CLIMATE
POLICY
INITIATIVE

Global Landscape of Climate Finance 2019

Barbara Buchner
Alex Clark
Angela Falconer
Rob Macquarie
Chavi Meattle
Rowena Tolentino
Cooper Wetherbee

November 2019

A CPI Report

Acknowledgements

The authors wish to thank the following for their contributions, including, in alphabetical order by affiliated organization: Alexis Bonnel and Damien Navizet (AFD), Benjamin Bitterman, Charlotte Bernts, Claudia Keller, and Susan Krohn (BMU Department IK I 3), Nancy Saich and Cinzia Losenno (EIB), Ian Cochran (I4CE), Jane Ellis, Jens Sedemund and Raphaël Jachnik (OECD), and Padraig Oliver (UNFCCC), and other Climate-Aligned Finance Tracking Group Steering Committee members. We are grateful to Convergence, Climate Bonds Initiative, and the International Energy Agency for sharing valuable data contained in the report. Finally, the authors would like to thank and acknowledge contributions from Baysa Naran, Elysha Davila, Caroline Dreyer, Federico Mazza, Valerio Micale, June Choi, Matthew Huxham, and Morgan Richmond for advice, internal review, and editing, Hélène Van Caenegem and Anna Mihlic for support on data cleaning and analysis, and Angela Woodall and Josh Wheeling for graphic design.

Descriptors

Sector	Climate Finance
Region	Global
Keywords	Climate Finance Flows, Private Finance, Public Finance, Tracking
Related CPI Reports	Global Landscape of Climate Finance 2017 Global Climate Finance: An Updated View 2018 Implementing Alignment: Recommendations for the International Development Finance Club Energizing Finance: Understanding the Landscape 2019 Measuring the Private Capital Response to Climate Change: A Proposed Dashboard
Contact	Chavi Meattle, chavi.meattle@cpiclimatefinance.org Rob Macquarie, rob.macquarie@cpiclimatefinance.org
Recommended citation	CPI, 2019. Global Landscape of Climate Finance 2019 [Barbara Buchner, Alex Clark, Angela Falconer, Rob Macquarie, Chavi Meattle, Rowena Tolentino, Cooper Wetherbee]. Climate Policy Initiative, London. Available at: https://climatepolicyinitiative.org/publication/global-climate-finance-2019/
Funder	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

About CPI

With deep expertise in finance and policy, CPI is an analysis and advisory organization that works to improve the most important energy and land use practices around the world. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six offices around the world in Brazil, Kenya, India, Indonesia, the United Kingdom, and the United States.

Contents

Executive Summary

Four years after world leaders negotiated the Paris Climate Agreement, now signed by 195 countries around the world and ratified by 187, national policies and market signals are starting to reflect the urgency both of increasing finance for mitigation of and adaptation to the effects of climate change, and of making all financial flows consistent with a pathway toward low-carbon and climate-resilient development. However, much more ambition will be needed to avoid the most catastrophic effects of climate change, including a push at the national level for countries to meet and exceed their climate action plans.

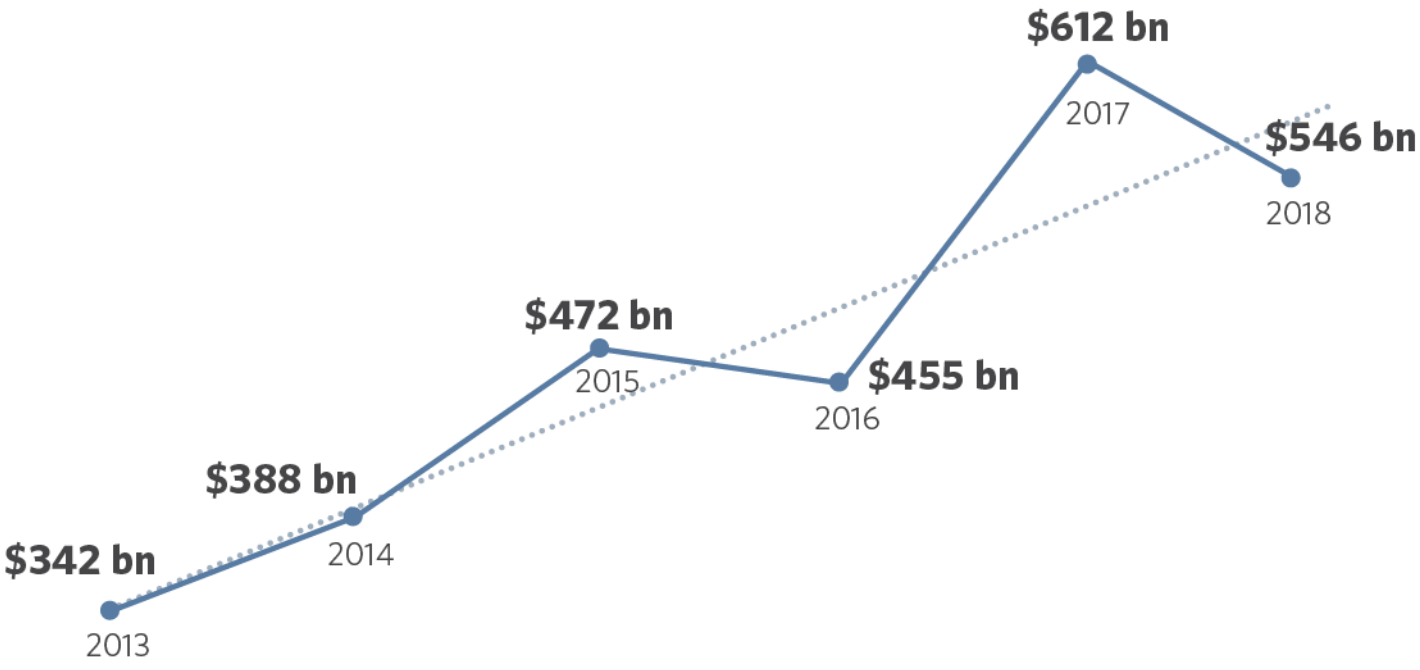
The 2019 edition of Climate Policy Initiative's Global Landscape of Climate Finance (the Landscape) again provides the most comprehensive overview of global climate-related primary investment. This year's report includes the first major wave of investments following ratification of the Paris Agreement, in 2017 and 2018.

Annual tracked climate finance in 2017 and 2018 crossed the USD half-trillion mark for the first time. Annual flows rose to USD 579 billion, on average, over the two-year period of 2017/2018, representing a USD 116 billion (25%) increase from 2015/2016. The rise reflects steady increases in financing across nearly all types of investors.

Increases are concentrated in low-carbon transport (by sector) and North America and East Asia (by region). Just under one quarter of the increase in climate finance tracked in 2017/2018 is due to the incorporation of new data sources into the Landscape, including EV charging infrastructure investments; private investment in sustainable infrastructure; and use of proceeds of bonds issued by the private sector and regional and municipal governments.

CPI reports two-year averages to smooth out annual fluctuations in data. Indeed, climate finance flows reached a record high of USD 612 billion in 2017, driven particularly by renewable energy capacity additions in China, the U.S., and India, as well as increased public commitments to land use and energy efficiency. This was followed by an 11% drop in 2018 to USD 546 billion. Changes in lending patterns due to regulatory shifts in the East Asia & Pacific region, in addition to a global slowdown in economic growth and significant year-over-year decreases in renewables costs, resulted in reduced public low-carbon transport and private renewable energy investment in 2018.

Figure 1: Total global climate finance flows, 2013-2018

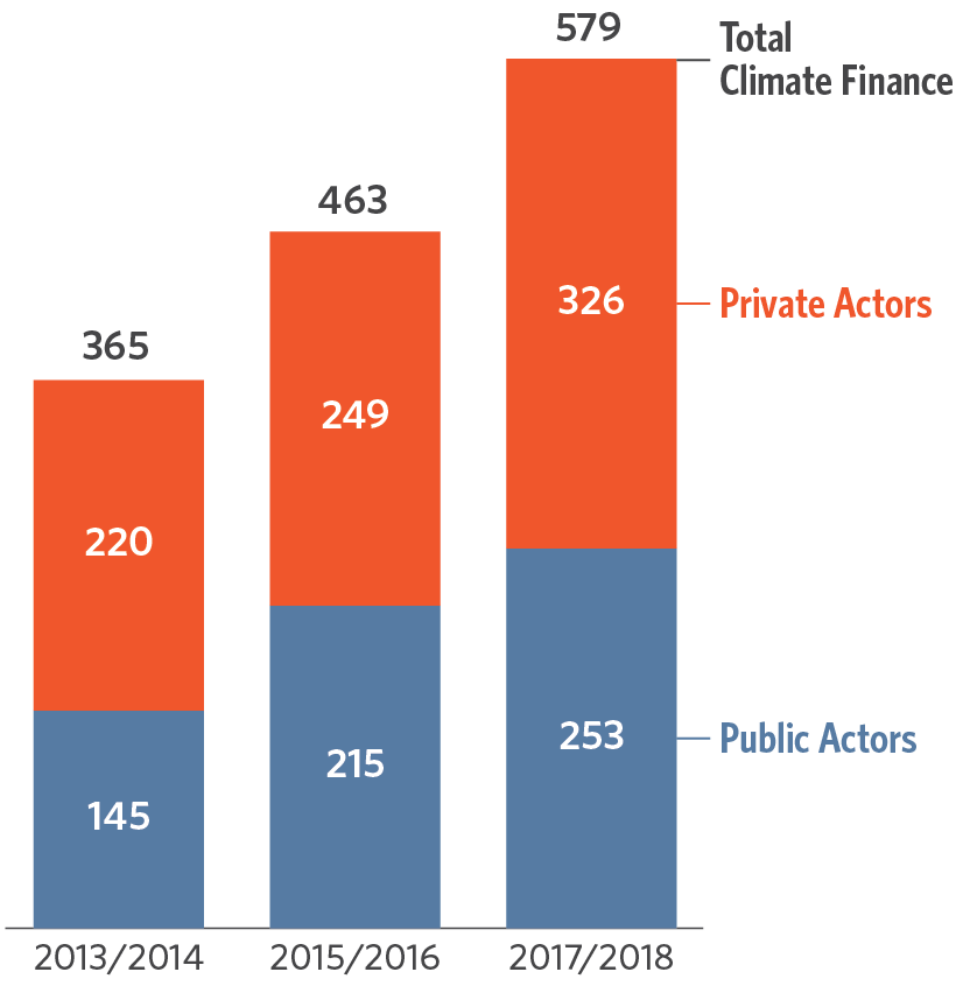


While climate finance has reached record levels, action still falls far short of what is needed under a 1.5 °C scenario. Estimates of the investment required to achieve the low-carbon transition range from USD 1.6 trillion to USD 3.8 trillion annually between 2016 and 2050, for supply-side energy system investments alone (IPCC 2018), while the Global Commission on Adaptation (GCA 2019) estimates adaptation costs of USD 180 billion annually from 2020 to 2030.

There is a need for a tectonic shift beyond 'climate finance as usual.' Annual investment must increase many times over, and rapidly, to achieve globally agreed climate goals and initiate a truly systemic transition across global, regional, and national economies. In addition to scaling up climate finance, it is also necessary to drastically reduce new fossil fuel investments, which are at odds with the Paris Agreement. Investments that lock in high-carbon emission pathways and lead to potential stranded assets, such as fossil fuel power generation and supply infrastructure, must be phased out. Finance also needs to better factor in climate risks and avoid aggravating ecosystems' vulnerability to climate change.

In this context, scarce public and other concessional financial resources must be used in a more transformative way. This will require unprecedented collaboration between governments, regulators, development banks, and private investors to align all financing with climate and sustainable development goals (SDGs), in order to identify the business models that can best enable private investment at scale, and to apply common frameworks to define climate-aligned and SDG-compatible investment.

Figure 2: Breakdown of global climate finance flows by public and private actors, 2013-2018 (two-year average, USD billion)[1]



[1] Numbers in figures in this report may not sum exactly due to rounding.

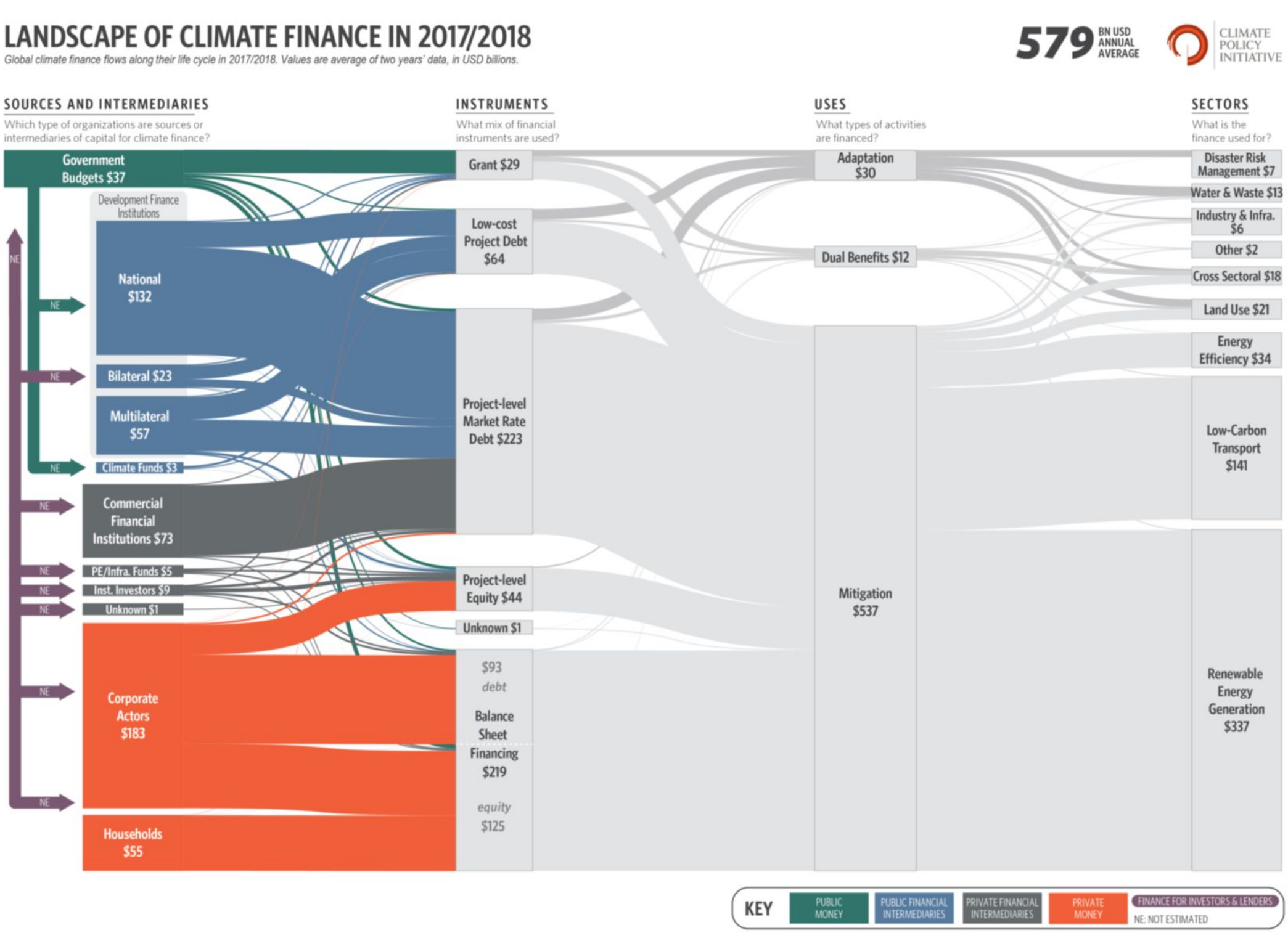


Figure 3: Global climate finance flows along their life cycle in 2017 and 2018. Values are average of two years' data, in USD billions

PUBLIC FINANCE

Average annual public climate finance totaled USD 253 billion in 2017/2018, representing 44% of total commitments. Spending on transport again outpaced renewable energy to become the largest beneficiary of public finance, receiving USD 94 billion, or 37% of the public total. Large sums of public money were also dedicated to adaptation and resilience, energy efficiency, land use, and projects with cross-sectoral impacts.

