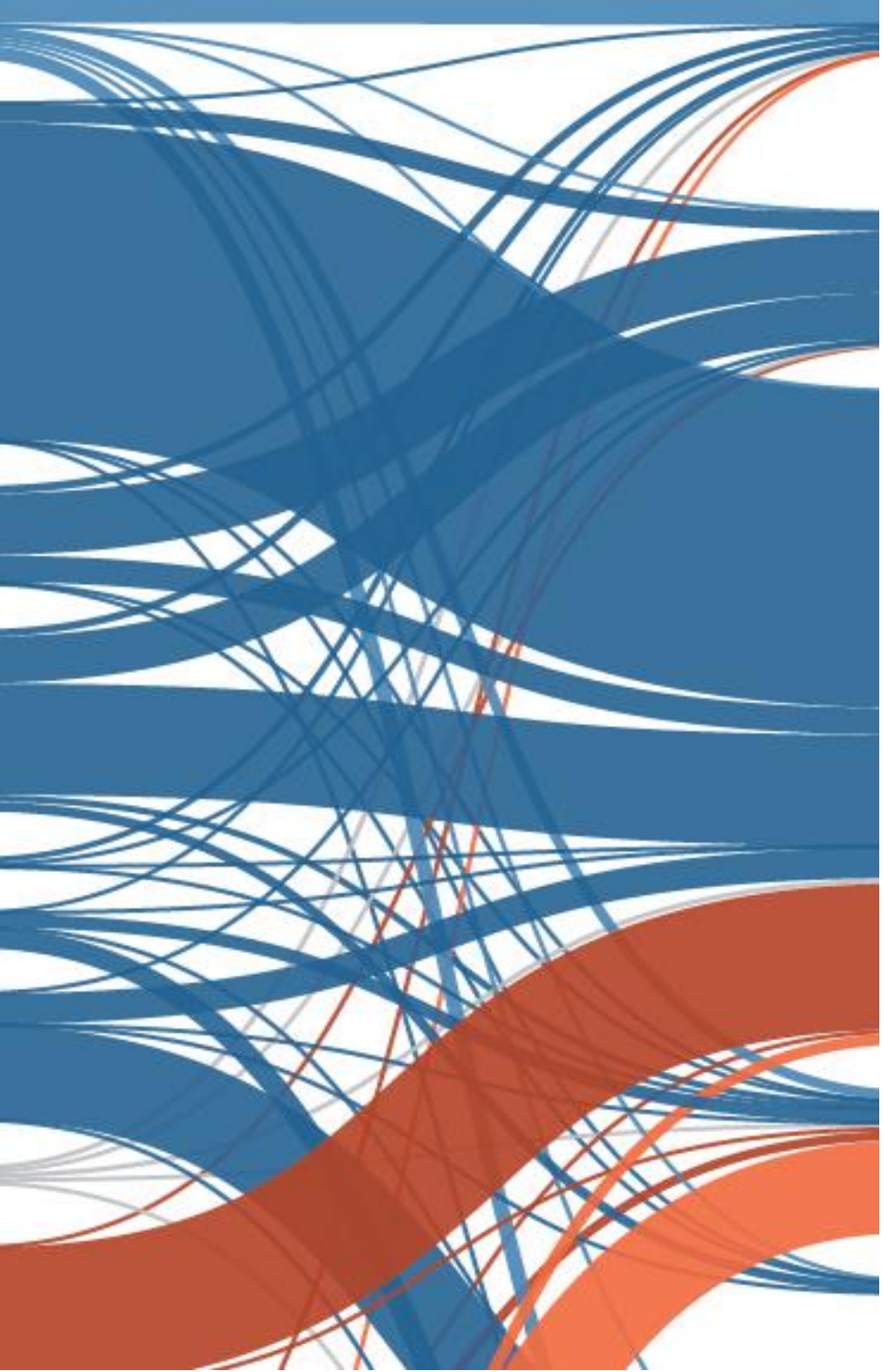


CLIMATE POLICY INITIATIVE

Global Landscape of Climate Finance

A Decade of Data: 2011-2020

SUPPORTED BY:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

Authors: Baysa Naran, Jake Connolly, Paul Rosane, Dharshan Wignarajah, Githungo Wakaba. This work was led under the guidance of Dr. Barbara Buchner.

Acknowledgements: 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 Caroline Dreyer, Rob Kahn, and Valerio Micale for advice, editing, and internal review, and Elana Fortin, Josh Wheeling, and Angela Woodall for layout and graphic design.

The authors appreciate the review and guidance from the following experts outside CPI (in alphabetical order): Alexis Bonnel (AFD), Renee Livesey (BEIS), Michael König (FS-UNEP Centre), Padraig Oliver (UNFCCC), Jens Sedemund (OECD), Charlene Watson (ODI) and many other contributors from CPI convened Climate-aligned Finance Tracking Group.

Recommended citation: Climate Policy Initiative [B.Naran, J.Connolly, P.Rosane, D.Wignarajah, E.Wakaba, B.Buchner]. 2022. Global Landscape of Climate Finance: A Decade of Data 2011-2020.

Related CPI reports:

Global Landscape of Climate Finance 2021
Private Financial Institutions' Commitments to Paris Agreement
Landscape of Climate Finance in Africa
The Landscape of Methane Abatement Finance
Net Zero Finance Tracker

Contact: Baysa Naran baysa.naran@cpiglobal.org
Media contact: Caroline Dreyer caroline.dreyer@cpiglobal.org

Copyright © 2022 Climate Policy Initiative climatepolicyinitiative.org. All rights reserved. CPI welcomes the use of its material for noncommercial purposes, such as policy discussions or educational activities, under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License. For commercial use, please contact adminsf@cpiglobal.org

CLIMATE POLICY INITIATIVE

Context

It has been more than a decade since CPI started comprehensively assessing global climate finance flows through the **Global Landscape of Climate Finance** (the Landscape). It monitors global primary investment by public and private actors in activities that reduce emissions and improve adaptation and resilience to climate change.

By setting this baseline, we aim to provide a snapshot of where and how climate mitigation and adaptation finance is flowing globally, based on consistently reported and collected data over the years.

The past decade saw growing momentum, where public and private climate finance almost doubled between 2011 and 2020. However, **reaching climate objectives will require climate investment to increase at least seven times by the end of this decade** as well as the alignment of all other financial flows with the objectives of the Paris Agreement.

Climate-focused investment in the real economy is more important than ever. Our window of opportunity to limit global temperature rise by 1.5C is rapidly running out.

CLIMATE POLICY INITIATIVE

Introduction

Reflecting on the past ten years of tracking global climate finance flows, this report presents seven key observations on climate finance in 2011 – 2020 and concludes with key actions to rapidly scale climate finance to the trillions.

