



CLIMATE
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IRENA
International Renewable Energy Agency

GLOBAL LANDSCAPE OF RENEWABLE ENERGY FINANCE 2018

Methodology

January 2018

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Citation: IRENA and CPI (2018), *Global Landscape of Renewable Energy Finance, 2018: Methodology*, IRENA, Abu Dhabi.

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The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

About CPI

Climate Policy Initiative works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organisation supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States. CPI's work helps nations grow while addressing increasingly scarce resources and climate risk. This is a complex challenge in which policy plays a crucial role.

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Abbreviations

BNEF	Bloomberg New Energy Finance
CDB	China Development Bank
CPI	Climate Policy Initiative
CSP	Concentrated solar power
DFI	Development finance institutions
HBF	Heinrich Böll Foundation
IRENA	International Renewable Energy Agency
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OECD-DAC	OECD Development Assistance Committee
OOF	Other Official Flows
PV	Photovoltaic
SOE	State-owned enterprise
VEB	Vnesheconombank

1. Introduction

This background document provides an overview of the methodology used for the analysis presented in the report *Global Landscape of Renewable Energy Finance, 2018* (IRENA and CPI, [2018](#)).

That report, launched in occasion of the 8th session of the International Renewable Energy Agency (IRENA)'s Assembly (January 2018), outlines key global investment trends over the period 2013-2016, by region and technology, examines the differing roles and approaches of private and public finance, highlights the emergence of viable risk mitigation instruments, and provides an outlook for renewable energy finance in 2018 and beyond.

The methodology described in this document stems from the approach developed by the Climate Policy Initiative (CPI) to produce the *Global Landscape of Climate Finance* since 2011 (Buchner *et al.*, 2017, 2015, 2014, 2013, 2012, 2011). The analysis extracts renewable energy investment, which represents the majority of annual global climate finance flows as tracked by CPI (over 70% on average in 2015-2016), and delves deeper into the main investment trends related to renewables.

2. Scope of the analysis

The *Global Landscape of Renewable Energy Finance* report analyses key trends in renewable energy investment over the period 2013-2016. In the context of this analysis, “investment” is defined as a financial commitment represented by a firm obligation, for example by means of a board (or equivalent body) decision, backed by the necessary funds, to provide specified financing whether through debt, equity or other financial instruments.

The full amount of finance expected to be transferred is recorded, irrespective of the time required for the completion of disbursement. This approach can yield different results to approaches which consider investment based on when an asset becomes operational. For example, under the approach adopted in this analysis, a project which reaches financial close in 2015 will be recorded as investment in 2015, regardless of when construction starts and ends. By contrast, an approach which records investment when an asset becomes operational will treat the investment as having occurred in 2016 for the same asset.

The *Global Landscape of Renewable Energy Finance* captures:

- Annual financial commitments in the latest available year;
- Total primary financial transactions and investment costs or, where tracked, components of activities that directly contribute to renewable energy.

The analysis does not track policy-induced revenue support mechanisms, secondary market transactions, or other public subsidies. Revenue support mechanisms such as feed-in tariffs pay back the investment costs, so including them would constitute double counting. Secondary market transactions (*e.g.*, re-selling of stakes) are not tracked as they do not represent new money targeting climate-specific outcomes, but rather money changing hands.

The analysis also does not include investment in private research and development in technology and investment in manufacturing for the production of green technologies (*e.g.*, new types of wind turbine).

Financial instruments

The analysis of the global landscape of renewable energy finance captures investment made through the following instruments:

- Grants;
- Concessional loans and equity;
- Market rate loans and equity;
- Balance sheet financing (*i.e.*, where the exact financing terms cannot be established, but the entity which owns the renewable energy asset is likely to have contributed equity).

The analysis does not include risk mitigation instruments such as loan guarantees. While such instruments are important, when presenting investment in renewable energy there is a risk of double counting both the loan and the guarantee. Given that many guarantees are never exercised, and the relatively low number of transactions that this covers, such instruments are excluded.

The analysis of risk mitigation instruments presented in section 5.3 of the report is based on IRENA's public investment database (IRENA, 2017), which compiles data from publicly available sources on renewable energy projects financed by 18 development financial institutions (DFIs). This represents a subset of the total number of public financial institutions covered in the rest of the report for the analysis of the landscape of renewable energy finance.

Technologies

The analysis captures investment in electricity and/or heat production made in the following technologies:

- Biomass and biogas power;
- Biofuels;
- Solar, including photovoltaic (PV), concentrated solar power (CSP) and solar heating systems (*e.g.*, solar water heaters);
- Geothermal;
- Hydropower;
- Wind, including onshore and offshore;
- Ocean renewable energy technologies such as wave power projects and tidal lagoons.

Although general upgrades to transmission and distribution infrastructure are often important for renewable energy development, such investments can typically benefit a wide variety of electricity generating plants. Consequently, the analysis excludes investment in transmission and distribution infrastructure projects that are not designed to specifically benefit renewable energy.

