficulties in cross-country comparisons arise from diverse definitions of electricity access across countries, variations in survey questions, and different data collection approaches. Data collection frequency is a challenge: only about 34 percent of countries have been updating their electricity survey data within two to three years, the required time frame, since 2010. This implies that extrapolations are required to update overall estimates. Data collection challenges include sampling errors, especially for household surveys in remote or rural areas, hampered by logistical challenges and capacity constraints. This means that regional disparities cannot be fully captured and estimates rather than actual survey data are used for areas with weak statistical systems. As private sector investments are leveraged, particularly in off-grid and mini-grid areas, there is a need for the type of information that helps private investors and consumers decide on investments and installations. The binary categorization of "access" or "no access" is increasingly seen to be insufficient. Multisectoral approaches are needed to assess affordability based on income levels, while more information on the geography and composition of underserved areas with a high density of unelectrified households would help decide where and how to focus investments to narrow the access gap. Frequency and accuracy of data collection are other limitations. More work is needed to make household surveys nimbler, faster, and backed by greater analytical strength. There is also a need for harmonized standards, greater collaboration, and the adoption of new technologies like satellite imagery and artificial intelligence to make data more accurate and more comparable in measuring global electricity access. However, even state-of-the-art technologies have limitations that need to be carefully considered. Two examples are given below:

Country-specific variations. Light emissions do not translate directly into access rates; for the same electrified population, different countries emit different light levels. Factors such as outdoor activity, energy-saving practices, and infrastructure differences influence results.

Limited multidimensional insight. Electrification is more than just light emissions. Quality household surveys with a multisectoral approach are a must for assessing consumer requirements, affordability thresholds, and the reliability and quality of options available.

Chapter 2. Access to clean fuels and technologies for cooking

Data sources

The WHO Household Energy Database contains data from nationally representative household surveys (WHO 2024). It is regularly updated, relies on multiple sources (table A1.1), and serves as the basis for all modeling efforts in this report. The database contains more than 1,650 surveys conducted in 171 countries (including high-income countries) between 1960 and 2023. A quarter of the surveys cover the years 2013–18; 330 new surveys cover 2016–23. Modeled estimates are provided only if there are underlying survey data on cooking fuels. Thus, there are no estimates for Lebanon, Libya, and Bulgaria.

Population data are from the latest revisions of the United Nations World Population Prospects (2024) and Urbanization Prospects (2018).

TABLE A1.1 • OVERVIEW OF DATA SOURCES FOR CLEAN FUELS AND TECHNOLOGY

NAME	ENTITY	NUMBER OF COUNTRIES	QUESTION
Census	National statistical agencies	109	What is the main source of cooking fuel in your household?
Demographic and Health Survey (DHS)	Funded by the United States Agency for International Development (USAID); implemented by ICF International	82	What type of fuel does your household mainly use for cooking?
Living Standards Measurement Survey (LSMS), income expenditure surveys, and other national surveys	National statistical agencies, supported by the World Bank	26	Which is the main source of energy for cooking?
Multiple Indicator Cluster Surveys (MICS)	United Nations Children's Fund (UNICEF)	90	What type of fuel does your household mainly use for cooking?
Study on Global AGEing and Adult Health (SAGE)	World Health Organization (WHO)	6	NA
World Health Survey	WHO	50	NA
National surveys		117	NA
Other		84	NA

Model

Given household surveys are conducted irregularly and reported heterogeneously, the WHO Global Household Energy Model (GHEM), developed in collaboration with the University of Glasgow, is used to estimate trends in household use of six fuel types:

- Unprocessed biomass (e.g., wood)
- Charcoal
- Coal
- Kerosene
- Gaseous fuels (e.g., liquefied petroleum gas)
- Electricity

Trends in the proportion of the population using each fuel type are estimated using a Bayesian hierarchical model—based on country survey data and with urban and rural disaggregation. Smooth time functions were the only covariate. Estimates for total polluting fuel use (unprocessed biomass, charcoal, coal, and kerosene) and total clean fuel use (gaseous fuels, electricity, and an aggregation of other clean fuels, such as alcohol) are produced by aggregating estimates for relevant fuel types. Estimates produced by the model automatically presume that total fuel use equals 100 percent.

The GHEM is implemented using the R programming language and the NIMBLE software package for Bayesian modeling with Markov chain Monte Carlo (MCMC). Summaries can be obtained to provide both point estimates (e.g., means) and measures of uncertainty (e.g., 95 percent credible and 95 percent prediction intervals). The GHEM is applied to the WHO Household Energy Database to produce a comprehensive set of country estimates for the use of four polluting cooking fuels and two cooking clean fuels for each year from 1990 to 2023, together with associated measures of uncertainty. Further details on the modeling methodology and validation can be found in Stoner and others (2020), and a more detailed analysis of individual fuel use can be found in Stoner and others (2021).

The analysis included only surveys where less than 15 percent of the population reported "missing," "no cooking," and "other fuels." Surveys were also discarded if the sum of all mutually exclusive categories reported was not within 98–102 percent. Fuel use values were uniformly scaled (divided) by the sum of all mutually exclusive categories, excluding "missing," "no cooking," and "other fuels." Countries classified by the World Bank as high income in the 2023 fiscal year were assumed to have transitioned to clean household energy. They are, therefore, reported as having 100 percent access to clean fuel and technologies; no fuel-specific estimates were reported for high-income countries. In addition, no estimates were reported for low- and middle-income countries for which there were no data suitable for modeling (Bulgaria, Lebanon, and Libya). Modeled fuel-specific estimates were reported for 128 low- and middle-income countries, plus three countries with no World Bank income classification (República Bolivariana de Venezuela, Niue, and Cook Islands). Estimates of overall clean fuel use were reported for 195 countries.