The report provides a brief overview of sources, instruments, uses, and geographies in the past decade, as well as **climate finance needs in the coming years by sectors and geographies**. It also offers a **preliminary estimate for climate finance in 2021**, drawing on data published in 2022.

To inform the United Nations Framework Convention on Climate Change (UNFCCC) fifth Biennial Assessment and Overview of Climate Finance Flows, we leveraged new data to update climate finance flow estimates for the years 2019 and 2020, as previously reported in our 2021 Landscape.

The Landscape goes beyond the developed countries' commitment to a collective goal of mobilizing USD 100 billion per year by 2020 for climate action in developing economies. It analyzes all climate mitigation and adaptation investment mobilized internationally and domestically, to assess global progress [1].

While tracking primary investment in climate mitigation and adaptation is important, we acknowledge that this is a means and not an end to meeting the challenge of aligning the global financial system with the climate goals of the Paris Agreement. There are still a lot of unknowns and data gaps in climate finance. The following observations are limited to what is known and tracked.

[1] Further information on the definition and scope of the Global Landscape of Climate Finance is available here.

CLIMATE POLICY INITIATIVE

Key observations: The need for scale

1. **Global climate finance almost doubled in the last decade, with a cumulative USD 4.8 trillion in climate finance committed between 2011-2020** or USD 480 billion annual average. While climate finance increased at a cumulative average annual growth rate (CAGR)[2] of 7%, the current levels of increase are not on track to meet a 1.5C global warming scenario. **We need at least USD 4.3 trillion in annual finance flows by 2030** (CAGR 21%) to avoid the worst impacts of climate change. There is enough liquidity in global financial markets (USD 200 trillion held by investors in 2020) but barriers impeding deployment exist.

2. **Private sector investment is increasing, but not at the scale and speed necessary for the transition.** Private sector actors, particularly financial institutions with trillions of asset under management, are committing to net zero and sustainable finance practices. Nonetheless, it is not clear how fast these commitments are translating into changes and investment on the ground. The growth rate of private climate finance was slower (4.8%) than that of the public sector (9.6%) and must increase rapidly at scale. The public sector has been vital in channeling finance to hard-to-invest sectors such as agriculture and adaptation. However, there still is room for public finance to take more risks and a clearer mandate to mobilize both public and private capital, and to create enabling environments necessary for unlocking further pools of capital.

3. **Finance towards renewable energy made the most progress, whereas adaptation and resilience finance lags significantly.** The renewable energy sector was transformed into an established and competitive sector with a 7x higher return on investment than fossil fuels (IEA & CCFI, 2021). Public sector support was particularly crucial in scaling renewable energy investment by supporting and enabling technology cost reduction, as well as providing incentives such as time bound subsidy mechanisms as markets became self-sustaining. Transport is the fastest-growing sector, built in part by government policy support for the industry. Other critical sectors, including agriculture, forestry, other land use and fisheries, industry, water and wastewater, all of which have potential to mature, are trailing behind. There is a lack of data on adaptation finance from the private sector. Nevertheless, the quantity and quality of adaptation finance fall far short of needs.

[2] CAGR refers to the growth rate at an annual compounded rate to show smoothed rate taking into account any fluctuations year on year

CLIMATE POLICY INITIATIVE

Key observations: The finance and data gaps

4. **Continued fossil fuel support remains a barrier to achieving global climate goals.** For example, the total fossil fuel subsidies in 51 major countries alone were 40% higher than the total global investment in climate finance between 2011 - 2020. This is alarming as fossil fuel subsidies are only a part of the overall funding in high emitting activities. Immediate action to remove dependencies on fossil fuel, including subsidies, will free up resources for more sustainable investments, as well as improve consumer price stability and increase energy independence.

5. **Concessional finance was 16% of total climate finance,** while debt consistently remained the main instrument for climate finance. Concessional financing is crucial in managing risks and uncertainties related to nascent technologies and markets. Grant finance is increasing, with volumes almost tripling between 2011-2020. However, their relative share in total climate finance remains low at less than 5%. The majority of grants were provided by governments in the forms of subsidies or international climate finance. The private sector relied on balance sheet investments (or investments through its own resources) and the public sector provided concessional or market rate loans. The majority of debt was raised in East Asia Pacific and Western Europe followed by North America, driven by renewable energy growth in those regions.

6. **76% of climate finance was raised domestically,** primarily concentrated in East Asia & Pacific (dominated by China), North America, and Western Europe, confirming the importance of domestic capital pool. Central Asia and Eastern Europe attracted both domestic and international climate finance. Across all regions, there is a lack of consistently reported data on domestic public climate finance.

7. **Data on finance flows is improving, but less is known about the impact and outcome of deployed climate finance**. Public international climate finance is advancing on its reporting methodologies, which enables providers to better understand and prioritize climate investments. However, the same level of sophistication and consistency in reporting is lacking from the private sector, as well as in public domestic budgets, which leads to data gaps. More broadly, there are knowledge gaps in impact, outcome, and outcome levels of climate finance that are important to assess their effectiveness.