Domestic, bilateral, and multilateral development finance institutions (DFIs) continue to account for the majority of public finance and increased their average commitments in 2017/2018, but economic developments in 2018 led some major players to reduce investment. National DFIs continued to be the largest providers of climate finance among DFIs, but unlike in 2015/2016, when their commitments almost doubled from 2013/2014, national DFI flows remained steady at an annual average of USD 132 billion in 2017/2018. A global slowdown in economic growth and a shift in domestic policies toward deleveraging and financial risk management, especially in East Asia & Pacific, are likely to have impacted national DFIs in 2018. At the same time, many bilateral and multilateral DFIs, individually and collectively, have recently made renewed commitments to significantly increase levels of financing in the short term and work toward making all development bank finance compatible with climate and SDG goals in the longer term (MDBs, 2018; IDFC, 2019).

Tracked climate finance provided by governments and their agencies doubled to USD 37 billion in 2017/2018, partly due to better availability of data on government activities. Expanded data coverage included electric vehicle (EV) charging infrastructure investments and bonds issued by regional and municipal governments. At the same time, increased government support for retail purchases of EVs, a category included in the 2015/2016 figures, also contributed to the rise.

PRIVATE FINANCE

Private finance, which reached USD 326 billion on average annually in 2017/2018, continues to account for the majority of climate finance, at around 56%. Of this quantity, 85% flowed to renewable energy, 14% to low-carbon transport, and under 1% to all other subsectors. This pattern partly reflects data limitations, but is also consistent with a preference for more commercially viable sustainable projects and industries among private investors.

Corporations continue to account for the majority of private investment, but commercial financial institutions play a more important role than ever, increasing financing by 51% from 2015/2016 to 2017/2018. Finance from institutional investors and smaller funds also increased more than fourfold from 2015/2016. While new data sources contributed a small portion of this growth, increased financing from actors who do not typically provide primary finance for infrastructure indicates a renewable energy market reaching greater maturity and projects perceived to be less risky. The proliferation of regulatory and industry initiatives to shift finance toward sustainable activities may also be starting to have an impact. Finally, households increased their climate-related consumption to USD 55 billion, a 32% increase from 2015/2016, likely signifying greater awareness and more widespread availability of sustainable alternatives in energy and transport.

INSTRUMENTS

Market-rate debt was the financial instrument used to channel the most climate finance in 2017/2018, averaging USD 316 billion annually. Seventy percent of this debt was provided at the project level, while the remaining 30% was balance sheet borrowing. An additional USD 64 billion in debt was issued as low-cost project debt, bringing the total debt issued for climate financing in 2017/2018 to an annual average of USD 380 billion, or 66% of all tracked finance, a similar share to the 2015/2016 figure. As expected, almost all low-cost project debt (93%) originated from public sources, as DFIs provided the bulk of concessional loans for climate-related projects. The second-largest instrument type as a percentage of tracked climate finance was equity, at 29%, averaging USD 169 billion annually. Seventy-four percent of this total was balance-sheet equity, while the other 26% was invested at the project level.

Grants accounted for an additional USD 29 billion per year in 2017/2018, or 5% of total climate finance. As in previous years, almost all grants were issued by the public sector, focusing on geographies and sectors underserved by commercial finance, with 78% of public grants directed to non-OECD regions, 35% of which flowed to the low-carbon transport sector and 24% to the agriculture, forestry, land use, and natural resource management sector.

USES AND SECTORS

The vast majority of tracked finance continues to flow toward activities for mitigation. Mitigation finance accounted for 93% of total flows in 2017/2018, or USD 537 billion annually on average. Adaptation finance made up another 5% of flows, showing no change from 2015/2016 as a percentage of tracked finance. However, finance with both mitigation and adaptation benefits rose to 2.1% of total flows in 2017/2018 compared to 1.2% in 2015/2016, suggesting a growing understanding of the integrated nature of the two categories.

Financing for low-carbon transport is increasing rapidly. Average annual finance to transport projects rose by 54% from its 2015/2016 level to USD 141 billion in 2017 and 2018. This was primarily led by increased investment in rail and transit projects by corporate and public actors, and increased purchases of EVs by households. In addition, the inclusion of investment in EV charging infrastructure in the Landscape for the first time accounted for an additional USD 3 billion per year in the sector compared to 2015/2016.

Renewable energy remains the primary destination sector for global climate finance tracked in the 2017/2018 Landscape, representing USD 337 billion annually, or 58% of global climate finance. Levelized costs of electricity generated by wind and solar have reached historic lows, and growing investment has increased global cumulative installed capacity to well over 500 GW for both technologies (IEA PVPS, 2019; GWEC, 2019). Data coverage is much more comprehensive for renewable energy investments than for other areas, meaning the renewables sector makes up a larger proportion of overall tracked climate finance than it would if more comprehensive data were available in other sectors.

Adaptation finance rose significantly from its previous level in 2015/2016, with annual adaptation finance reaching USD 30 billion on average in 2017/2018. This year we also find a more balanced allocation of funds across adaptation sectors. While water projects remain the largest share of adaptation finance, spending on other sectors, including land use and disaster risk mitigation, also increased, though the latter may also be linked to heightened severity and frequency of extreme weather events.

Tracked adaption finance represents only a partial estimate, as definitional challenges, accounting issues, confidentiality restrictions, and an absence of universally accepted impact metrics results in limited data availability, particularly with regard to the private sector. However, efforts are underway to improve methodologies and fill remaining gaps, as evidenced by the common principles developed by MDBs, among others. Nonetheless, the overall share of finance flowing toward adaptation and resilience falls far short of international needs and targets as specified in the Paris Agreement.

GEOGRAPHIES

Finance for projects in non-OECD countries reached USD 356 billion, a major increase from USD 270 billion in 2015/2016 and, at 61% global climate finance, a larger share of total flows than in 2015/2016 (58%). East Asia & Pacific remained the largest regional provider of and destination for climate finance, rising to USD 238 billion on average per year in 2017/2018 from USD 180 billion in 2015/2016. Almost all regions saw an increase in total climate finance received, other than Western Europe, Japan, Korea, and Israel.

Most climate finance – 76% of the tracked total – is still invested in the same country in which it is sourced. As in previous Landscapes, this reveals a strong "domestic preference" among investors where home-country risks are well-understood, indicating the importance of national-level factors which policy and enabling frameworks can help to address.

RECOMMENDATIONS

Based on the trends identified in this report, we identify several opportunities to scale up and speed up the growth of global climate finance.

Governments should continue to raise the level of ambition in national climate plans and allocate resources to enable implementation of these plans. In response to the vast financing gap, many countries are renewing pledges to decarbonize their economies. Furthermore, governments have the unique opportunity to drive ambition and increase climate finance by explicitly adjusting the mandates of national institutions and of development banks, including explicit references to the Paris Agreement and the SDGs. Regulators also have a key role in supporting this development, by incorporating climate concerns into regulatory frameworks. Public financial institutions must focus on the effectiveness and impact of climate investments in order to maximize value per dollar and ensure that public finance is used as a lever for transformative change.

Public and private actors must coordinate to rapidly scale up finance in sectors beyond renewable energy generation. In 2017/2018, renewable generation investments accounted for 58% of all tracked climate finance, largely due to the existence of well-developed market paradigms and business models in the sector. To achieve transition to a low-carbon, climate-resilient economy, all financial actors will need to increase their investment in other sectors, especially energy efficiency, adaptation, and land use. The public sector and other actors, such as philanthropic foundations, have an important role in facilitating private finance, through both regulation and blended finance (CPI, 2018a). In addition, a strong commitment to deep decarbonization should emphasize research and development of new technologies, rather than targeting only low-cost marginal abatement opportunities, in order to enable technological pathways to net zero (CPI & Climateworks, 2018). Tracking progress toward this goal will require better, deeper data on climate-related R&D spending.

All financial actors should seek full alignment with the Paris Agreement across all of their operations, including, but not limited to, their loan portfolios. For public institutions, this will mean strategic collaboration with governments, refreshed investment pipelines, and reassessment of risk management, asset valuation, and capital allocation practices. Meanwhile, private actors must implement initiatives to measure, disclose, manage, and mitigate climate risks, and move capital away from high-carbon activities toward sustainable sectors. Any new finance for fossil fuels increases the risk of falling further behind the goals established by the Paris Agreement. Furthermore, all actors must contribute to closing the adaptation finance gap, requiring urgent scaling up of investment in adaptation projects and long-term climate resilience in all infrastructure. Opportunities to direct investment toward adaptation and long-term climate resilience already exist in areas like water security and resilience for urban populations living in poverty (GCA, 2019).

Capital markets and banking must shift toward green finance. While the Landscape and other climate finance tracking efforts focus on primary infrastructure investment, overall financial markets are another important component of the climate finance ecosystem. Banks and other lenders greatly influence climate outcomes, as illustrated by their lending tracked in the Landscape and in recent findings on lending for fossil fuel investment and should therefore be considered in future assessments of progress in transitioning to a greener economy. In addition, future tracking efforts will need to map the integration of climate metrics into business models, strategies, and policies, as informed by initiatives to measure, disclose, manage and mitigate climate risks, such as the Taskforce for Climate-Related Financial Disclosures. More widespread disclosures will enable analysis of the climate impact of financial markets, opening the way to climate-aligned capital mobilization. Meanwhile, developing project- and asset-level investment tracking and climate risk assessment tools can aid in creating methodologies to map climate-aligned finance at scale.

Public institutions in particular must make every dollar count and ensure quality as well as quantity of flows. The lack of appropriate resources and methods to evaluate the effectiveness of climate investments is a pressing concern. Data on the substantive benefits of climate-oriented investments will need to be sourced from a wide range of actors and communities, requiring a collaborative approach. Better information can guide public finance towards more transformative uses, aimed at unlocking other pools of capital instead of crowding out private investors. Mobilizing private actors demands a deep understanding of different countries' low-carbon development pathways, especially in coordinating investment flows and needs in developing countries to ensure priority sectors receive the finance required.

Finally, the climate finance tracking community will need to further anticipate, adapt to, and promote these changes to facilitate a rapid transition. Achieving alignment with the Paris Agreement will require new definitions, frameworks, and methodologies to understand which financial flows are consistent with the Agreement's goals, and which are not. CPI's newly formed Climate-aligned Finance Tracking Group[2] is one forum for making progress in this area – alongside initiatives such as the OECD Research Collaborative, the Joint MDB Climate Finance Group, and the Climate Action in Financial Institutions Initiative – helping to convene stakeholders in the tracking community to pool resources and link areas of expertise.

[2] More information regarding this group can be found at https://climatepolicyinitiative.org/press-release/cpi-launches-climate-aligned-finance-tracking-group/

1. Introduction

The Global Landscape of Climate Finance 2019 analyzes climate finance flows along their life cycle. First, we examine the sources and intermediaries of finance, followed by the instruments used and the purposes and sectors served. We then present the geographic profile of climate finance flows, before concluding with a discussion of the current outlook for global climate finance and ways to improve tracking practices in the future.

In most cases, we cite figures as annual averages across two years of data to flatten annual fluctuations in commitment-investment cycles that would otherwise skew overall trends.

While the Global Landscape of Climate Finance 2019 presents the most comprehensive information available about which sources and financial instruments are driving investment and how much climate finance is flowing globally, it does not capture potentially greater flows due to methodological issues related to data coverage and data limitations, particularly domestic government expenditures on climate finance and private investments in energy efficiency, transport, land use, and adaptation. Improvements in data coverage and methodological limitations are discussed further in Box A. Further details are available in the full Landscape methodology, published as an appendix to this document on CPI's website.[3]

Box A: Data additions and remaining gaps

In line with previous editions, the 2019 Landscape includes primary investment into productive assets at the project level to capture new money targeting climate-specific outcomes - excluding secondary transactions that involve money changing hands but no physical impact, and also research and development spending assumed to be recovered through the sale of resulting products. This approach seeks to capture a non-double-counted estimate of financial flows. Finance provided through some financial instruments such as guarantees, insurance, government revenue support schemes, and fiscal incentives, or "intermediate output" investments in manufacturing or equipment sales, are not counted due to the potential for double-counting and over-estimating project investment costs. There are also significant data limitations associated with comprehensive, reliable measurement of these other forms of support and investment.