Uncertainty intervals

Many of the point estimates we provide here are accompanied by 95 percent uncertainty intervals, which imply a 95 percent chance that the true value lies within the given range. Small annual changes in the point estimates may be statistical noise arising from either the modeling process or survey variability, and may, therefore, not reflect a real variation in the numbers, which vary based on the fuels between years. The uncertainty intervals should, therefore, be considered when assessing changes in the rate of access to orthe use of specific fuels between years.

Moreover, for some countries, unavailability of recent survey data (e.g., for the past 10 years) naturally leads to very wide uncertainty intervals associated with estimates for 2022 and preceding years. For countries with very wide uncertainty intervals, point estimates should be treated with some caution.

Global and regional aggregations

Population data from the United Nations Population Prospects (2024) and Urbanization Prospects (2018) (for disaggregation by residence) were used to derive the population-weighted regional and global aggregates (UN 2024, 2018). Low- and middle-income countries for which data were not available were excluded from all aggregate calculations. High-income countries were excluded from aggregate calculation for specific fuels.

The aggregation methods used ensure that uncertainty in the percentage of people and the absolute number of people using different fuels for cooking in individual countries propagate into the uncertainty intervals accompanying global and regional estimates.

Annualized growth rates

The annualized increase in the access rate is calculated as the difference between the access rate in year 2 and that in year 1, divided by the number of years to annualize the value:

(Access Rate Year 2–Access Rate Year 1) / (Year 2–Year 1)

This approach accounts for population growth by making use of the final national access rate.

Projections

Projected access rates, access deficits, and fuel use can be estimated using the GHEM, whereby uncertainty increases the further into the future estimates are calculated, reflecting how country trends may shift based on how unsettled they were during the data period.

Projections in this chapter are hypothetical scenarios in which no new policies or interventions (positive or otherwise) take place. As such, they are useful as baseline scenarios for comparing the effect of interventions. The scenarios are calculated by extrapolating current trends into the future.

Chapter 3. Renewables

Definitions

Renewable energy sources. Total renewable energy from hydropower (excluding pumped hydro), wind, solar photovoltaic, solar thermal, geothermal, tide/wave/ocean, renewable municipal waste, solid biofuels, liquid biofuels, and biogases.

Renewable energy consumption. Final consumption of direct renewables along with the estimated consumption of renewables-based electricity and renewables-based heat. Ambient heat harnessed by heat pumps is not accounted for in this report, due to limited data availability.

Direct renewables. Bioenergy, and direct uses of solar thermal and geothermal energy.

Total final energy consumption. The sum of the final energy consumption in transport, industry, and other sectors (equivalent to the difference between total final consumption and nonenergy use). Total final energy consumption excludes energy transformed into other forms (e.g., natural gas used to generate electricity), as well as energy used by energy industries.

Traditional uses of biomass. Biomass uses are considered traditional when solid biomass is consumed for energy purposes in the residential sector in countries outside the Organisation for Economic Co-operation and Development (OECD). IEA's statistics classify solid biomass into primary solid biomass, charcoal and unspecified primary biomass, and waste. The United Nations Statistics Division has a similar classification with a more detailed breakdown of products. Traditional consumption/use of biomass is a “conventional proxy” because it is estimated rather than measured directly, due to limited data on the use of solid biomass in traditional and inefficient cookstoves.

Modern uses of renewable energy consumption. This is the difference between the total renewable energy consumption and the traditional consumption/use of biomass.

Methodology for the indicator

The indicator used in this report to track Sustainable Development Goal (SDG) 7.2 is the share of renewable energy in total final energy consumption. Data from the International Energy Agency’s World Energy Balances (IEA 2024a) and the United Nations Statistics Division’s Energy Balances 2022 (UNSD 2024) are used to calculate the indicator according to this formula:

$$\%TFEC_{RES} = \frac{TFEC_{RES} + \left(TFEC_{ELE} \times \frac{ELE_{RES}}{ELE_{TOTAL}}\right) + \left(TFEC_{HEAT} \times \frac{HEAT_{RES}}{HEAT_{TOTAL}}\right)}{TFEC_{TOTAL}}$$

The variables are derived from the energy balance flows: TFEC = total final energy consumption as defined in the definitions above, ELE = gross electricity production, and HEAT = gross heat production; the subscript RES corresponds to the portion coming from renewable energy sources.

The denominator is the total final energy consumption across all energy products (as defined above). The numerator—final renewable energy consumption—is a series of calculations defined as the direct consumption of renewable energy sources plus the final consumption of electricity and heat estimated to have come from renewable sources. For the calculation at the final energy level, the amount of electricity and heat consumption deemed to come from renewable sources is allocated based on the renewables’ share in gross production.

Methodology for additional metrics beyond the main indicator

The amount of renewable energy consumption can be divided into three sectors to refer to how the energy is consumed: electricity, heat, and transport. They are calculated from the energy balance and are defined as follows:

Electricity refers to the amounts of electricity consumed by end users. Electricity used for transport is excluded from this aggregation. Electricity used to produce district heat is also not included, because it is not part of final consumption. Electricity used to produce heat in electric boilers and heaters (except where this heat is distributed as district heat) is included, however, since official data at the final energy service level are unavailable to determine what electricity is used for heat.