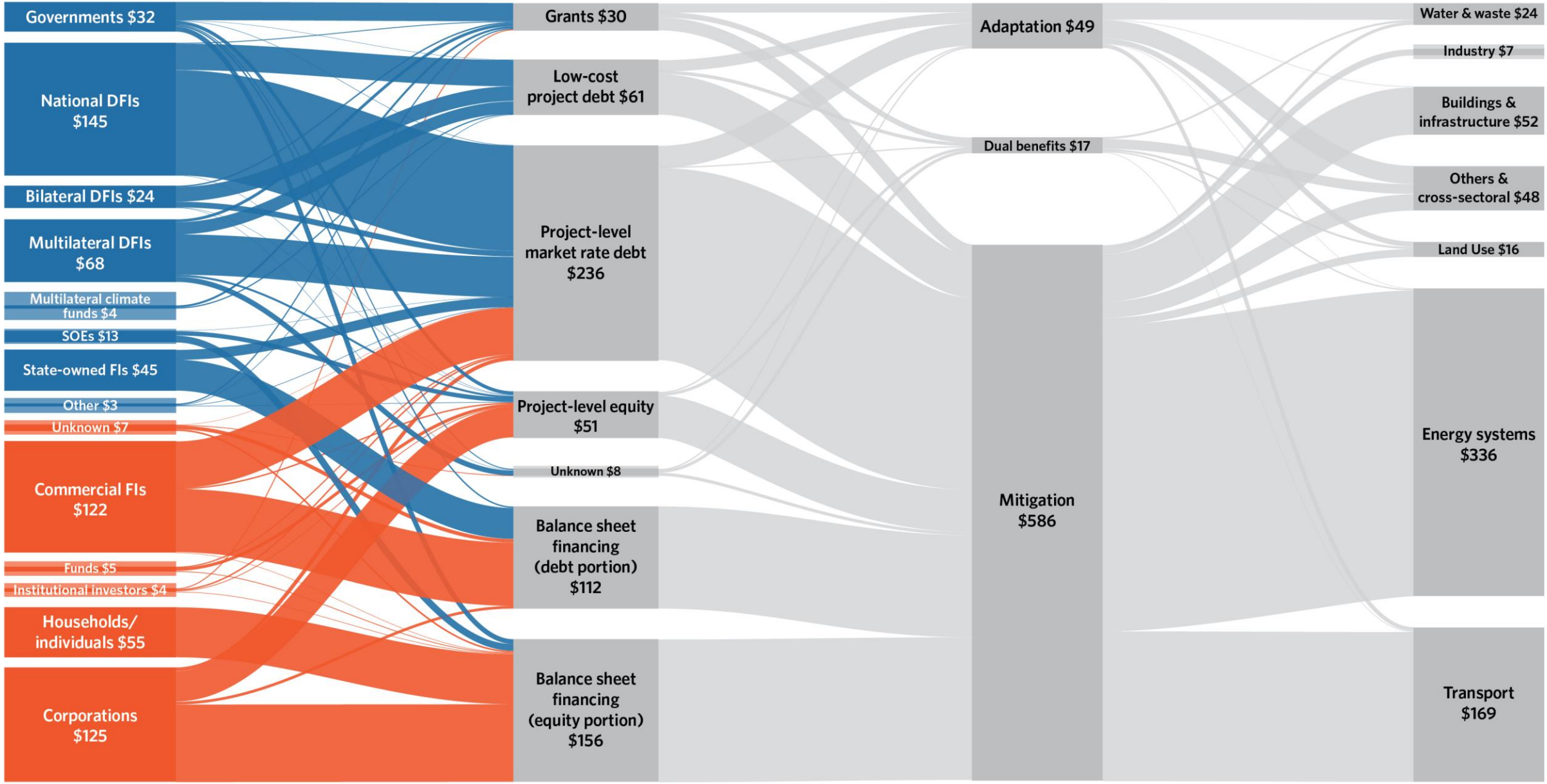
LANDSCAPE OF CLIMATE FINANCE IN 2019/2020

Global climate finance flows along their life cycle in 2019 and 2020. Values are average of two years' data, in USD billions.

653 BN USD ANNUAL AVERAGE

Government funds to other public sources are not estimated

CLIMATE POLICY INITIATIVE



CLIMATE POLICY INITIATIVE

Key insights from our preliminary estimates for 2021

- **Annual climate finance flows in 2019/20 reached USD 653 billion on average, which was 15% higher than in 2017/18.** Our 2019/20 numbers were revised and enhanced following additional data sources on energy efficiency and updated data from OECD-DAC. Further details in Annex I.

- **Based on currently available information, our preliminary estimates suggest 2021 climate finance flows amount to USD 850 – USD 940 billion**, representing a 28% - 42% increase from 2019/20 averages, reaching an all-time high. A more precise analysis of 2021 climate finance flows will be confirmed in the next Landscape (2023) when more primary data becomes available.

- The estimated increase is attributable to a significant increase in the transport sector driven by increased demand for electric vehicles and related infrastructure. For example, sales of electric vehicles alone doubled in 2021, reaching a new record.

- Climate finance continues to be affected by global economic conditions:

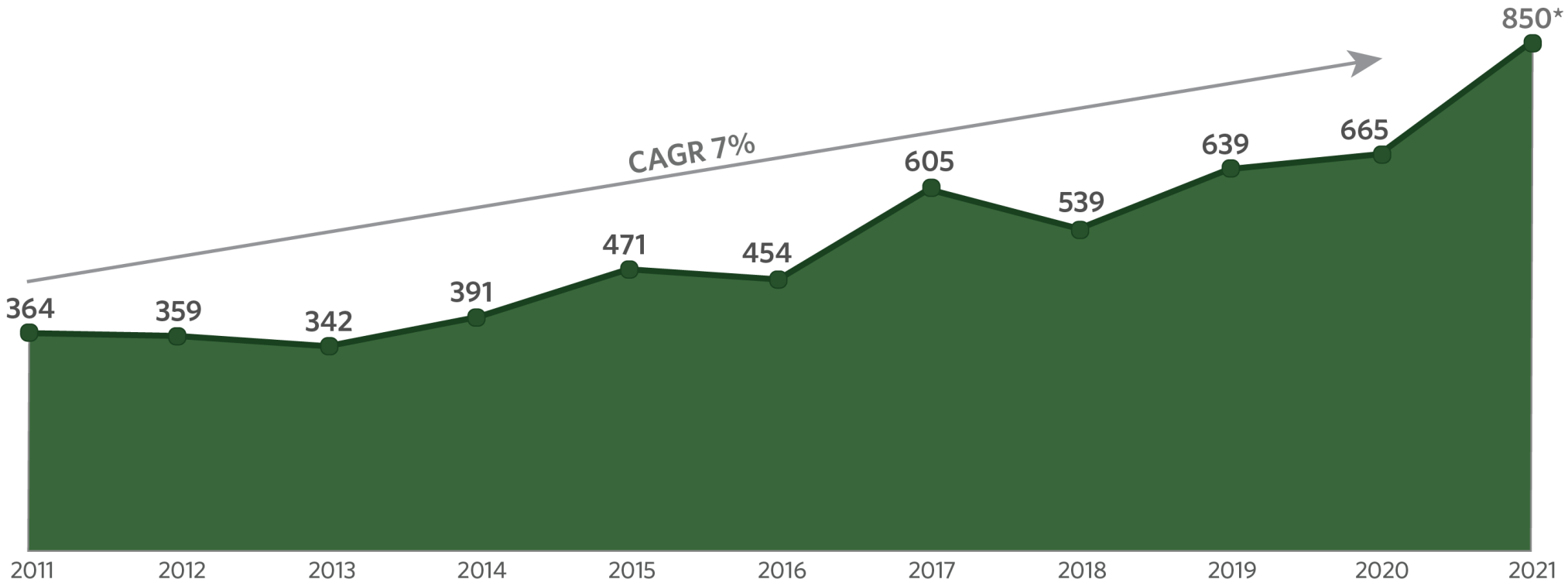
    - Prices for energy, shipping, raw material, and labor are rising throughout the supply chains of various industries, including renewable energy. Nonetheless, renewable energy competitiveness is high given that natural gas and coal prices sharply increase(IEA, 2022c).
    - High inflation environment may lead to high borrowing cost for all actors. Debt accounts for more than half of climate finance in developing economies, particularly in Africa (CPI, 2022). High debt vulnerability poses risks to many countries that are also facing food insecurity, and exchange rate vulnerabilities.
    - Climate disasters such as floods and droughts are intensifying and becoming the most frequent reasons for infrastructure disruptions, costing between USD 391 - 647 billion in low- and middle-income countries annually (Hallegate et al, 2019). Despite this, investment to improve the resilience of infrastructure remains low (Annex 3).
    - Due to the relative change in energy prices, incentives are on the table to build 1.5C compatible portfolios – green investments are more profitable than prior to the current crises (NGFS, 2022).