This edition uses several new data sources to track climate finance in areas that were not previously included in the scope. These are with average annual contributions to the total finance reported in the Landscape:

- **EV charging infrastructure investment data, from the IEA (USD 3 billion).** Investment in EV charging infrastructure has been integrated into the dataset for the first time. These estimates are derived from figures published in the IEA World Energy Investment Report in 2019 and combine estimates of public and private investment in EV charging installation with prevailing cost information (IEA, 2019c).
- **Blended finance transactions from Convergence (USD 3 billion):** the largest and most comprehensive database tracking blended transactions, which combine commercial and concessional capital resources, against the Sustainable Development Goals (SDGs).
- **Use of proceeds data for private and municipal green bond issuances from Climate Bonds Initiative (USD 3 billion).** Where available, project-level data contained in post-issuance reporting was used to capture private and sub-national government expenditure in low-carbon transport and energy efficiency, and public finance for municipal infrastructure, water, waste, and disaster prevention (see Box C).
- **Non-energy infrastructure project finance transactions from IJGlobal (USD 19 billion):** both public and private finance for low-carbon transport, water and waste, and public expenditure on climate-relevant investments in municipal infrastructure and the built environment.
- **Improved coverage of public investment from several DFIs:** This year's Landscape includes

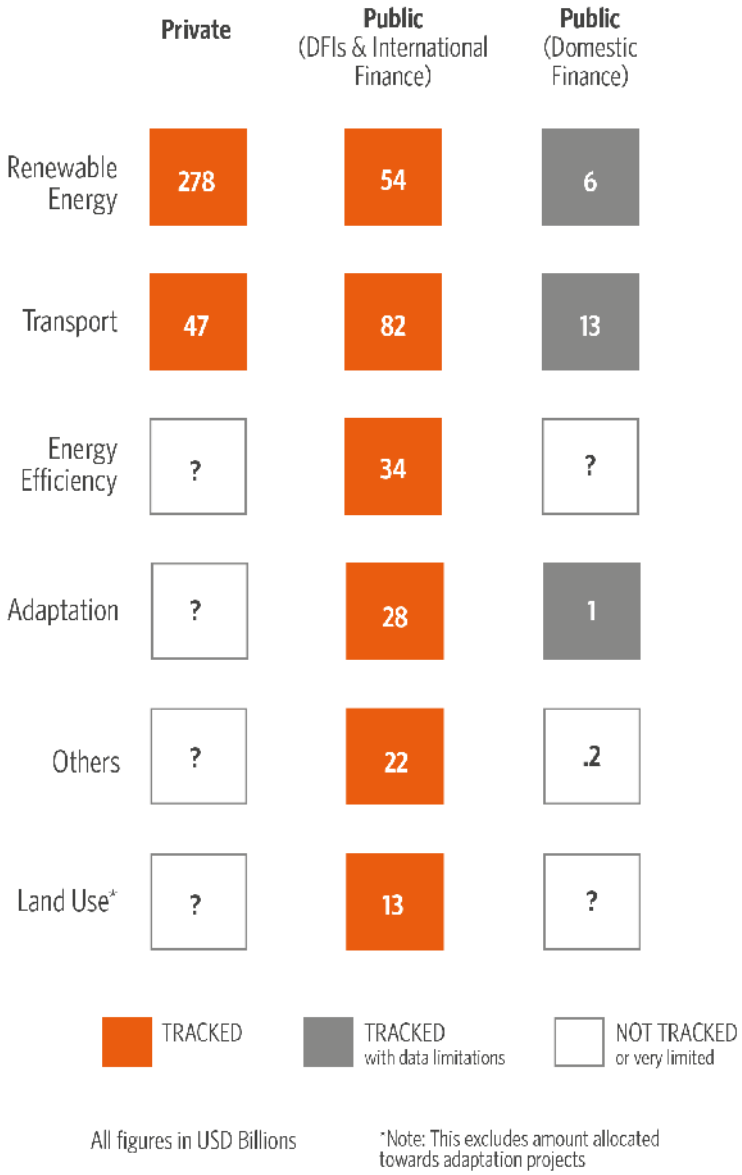
[3] www.ClimateFinanceLandscape.org

survey data from three additional DFIs, and four DFIs also provided more detailed project level data than in previous years. In fact, several DFIs now make detailed information on projects supporting climate change available publicly to improve transparency and accountability.

Despite these additions, gaps remain in the Landscape's coverage, as illustrated in Figure 4, specifically:

- **Domestic public climate finance from governments.** Tracking domestic climate finance flows offers an opportunity for governments to mobilize and plan resources by identifying funding gaps at national or sub-national levels and better align finance to their climate policy objectives. While several countries are undertaking climate finance tracking activities, data limitations prevent a full accounting of public budgets dedicated to domestic climate action, in particular domestic public procurement or infrastructure investment and government shares in state-owned enterprises' investments.
- **Private investment in energy efficiency, land use, and adaptation.** Despite expanded coverage of private climate finance in several new sectors – IJGlobal includes projects to manage water supplies, while climate bonds provide information on energy efficiency, particularly in buildings – coverage remains very limited. Tracking private investment for both energy efficiency and adaptation faces similar difficulties. In both cases, the relevant investments are often components within larger projects, requiring additional information which private actors are unlikely to report voluntarily. Moreover, for investments in both fields to be effective, they must be consistent with low-carbon and climate-resilient pathways (respectively) and not just represent an arbitrary improvement over business-as-usual. Assessment of consistency therefore also requires reporting on progress against benchmarks or standards. Data currently disclosed falls far short of providing such detail. Surmounting these obstacles will require a variety of stakeholders to define key services and technologies and work with key data providers to improve availability (CPI, 2019b). External estimates on energy efficiency investment are available (e.g. IEA, 2019c), but are not included in this report due to methodological differences.

Figure 4: Landscape coverage and remaining data gaps by sector and institution (USD billion, 2017/2018 annual averages)



2. Sources and Intermediaries

2.1 Public Finance

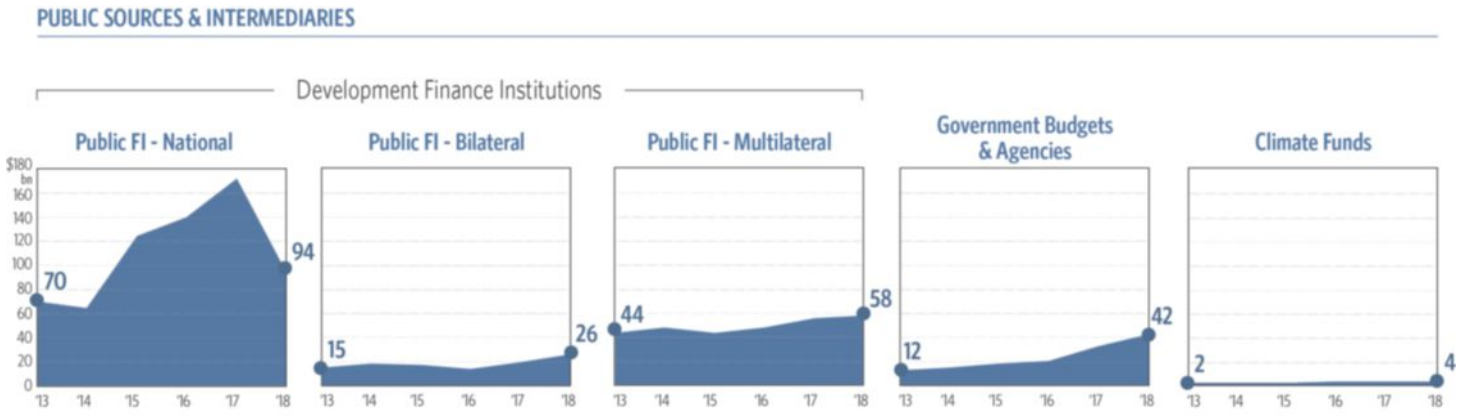
Public finance actors and intermediaries committed an annual average of USD 253 billion in climate finance in 2017/2018, an 18% increase from 2015/2016.

Public finance includes funds provided by governments and their agencies, climate funds, and development finance institutions (DFIs). Climate finance provided by public sources increased 18% from USD 215 billion annually in 2015/2016 to USD 253 billion in 2017/2018, and the overall share of tracked climate finance provided by public sources fell by two percentage points, to 44% of the total.

DFIs continued to provide the majority of public finance, contributing USD 213 billion annually, or 84% of tracked public finance, up from USD 194 billion in 2015/2016. National DFIs were still the largest group among these institutions, but unlike in 2015/2016, during which DFI climate finance almost doubled, their commitments remained steady at an annual average of USD 132 billion in 2017/2018. Though there was a spike in total commitments in 2017 from DFIs, a retrenchment among some larger institutions led to the decline in 2018, leaving investment from this group of institutions at its lowest point since 2014. This reversal was due to regulatory tightening and shifts in some domestic policies toward deleveraging and financial risk management, particularly in East Asia & Pacific (World Bank, 2018a). A global economic slowdown in 2018 likely also had an influence: after an upswing in global growth in 2017 at close to 4%, global economic expansion decelerated in 2018, with output growing just 3.2% (IMF, 2019). Box B contains a more detailed discussion of macroeconomic trends in 2018.

Bilateral and multilateral DFIs have continued to increase their commitments, growing their financing by USD 7 billion (47%) and USD 11 billion (24%), respectively. Furthermore, many national, bilateral, and multilateral DFIs, individually and collectively,

Figure 5: Public Sources and Intermediaries of Climate Finance (USD billion)



have made commitments to ramp up financing significantly in the short term and work toward making all development bank finance compatible with climate targets and SDGs in the longer term. At the recent UN Climate Action Summit, International Development Finance Club (IDFC) members identified the potential to collectively provide more than USD 1 trillion of climate finance by 2025 and individually made commitments related to increased climate finance and alignment of their portfolios with climate goals (IDFC, 2019; UNSG, 2019).

Six multilateral DFIs,[4] accounting for 23% of the total tracked public finance, are well on track to meeting targets to scale up climate finance to 25-40% of their loan portfolios by 2020 (MDBs, 2015). Out of these, two MDBs have already surpassed their target, two have reached 85% to 95% of their annual targets, and the remaining two have reached about 50% to 60% of their targets. Many of these MDBs have now announced new commitments for the post-2020 period. For instance, AfDB has pledged at least USD 25 billion between 2020-2025, doubling its commitments from current levels (AfDB, 2019), and ADB has committed to increase its climate finance to USD 80 billion over the period from 2019 to 2030 (ADB, 2019). These increased commitments, while not accounting for concurrent investments in fossil fuel supply infrastructure and other non-aligned projects, reflect ongoing efforts to mainstream climate change into overall portfolios. Methodological frameworks for tracking the alignment of all flows with the Paris Agreement are under development by the MDBs and the IDFC (CPI & I4CE, 2019; IDFC-MDBs, 2017; MDBs, 2018).

Tracked climate finance from government budgets and agencies more than doubled to USD 37 billion in 2017/2018, accounting for 15% of public flows. The growth is due to increased government spending on EV grants, the incorporation of new data sources into the Landscape tracking database, which now covers both EV charging infrastructure investments and a subset of bonds issued by regional and municipal governments.

Multilateral climate funds increased annual financing to USD 3.2 billion in 2017/2018, up 43% from 2015/2016. The Green Climate Fund (GCF) confirmed its emerging role as the dominant player among multilateral climate funds, providing 50% of total finance from these institutions. The next-largest contributors were the Global Environment Facility (GEF) and Climate Investment Funds, which provided 32% and 14%, respectively. Increased spending was primarily driven by GCF and GEF, which saw finance flows increase by USD 0.9 billion and USD 0.6 billion from their 2015/2016 levels, respectively. However, reductions in commitments by other climate funds slowed the growth in total finance provided by this group.

Box B: Overview of recent macroeconomic trends

While 2017 saw relatively strong growth in the global economy, including booming equity markets in a variety of regions, growth slowed in 2018 as a variety of factors drove increased market volatility, resulting in a less attractive investment environment in many economies (Brett, 2018). Reduced business and investor confidence are expected to have played a role in the decrease in global climate finance in 2018 compared with 2017. Much of the decrease in climate finance occurred in China, although it is unclear whether this reduction in green investment was tied to slower overall GDP growth in 2018, caused by a manufacturing sector downturn and a punitive import tariff regime imposed by the U.S. (Wei, 2019). Similarly, slower growth in the Eurozone, with uncertainty surrounding Brexit, and in the U.S., partially driven by the tariff war with China, put a damper on the overall investment climate (IMF, 2019). Other markets also saw lower growth and higher volatility in 2018, with global stock exchanges swinging wildly throughout the year (Brett, 2018). Despite the generally negative short-term economic trend, climate finance did not decrease uniformly across geographies from 2017 to 2018, as a range of idiosyncratic economic and political trends drove country- and regional-level fluctuations. Further analysis is required to determine the extent to which both local and global economic conditions influence climate finance provided by both public and private actors.

[4] The six MDBs are the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank Group, and the World Bank Group.

2.2 Private Finance

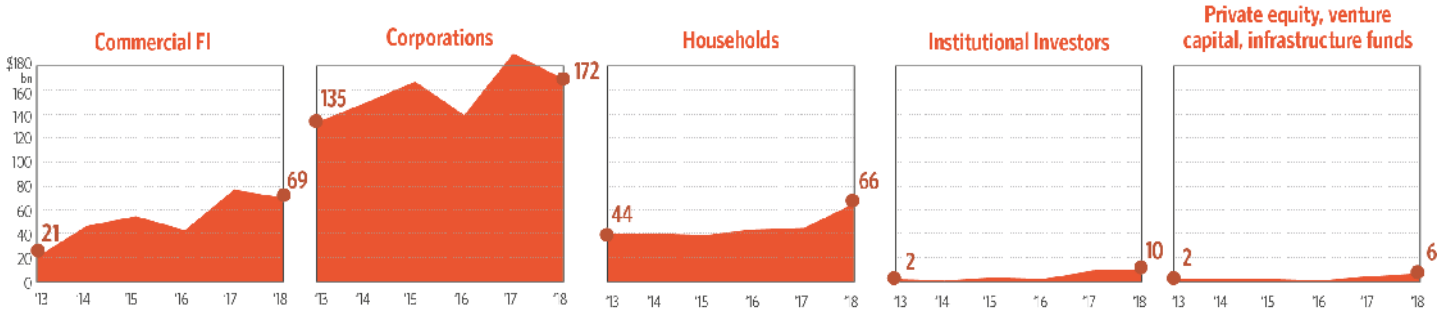
Private actors provided on average USD 326 billion per year during 2017 and 2018, a 31% increase from the 2015/2016 average.

Private climate finance reached a record high of USD 330 billion in 2017, representing an increase of USD 99 billion from 2016, or 43% year-on-year growth. However, financing fell slightly in 2018, to USD 323 billion, in response to macroeconomic trends resulting in a dampened global investment environment (see Box B), as well as continued decreases in global renewable energy capital costs.

In this Landscape, we consider five categories of private actors: households, non-financial corporations,[5] commercial financial institutions (banks), institutional investors (including asset managers, insurance companies, and pension funds), and a mixture of private equity, venture capital, and infrastructure funds. The Landscape tracks direct primary investment in climate-related infrastructure by each of these groups.

Corporations are the largest source of private climate investment, accounting for USD 183 billion per year on average, or 56% of private flows in 2017 and 2018. The share of private investment provided by corporate entities has consistently declined over the past six years, from 68% of private climate finance in 2013 to 53% in 2018. **The decline in the share provided by corporations is due to commercial financial institutions and households engaging in more climate-related finance and consumption, respectively, than in previous years.**

Figure 6: Private sources and intermediaries of climate finance (USD billion)



[5] This group aggregates two actor categories – project developers and other corporate actors – used in previous editions of the Landscape. The change is for methodological reasons, since project developers are only clearly distinct from other corporates in renewable energy markets, meaning classification is difficult or arbitrary in other sectors.

Commercial financial institutions increased annual climate finance by USD 25 billion compared to 2015/2016, contributing just over one-fifth of private climate finance, or USD 73 billion annually, in 2017/2018. A more prominent role for banks is one aspect of a broader move within financial markets into sustainable industries – particularly renewable energy, which received 93% of banks' climate finance in 2017 and 2018.

However, major banks' average annual lending for fossil fuel expansion (new reserves, infrastructure, and power) in 2017 and 2018 has been estimated at USD 178 billion, which is a small fraction of the annual total USD 650 billion in loans to fossil fuel companies (RAN, Banktrack et al., 2019). Although they go beyond the scope of direct project finance, these figures indicate that commercial lenders still have to implement a major shift in investment strategy to align their financing activities with decarbonization pathways under the Paris Agreement.

In 2017/2018, climate finance from institutional investors and funds more than tripled from 2015/2016 and flowed mostly to renewable energy generation, indicating renewables markets are increasingly perceived as more mature and less risky.