Heat refers to the amount of energy consumed for heating in industry and other sectors, as well as other uses not included in electricity and transport, such as fuels used to pump water. Because official data at the final energy service level are unavailable, electricity-based heat in electric boilers and heaters—the final consumers—is not included in this aggregation.

Therefore, the heat category here is not equivalent to the final energy end-use service. It is also important to note that in this chapter, in the context of an “end use,” heat does not refer to the same quantity as the energy product, “Heat,” in the energy balance used in the formula above.

Transport refers to the amounts of energy consumed for transport. The majority is consumed in rail and road transport, followed by pipeline transport. The amount of renewables-based electricity consumed in the transport sector is estimated as the product of the annual shares of renewable sources in the gross national electricity production and the amount of electricity used nationally in the transport sector.

Methodology for indicator SDG 7.b.1

Indicator 7.b.1 measures the installed renewable energy–generating capacity in developed and developing countries (in watts per capita). It is computed by dividing the maximum year-end installed renewable electricity–generating capacity of power plants by the country's midyear population. Data from IRENA are used to calculate this indicator.

IRENA's electricity capacity database contains information on installed electricity-generating capacity, measured in megawatts. The dataset covers all countries and areas from the year 2000, records whether capacity is on- or off-grid, and is divided into 36 renewable energy types, which together constitute the six main sources of renewables-based electricity. For the population part of this indicator, IRENA uses the latest population data from the United Nations World Population Prospects (UN 2024).

More details on the methodology used in this chapter can be found in the SDG indicators metadata repository (https://unstats.un.org/sdgs/metadata/files/Metadata-07-0b-01.pdf).

Chapter 4. Energy efficiency

Total energy supply (TES) in megajoules (MJ)

This represents the amount of energy available in the national territory during the reference period. It is calculated as follows: Total energy supply = Primary energy production + Import of primary and secondary energy – Export of primary and secondary energy – International (aviation and marine) bunkers – Stock changes. This definition is consistent with International Recommendations for Energy Statistics (IEA 2024a; UNSD 2024).

Gross domestic product (GDP) in 2021 US dollars (USD) at purchasing power parity (PPP)

This is the sum of the gross value-added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the products' value. It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources. GDP is measured in constant 2021 USD PPP. The data source is IMF's World Economic Outlook (https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases/), complemented by World Bank's World Development Indicators (https://databank.worldbank.org/source/world-development-indicators) and CEPII's CHELEM database (http://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=17).

Primary energy intensity in MJ/2021 USD PPP

$$Primary\ energy\ intensity = \frac{TES\ (MJ)}{GDP\ (USD\ 2021\ PPP)}$$

The TES–GDP ratio is measured in MJ per 2021 USD PPP. Energy intensity (EI) indicates how much energy is used to produce one unit of economic output. A lower ratio indicates that less energy is used to produce one unit of economic output.

EI is an indicator of an economy's energy efficiency, since an economy can only be meaningfully aggregated in monetary terms, and changes over time can provide insights into progress in efficiency. However, it is an imperfect indicator, since changes are affected by other factors in addition to energy efficiency, especially changes in the structure of economic activity.

Average annual rate of improvement in energy intensity (%)

This is calculated using the compound annual growth rate (CAGR):

$$CAGR = \left(\frac{EI_{t2}}{EI_{t1}}\right)^{\frac{1}{(t2-t1)}} - 1\ (\%)$$

Where:

EI_{t2} is energy intensity in year t2

EI_{t1} is energy intensity in year t1

Negative values represent decreases (or improvements) in energy intensity (less energy is used to produce one unit of economic output or per unit of activity), whereas positive numbers indicate increases in energy intensity (more energy is used to produce one unit of economic output or per unit of activity).

Total final energy consumption (TFEC) in MJ

The sum of the energy consumption of the different end-use sectors, excluding nonenergy uses of fuels, TFEC is broken down into final energy demand in industry, transport, residential, services, agriculture, and other sectors. It excludes international marine and aviation bunkers, except at the global level, where it is included in the transport sector (IEA 2024a; UNSD 2024).

Value-added in 2023 USD PPP

Value-added is the net output of a sector after adding all outputs and subtracting intermediate inputs. It is calculated without making deductions for the depreciation of fabricated assets or the depletion and degradation of natural resources. The industrial origin of value-added is determined by the International Standard Industrial Classification, revision 3 (IEA 2024b).

Industrial energy intensity in MJ/2023 USD PPP

$$Industrial\ energy\ intensity = \frac{Industrial\ TFEC\ (MJ)}{Industrial\ value\ added\ (USD\ 2023\ PPP)}$$

Ratio of industry TFEC and industry value-added, measured in MJ per 2023 USD PPP (IEA 2024a, 2024b.

Road passenger transport energy intensity in MJ/passenger-kilometer (km)

$$Passenger\ transport\ energy\ intensity = \frac{Passenger\ transport\ TFEC\ (MJ)}{Passenger\text{-}kilometers}$$

Ratio of final energy consumption for road passenger transport and road passenger transport activity measured in MJ per passenger-km (IEA 2024c).

Freight transport (heavy trucks) energy intensity in MJ/tonne-km

$$Freight\ transport\ energy\ intensity = \frac{Freight\ transport\ TFEC\ (MJ)}{Tonne\text{-}kilometers}$$

Ratio of freight transport (heavy trucks) final energy consumption and activity measured in MJ per tonne-km (IEA 2024c).

Buildings energy intensity in MJ/unit of floor area

$$Buildings\ energy\ intensity = \frac{Buildings\ TFEC\ (MJ)}{Buildings\ floor\ area\ (m^2)}$$

Ratio of buildings TFEC and square meters of building floor area (IEA 2024c).