7 key observations from tracking global climate finance

2011 - 2020

1. Global climate finance flows almost doubled in the last decade

Figure 1: Global climate finance in 2011- 2021 (USD bn, nominal)

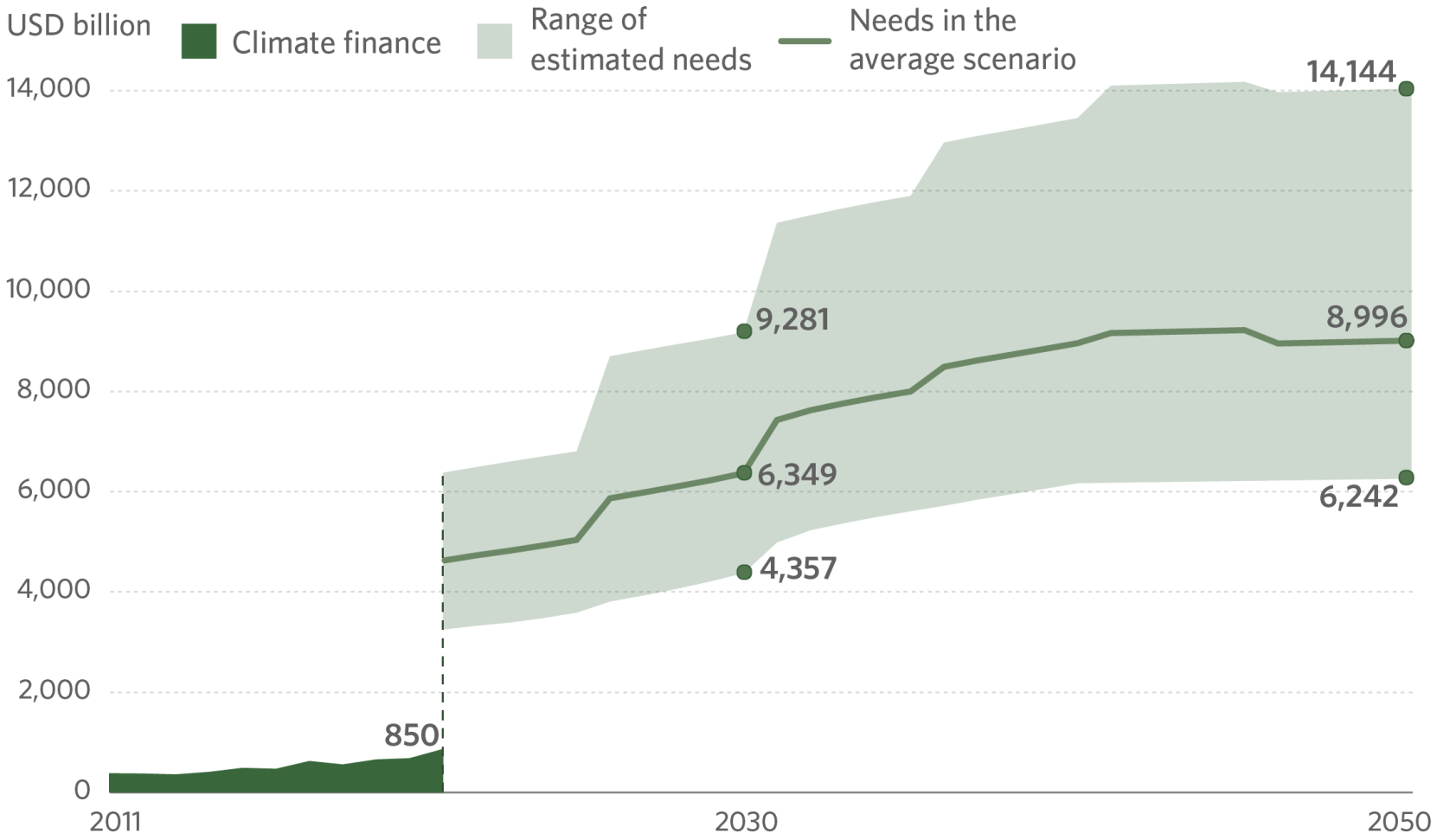


* Low bound estimate

- Global climate finance flows have been steadily increasing in the past decade**. Climate finance increased at 7% (CAGR) on an annual basis reaching USD 665 billion in 2020.** This was driven primarily by growth in the renewable energy and transport sectors. Data on climate finance also improved over the years (p. 20). Despite the increase, current investment levels are still significantly short of the estimated needs (p. 9).

A rapid and sustained increase in climate finance and redirection of high-carbon finance is required to secure a climate resilient, net zero future

Figure 2: Global tracked climate finance flows and the average estimated annual climate investment need* through 2050