Beyond commercial financial institutions, the global greening of financial markets is creating a greater role for institutional investors and funds. While small compared to their secondary transactions, annual project-level climate finance flows from institutional investors averaged USD 9 billion in 2017/2018, over three times greater than in 2015/2016. Venture capital, private equity, and infrastructure funds more than doubled their investment to USD 5 billion over the same period. Renewable energy received nearly two-thirds of institutional investors' financing, and more than 90% of finance from smaller funds, with new coverage of low-carbon transport accounting for the remainder. While these flows remain much smaller than those from corporations and banks, the rapid increase reflects continuing maturity and lower perceived risk in renewable energy markets, and greater willingness among these investors to finance projects in their earlier stages.

Households' average annual climate-related spending increased to USD 55 billion in 2017/2018, up from USD 42 billion in 2015/2016. After accounting for public subsidies, households' annual spending on EVs was USD 33 billion on average over 2017/2018. China and the U.S. remain the largest EV markets, accounting for average annual spending of USD 14 billion and USD 8 billion, respectively, followed by Norway, France, Germany, and the UK. Deployment of small-scale solar panels and solar water heaters accounts for the remaining climate finance provided by households. Outside of the U.S. and China, the only countries with annual household consumption of solar panels over USD 1 billion were Japan and Australia, as well as Pakistan, where the central government has adopted net-metering regulations to encourage rooftop solar installations and provincial governments run support programs for off-grid solar (IRENA, 2018).

While renewable energy is the sector that received the most tracked finance from private sources, low-carbon transport is growing the fastest, increasing 20% year-on-year from 2017 to 2018. In addition to organic growth year-over-year, increased availability of private-sector transport finance data accounted for a significant part of this increase, which is discussed in greater detail in Section 4.1, Mitigation Finance.

Private finance for energy efficiency, waste, and water are also captured for the first time in this year's Landscape due to expanded data coverage. However, methodological and data shortages remain, and the sums in each of these sectors are small. Average annual private finance for energy efficiency tracked during 2017 and 2018 was USD 482 million. Adaptation represents only 0.1% of private flows tracked in the Landscape, owing to limitations in data, as well as the lack of well-developed markets and business models for climate resilience solutions. Box A elaborates on the challenges associated with tracking private finance in these sectors.

Box C: Tracking climate finance from green bond reporting

The green bond market has grown rapidly, with annual issuance of labeled bonds reaching USD 165 billion, on average, during 2017 and 2018, compared to USD 62 billion in 2015/2016 (CBI, 2017, 2019). As the Landscape focuses on primary investment in new projects, finance raised through green bonds often does not fit within the scope of the methodology due to double-counting issues. Green bonds' use of proceeds is predominantly linked to existing loans or projects already financed – where, for example, a solar project loan may be linked to a green bond issued in 2018, but the loan dates from 2016 and would have therefore featured in the 2017 Landscape. Alternatively, green bonds' use of proceeds is allocated for financing future green eligible projects yet to be identified.

However, in sectors where data gaps persist in the Landscape methodology (see Box A), green bond use of proceeds impact reports may provide a window to identify primary investment data for projects to incorporate in the Landscape. We have analyzed the impact reports of labelled green bonds for the first time in the 2019 Landscape, using a dataset of issuances compiled by the Climate Bonds Initiative (CBI), in order to identify project-level information on primary investment that fits the Landscape methodology. To avoid double-counting with other datasets, issuances from DFIs and pureplay renewable energy institutions were excluded.

Using bond data to track primary climate finance presents methodological challenges due to poor quality of reporting, specifically:

- Lack of project-level information provided in impact-reporting documentation – only 69% of issuers in the dataset had such data;
- Failure to distinguish between refinancing, which is excluded from the Landscape to avoid double-counting and primary infrastructure finance. Since a large volume of green bond proceeds are used for refinancing existing assets, only data exhibiting a clear link to construction expenditure are included in the Landscape;
- Especially poor reporting on investment in adaptation. While some bond proceeds are apparently allocated to projects for climate resilience, project-specific detail is in most cases extremely limited. Recent efforts have aimed to clarify approaches to tracking adaptation project finance. The EU Taxonomy on adaptation sets out a two-step process along with screening criteria for demonstrating how an activity substantially contributes to adaptation (EU TEG, 2019). CBI's Climate Resilience Principles similarly employ a process-based approach for identifying a range of resilient investments (CBI et al., 2019);
- Inherent time lags of relying on green bond impact reports, typically released one year after issuance, hinder data collection. Disclosing anonymous project-level data at date of issuance, where available, would rectify this.

We estimate that USD 2.8 billion in annual primary investment went to projects in sectors where data gaps persist, such as water, waste, and private investments in energy efficiency and low-carbon transport, and from domestic public actors, such as municipalities, out of total of USD 53 billion in issuance from these actors. This highlights the clear disparity between total issuance and tracked project level use of proceeds within green bond reporting practices and how significant improvements are needed to ensure full market transparency and timely disclosure of use of proceeds.

3. Instruments

Market-rate debt, through project-level or balance sheet finance, was the largest financial instrument used to channel climate finance, averaging USD 316 billion per year during 2017/2018, or 55% of the total.

The Landscape categorizes transactions by the instrument used to structure the provision of finance by one actor to another or to specific climate projects.[6] It includes both debt and equity instruments, both of which are differentiated between arrangements at the project level (i.e. relying on the project's cash flow for repayment) and on balance sheets (i.e. funded by the assets of the recipient institution or entity). Grants, which do not usually require repayment, are the final category.

The majority of climate finance was raised as debt, which came to USD 380 billion annually, or 66% of total financing, in 2017 and 2018. Of this total, USD 316 billion was provided at market rate (some of which may have had other concessional characteristics). Market-rate debt represented 55% of total tracked climate finance over the two-year period, almost unchanged from 56% in 2015/2016. Most of this debt was provided at the project level, and market-rate project debt financing increased from USD 202 billion in 2015/2016 to USD 223 billion in 2017/2018, a 10% uptick.

Public institutions provided 66% of project-level market-rate debt in 2017/2018, primarily multilateral and national DFIs. This figure suggests that crowding-out of private finance may be a concern, especially in markets where proven private-sector business models exist, such as large-scale renewable energy projects. More analysis is needed to understand what the most effective mandate for DFIs is in different types of markets.

Debt issued directly through balance sheets averaged USD 93 billion annually in 2017/ 2018, or 30% of total annual market-rate debt. The vast majority of this finance was capital raised by corporations for direct expenditure in renewable energy projects. However, our data show that corporations and municipal governments spent an average of USD 3 billion annually on projects outside renewable energy, using the proceeds from green bond issuances. The actual figure is likely to be higher, since only 29% of green bond issuers analyzed reported sufficient use of proceeds information to be included in the Landscape.

Climate finance provided in the form of low-cost project-level debt was USD 64 billion annually on average over 2017 and 2018, 98% of which was provided by public institutions. This represents an increase of USD 19 billion from the 2015/2016 annual average of USD 45 billion, reversing a fall from USD 61 billion in 2013/2014, likely influenced by higher investment targets for climate finance (particularly in relation to adaptation and energy efficiency) following the Paris Agreement.

Equity investments, the next-largest category after debt, made up a roughly stable share of total climate finance flows, at 29% in 2017/2018 compared to 30% in 2015/2016. Similar to debt, equity investments can be at the project level or can be placed directly on investors' balance sheets. In 2017 and 2018, balance sheet equity investments by firms and public entities represented 42% of total equity finance, accounting for USD 70 billion in annual flows, on average. Including household investment, which the Landscape also classifies as balance sheet equity, this figure rises to USD 125 billion, or 74% of total equity finance. Annual financing through project-level equity, accounting for the remaining 26% of total equity, increased by USD 5 billion to USD 44 billion on average over 2017/2018.

[6] The 2019 Landscape uses updated assumptions to calculate the distribution of climate finance by instrument, outlined in the separate methodology document.

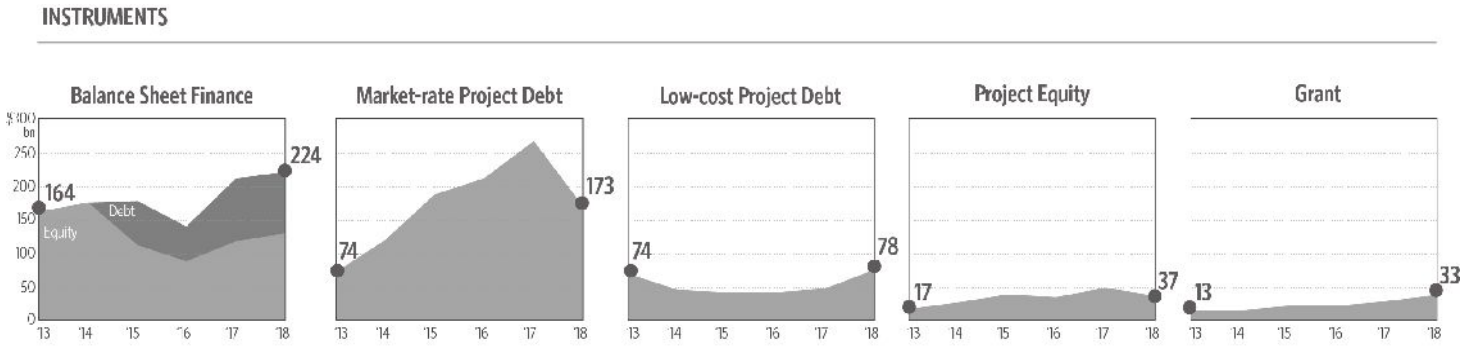
Grants represent a larger share of climate finance than ever before, as public actors seek to build strong enabling environments and undertake demonstration projects for sustainable investment across a range of sectors. Annual grant finance averaged USD 29 billion (5% of total flows) in 2017/2018 compared to USD 18 billion (4%) in 2015/2016 and USD 13 billion (3%) in 2013/2014. Almost three-fifths of tracked grants in 2017/2018 were made internationally, and two-fifths domestically. Increased grant finance reflects the ongoing need for public flows to reach more challenging sectors and geographies. For instance, 35% of international grants were in the agriculture, forestry, land use, and natural resource management sector – of which 71% were used for adaptation or had dual benefits, and 42% were to Sub-Saharan Africa – while the same sector accounts for only 10% of total international flows.

Box D: Risk management instruments

Public investors can use risk management instruments, such as guarantees and insurance, as tools to address the most prevalent market risks for green investments (CPI, 2018a). Although they are excluded from the flows reported in the aggregate Landscape figures to avoid risk of over-estimation, these are increasingly being used, in particular by DFIs. They can help catalyze investment in challenging sectors and geographies.

Annual commitments of these instruments come to USD 1.5 billion on average in 2017/2018, compared to USD 970 million in 2015/2016. While their primary use is in renewables deployment (53% in 2017/2018), typically in the form of political risk insurance, off-taker guarantees or first-loss coverage, they are increasingly used in other sectors, including energy efficiency, land use, and transport. These instruments are also important tools for leveraging private investment: guarantees and insurance were linked to 39% of USD 38.2 billion in private financing reportedly mobilized by DFIs in 2017, of which over a third was in the energy sector (OECD 2019).

Figure 7: Breakdown of climate flows by instrument (USD billion)



4. Sectors

Climate finance flows to two primary use categories: mitigation and adaptation. Mitigation finance aims to reduce greenhouse gas (GHG) emissions, or to remove GHGs already in the atmosphere or ocean, in order to slow warming and stabilize the climate in the long term. Adaptation finance, by contrast, focuses on improving preparation and reducing climate-related risk and damage, for both human and natural systems, as short-term climate impacts will continue to exert economic, social, and environmental costs even if appropriate mitigation actions are taken. Some finance has dual benefits – that is, projects and initiatives that target both mitigation and adaptation outcomes.

4.1 Mitigation Finance

Mitigation activities tracked in 2017 and 2018 averaged USD 537 billion per year, accounting for 93% of climate finance tracked during that period.

Mitigation activities accounted for 93% of climate finance captured in the Landscape in 2017/2018, averaging USD 537 billion per year and representing a USD 101 billion annual increase from the 2015/2016 period. Renewable energy generation, at 63% of mitigation finance, accounted for the largest portion of mitigation flows captured in 2017/2018, while an additional 26% went to low-carbon transport and 6% to energy efficiency. No other category accounted for more than 2% of the total.

Renewable energy generation investment remained the largest area of climate finance, reaching an all-time high of USD 350 billion in 2017. This represents a 30% increase from 2016 levels, driven by an spike in capacity additions, particularly in China, the U.S., and India. Growth was particularly high in China, where renewable projects received USD 157 billion in financing in 2017, predominantly directed toward solar PV (USD 73 billion), wind (USD 48 billion), and large hydropower (USD 22 billion). The U.S. was the country with second-highest volume of finance for renewables, with 98% of U.S.-bound finance in 2017 directed toward either solar PV (USD 32 billion) or onshore wind (USD 20 billion), followed by India's USD 15 billion in 2017 for renewables financing.

However, total finance for renewable electricity generation decreased from 2017 to 2018. This is because average renewable energy technology costs continued to decrease in 2018, with installed capacity costs and levelized cost of energy for solar and wind projects declining from the previous year (see fig. 6 below). The levelized costs of solar PV and onshore wind decreased 12% and 14% from 2017 levels, respectively, implying that each dollar invested in these technologies bought more generating capacity than in previous years. The second reason is due to less capacity being added in 2018 than in 2017, driven by a slowdown in Chinese solar investment and the weakening growth in wind capacity outside of China and the U.S.

In 2017 and 2018, mitigation finance for renewable electricity continued to exceed finance for fossil fuel power generation. In 2015 and 2016, at USD 295 billion, global investment in renewables was more than twice the total invested in new fossil fuel power generation capacity, which the IEA estimated at USD 141 billion (2019c).[7] This ratio increased in 2017 and 2018, as average annual finance for renewables of USD 336 billion was more than two and a half times the investment for fossil fuel generation, at USD 130 billion.

However, if investment in fossil fuel supply infrastructure is included, the comparison paints a different picture, as shown in Figure 9. In 2017 and 2018, average annual finance for fossil fuel supply included USD 468 billion invested in upstream oil and gas, USD 253 billion in downstream oil and gas, and USD 79 billion in coal mining and related infrastructure. Although some of this total does not directly flow to the energy sector, such as financing for the production of plastics and industrial lubricants, funds flowing to fossil fuel projects still greatly outweigh finance for clean energy.[8] These must be reduced and phased out as soon as possible to avoid locking in high-carbon assets likely to become stranded over the course of a successful low-carbon transition.

[7] IEA figures for fossil fuels and CPI's estimates for renewable investment have been revised since the 2017 Global Landscape, which reported investment in renewable energy as more than double that in fossil fuel power generation.

[8] In 2015, approximately 85% of oil demand was for transportation and other energy uses, with the balance in non-energy uses (IEA, 2017).