Fossil fuel electricity generation efficiency (%)

$$Generation\ efficiency = \frac{Electricity\ output\ from\ coal + oil + natural\ gas}{Electricity\ input\ from\ coal + oil + natural\ gas}(\%)$$

Ratio of electricity output from fossil fuel–fired (coal, oil, and natural gas) electricity generation and the fossil fuel–based energy input to electricity generation

Fuel inputs to and electricity output from combined heat and power plants (CHPs) are excluded from this figure (IEA 2024a).

Chapter 5. International public financial flows to developing countries in support of clean energy

Data sources

For SDG indicator 7.a.1, a combined subset from two databases is used. The databases, the Creditor Reporting System (CRS) of the OECD's Development Assistance Committee (DAC) and IRENA's Renewable Energy Public Finance Database, are used to track international public financial flows. The CRS is a quarterly updated database containing various financial flows provided by investors to countries for multiple purposes (OECD 2025). Progress in this indicator is tracked based on only a subset of the commitments in this database. To obtain that subset, we downloaded bulk data from the CRS from 2000 onward; consolidated the files; removed unused columns, noncommitments, and flows from private sector donors (flow code 30); and filtered the data to include clean energy investments (purpose codes 23210–23290, 23410, 23631).

IRENA's Renewable Energy Public Finance Database covers commitments beyond those included in the CRS, especially by non-DAC donors that do not report their commitments through the CRS. These flows represent approximately 40 percent of the financial value of the commitments in both databases combined. We categorized each commitment by type of energy, financial instrument, and other metadata that matches the CRS. Reporting precedes data compilation in the CRS by a few months. After the CRS data were released, we reviewed individual commitments across the datasets to remove duplicates from the IRENA data. We compiled both sources and used the combined dataset for SDG 7.a.1.

Deflating nominal US dollar prices to constant prices and exchange rates

Commitments are measured in millions of US dollars at constant prices, using an exchange rate for a base year. The base year is updated annually; it generally reflects a three-year lag in the publication cycle and a one-year lag in the latest reporting data (that is, the 2025 cycle will report commitments up to 2023 at 2022 constant prices).

International financial 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 in all years, are expressed as the purchasing power of a US dollar in a recent year (2022 in this report). For this report, a combination of the OECD deflators for DAC donors and deflators calculated by IRENA for other international donors not included in the CRS database is used.[50] The following formula converts the nominal investment amounts in current US dollars to US dollars at constant prices and constant 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 (real).

50 The OECD publishes DAC deflators for each donor. For more information, see https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/informationnoteonthedacdeflators.html. IRENA sometimes tracks flows from donors that are not identified in the DAC list and that do not have an allocated DAC deflator. The agency follows the same methodology as the OECD to calculate country-specific DAC deflators.

Regional aggregations and classifications

Regional aggregations start with the microdata of commitments. Each commitment is assigned to either a specific country or to an unspecified country, or to a mix of countries. Where commitments could not be categorized under specific countries or territories following the United Nations' M49 classification, they were classified as "residual/unallocated ODA [official development assistance]," followed by the region name. Where the region was unclear, the commitment was classified under "unspecified countries." 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. International flows for which no information on the region or country is available, are classified as multilateral and excluded from the indicator, since some of this finance may be directed to countries outside the scope of the SDG 7.a.1 indicator.

We continue aggregating financial flows based on the SDG regions and subregions defined by the United Nations and published as the M49 classifications. For other types of classifications, we keep a modified list of countries from "developing regions" to determine which countries are to be included in the aggregation and data dissemination. Chapter 7 discusses these classifications.

Measuring financial flows through commitments

Financial flows are recorded as donor 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 disbursements, which may occur over weeks, months, or years.

Tracking of financial commitments can yield quite different results than tracking disbursements. Disbursement information would portray the actual yearly renewable energy financial flows more accurately but disbursement data are often limited or not available. On the other hand, a more comprehensive and granular analysis of financial flows is possible through tracking commitments, which also ensures methodological consistency across data sources. It may, however, 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 the annual values.

Financial instruments

The financial instruments used by public financial institutions were categorized based on OECD's list of financial types and IRENA's classifications for concessional loans and credit lines (table A1.2). This taxonomy excludes debt relief mechanisms. Some of these instruments have yet to be used in connection with commitments in the years covered by this chapter.

TABLE A1.2 • DESCRIPTION OF INSTRUMENTS USED FOR INTERNATIONAL PUBLIC FINANCIAL FLOWS

FINANCIAL INSTRUMENT	DESCRIPTION
Debt	
Standard loan	Legal debt obligations assumed by the recipient, including transfers in cash or in kind (creditor 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 grant elements. They are not necessarily market-rate loans. Where no concessional information is available, commitments are categorized as loans, not concessional loans.
Concessional loan	Loans that meet official development assistance criteria of at least a 45 percent grant element for least-developed countries, landlocked developing countries, and small island developing states; 15 percent for lower-middle-income countries; and 10 percent for upper-middle-income countries and multilateral development banks within the Creditor Reporting System database—or when specified as "concessional" by the public donor itself in the International Renewable Energy Agency's Public Investments database. Concessional loans incur external debt from recipients, 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 are backed by a pool of underlying assets.
Reimbursable grants	Contributions provided to a recipient institution for investment purposes with the expectation of long-term reimbursement under the 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	Financial instruments that represent a debt obligation but are neither standard loans, nor concessional loans, bonds, or asset-backed securities. They can be issued by various entities, including governments, corporations, or financial institutions. Examples include promissory notes, commercial paper, and medium-term notes. These securities typically have varying maturities, interest rates, and risk profiles, and 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. The deposit basis refers to the accounting of the capital once it is deposited in the multilateral agencies' funds.
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. The encashment basis refers to the accounting of the capital once it is accessed (cashed) by the multilateral agencies from its funds.