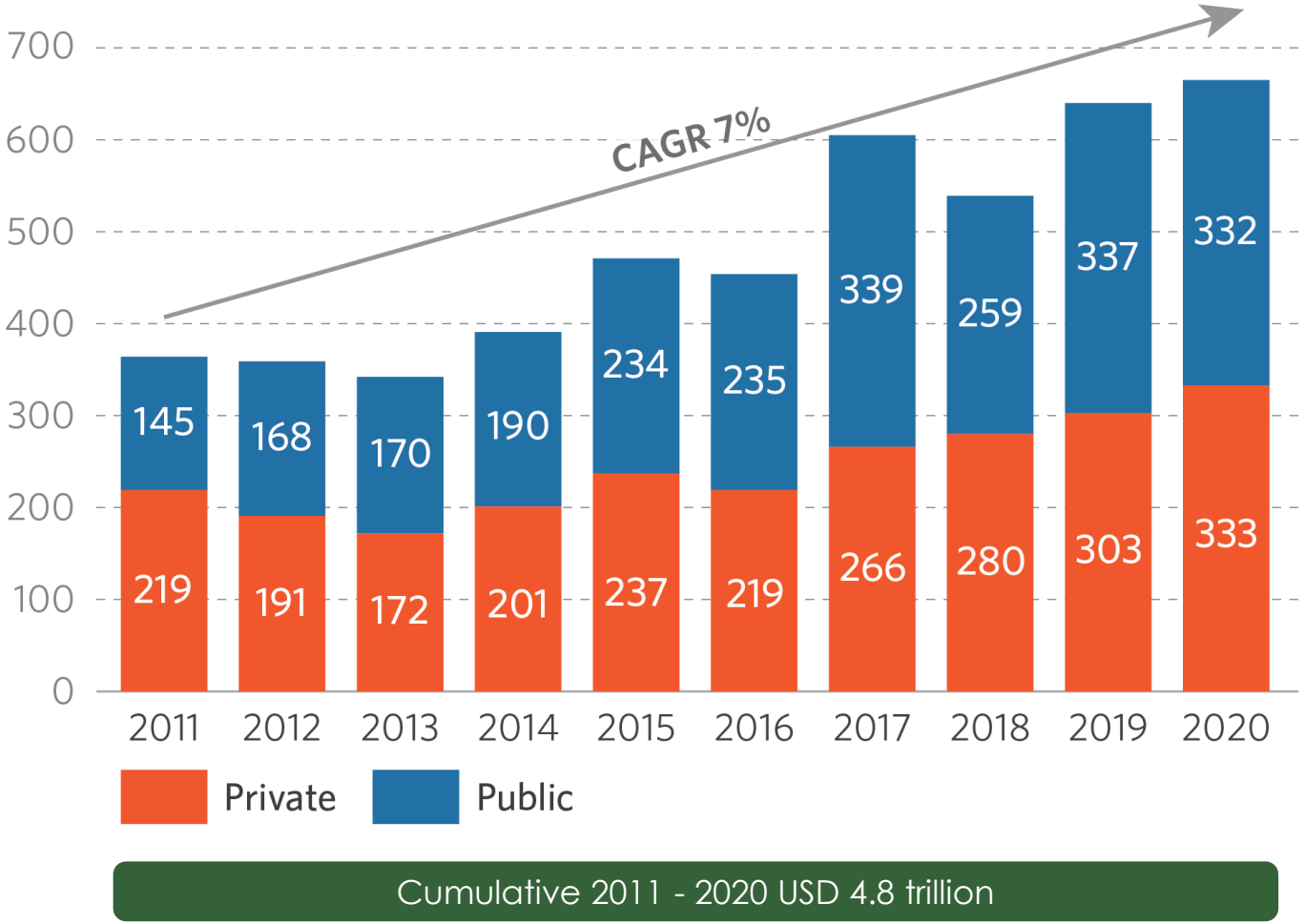
- **At least USD 4.3 trillion in annual finance flows or a 20% year-on-year increase by 2030 is required** to avoid the worst impacts of climate change.
- Despite the seemingly dramatic scale of the funding gap, it represents less than 5% of global GDP.[3]
- Moreover, **this increase would not be based solely on new, additional sources of finance**.
- Aligning finance with a 1.5C path would demand to cut the financing of high emissions activities and some resources to be reallocated to climate finance.

[3] Global total GDP is on average USD 94 trillion per year based on IMF estimations (IMF, 2021)

*Please refer to Annex II for further details

2. Private actors' contributions are increasing, but not at the pace necessary considering public sector capacity constraints

Figure 3: Climate Finance by public and private sources in 2011-2020 (USD bn)*



The public and private sectors provided USD 4.8 trillion in climate finance in total between 2011 - 2020, with the private sector responsible for about half.

These represent joint efforts of about 20,000 public and private investors, worldwide, which have accumulated knowledge, capacity, and capabilities in channelling climate finance.

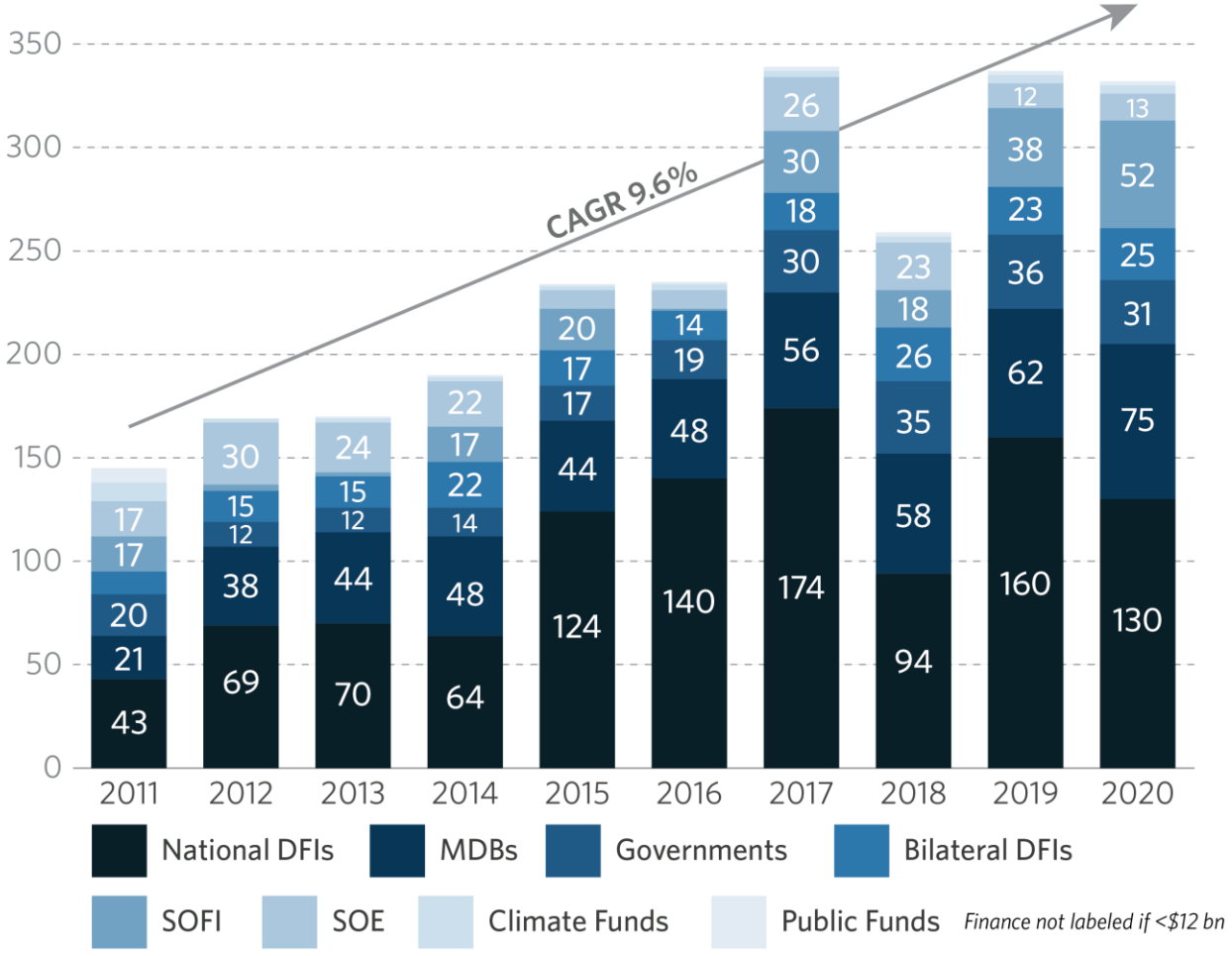
Although private sector contributions are increasing, their CAGR was only 4.3% compared to 9.1% by the public sector between 2011-2020.