Figure 8: Global installed capacity and levelized electricity cost, solar PV and wind, 2010-2018[9]

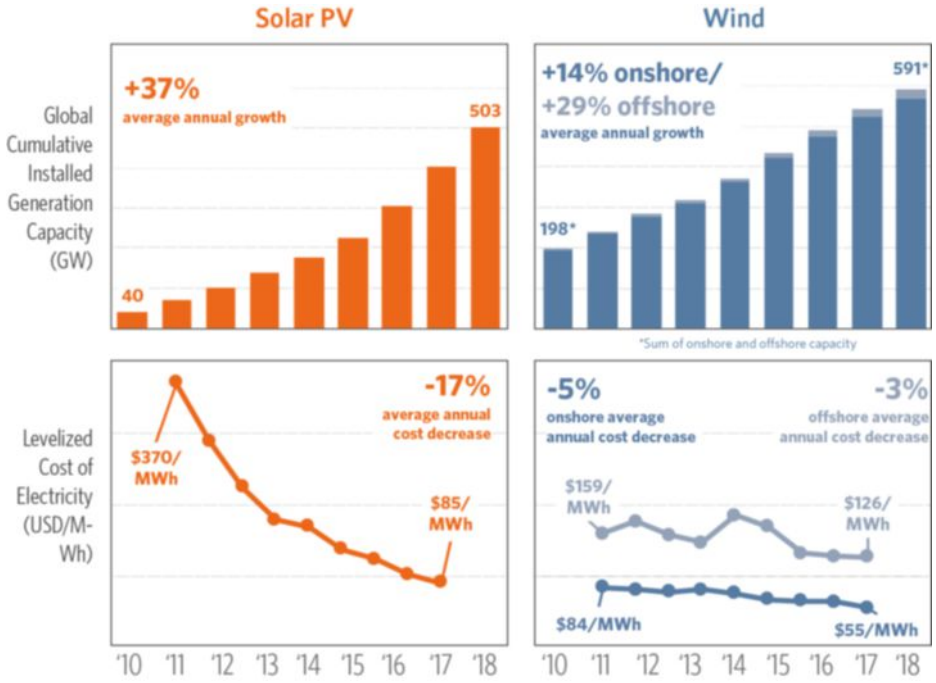
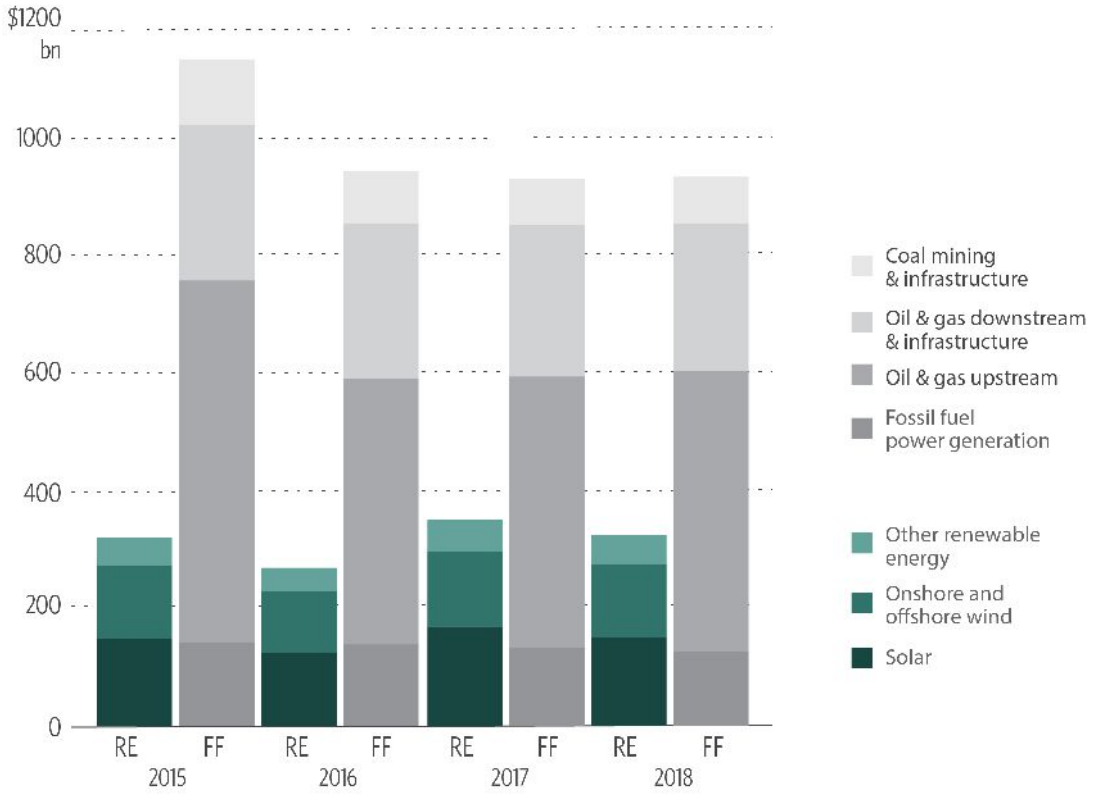


Figure 9: Global renewables and fossil fuel investment, billion USD, 2015-2018

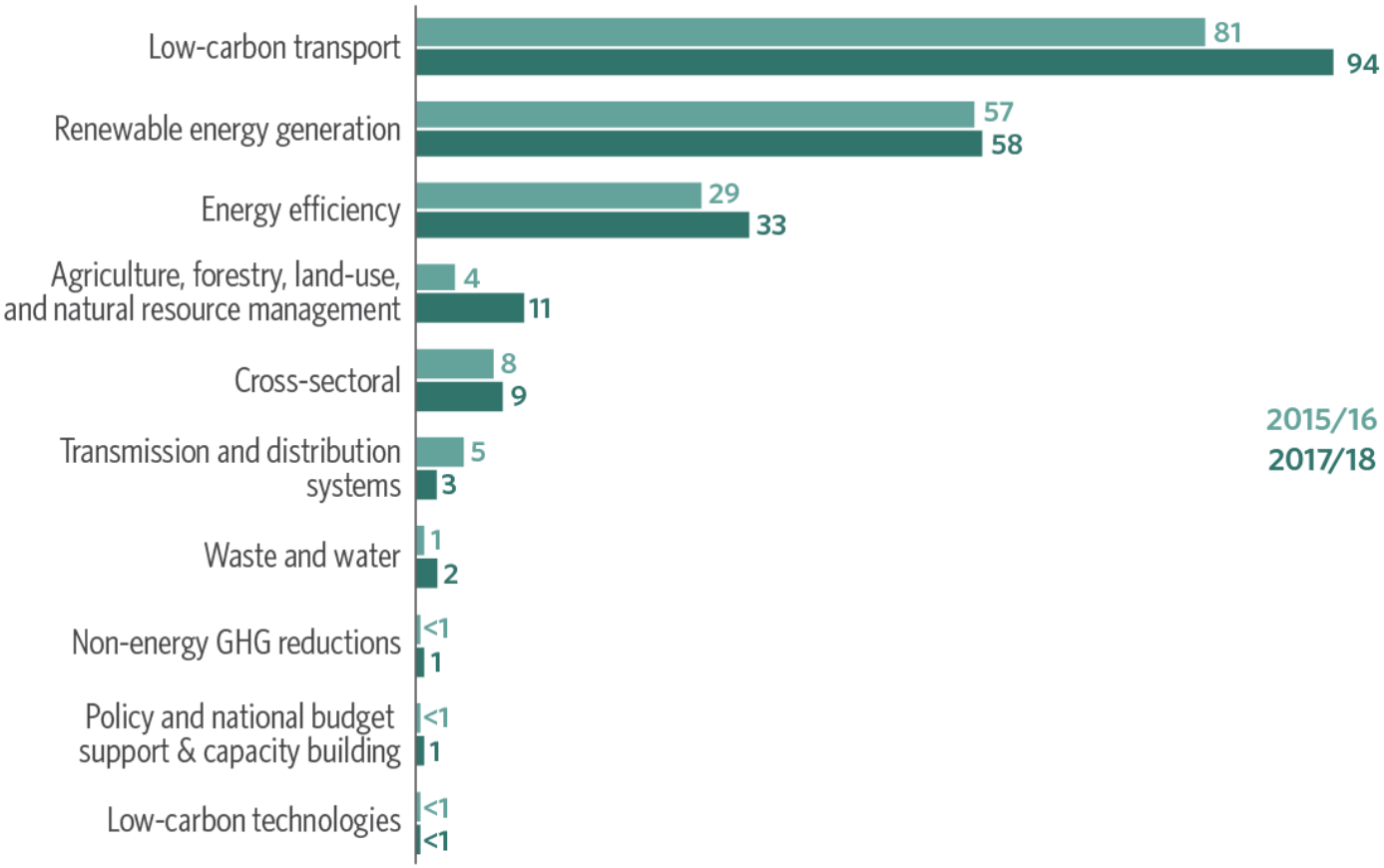


[9] Source: CPI analysis of IEA PVPS 2018 and 2019 (Solar capacity), IRENA 2019 (Solar and wind levelized costs), and GWEC 2019 (Wind capacity).

During the 2017/2018 period, the low-carbon transport sector was the second-largest recipient for mitigation finance, averaging USD 140 billion annually. In fact, low-carbon transport became the fastest-growing sector for climate finance during the 2017/2018 period, increasing from an annual average of USD 92 billion in 2015/2016 to USD 140 billion in 2017/2018.

In 2017/2018, low-carbon transport accounted for the largest portion of public mitigation finance, averaging USD 94 billion annually, or 44% of total public finance for mitigation. This figure represents a 15% increase from the USD 81 billion invested annually in 2015/2016, underlining growing public-sector commitments to pursue low-carbon transport as a key component of climate-smart investment strategies. Renewable energy generation accounted for the next-largest share of public mitigation investment, with an annual average of USD 58 billion (28%), while public energy efficiency investment came in third with USD 33 billion annually (16%).

Figure 10: Average annual public mitigation finance 2015-2018, billion USD, most notable sectors



In contrast with the public sector's focus on funding low-carbon transport, private mitigation investment tracked in the Landscape continues to be dominated by renewable energy generation, which averaged USD 278 billion annually and accounted for 85% of tracked private mitigation finance in 2017/2018. While partially due to the maturity and bankability of renewable energy investments relative to other climate-related projects, this trend also reflects data limitations. Comprehensive data are available for renewable energy investments but partially or completely unavailable for other mitigation subsectors, causing the renewables sector to account for an even larger overall proportion of tracked climate finance. In 2017/2018, 53% of tracked private renewables financing flowed to solar PV, while wind accounted for an additional 40% split between onshore (32%) and offshore (8%). No other category represented more than 3% of the total.

The next-largest sector for tracked private mitigation investment was low-carbon transport, at USD 47 billion annually (14%). Individual households' spending on electric vehicle purchases made up the largest portion of this figure at USD 32 billion (68%). Other significant subsectors for private-sector transport investment included urban transit (13%) and heavy rail (12%), both of which received private funding from a mixture of commercial financial institutions, corporate entities, funds, and institutional investors. While renewables made up a much larger absolute portion of private mitigation financing, low-carbon transport grew more quickly, as private transport finance more than quadrupled from 2015/2016 to 2017/2018, compared to a smaller percentage increase of 16% for renewables, with modest additional growth spread among a variety of other sectors. Total annual private finance for mitigation grew by USD 77 billion during this period, representing a 31% top-line increase.

One reason for faster growth in private transport investment, relative to renewable energy growth, was a rapid increase in individual households' adoption of electric vehicles. When CPI first analyzed household EV spending in Global Climate Finance: An Updated View (2018), it totaled USD 9 billion in 2015 and USD 13 billion in 2016. Total household spending on EVs rose to USD 23 billion in 2017 and USD 41 billion in 2018, representing a quadrupling of spending in just three years. This rapid growth in EV uptake can be largely ascribed to the impact of increasing public awareness and knowledge of the benefits of EVs, aided by government-backed subsidy programs in many countries (IEA, 2019a). As governments continue to expand EV education programs, subsidy schemes, and charging infrastructure, EVs are primed for continued strong growth, with potential to become a key contributor to global decarbonization of the transportation sector.

4.2 Adaptation Finance

Adaptation finance gained momentum in 2017/2018, increasing 35% to an annual average of USD 30 billion from 2015/2016, although adaptation still accounts for just 5% of tracked climate finance based on available data.

Adaptation finance gained momentum in 2017/2018, increasing 35% to an annual average of USD 30 billion from USD 22 billion in 2015/2016. The increase in adaptation finance is indicative of increasing importance of climate-resilient development, and the urgency to build adaptive capacity to manage climate change vulnerabilities, reflected also by better data coverage. However, based on the available data sources, adaptation finance continues to fall drastically short of the required global adaptation financing of USD 180 billion annually for the period 2020-2030 (GCA, 2019) and the USD 50 billion per annum needed by the Non-Annex I countries[10] to achieve their nationally-determined contributions (NDCs) (UNEP, 2018).

Almost all adaptation finance tracked in the Landscape was funded by public actors.[11] Adaptation finance accounted for 12% of 2017/2018 public finance flows, a slight increase from 10% in 2015/2016. The step up in public adaptation finance was driven by increased commitments from DFIs, which accounted for 79% of total adaption financing (USD 23 billion), indicating a higher priority for adaptation in their climate finance

[10] Non-Annex I countries refer to parties to the United Nations Framework Convention on Climate Change (UNFCCC) not listed in Annex I of the Convention, which are mainly developing countries.