FINANCIAL INSTRUMENT	DESCRIPTION
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 debtholders receive a higher return for their investment.
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, but less expensive than equity.
Other hybrid instruments	Such instruments include convertible debt or equity.
Equity	
Common equity	Share of ownership in 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 or nonfinancial assets. These vehicles issue shares (for corporate structures) or units (for trust structures).
Reinvested earnings	Reinvested earnings are applicable to only foreign direct investment (FDI). Reinvested earnings on FDI consist of the retained earnings of an FDI enterprise, treated as if they were distributed and remitted to foreign direct investors (in proportion to their ownership of the enterprise's equity) and then reinvested 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 commercial risks (credit, regulatory/contractual) that investors are unwilling or unable to bear.
Credit lines	Arrangements 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.

Source: OECD and IRENA 2024.

Changes to data

Several revisions were made to the combined public investments database (OECD and IRENA). Some commitments were canceled, some were reclassified to different years, and some recipient countries were removed from the dataset. In addition, all figures were subsequently updated to reflect 2022 prices and exchange rates (table A1.3). As a result, the difference in the reported dollar amounts reflects a compounded effect of both these data revisions and the shift from 2021 to 2022 constant USD values.

TABLE A1.3 • REVISIONS TO PUBLIC FLOWS, 2000–22

YEAR	BEFORE REVISION (2021 USD MILLIONS)	AFTER REVISION (2022 USD MILLIONS)	DIFFERENCE (2022 USD MILLIONS)
2000	1,535	1,447	-88
2001	1,739	1,610	-129
2002	1,283	1,169	-114
2003	2,878	2,787	-91
2004	1,723	1,573	-149
2005	2,772	2,629	-143
2006	3,231	3,122	-109
2007	4,391	4,336	-55
2008	4,066	3,886	-181
2009	4,896	4,739	-157
2010	11,334	10,964	-370
2011	12,826	12,489	-337
2012	10,085	10,316	230
2013	13,322	13,190	-132
2014	18,076	18,956	879
2015	12,329	12,143	-186
2016	28,454	28,427	-27
2017	22,840	22,320	-520
2018	17,680	17,483	-197
2019	12,758	12,353	-405
2020	12,151	12,053	-98
2021	12,385	13,159	774
2022	15,433	17,014	1,581
Total	228,186	228,163	-23

Source: IRENA and OECD 2024.

The difference over the past two decades reflects a minor downward revision of the total USD 23 million in commitments. This minor difference is mainly due to upward revisions for 2022 (USD 1,581 million), 2021 (USD 774 million), and 2014 (USD 879 million), along with downward revisions for 2017 (USD 520 million) and 2019 (USD 405 million). In addition, part of the difference is due to the shift from using 2021 to 2022 as the constant USD base year.

Chapter 6. Outlook for SDG 7

Investment figures from IEA scenarios are in constant 2021 USD at the market exchange rate. Investment figures from IRENA scenarios are in constant 2015 USD at the market exchange rate.

IEA methodology

The analysis in this chapter is based on results from the Global Energy and Climate Model (GEC Model) and IEA's analysis in the World Energy Outlook (WEO). Detailed documentation of the WEM methodology is available at: https://www.iea.org/reports/global-energy-and-climate-model

IEA presents in this report two of its models. The Stated Policies Scenario (STEPS) is designed to provide a sense of the prevailing direction of energy system progression, based on a detailed review of the current policy landscape. It provides a more granular, sector-by-sector evaluation of the policies that have been put in place to reach stated goals and other energy-related objectives, taking account not only of existing policies and measures but also those that are under development. They are implemented under this scenario to the extent that they are supported by specific policies, funding, and measures. The scenario also reflects progress with the implementation of corporate sustainability commitments.

The Net Zero Emissions by 2050 Scenario (NZE Scenario) is a normative scenario that shows a pathway for the global energy sector to achieve net zero CO2 emissions by 2050, with advanced economies reaching net zero emissions in advance of others. This scenario also meets key energy-related Sustainable Development Goals (SDGs), in particular universal energy access by 2030 and major improvements in air quality. It is consistent with limiting the global temperature rise to 1.5 °C (with at least a 50% probability), in line with emissions reductions assessed in the Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report. This scenario is based on the following assumptions:

- Adoption of all available technologies and emission reduction options is dictated by costs, technology maturity, policy preferences, and market and country conditions.
- All countries cooperate toward achieving net-zero emissions worldwide.
- The entire energy sector sees an orderly transition that ensures the security of fuel and electricity supplies at all times, minimizes stranded assets where possible, and avoids volatility in energy markets.

Methodology for tracking access to electricity and to clean cooking

The projections presented in the WEO and in this chapter focus on two elements of energy access— household access to electricity and clean cooking facilities—which are measured separately. IEA maintains databases on the levels of national, urban, and rural electrification rates. For the proportion of the population without access to clean cooking, the main sources are the WHO's Household Energy Database and IEA's Energy Balances. Both databases are regularly updated and form the baseline for the WEO energy access scenarios to 2040.