Public actors have most recently (2019/20) provided the majority of climate finance.

We anticipate that investment will continue to play a pivotal role going forward, with efforts to pursue decarbonization, climate resilience, and alignment of all finance flows with the Paris Agreement.

All public sources are increasing finance, but their roles are evolving

Figure 4: Climate finance from different sources within the public sector (USD bn)

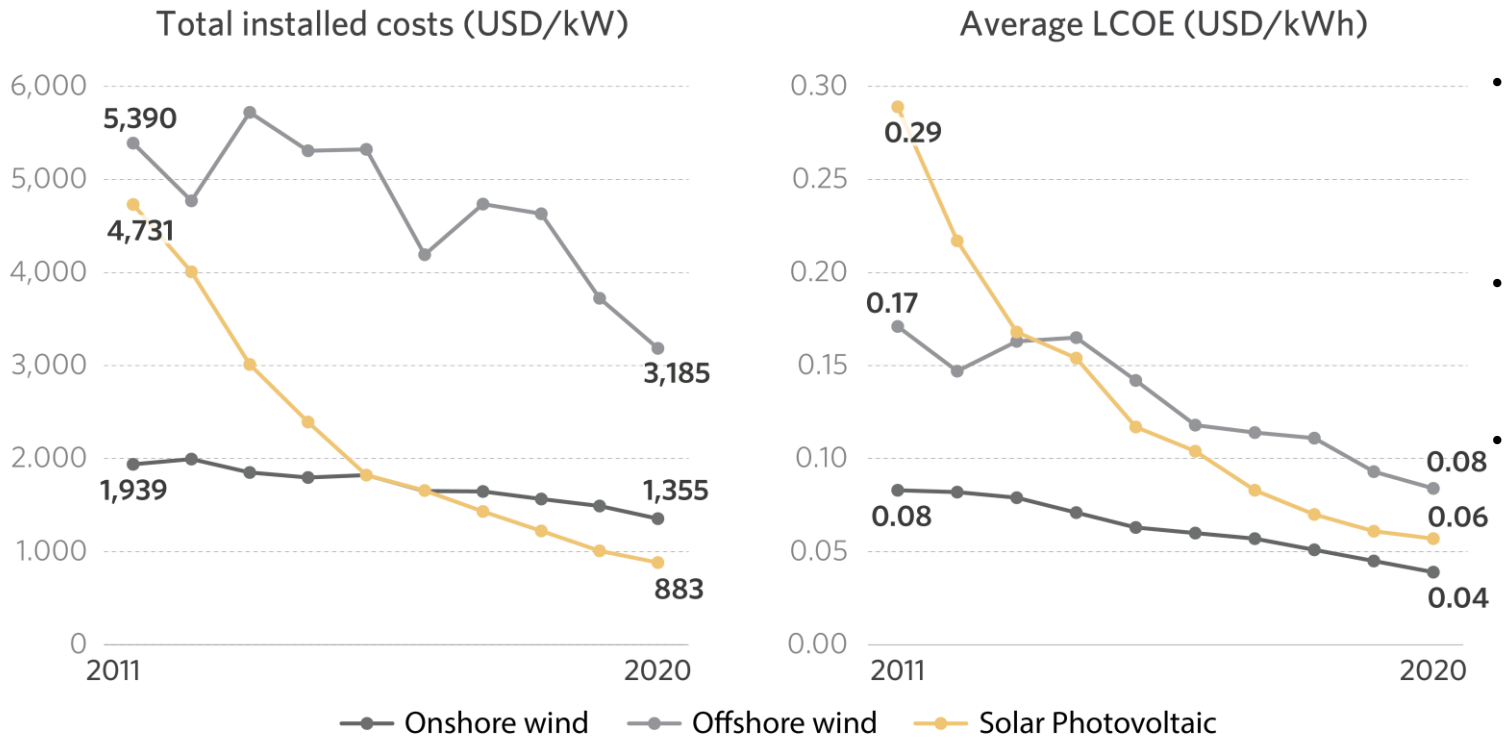


Cumulative 2011-2020 USD 2.4 trillion

- About 65% of National Development Bank funding went to renewable energy and energy efficiency at the beginning of the 2010s. While they continue to support domestic energy sector projects, the majority is going to transport sector in most recent years.
- Bilateral DFIs and Multilateral Climate Funds have more focus on cross-sectoral projects recently, instead of renewable energy.
- Governments have played a prominent role in the transport sector. In recent years they have been providing grants and subsidies to increase the market uptake of lower emission vehicles.
- Climate Funds channeled about USD 2.5 billion on average. They play important roles in catalyzing and coordinating resources for co-financing, including at national levels.
- 54% of total finance by public sector was provided through project-level debt and 31% was concessional finance in the form of grants and low cost debt.