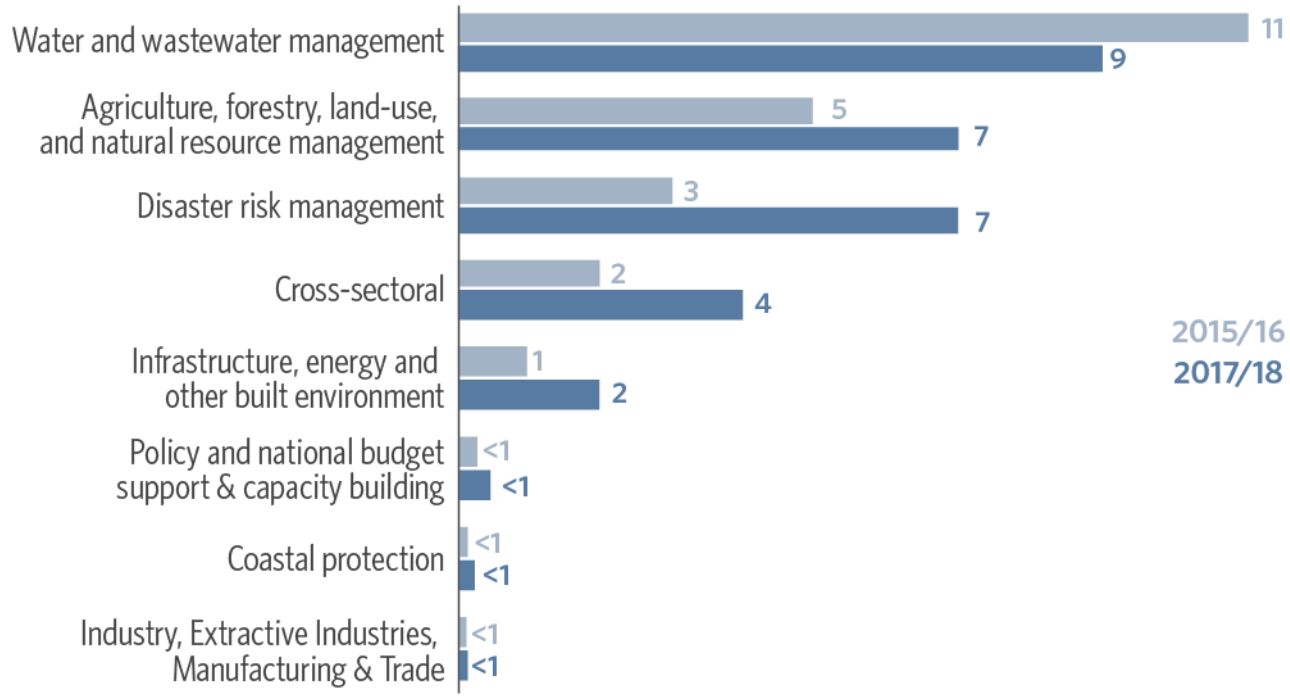
[11] Only around USD 0.5 billion of adaptation finance came from private sector sources. These funds were directed primarily toward supporting water and wastewater management (70%, USD0.32 billion) and infrastructure, energy and other built environment (17%, USD0.08 billion). In terms of destination, 83% of the flows went to Canada (31%), United Arab Emirates (21%), Spain (17%) and Peru (13%), while the rest were for transregional projects and other countries.

portfolios – a positive response to the Paris Agreement's call for greater balance between mitigation and adaptation finance.[12]

The minimal amount of tracked private finance for adaptation and resilience has several causes. Adaptation finance tracking, regardless of funding source, is constrained by definitional challenges making it difficult to distinguish climate-related finance from regular business operations and broader development finance, as well as conceptual and accounting issues, confidentiality restrictions, and a lack of universally accepted impact metrics (UNFCC, 2018; UNEP 2016b, CPI, 2019a). At the same time, uncertainty and risk are a barrier not only to information but also to action. Some adaptation and resilience projects may not be investment-grade , and the territories most in need of adaptation finance have higher market and governance risks, which can deter private investors (UNEP, 2014; UNEP, 2016a; GCA, 2019).

Increased investment in adaptation has been accompanied by greater balance in spending across sectors. Public adaptation finance was fairly evenly distributed across three sectors – water and wastewater management (32%), agriculture and land use (24%), and disaster risk management (22%) – together accounting for 78% of total adaption finance, or USD 23 billion annually. This represents a shift from previous years, in which adaptation finance was mainly concentrated in the water sector (Figure 11).

Figure 11: Public Adaptation Finance by Sector, in USD billion



[12] Article 9.4 of the Paris Agreement emphasized that the provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation, while Article 10.4 directed that the provision of support to developing countries should be done with a view to achieving a balance between support for mitigation and adaptation.

Public financing for disaster risk management projects grew the fastest, increasing 128% from an annual average of USD 2.9 billion in 2015/2016 to USD 6.6 billion in 2017/2018. This reflects the growing need to invest in early warning and rapid response systems to protect against extreme weather events. Reinforcing this trend, 2017 and 2018 were recorded as the costliest years on record for weather disasters, with more than half a trillion USD in losses incurred globally (Aon, 2017, 2018).

Climate finance directed toward agriculture, forestry, and land use showed an especially large increase to USD 7 billion, posting growth of USD 2.5 billion from 2015/2016 levels. This sector accounted for 24% of 2017/2018 public adaptation flows, and was chiefly funded by multilateral DFIs (52%) and government budgets and agencies (25%).

Despite continued growth, urgent and massive upscaling of adaptation investment across the board is required. Developing countries are already the most vulnerable to the climate crisis – as measured, for instance, by the GermanWatch Climate Risk Index (GermanWatch, 2019). Closing the adaptation finance gap will require transformational actions and looking beyond public finance to support adaptation. While public finance plays a pivotal role in creating long-term climate resilience and establishing enabling conditions, private finance is needed to complement public institutions to bridge the finance gap (with due recognition of distributional differences on risks and costs across countries and sectors (UNEP, 2018)).

Efforts are being made to address the information gap and improve adaptation tracking, including continued iteration of well-established common principles among IDFC and the majority of MDBs. However, other barriers include fragmented responsibilities, poor institutional cooperation, lack of resources, and programming and implementation costs (GCA, 2019, UNEP, 2018), all of which must be surmounted to achieve the increase in scale required.

4.3 Finance with Dual Benefits

There is growing recognition that adaptation and mitigation activities are interdependent and must be addressed holistically.

The remaining USD 11.9 billion (2%) of total 2017/2018 climate finance flows provided funding for projects and activities contributing toward both mitigation and adaptation outcomes, a substantial increase compared to USD 5.3 billion in 2015/2016. This is primarily due to a significant increase in funding for projects categorized as cross-sectoral (from USD 2.1 billion to 5.3 billion), and land use (from USD 1.8 billion to USD 2.5 billion).

Further improving our understanding of investments that deliver dual benefits requires harmonization of methodologies and processes as different institutions apply different reporting methods. Current methodologies include categorizing dual-benefit projects as either mitigation or adaptation based on which category is more relevant, assigning tracked finance equally to mitigation and adaptation, assigning to adaptation, or simplify reporting (MDBs, 2019).

5. Geographic Flows

A strong domestic preference continues to exist, with 76% of finance being raised and spent domestically in 2017/2018.

Seventy-six percent, or USD 438 billion, of climate finance was spent in the same country in which it was sourced in 2017/2018, indicating a strong "domestic preference" among investors where home-country risks are well understood. However, the share of domestic finance in total climate finance declined from 81% in 2015/2016, as a result of an increase in international finance from USD 87 billion in 2015/2016 to USD 141 billion (24%) in 2017/2018. This may be the result of ongoing efforts to establish better enabling environments for climate finance, thereby strengthening cooperation and flows of funds across countries and regions. Most international finance was sourced from OECD nations[13] (USD 118 billion), of which 60% (USD 72 billion[14]) was spent in non-OECD countries.

Climate finance to developing countries grew to an annual average of USD 356 billion in 2017/2018, a 32% increase from USD 270 billion in 2015/2016.

Climate finance flows were almost equally sourced from OECD (USD 291 billion) and non-OECD (USD 286 billion) countries, continuing a trend seen in 2015/2016. This suggests balanced awareness between developed and developing countries regarding the need to scale up climate investments.

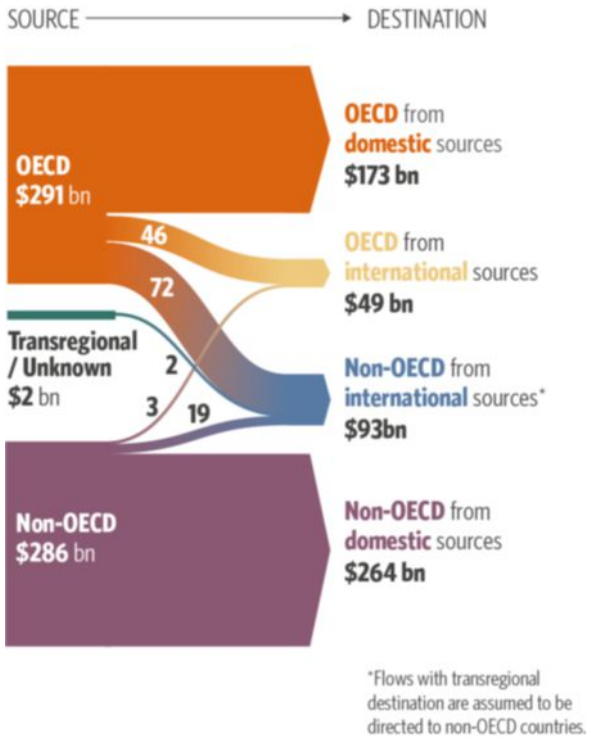
The majority of climate finance continues to fund projects in developing countries, with non-OECD countries receiving 61%, or USD 356 billion. East Asia & Pacific remained the primary destination region for climate finance, accounting for USD 238 billion per year (41% of all flows) on average during 2017/2018. China remained the largest country in terms of both originating and receiving investment. The regions of Oceania and the Middle East & North Africa recorded the highest growth since 2015/2016, increasing 165% and 78%, respectively. However, climate finance flows to Japan, South Korea, and Israel decreased from USD 26 billion to USD 13 billion in 2017/2018, and those to Western Europe declined by USD 1 billion to USD 106 billion.

Of total international flows, USD 72 billion flowed from OECD to non-OECD countries in 2017/2018, a 60% increase from USD 45 billion in 2015/2016, accounting for 12% of tracked climate finance.[15] Flows between developing countries increased from USD 11 billion in 2015/2016 to USD 19 billion, indicating stronger south-to-south cooperation in climate actions. Non-OECD countries provided USD 3 billion in funds to OECD countries, the same as in 2015/2016.

Private-sector entities dominated climate finance in the Americas, Oceania, Japan, South Korea, and Israel, while Western Europe, East Asia & Pacific, and South Asia had an almost equal split of public and private funds received. In all other regions, public entities were the primary sources of climate finance. This reflects a continued dependency on public funds among developing and vulnerable territories for sustainable growth, as well as a need to further attract private investors to bring about a larger-scale shift in financing.

Domestic finance tracking is still limited but provides opportunities for better alignment with climate goals. Data availability constraints prevent the Landscape from capturing a more comprehensive picture of climate finance at the country level. Though domestic climate finance tracking is faced with challenges on definitional issues, limited institutional capacity, and a lack of systematized information, among others (GFLAC and

Figure 12: Climate finance flows by OECD status of source and destination (USD billion, 2017/2018 annual average)



[13] OECD countries are those countries who are members of the Organisation for Economic Co-operation and Development, including a few countries listed as Non-Annex I Parties to the UNCCC (Chile, Mexico, Korea, Israel, San Marino). For the landscape, OECD and non-OECD countries are used interchangeably with developed and developing countries, respectively.

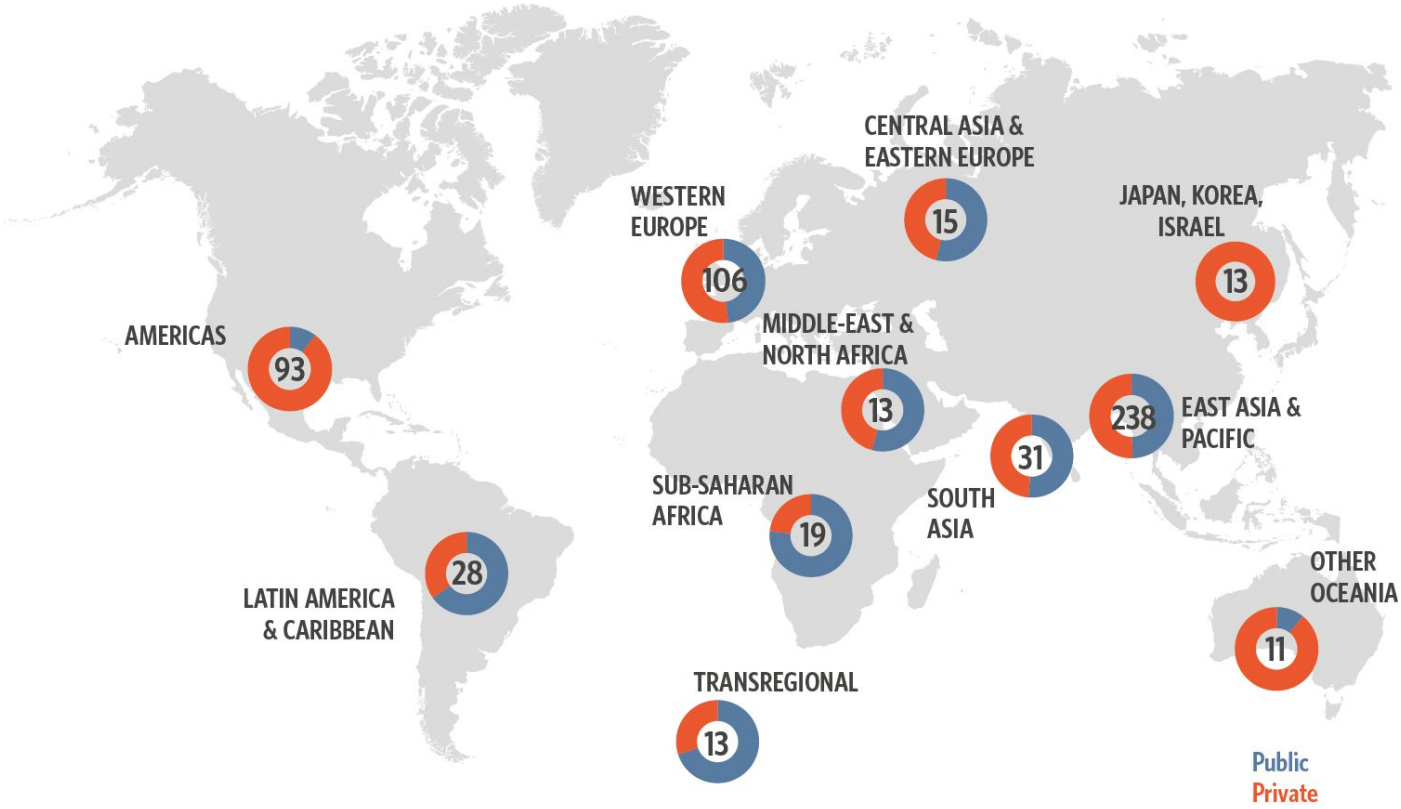
[14] This includes USD 1.3 billion of transregional flows assumed to be flowing to non-OECD countries.

[15] Note that we have slightly adjusted our methodology, recognizing information gaps hinder a proper understanding of international private investments. For this and other reasons, as per previous Landscape reports, the figures identified in the current Landscape should not be confused with amounts that may count toward the $100 billion per year developed countries committed to mobilize to assist developing countries.

UNDP, 2018), various efforts to fill in the knowledge gap have already been undertaken[16] or are currently underway.[17]

Tracking domestic climate finance flows helps governments assess if national climate policies are succeeding in mobilizing investment, identifying financial gaps and determining where existing finance flows may be better directed to attain climate goals, and improve accountability among donors and parties of the Paris Agreement (CPI, 2018b; GFLAC and UNDP, 2018). It complements the global landscape in providing policy input to ensure alignment of local policies and governance mechanisms with the global climate goals and making them responsive to unique national climate circumstances.

Figure 13: Destination region of climate finance, by public/private (USD billion, 2017/2018 annual average)



[16] These include domestic climate finance tracking for Papua New Guinea (UNDP, 2018), France (I4CE, 2018), Ivory Coast (CPI, 2017), Belgium (Trinomics and EY, 2016), Indonesia (CPI, 2014), South Africa (TIPS, 2013), Germany (CPI, 2012; IKEM, 2019).

[17] Several ongoing studies include Brazil (CPI), Costa Rica (GIZ), Czech Republic (RTU, IKEM), France (I4CE), Germany (I4CE), India (CPI), Indonesia (CPI), Kenya (CPI, AECOM, Baker Mckenzie), Latvia (CVUT), and Poland (I4CE, Wise Europa, New Climate Institute).