The projections under the Stated Policies Scenario consider current and planned policies; recent progress; and population growth, economic growth, the urbanization rate, and the availability and prices of different fuels. The Net Zero Emissions by 2050 Scenario identifies least-cost technologies and fuels for universal access to electricity as well as clean cooking. For electricity access, the analysis incorporates a geographic information systems (GIS) model based on open-access geospatial data; technology, energy prices, electricity access rates, and demand projections are obtained from the GEC Model. This analysis was developed in collaboration with the KTH Royal Institute of Technology, Division of Energy Systems Analysis (KTH-dESA), in Stockholm, Sweden. on the IEA methodology for energy access projections can be found in the Global Energy and Climate Model documentation (https://www.iea.org/reports/global-energy-and-climate-model)

Methodology for renewable energy projections

The annual updates to the WEO projections reflect the broadening and strengthening of policies over time, including for renewables. Projections for renewables-based electricity generation are derived in the renewables submodule of the GEC Model, which projects the future deployment of renewables for electricity generation and the required investment. This future deployment relies on an assessment of the potential of and costs for each renewable energy source (bioenergy, hydropower, photovoltaics, concentrated solar power, geothermal electricity, wind, and marine energy) in each of the 27 GEC Model regions. Under all scenarios, IEA modeling incorporates a process of learning by doing that affects costs. The model calculates deployment as well as the resulting annual investment needs for each renewable source in each region by including the financial incentives for the renewables' use and the nonfinancial barriers in each market; technical and social constraints; and the value added by each technology to the system in terms of energy, capacity, and flexibility.

Methodology for energy efficiency projections

The key energy efficiency indicator refers to GDP and total final energy demand. Economic growth assumptions for the short to medium term are based largely on those prepared by the Organisation for Economic Co-operation and Development, the International Monetary Fund, and the World Bank. Over the long term, growth in each GEC Model region is assumed to converge to an annual long-term rate that depends on demographic and productivity trends, macroeconomic conditions, and the pace of technological change.

Total final energy demand is the sum of energy consumption for each end use in each final demand sector. In each subsector or for each end use, at least six types of energy are shown: coal, oil, gas, electricity, heat, and renewables. The main oil products—liquefied petroleum gas, naphtha, gasoline, kerosene, diesel, heavy fuel oil, and ethane—are modeled separately for each final demand sector.

In most of the equations, energy demand is a function of activity variables that are driven by the following factors:

- Socioeconomic variables: GDP and population are important drivers of sectoral activity variables that determine the energy demand for each end use within each sector.
- End-user prices: Historical time series data for coal, oil, gas, electricity, heat, and biomass prices within each sector are compiled based on the IEA's Energy Prices and Taxes database and several external sources. End-user prices are then used as an explanatory variable affecting the demand for energy services.
- Technological parameters include recycling in industry and material efficiency.

All 27 GEC Model regions for energy demand are modeled in considerable sectoral and end-use detail:

- Industry is separated into six subsectors (with the chemicals sector disaggregated into six subcategories).
- Buildings' energy demand is separated into residential and services buildings, which are then separated into six end uses. Within the residential sector, appliances energy demand is separated into four appliance types.
- Transport demand is separated into nine modes, with considerable detail for road transport.

IRENA methodology

IRENA scenarios

IRENA's scenarios outlined in this report a series of roadmaps outlining renewables-dominated pathways for deploying low-carbon technologies for a clean and sustainable energy future globally, regionally, and nationally.

The findings in this report are based on IRENA's World Energy Transitions Outlook: 1.5°C Pathway workstream. The Planned Energy Scenario (PES) reflects energy system developments based on governments' existing energy plans, targets, and policies as of early 2023. Meanwhile, the 1.5°C Scenario (1.5-S) presents an energy transition pathway supporting the Paris Agreement's goal of limiting global temperature rise to 1.5°C above preindustrial levels.

IRENA's energy scenarios are developed using its Renewable energy roadmap (REmap) energy modeling tool. The first step is an extensive process of collecting data on energy balances, energy statistics and policy and regulatory frameworks (by sector), and key activity indicators relevant to the energy system under analysis.

These data serve as input variables for its REmap tool, which translates them into detailed energy and emission flows, generating full energy and emission balances. These outputs undergo consistency checks against national references, thematic studies, and IRENA's internal work. The results are iteratively refined until they align with a scenario's normative objectives and pass quality control. The REmap tool covers the entire energy system—from final energy consumption (fuels, electricity, and heat) to transformation centers (power and heat plants, hydrogen production, and biofuels) and primary energy supply (raw energy sources). Final energy consumption is further divided into buildings, transport, and industry, with each sector further subdivided into subsectors, technologies, and energy carriers. The model estimates consumption based on activity levels, efficiency rates, and technology shares, enabling scenario adjustments through:

- Activity reduction, including energy conservation and circular economy measures;
- Efficiency improvements, reducing energy consumption per unit of activity; and
- Technology shifts, increasing renewables and electrification.

Once final energy consumption is determined, the analysis examines transformation centers, which convert primary energy (e.g., solar, wind, crude oil, and biomass) into final energy (e.g., electricity, gasoline, and biodiesel). The transformation centers are modeled based on energy transformation efficiency, linking energy demand to primary supply.

Scenario development

Each analysis begins with deriving the Planned Energy Scenario, which reflects current national policies and plans. This scenario serves as the foundation for the 1.5°C Scenario, which targets net-zero emissions by midcentury. While the 1.5°C Scenario considers existing policies, it prioritizes ambitious mitigation measures, including:

- Demand reduction through conservation and efficiency measures;
- Lower energy and emission intensity through technological improvements; and
- Rapid deployment of clean energy through renewables and electrification.

For more information on the scenarios, methodology, and scope of this work, please visit www.irena.org/remap.