Renewable energy and the role of public sector

Figure 5: Wind and solar installed costs and average LCOE

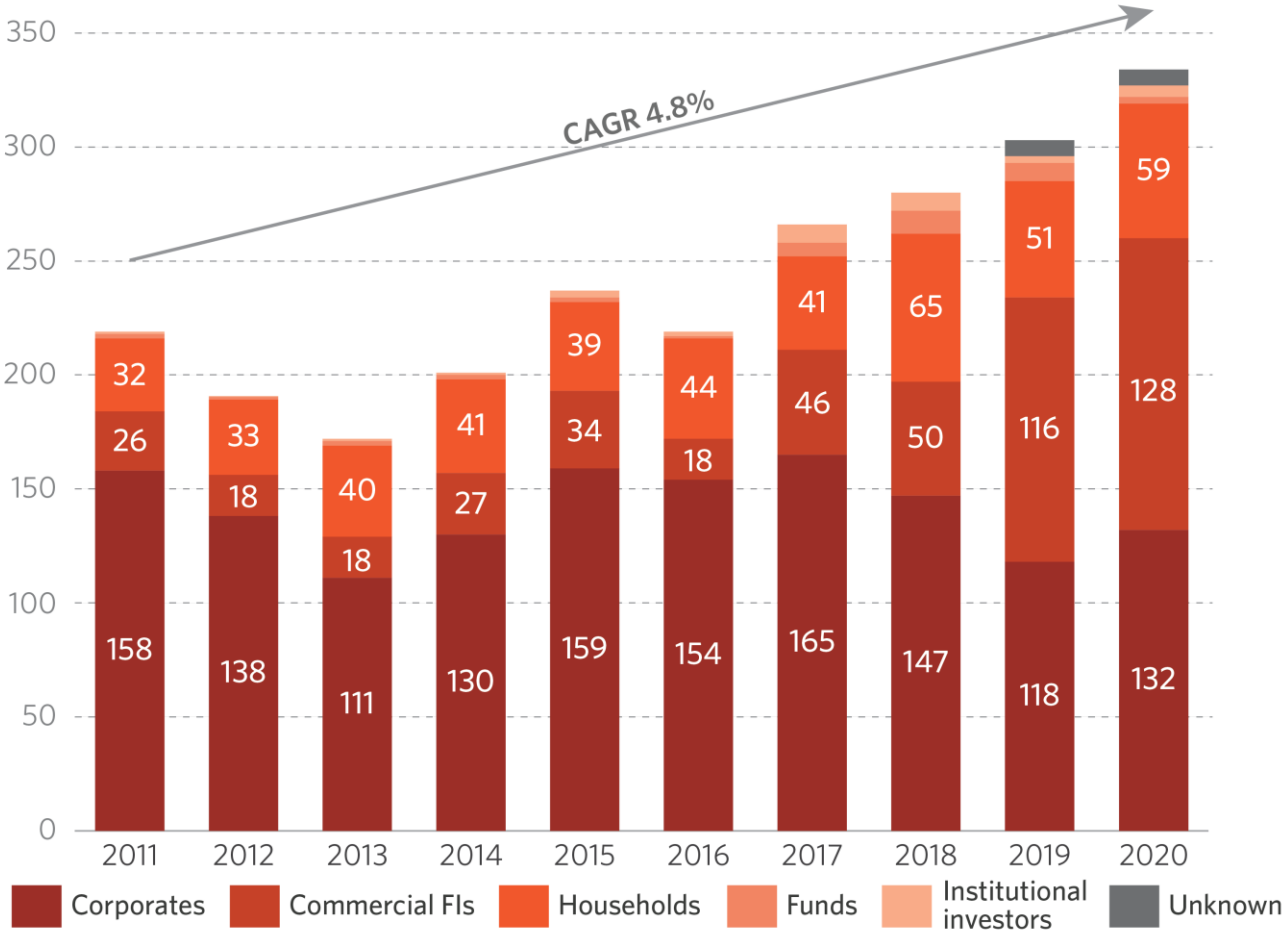


- Solar PV costs reduced by 80% in the past decade, while onshore and offshore wind costs dropped by almost 45%.
- This means more capacity was added towards the end of the decade per dollar invested (IRENA, 2022).
- The economics of decarbonizing the world economy would be fundamentally different if not for the rapid decline in the cost of renewable technologies. This was driven by bold policy decisions.

- Government initiatives in the last decade guaranteed the full electricity price to the investor, or a certificate that could be sold to provide another income source alongside the wholesale market electricity price.
- Stable and subsidized markets have helped the private sector embrace the industry and enable mobilization of finance by the private sector at attractive returns (IRENA, 2018).
- The success, mirrored by wind technology, speaks to crucial role government plays in market creation – driving demand and providing investment to encourage the development of climate solutions. Similar strategies must be applied to other sectors to reduce the cost of capital and achieve net zero across the economy.

96% of private finance is driven by corporates, commercial financial institutions, and households

Figure 6: Climate finance by private sector actors between 2011-2020 (USD bn)

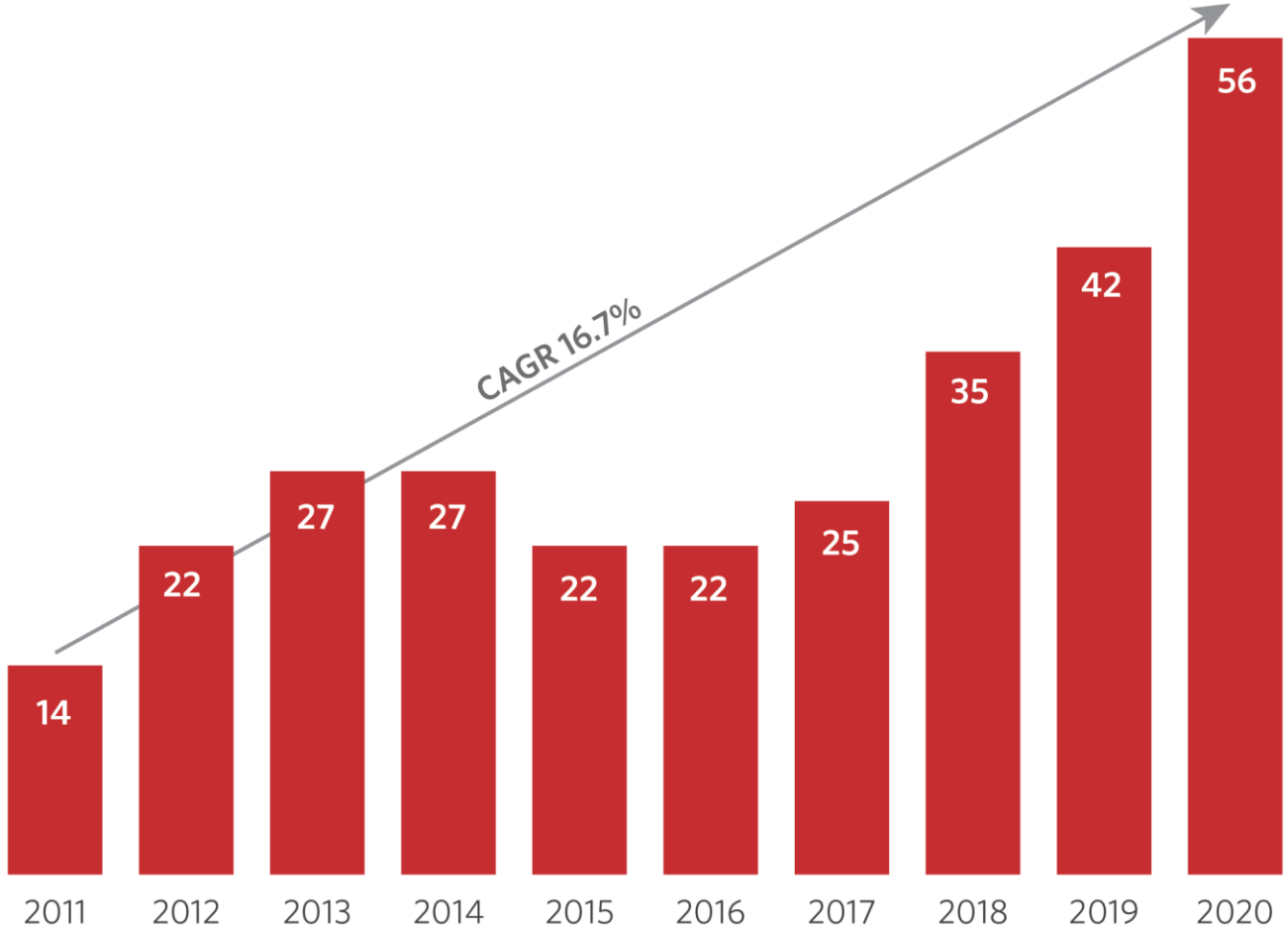


Cumulative 2011-2020 USD 2.4 trillion

- Corporates representing established energy utilities, independent power producers, and project developers specializing in renewable energy represented the largest single class of investors historically.
- Their composition is now gradually diversifying whereby non-energy related corporates and commercial financial institutions are joining the efforts to combat climate change.
- Households have been contributing to climate finance by purchasing low carbon equipment such as solar water heaters or low carbon vehicles.
- Direct investment by institutional investors was USD 3.2 billion annually. Institutional investors make indirect investments to corporates, financial institutions, or funds that then invest in climate action. These may appear as balance sheet investments by corporates or other private finance institutions which are not captured by this analysis.