Box E: Recipients of climate finance

Understanding which entities receive climate finance from public sources can shed light on the extent to which public funding might mobilize capital in the long term, a process known as "crowding in." **During 2017 and 2018, an average of 13% of publicly sourced climate finance flows went to private recipients, 3% to public-private partnerships, and 26% to public entities, such as UN agencies and national governments.** However, during 2017 and 2018, a specific recipient could not be identified for 59% of publicly sourced climate finance due to data limitations, limiting the usefulness of the breakdown for known recipients.

Our analysis also shows that in 2017/2018, 96% of privately sourced finance flowed to private-sector recipients, with only 3% directed to public-private partnerships and 1% to public recipients. This outcome is consistent with the breakdown of private finance in previous Landscape reports, as historically almost all privately-sourced climate finance has stayed within the private sector.

6. Conclusions

Our analysis of the global landscape of climate finance in 2017/2018 reveals several positive trends, including continued increases in financing for renewables, a surge in public flows toward low-carbon transport, a strong upward trend in public finance for adaptation, and early signs for mainstreaming across a larger set of private financial institutions.

However, increasing climate finance commitments is not enough on its own – today more than ever it is crucial to phase out investment in the fossil fuel supply chain from exploration to generation, which far outstripped finance for renewables generation in 2017/2018. The existing global stock of fossil fuel energy infrastructure today implies emissions in excess of the entire remaining carbon budget necessary to stand a more-than-even chance of limiting global warming to 1.5 °C (Pfeiffer et al., 2018; Tong et al., 2019).

Continued financing for fossil fuel supply infrastructure increases the risk of missing abatement targets, magnifies financial transition risks related to stranded assets, and contrasts starkly with the goals set by the Paris Agreement. Commitments to move away from fossil fuels, such as the Powering Past Coal Alliance (most recently joined by Germany and Slovakia), are gaining momentum. However, a much greater economy-wide shift is required to redirect high-carbon investment into green infrastructure projects, not only in energy systems, but also in other crucial sectors, including land use, transport, water, and industry.

In addition, the current scope and scale of global climate finance are grossly insufficient to limit the worst effects of climate change – there is a need for a tectonic shift beyond 'climate finance as usual' toward truly transformative policies and investments.

The IPCC (2018) warns that a breach of the 1.5 °C threshold in global warming between 2030 and 2052 will result in irreversible damage to the environment and welfare losses. Keeping warming below this level necessitates rapid, large-scale emissions reductions, and a corresponding transition away from high-carbon production and consumption, across all sectors. While there is no single estimate of the investment required to meet these goals, indicative, regional, and sectoral estimates show that the gap between existing investment and what is needed represents an order of magnitude. This means that incremental increases in climate finance flows will not deliver on these objectives.

Several factors will determine the scope and scale of the transition toward a net-zero carbon future. We focus on five such trends and one overarching, enabling action.

6.1 Governments should continue to raise their levels of ambition

Governments should continue to raise the level of ambition in national climate plans and target resources to enable these plans to be implemented. Targets send market signals and help direct budgetary and fiscal policy. In response to the vast financing gap, many countries are raising their level of ambition in pledges to decarbonize their economies. In a positive response to the UN Climate Action Summit in September 2019, 77 countries pledged to deliver net zero carbon emissions by 2050, with the UK the first to enshrine such a commitment in legislation. Some countries and regions have pledged to expand their financial commitments as well – for instance,

the EU committed to allocate a quarter of its 2021-2027 budget to climate-related activities (European Commission, 2019), while the UK announced it would double its international climate finance between 2021 and 2025 to USD 14.7 billion (UK Government, 2019). In addition to these expanded commitments to address the financing gap, governments should also commit to moving away from fossil fuel finance and ending lock-in of high-carbon infrastructure. These commitments could be structured as explicit targets in which portfolio share of high-carbon projects steps down over time, or as revisions of development banks' mandates to emphasize the need to avoid these types of investments at an institutional level.

There is much work to be done in 2020 to increase the ambition levels of countries under the Paris Agreement, with revised NDCs due to be submitted by COP 26. In parallel, considerable efforts are needed to plan best use of financial resources to start implementing the plans aggressively. In particular, there is an urgent need to guide scarce public capital toward its most transformative use. In this context, governments have the unique opportunity to drive ambition and increased climate finance by explicitly adjusting the mandates of national institutions and including references to the Paris Agreement and the SDGs. Financial regulatory frameworks could further incentivize public institutions to target climate action and sustainable development impact.

6.2 Public and private actors must coordinate to rapidly scale up finance in sectors beyond renewable energy generation

The Landscape shows that public finance is more evenly spread across end uses than private finance. To achieve the transition, all financial actors will need to increase their investment in important sectors, especially energy efficiency, adaptation, and land use. The public sector and actors who can use capital more nimbly such as philanthropic foundations have an important role in facilitating private finance. They need to work to support that transition through both regulation and blended financing, quickly establishing a track record of successful projects and partnerships, while avoiding crowding-out (CPI, 2018a). Sectors where the opportunities are concentrated include:

- **Energy Efficiency.** In the absence of new technologies, energy efficiency will need to deliver around 40% of emissions reductions by 2040 for emissions pathways to remain consistent with the Paris Agreement (IEA, 2018), making it equally important as renewables in delivering the necessary emissions abatement. Weakening policy efforts to support energy efficiency measures in 2017 suggest further difficulties ahead in encouraging private investment in (IEA , 2019b).
- **Adaptation and climate resilience.** The USD 180 billion in resilience investment required annually between 2020 and 2035 would yield net benefits of USD 7.1 trillion, a threefold return. New partnerships and business models are needed to monetize these benefits, opening more opportunities to scale up investment in adaptation and long-term climate resilience. Adaptation investment is urgently needed in areas highly disrupted by the climate crisis, such as food production, water and natural environment, urban services, infrastructure, and disaster risk management (GCA, 2019).
- **Food.** Global food systems contribute approximately 20-30% of global GHG emissions including on farm emissions, land use change, transport, and processing (Vermeulen et al., 2012). At the same time, protection and restoration of many different types of ecosystem holds huge carbon sequestration potential which will be essential to meet net zero targets. Yet the Landscape only identifies 8% of public climate finance being channeled to sustainable land use. Only a small proportion of the USD 528bn spent in 2017 on agricultural subsidies globally, is used to incentivize sustainable production and ecosystem protection (World Bank, 2018b). Many sustainable supply chain initiatives involving major agriculture corporations and blended finance funds launched in recent years are isolated bright spots - the pace and scale is still far below what we need to see in 2019.
- **Technologies and R&D.** An agenda for deep decarbonization should avoid investing only in low-cost marginal abatement opportunities, and instead focus on a complete technological pathway to net-zero (CPI & Climateworks, 2018). Tracking progress toward this goal implies considering R&D expenditure and breakdowns of technology costs as well as headline investment flows and capacity additions. Grants from governments and philanthropic actors, such as the UK's recent

decision to allocate GBP 1 billion to British research on climate solutions, will increasingly need to figure in accounting for climate finance.

6.3 Financial institutions must accelerate alignment with the Paris Agreement

Article 2.1(c) of the Paris Agreement calls for governments to ensure financial flows are "consistent with a pathway toward low GHG emissions and climate-resilient development" throughout their economies. Failure to reallocate would not only lock in high-carbon activities that would push temperatures beyond 1.5 °C thresholds, but also expose governments and private investors to both transition and physical climate risks that may amplify as they travel through the economy, resulting in a major loss of income and therefore lower living standards (CPI, 2019c; OECD, 2018).

To meet Paris objectives and catalyze private finance at scale, DFIs must align both their portfolios and operations with the Paris Agreement. As several DFIs have already reached, or are close to reaching, their 2020 targets, there is a need to push beyond growing the share of 'climate finance' in their portfolio to greening institutions' entire portfolios and expand the scope of alignment efforts. Indeed, many bilateral and multilateral DFIs, individually and collectively, have recently made renewed commitments to raise levels of financing significantly in the short term and work toward making all development bank finance compatible with climate and SDG goals in the longer term (IDFC, 2019; MDBs, 2018).

DFIs and climate funds are reflecting on how to make the most catalytic use of their resources and push transformative change, including through outcome-based policy lending, lending to intermediaries, and procurement processes. For instance, the multilateral development banks published a framework for achieving alignment during COP24 in Katowice (MDBs, 2018). Key steps for DFIs to take include establishing an internal working definition of alignment, actively pursue strategic collaboration with governments in their countries of operation to improve policy environments, develop investment pipelines and support the transition of non-aligned sectors, and reassess risk management, asset valuation, and capital allocation practices, to reflect climate risks and optimize the risk capacity of each member to ensure its interventions are catalytic in nature (CPI & I4CE, 2019). DFIs need to re-examine their role with respect to intervention and collaboration with the private sector, acting as enablers of climate-aligned investment rather than investing directly and potentially crowding out private finance.

Alignment is being pursued in the private sector by initiatives such as the International Investors Group on Climate Change (IIGCC, 2019). Mapping the success of these initiatives will itself be a new frontier in tracking, since all financial flows, not just those directly related to green infrastructure, must be part of an assessment of consistency with the Paris objectives. Ongoing work at CPI and partner organisations, such as the OECD's Research Collaborative on Tracking Finance for Climate Action,[18] the Climate Action in Financial Institutions Initiative,[19] and DFI initiatives on tracking climate and green finance by the Joint MDB Climate Finance Group and IDFC, focuses on ways to measure and track climate-aligned finance.

6.4 Capital markets and banking must shift toward green finance

While the conventional approach in the Landscape and elsewhere in the climate finance field is to focus on primary infrastructure investment, the ability to invest is directly influenced by financial markets. The ecosystem channeling green capital flows includes trading platforms, low-carbon indices, and green funds. Bank lending also greatly influences climate outcomes, as seen both in their large role in the Landscape and in recent findings on fossil fuel lending. A comprehensive assessment of progress in shifting the trillions required for mitigation and adaptation will need to include these mechanisms, which can be supplemented by mapping the integration of climate factors into business models, strategies, and policies, and mapping investor sentiment as a leading indicator of future flows (see CPI, 2019a).

These efforts will gain from initiatives to measure, disclose, manage and mitigate climate risks. Mispricing of climate-related physical risks results in mispricing of assets, and ultimately the misallocation of capital. The Taskforce for Climate-Related Financial Disclosures, the foremost initiative aiming to address this, has more than 700 supporting organisations. However, as of mid-2019, the Task Force is concerned that not enough companies are disclosing decision-useful climate-related financial information (TCFD, 2019). More

[18] https://www.oecd.org/env/researchcollaborative/
[19] https://www.mainstreamingclimate.org/

widespread disclosure, possibly prompted through regulatory agencies, will widen the scope for profiling financial markets by their climate impact – including flows with a negative impact on climate objectives – and open the way to mobilizing capital in the right direction. In the interim, tracking project-level investment can occur in tandem with research into climate risk at the asset level, to develop methods for mapping climate-aligned finance at scale.

6.5 Public institutions in particular must make every dollar count and ensure quality as well as quantity

The absence of appropriate indicators, metrics, and data to determine the effectiveness of climate investments is a pressing concern (GFLAC & UNDP, 2018), as the interest and need to measure and report grows amongst various stakeholders. Data on the substantive benefits of investments (GHG emissions mitigated, value in USD of infrastructure rendered resilient to flood damage, etc.) will need to be sourced from a wide range of actors and communities, requiring a collaborative approach.

As well as understanding the value of each dollar spent in terms of abatement or resilience, public finance has a crucial role to play in mobilizing private actors. This also requires understanding the low-carbon development pathways for different countries. Developing countries in particular need to promote a dialogue between investment flows and needs, supported by the DFI community and technical expertise providers, to ensure priority sectors receive the finance required to make the transition.

6.6 Enabling action: Information and communication

While the efforts listed in the previous sections are important to shift gear toward climate finance at scale, greater coverage and depth of climate finance tracking can provide the necessary evidence to target climate finance most effectively. Convening stakeholders in the tracking community to pool resources, share expertise, and help communicate across different silos of discussion can help make headway toward these goals. Sub-groups within the community need to focus on areas of respective expertise to make advances in many of the areas identified above. CPI's newly reformed Climate-aligned Finance Tracking Group is one forum for making progress in this area. At the turn of a pivotal decade for action against climate change, the role of this expanded and refined Global Landscape in helping to describe and interpret climate finance trends is more important than ever before. A focus on unlocking broader and deeper financial data can help ensure that future versions of the Landscape, as well as other crucial tracking efforts, continue to inform climate action across diverse geographies, markets, and institutional contexts.

7. Annex: Data Tables

Table A.1 – Breakdown of global climate finance by public and private actors (USD billion)

ACTOR	2017	2018	2017-2018 AVERAGES
PRIVATE	330	323	326
Commercial FI	76	69	73
Corporations	193	172	183
Households	45	66	55
Institutional investors	9	10	9
Private equity, venture capital, infrastructure funds	4	6	5
Unknown	2	0	1
PUBLIC	282	224	253
Government Budgets & Agencies	32	42	37
Climate Funds	3	4	3
Public FI - Bilateral	20	26	23
Public FI - Multilateral	56	58	57
Public FI - National	171	94	132
TOTAL	612	546	579

Table A.2 – Breakdown of global climate finance by sectors (USD billion)

SECTOR	2017	2018	2017-2018 AVERAGES
ADAPTATION	25	34	30
Agriculture, forestry, land-use, and natural resource management	7	7	7
Coastal protection	0.4	0.1	0.3
Disaster risk management	4	9	7
Industry, Extractive Industries, Manufacturing & Trade	0.0	0.1	0.1
Infrastructure, energy and other built environment	2	3	2
Others / cross-sectoral	3	4	4
Policy and national budget support & capacity building	1	0.3	0
Water and wastewater management	8	11	10
MITIGATION	574	500	537
Agriculture, forestry, land-use, and natural resource management	12	9	11
Energy efficiency	36	32	34
Low-carbon technologies	0.1	0.4	0.2
Non-energy GHG reductions	1	0.5	1
Others / cross-sectoral	9	8	9
Policy and national budget support & capacity building	1	0.3	1
Renewable energy generation	350	322	336
Low-carbon transport	159	122	140
Transmission & distribution systems	4	3	3
Waste and wastewater	2	3	2
DUAL BENEFITS	12	12	12
TOTAL	612	546	579

Table A.3 – Breakdown of global climate finance by instruments (USD billion)

INSTRUMENT	2017	2018	2017-2018 AVERAGES
Balance sheet financing (debt portion)	95	92	93
Balance sheet financing (equity portion)	118	132	125
Grant	25	33	29
Low-cost project debt	50	78	64
Project-level equity	50	37	44
Project-level market rate debt	272	173	223
Unknown	1	1	1
TOTAL	612	546	579

Table A.4 – Breakdown of public climate finance by recipients (USD billion)

RECIPIENT	2017	2018	2017-2018 AVERAGES
Private	340	349	344
Public	74	61	67
Public-Private	19	16	18
Unknown	179	120	150
TOTAL	612	546	579

Table A.5 – Breakdown of global climate finance by region of destination (USD billion)

REGION	2017	2018	2017-2018 AVERAGES
OECD	211	234	223
Americas	80	106	93
Japan, Korea and Israel	15	10	13
Other Oceania	12	10	11
Western Europe	104	108	106
NON-OECD	400	312	356
Central Asia and Eastern Europe	10	18	14
East Asia and Pacific	294	183	238
Latin America & the Caribbean	26	31	28
Middle East and North Africa	14	14	14
South Asia	30	31	30
Sub-Saharan Africa	15	23	19
Transregional	12	13	12
TOTAL	612	546	579

Table A.6 – International and domestic climate finance flows (USD billion)

REGION	2017	2018	2017-2018 AVERAGES
DOMESTIC	484	391	438
Non-OECD	321	209	265
OECD	164	182	173
INTERNATIONAL	127	155	141
From Non-OECD to Other Non-OECD	18	21	19
From Non-OECD to OECD	4	3	3
From OECD to Other OECD	43	49	46
From OECD to Non- OECD	62	82	72
TOTAL	612	546	579

Note: All transregional/unknown are grouped under non-OECD.