IRENA socioeconomic modeling

Since 2016, IRENA has been analyzing the socioeconomic implications of transition roadmaps. Socioeconomic analysis is conducted using a macroeconometric model (E3ME)[51] that integrates the energy system and global economies into a single quantitative framework. IRENA's analysis of key drivers and impacts has yielded insights supporting energy transition planning at different geographical scopes.

The socioeconomic analysis sheds light on the trade-offs between economic prosperity and employment; it also examines welfare aspects, including the distributional implications of policy choices. It discusses the socioeconomic differences between transition pathways at different levels of ambition. Policy makers need to be aware of how policy choices will affect people's well-being and overall welfare, and of the potential gaps and hurdles that could affect progress. The results from the analysis of the socioeconomic footprint include GDP (aggregated economic activity), employment (economywide and with a deep-dive into the energy sector), and the IRENA Welfare Index (which has five dimensions relating to the energy transition—economic, social, environmental, distributional, and access—and two indicators per dimension).

WHO projections

The projected access rates, access deficits, and fuel usage presented in chapter 6 are estimated using the WHO GHEM (detailed further in the methodological notes for chapter 2). The uncertainty of these estimates grows with projections further into the future, reflecting potential shifts in country trends based on their volatility during the data period.

The projections in this chapter are based on a hypothetical business-as-usual scenario derived from current trends that assumes that no new policies or interventions (either positive or negative) occur. Thus, these scenarios serve as useful baselines for evaluating the impact of potential interventions. The scenarios are derived by extrapolating current trends into the future.

Chapter 7. Regional classifications of countries/ territories

This report classifies countries and territories according to the United Nations' SDG classification for regions; the most recent classification for developing countries; and the special groupings for the least-developed countries, landlocked developing countries, and small island developing states (table A1.4). The SDG regional groupings are not the same as the M49 regional grouping of the United Nations, which focuses more closely on geography. The United Nations discontinued its developing countries classification in late 2022. This report will continue to use the most recent UN classification for developing countries to ensure continuity for indicators 7.a.1 and 7.b.1 (as well as 12.a.1).

51 The E3ME global macroeconometric model (www.e3me.com) is used for the assessment of socioeconomic impacts. Results for REmap roadmaps (e.g., energy mixes and the related investments) are used as exogenous inputs for each scenario, as well as climate- and transition-related policies.

TABLE A1.4 • GROUPINGS OF REGIONS, COUNTRIES, AND TERRITORIES AS USED IN THIS REPORT

CATEGORY	COUNTRIES/TERRITORIES WITHIN THE CATEGORY
Northern America and Europe	Åland Islands, Albania, Andorra, Austria, Belarus, Belgium, Bermuda, Bosnia and Herzegovina, Bulgaria, Canada, Channel Islands, Croatia, Czechia, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Guernsey, Holy See (the), Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands (Kingdom of the), North Macedonia, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation (the), Saint Pierre and Miquelon, San Marino, Sark, Serbia, Slovakia, Slovenia, Spain, Svalbard and Jan Mayen Islands, Sweden, Switzerland, Ukraine, United Kingdom of Great Britain and Northern Ireland (the), United States of America (the)
Sub-Saharan Africa	Angola, Benin, Botswana, British Indian Ocean Territory, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic (the), Chad, Comoros (the), Congo (the), Côte d'Ivoire, Democratic Republic of the Congo (the), Djibouti, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, French Southern and Antarctic Territories, Gabon, Gambia (the), Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Mozambique, Namibia, Niger (the), Nigeria, Réunion, Rwanda, Saint Helena, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Eswatini, Togo, Uganda, United Republic of Tanzania (the), Zambia, Zimbabwe
Latin America and the Caribbean	Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas (the), Barbados, Belize, Bolivia (Plurinational State of), Bonaire, Sint Eustatius and Saba, Bouvet Island, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Dominican Republic (the), Ecuador, El Salvador, Falkland Islands (Malvinas), French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Barthélemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French Part), Saint Vincent and the Grenadines, Sint Maarten (Dutch part), South Georgia and the South Sandwich Islands, Suriname, Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands, Uruguay, Venezuela (Bolivarian Republic of)
Western Asia and Northern Africa	Algeria, Armenia, Azerbaijan, Bahrain, Cyprus, Egypt, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, State of Palestine (the), Sudan (the), Syrian Arab Republic (the), Tunisia, Türkiye, United Arab Emirates (the), Western Sahara, Yemen
Oceania	American Samoa, Australia, Christmas Island, Cocos (Keeling Islands), Cook Islands (the), Fiji, French Polynesia, Guam, Heard Island and McDonald Islands, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Norfolk Island, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States minor outlying islands, Vanuatu, Wallis and Futuna Islands
Eastern Asia and South-eastern Asia	Brunei Darussalam, Cambodia, China, China, Hong Kong Special Administrative Region, China, Macao Special Administrative Region, Democratic People's Republic of Korea (the), Indonesia, Japan, Lao People's Democratic Republic (the), Malaysia, Mongolia, Myanmar, Philippines (the), Republic of Korea (the), Singapore, Thailand, Timor-Leste, Viet Nam
Central Asia and Southern Asia	Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan
Developed countries	Åland Islands, Albania, Andorra, Australia, Austria, Belarus, Belgium, Bermuda, Bosnia and Herzegovina, Bulgaria, Canada, Channel Islands, Christmas Island, Cocos (Keeling) Islands, Croatia, Cyprus, Czechia, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Guernsey, Heard Island and McDonald Islands, Holy See (the), Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Jersey, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands (Kingdom of the), New Zealand, Norfolk Island, North Macedonia, Norway, Poland, Portugal, Republic of Korea (the), Republic of Moldova (the), Romania, Russian Federation (the), Saint Pierre and Miquelon, San Marino, Sark, Serbia, Slovakia, Slovenia, Spain, Svalbard and Jan Mayen Islands, Sweden, Switzerland, Ukraine, United Kingdom of Great Britain and Northern Ireland (the), United States of America (the)