Investors

The analysis covers both private and public investment. The nature of finance flows is determined by the actors undertaking a given transaction.

Private investors include:

- **Corporate actors**, i.e., non-energy corporations (e.g., a technology company investing in a rooftop PV system);
- **Project developers**, i.e., entities designing, commissioning, operating and maintaining emissions reduction projects (e.g., utilities and energy companies);
- **Households**, i.e., family-level economic entities, high-net-worth individuals, and their intermediaries (e.g., family offices investing on their behalf);
- **Commercial financial institutions**, i.e., providers of private debt capital such as commercial and investment banks;
- **Institutional investors**: insurance companies (asset management), pension funds, foundations and endowments;
- **Private equity, venture capital and infrastructure funds.**

Public investors include:

- **Donor governments** and their agencies;
- **Climate funds**;
- **Development finance institutions (DFIs)**, multilateral (where public finance institutions have multiple countries as shareholders and finance flows internationally); bilateral (where there is single-country ownership of the public finance institution and finance flows internationally); and national (where there is single-country ownership of the public finance institution and finance is directed domestically);
- **State-owned enterprises (SOEs)**, i.e. any entity where a national government holds an ownership stake above zero.

3. Data sources

The analysis is based on empirical data drawn from a wide range of primary and secondary sources, depending on the public versus private nature of the investment flows.

Private finance flows

The data for private finance flows was gathered as follows:

- **Large-scale renewable energy projects.** The research team analysed direct primary financing data from 14,670 large-scale renewable energy projects to identify their financing structure and the entities providing financing. These data were retrieved from the Bloomberg New Energy Finance (BNEF) renewable energy and asset finance databases (BNEF, 2017a).
- **Small-scale renewable energy investments** obtained from the BNEF market-size generation capacity and finance databases (BNEF, 2017b; 2017c).
- **Household, corporate and government investments in solar heating systems** estimated based on Weiss *et al.* (2017) and REN21 (2015).

Public investment flows:

The data for public finance flows was gathered through:

- Climate Policy Initiative’s own quantitative aggregate survey and project-level data template sent to 38 DFIs for data in 2015 and 2016.
- The Creditor Reporting Systems of the Organisation for Economic Co-operation and Development’s Development Assistance Committee (OECD-DAC) for DFI data in 2015 (OECD, 2017).
- Data retrieved through the project-level assessment of transactions tracked in BNEF (2017a).
- Annual reports for those DFIs for which no other source for updated data was available, specifically for China Development Bank (CDB, 2016) and the Russian Bank for Development and Foreign Economic Affairs, or Vnesheconombank (VEB, 2016).
- Estimates for 2016 investment for those DFIs for which updated data was not available; bilateral climate-related development finance reported to the OECD-DAC Creditor Reporting System (OECD, 2017) to track Official Development Assistance (ODA) and Other Official Flows (OOF) in 2015 and 2016.
- National and multilateral Climate Funds commitments retrieved from OECD (2017) for 2015 and Climate Funds Update (ODI/HBF, 2015) for 2016.

Table 1 provides a detailed list of sources used for each investment flow.

Table 1. List of data sources

Investment	Source	Data level
Private finance	BNEF (2017a) BNEF (2017b) BNEF (2017c)	Project-level (large scale) Aggregated (small-scale)
Development finance institutions	Direct reporting to Climate Policy Initiative BNEF (2017a) CDB (2016) VEB (2016)	Project-level and aggregated Project-level Aggregated Aggregated
Climate Funds	ODI/HBF (2017) OECD (2017)	Project-level
Governments and their agencies	OECD (2017) BNEF (2017a)	Project-level

4. Regional classification

Table 2 describes the regional grouping adopted in the *Global Landscape of Renewable Energy Finance* report. The designations employed in this report and the presentation of material herein do not imply the expression of any opinion on the part of IRENA or CPI concerning the legal status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries. Flows are classified as “transregional” when resources are channelled to more than one region.

Table 2. Regional grouping used in the *Global Landscape of Renewable Energy Finance* report

Region	Country
Middle East and North Africa	Algeria, Bahrain, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen
Sub-Saharan Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, United Republic of Tanzania, Togo, Uganda, Zambia
South Asia	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
East Asia and Pacific	Brunei Darussalam, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Fiji, Indonesia, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Viet Nam
Central Asia and Eastern Europe	Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Belarus, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Montenegro, Republic of Moldova, Romania, Russian Federation, Serbia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine, Uzbekistan
Latin America and Caribbean	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela (Bolivarian Republic of)
Western Europe	Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Kingdom of the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland
OECD Americas	Canada, Chile, Mexico, United States of America
OECD Asia	Israel, Japan, Republic of Korea
OECD Oceania	Australia, New Zealand

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