8. References

ADB, 2019. Climate Finance in 2018. Asian Develoment Bank, Available at: https://www.adb.org/news/infographics/climate-finance-2018

AfDB, 2019. The African Development Bank pledges US$ 25 billion to climate finance for 2020-2025, doubling its commitments. 14 March. Available at: https://www.afdb.org/en/news-and-events/the-african-development-bank-pledges-us-25-billion-to-climate-finance-for-2020-2025-doubling-its-commitments-19090

Aon, 2017. Weather, Climate & Catastrophe Insight: 2017 Annual Report. Available at: http://thoughtleadership.aonbenfield.com/Documents/20180124-ab-if-annual-report-weather-climate-2017.pdf

Aon, 2018. Weather, Climate & Catastrophe Insight: 2018 Annual Report. Available at: http://thoughtleadership.aonbenfield.com/Documents/20190122-ab-if-annual-weather-climate-report-2018.pdf

Brett, 2018. Financial Markets 2018: the year in review. Schroders, 24 December. Available at: https://www.schroders.com/en/insights/economics/financial-markets-2018-the-year-in-review/

CBI, 2017. Bonds and Climate Change: The State of the Market 2017. Available at: https://www.climatebonds.net/resources/reports/bonds-and-climate-change-state-market-2017

CBI, 2019. Green Bonds: The State of the Market 2018. Available at: https://www.climatebonds.net/resources/reports/green-bonds-state-market-2018

Climate Bonds Initiative, Climate Resilient Consulting, and World Resources Institute, 2019. Climate Resilience Principles: A framework for assessing climate resilient investments. Available at: https://www.climatebonds.net/climate-resilience-principles

Climate Policy Initiative (CPI), 2012. The Landscape of Climate Finance in Germany. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2012/11/Landscape-of-Climate-Finance-in-Germany-Full-Report.pdf

CPI (2017) Landscape of REDD+ Aligned Finance in Côte d'Ivoire. Available at: https://climatepolicyinitiative.org/publication/landscape-redd-aligned-finance-cote-divoire/

CPI, 2018a. Blended Finance in Clean Energy: Experiences and Opportunities. Available at: https://climatepolicyinitiative.org/publication/blended-finance-clean-energy-experiences-opportunities/

CPI, 2018b. Global Climate Finance: An Updated View. Available at: https://climatepolicyinitiative.org/publication/global-climate-finance-an-updated-view-2018/

CPI, 2019a. Measuring the Private Capital Response to Climate Change: Shifting the Trillions. Available at: https://climatepolicyinitiative.org/publication/measuring-the-private-capital-response-to-climate-change-a-proposed-dashboard/

CPI, 2019b. Tracking Adaptation Finance Flows: A snapshot of global adaptation investment and tracking methods. Available at: www.gca.org.

CPI, 2019c. Understanding the impact of a low carbon transition on South Africa. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2019/03/CPI-Energy-Finance-Understanding-the-impact-of-a-low-carbon-transition-on-South-Africa-March-2019.pdf

CPI & Climateworks, 2018. Deep decarbonization by 2050: Rethinking the role of climate finance. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2018/07/Deep-decarbonization-by-2050-rethinking-the-role-of-climate-finance.pdf

CPI & Institute for Climate Economics (I4CE), 2019. Implementing Alignment with the Paris Agreement: Recommendations for the Members of the International Development Finance Club. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2019/09/19-09-25-CPI_IDFCalignment-study.pdf

CPI and Indonesia Ministry of Finance (Indonesia IM), 2014. The Landscape of Public Climate Finance in Indonesia. An Indonesian Ministry of Finance & CPI Report. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2014/07/The-Landscape-of-Public-Finance-in-Indonesia.pdf

European Commission, 2019. Supporting climate action through the EU budget. Available at: https://ec.europa.eu/clima/policies/budget/mainstreaming_en

EU Technical Expert Group (TEG) on Sustainable Finance (ed.), 2019. Financing a Sustainable European Economy: Taxonomy. Technical Report. European Commission: Brussels Available at: https://ec.europa.eu/info/files/190618-sustainable-finance-teg-report-taxonomy_en

Global Commission on Adaptation (GCA), 2019. Adapt Now: A Global Call for Leadership on Climate Resilience. Global Commission on Adaptation. Available at: https://cdn.gca.org/assets/2019-09/GlobalCommission_Report_FINAL.pdf

GermanWatch, 2019. Global Climate Risk index 2019- Who Suffers Most From Extreme Weather Events? Weather-related Loss Events in 2017 and 1998 to 2017. Bonn, Germany. Available at: https://www.germanwatch.org/sites/germanwatch.org/files/Global%20Climate%20Risk%20Index%202019_2.pdf.

Latin American and Caribbean Climate Finance Group (GFLAC) and United Nations Development Programme (UNDP), 2018. A Review of Domestic Data Sources for Climate Finance Flows in Recipient Countries. Available at: https://www.climatefinance-developmenteffectiveness.org/sites/default/files/GFLACWeb.pdf

Global Wind Energy Council (GWEC), 2019. Global Wind Report 2018. Available at: https://gwec.net/global-wind-report-2018/

I4CE (2018) Landscape of climate finance in France, low-carbon investment 2011-2017. Available at: https://www.i4ce.org/wp-core/wp-content/uploads/2018/09/I4CE-Low-Carbon-investment-Panorama-des-financements-climat-2017-Final.pdf

International Development Finance Club (IDFC), 2019. IDFC's Contribution to the United Nations Climate Action Summit 2019. Available at: https://www.idfc.org/wp-content/uploads/2019/09/official-idfc-communique-vdef21-09-2019-22h50-cet.pdf

IDFC-MDBs, 2017. Joint IDFC-MDB Statement: Together Major Development Finance Institutions Align Financial Flows with the Paris Agreement. Available at: https://www.eib.org/attachments/general/events/20171212-joint-idfc-mdb-statement.pdf

Institutional Investors Group on Climate Change (IIGCC), 2019. IIGCC Paris Aligned Investment Initiative. Available at: https://www.iigcc.org/resource/iigcc-paris-aligned-investment-initiative/

International Energy Agency (IEA). 2017. Key World Energy Statistics. Available at: https://www. iea.org/publications/freepublications/publication/KeyWorld2017.pdf

IEA, 2018. World Energy Outlook 2018. International Energy Agency (IEA). Available at: https://www.iea.org/weo2018/

IEA, 2019a. Global EV Outlook 2019. Available at: www.iea.org/publications/reports/globalevoutlook2019/

IEA, 2019b. Market Report Series: Energy Efficiency 2018 – Analysis and Outlooks to 2040. Available at: https://webstore.iea.org/download/direct/2369?fileName=Market_Report_Series_Energy_Efficiency_2018.pdf

IEA 2019c. World Energy Investment 2019. Available at: https://www.iea.org/wei2019/

IEA PVPS, 2018. Trends 2018 in Photovoltaic Applications. Available at: http://www.iea-pvps.org/fileadmin/dam/intranet/task1/IEA_PVPS_Trends_2018_in_Photovoltaic_Applications.pdf

IEA PVPS, 2019. 2019 Snapshot of Global PV Markets. Available at: http://www.iea-pvps.org/fileadmin/dam/public/report/statistics/IEA-PVPS_T1_35_Snapshot2019-Report.pdf

IISD, 2019. 77 Countries, 100+ Cities Commit to Net Zero Carbon Emissions by 2050 at Climate Summit. Available at: https://sdg.iisd.org/news/77-countries-100-cities-commit-to-net-zero-carbon-emissions-by-2050-at-climate-summit/

Institute for Climate Protection, Energy and Mobility (IKEM), 2019. Climate and energy investment map in Germany: Status report 2016. Available at: https://www.euki.de/wp-content/uploads/2019/05/IKEM_ANovikova-et-al_2019_Climate_Energy_Investment_Map_Germany2016_Full-report.pdf

International Monetary Fund (IMF), 2019. World Economic Outlook Update July 2019. Available at: https://www.imf.org/~/media/Files/Publications/WEO/2019/Update/July/English/WEOupdateENGJuly2019.ashx?la=en

Intergovernmental Panel on Climate Change (IPCC), 2018. Global Warming of 1.5° C: An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Available at: https://www.ipcc.ch/sr15/

International Renewable Energy Agency (IRENA), 2018. Renewables Readiness Assessment: Pakistan. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_RRA_Pakistan_2018.pdf

IRENA, 2019. Renewable Power Generation Costs in 2018. Available at: https://www.irena.org/publications/2019/May/Renewable-power-generation-costs-in-2018

MDBs, 2015. Joint Statement by the Multilateral Development Banks at Paris, COP21 Delivering Climate Change Action at Scale: Our Commitment to Implementation. Available at: https://www.eib.org/attachments/press/joint-mdb-statement-climate_nov-28_final.pdf

MDBs, 2018. The MDBs' alignment approach to the objectives of the Paris Agreement: working together to catalyse low-emissions and climate-resilient development. Available at: https://www.ndb.int/wp-content/uploads/2018/12/Joint-Declaration-MDBs-Alignment-Approach-to-Paris-Agreement_COP24_Final....pdf

MDBs, 2019. 2018 Joint Report on Multilateral Development Banks Climate Finance. Multilateral Development Banks. Available at: https://www.worldbank.org/en/news/press-release/2019/06/13/mdb-climate-finance-hit-record-high-of-us431-billion-in-2018

Organisation for Economic Co-operation and Development (OECD), 2018. Financing Climate Futures RETHINKING INFRASTRUCTURE: Synthesis and Key Messages for High-level Discussion New York, 25 September 2018. Available at: https://www.oecd.org/environment/cc/climate-futures/synthesis-financing-climate-futures.pdf

OECD, 2019. Amounts mobilised from the private sector by development finance interventions: Highlights from 2017. Available at: https://issuu.com/oecd.publishing/docs/amounts-mobilsed-from-the-private-sector-by-dev-fi

Pfeiffer et al., 2018. Committed emissions from existing and planned power plants and asset stranding required to meet the Paris Agreement. Environmental Research Letters, 13.5, IOP Publishing Ltd. Available at: https://www.inet.ox.ac.uk/files/Pfeiffer_2018_Environ__Res__Lett__13_054019.pdf

Rainforest Action Network, Banktrack, Sierra Club, Oil Change International, Indigenous Environmental Network, and Honor the Earth, 2019. Banking on Climate Change: Fossil Fuel Finance Report Card 2019. Available at: https://www.ran.org/bankingonclimatechange2019/

Task Force on Climate-related Financial Disclosures (TCFD), 2019. TCFD: 2019 Status Report (June 2019). Available at: https://www.fsb-tcfd.org/publications/tcfd-2019-status-report/

Trade and Industrial Policy Strategies (TIPS), 2013. Tracking Climate Finance Inflows to South Africa. Discussion document prepared for the Climate Change Expert Group (CGXG) Global Forum. Available at: http://www.oecd.org/env/cc/Tracking%20climate%20finance%20inflows%20to%20South%20Africa.pdf

Trinomics and EY, 2016. Landscape of climate finance in Belgium. Available at: https://www.klimaat.be/files/4914/6901/4152/Landscape_of_climate_finance_in_Belgium.pdf

Tong et al., 2019. Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. Nature, 572, pp. 373–377. Available at: https://doi.org/10.1038/s41586-019-1364-3

UK Government, 2019. UK aid to double efforts to tackle climate change. 23 September. Available at: https://www.gov.uk/government/news/uk-aid-to-double-efforts-to-tackle-climate-change

United Nations Development Programme (UNDP), 2018). Landscape of Climate-Relevant Land-Use Finance in Papua New Guinea. May. Available at: https://www.undp.org/content/dam/papua_new_guinea/docs/Projects/PNG%20FCPF%20REDD+%20Readiness/Landscape%20of%20Land-Use%20Finance%20in%20Papua%20New%20Guinea%20FINAL%20REPORT.pdf

United Nations Environment Programme (UNEP), 2014. Adaptation Gap Report. United Nations Environment Programme. Available at: https://www.unenvironment.org/resources/adaptation-gap-report-2014

UNEP, 2016a. The Adaptation Finance Gap Report 2016. Available at: Available at: https://climateanalytics.org/media/agr2016.pdf

UNEP, 2016b. Demystifying Adaptation Finance for the Private Sector. Available at: https://www.unepfi.org/wordpress/wp-content/uploads/2016/11/DEMYSITIFYING-ADAPTATION-FINANCE-FOR-THE-PRIVATE-SECTOR-AW-FULL-REPORT.pdf

UNEP, 2018. The Adaptation Gap Report 2018. Available at: https://www.unenvironment.org/resources/adaptation-gap-report

United Nations Framework Convention on Climate Change (UNFCC), 2018. UNFCCC Standing Committee on Finance 2018 Biennial Assessment and Overview of Climate Finance Flows Technical Report. Available at: https://unfccc.int/sites/default/files/resource/2018%20BA%20Technical%20Report%20Final%20Feb%202019.pdf

UNSG, 2019. Climate Action Summit Press Release: In the face of worsening climate crisis, UN Summit to deliver new pathways and practical actions to shift global response into higher. New York, 23 September. Available at: https://www.un.org/en/climatechange/assets/pdf/CAS_main_release.pdf

Vermuelan et.al, 2012. Climate Change and Food Systems [Vermeulen, S.J., Campbell, B.M. and Ingram, J.S.I]. Annual Review of Environment and Resources, 37, 195-222. Available at: https://doi.org/10.1146/annurev-environ-020411-130608

Wei, 2019. China's Annual Economic Growth Rate Is Slowest Since 1990. The Wall Street Journal, 21 January. Available at: https://www.wsj.com/articles/china-annual-economic-growth-rate-is-slowest-since-1990-11548037761?mod=article_inline

World Bank, 2018a. China Economic Update December 2018. Available at: http://pubdocs.worldbank.org/en/917591545202039807/CEU-Dec-2018-EN.pdf

World Bank. 2018b. Realigning Agricultural Support to Promote Climate-Smart Agriculture. Agriculture Global Practice Note. Available at: http://documents.worldbank.org/curated/en/734701543906677048/Realigning-Agricultural-Support-to-Promote-Climate-Smart-Agriculture