CATEGORY	COUNTRIES/TERRITORIES WITHIN THE CATEGORY
Developing countries	Afghanistan, Algeria, American Samoa, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Azerbaijan, Bahamas (the), Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia (Plurinational State of), Bonaire, Sint Eustatius and Saba, Botswana, Bouvet Island, Brazil, British Indian Ocean Territory, British Virgin Islands, Brunei Darussalam, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Cayman Islands, Central African Republic (the), Chad, Chile, China, China, Hong Kong Special Administrative Region, China, Macao Special Administrative Region, Chinese Taipei, Colombia, Comoros (the), Congo (the), Cook Islands (the), Costa Rica, Côte d'Ivoire, Cuba, Curaçao, Democratic People's Republic of Korea (the), Democratic Republic of the Congo (the), Djibouti, Dominica, Dominican Republic (the), Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Falkland Islands (Malvinas), Fiji, French Guiana, French Polynesia, French Southern and Antarctic Territories, Gabon, Gambia (the), Georgia, Ghana, Grenada, Guadeloupe, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao People's Democratic Republic (the), Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands (the), Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia (Federated States of), Mongolia, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, New Caledonia, Nicaragua, Niger (the), Nigeria, Niue, Northern Mariana Islands, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines (the), Pitcairn, Puerto Rico, Qatar, Réunion, Rwanda, Saint Barthélemy, Saint Helena, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French Part), Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Sint Maarten (Dutch Part), Solomon Islands, Somalia, South Africa, South Georgia and the South Sandwich Islands, South Sudan, Sri Lanka, State of Palestine (the), Sudan (the), Suriname, Syrian Arab Republic (the), Tajikistan, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Turks and Caicos Islands, Tuvalu, Uganda, United Arab Emirates (the), United Republic of Tanzania (the), United States minor outlying islands, United States Virgin Islands, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Wallis and Futuna Islands, Western Sahara, Yemen, Zambia, Zimbabwe
Least-developed countries	Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic (the), Chad, Comoros (the), Democratic Republic of the Congo (the), Djibouti, Eritrea, Ethiopia, Gambia (the), Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic (the), Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger (the), Rwanda, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan (the), Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania (the), Yemen, Zambia
Landlocked developing countries	Afghanistan, Armenia, Azerbaijan, Bhutan, Bolivia (Plurinational State of), Botswana, Burkina Faso, Burundi, Central African Republic (the), Chad, Eswatini, Ethiopia, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic (the), Lesotho, Malawi, Mali, Mongolia, Nepal, Niger (the), North Macedonia, Paraguay, Republic of Moldova, Rwanda, South Sudan, Tajikistan, Turkmenistan, Uganda, Uzbekistan, Zambia, Zimbabwe
Small island developing states	American Samoa, Anguilla, Antigua and Barbuda, Aruba, Bahamas (the), Barbados, Belize, Bonaire, Sint Eustatius and Saba, British Virgin Islands, Cabo Verde, Comoros (the), Cook Islands (the), Cuba, Curaçao, Dominica, Dominican Republic (the), Fiji, French Polynesia, Grenada, Guam, Guinea-Bissau, Guyana, Haiti, Jamaica, Kiribati, Maldives, Marshall Islands (the), Mauritius, Micronesia (Federated States of), Montserrat, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Singapore, Sint Maarten (Dutch Part), Solomon Islands, Suriname, Timor-Leste, Tonga, Trinidad and Tobago, Tuvalu, United States Virgin Islands, Vanuatu

CATEGORY	COUNTRIES/TERRITORIES WITHIN THE CATEGORY
"Developing countries" under indicator 7.a.1. These are a modified list of countries specific to international public finance flows	Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas (the), Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia (Plurinational State of), Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic (the), Chad, Chile, China, China, Hong Kong Special Administrative Region, China, Macao Special Administrative Region, Chinese Taipei, Colombia, Comoros (the), Congo (the), Cook Islands (the), Costa Rica, Côte d'Ivoire, Cuba, Democratic People's Republic of Korea (the), Democratic Republic of the Congo (the), Djibouti, Dominica, Dominican Republic (the), Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Fiji, French Polynesia, Gabon, Gambia (the), Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kyrgyzstan, Lao People's Democratic Republic (the), Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands (the), Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, New Caledonia, Nicaragua, Niger (the), Nigeria, Niue, North Macedonia, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines (the), Republic of Moldova (the), residual/unallocated ODA: Central Asia and Southern Asia, residual/unallocated ODA: Eastern and South-eastern Asia, residual/unallocated ODA: Latin America and the Caribbean, residual/unallocated ODA: Northern America and Europe, residual/unallocated ODA: Oceania excl. Aus. and N. Zealand, residual/unallocated ODA: Sub-Saharan Africa, residual/unallocated ODA: Western Asia and Northern Africa, Rwanda, Saint Helena, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, State of Palestine (the), Sudan (the), Suriname, Syrian Arab Republic (the), Tajikistan, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Tuvalu, Uganda, Ukraine, United Republic of Tanzania (the), Unspecified countries, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Wallis and Futuna Islands, Yemen, Zambia, Zimbabwe

Note: ODA = official development assistance.