3. Adaptation finance is increasing, but is starkly underfunded

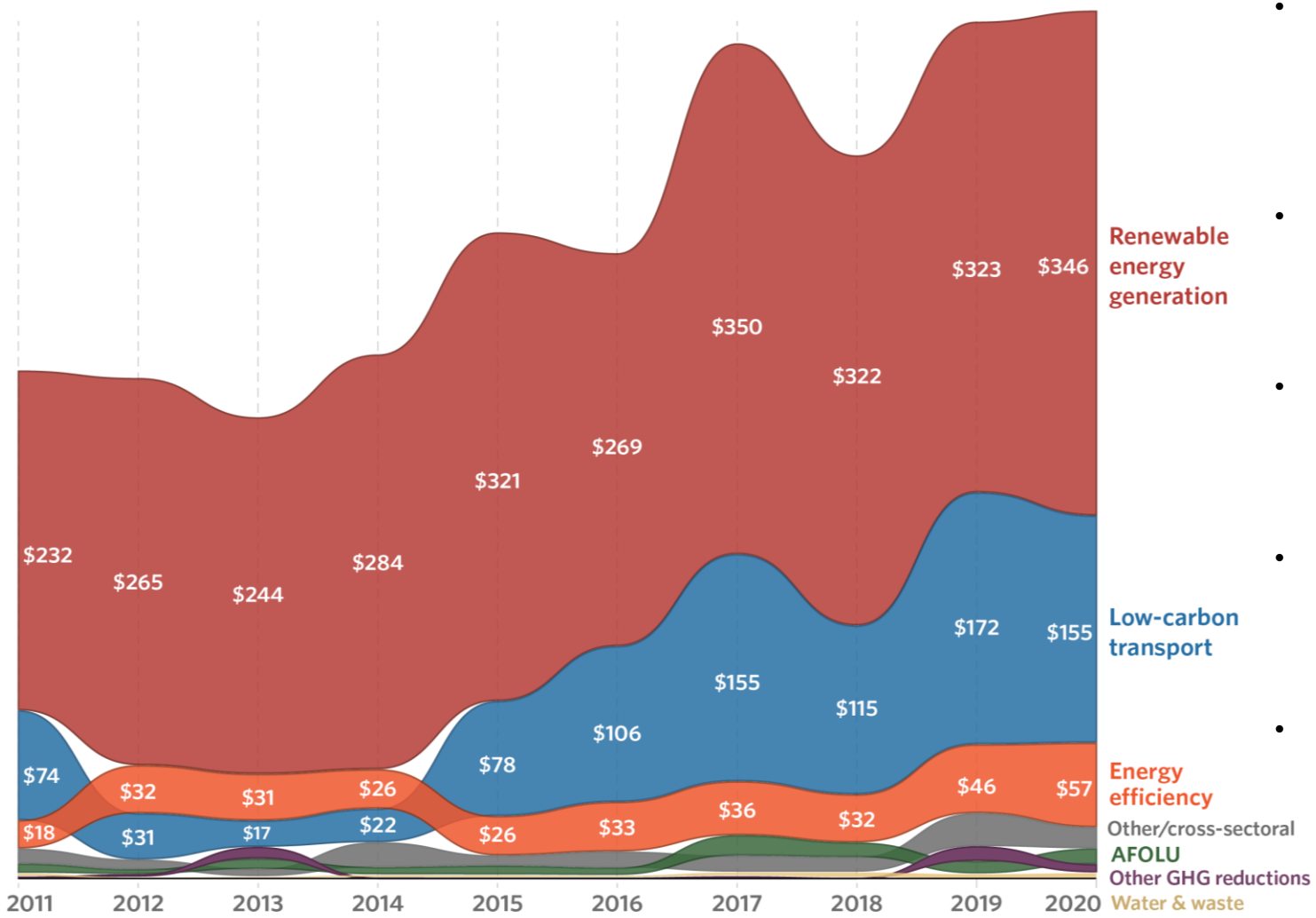
Figure 7: Adaptation finance between 2011-2020 (USD bn)



- Adaptation finance has been growing faster, with an overall 16.7% CAGR compared to a 6% CAGR in mitigation finance. However, it remains severely underfunded.
- Most adaptation finance was channelled via public actors such as multilateral and national development finance institutions.
- Top sectors included water and waste water management, AFOLU and other cross sectors.
- It should be noted that the concept of adaptation finance and the methodologies of its tracking are less developed than mitigation finance.
- Adaptation finance is usually tracked as an incremental investment over business as usual. Therefore, adaptation finance is less directly comparable to mitigation finance.
- There are significant data gaps on adaptation finance, particularly from the private sector.

Mitigation finance was dominated by renewable energy in the last 10 years, accounting for almost 70% of total

Figure 8: Climate mitigation finance by solutions between 2011-2020 (USD bn)



- Low carbon transport is now the fastest growing climate mitigation solution in the most recent five years. Transport attracts funding from a variety of actors due to investment size and commercial viability.
- Other solutions, such as energy efficiency, agriculture, and other industry-related investment lack progress due to various sectoral barriers (examples are in Annex 3).
- Less than 2% of climate finance tackles methane emissions, although it is responsible for half of net global warming to date (CPI, 2022a).
- The agriculture, forestry, other land use and fisheries (AFOLU) sector attracts considerably low levels of climate finance, although it is responsible for almost 20% of emissions.
- More importantly, there is a lack of climate investment data on these critical sectors from the private sector, making it hard to track progress against climate objectives.

CLIMATE POLICY INITIATIVE

End-use sectors and AFOLU show alarming signs of delayed climate action

Although needs figures should be compared to tracked investment with caution, due to coverage discrepancies of tracked climate finance and the finance needs scenarios, overall trends suggest end-use (Transport, Industry, Buildings) and AFOLU sectors suffer from dramatic climate underinvestment.

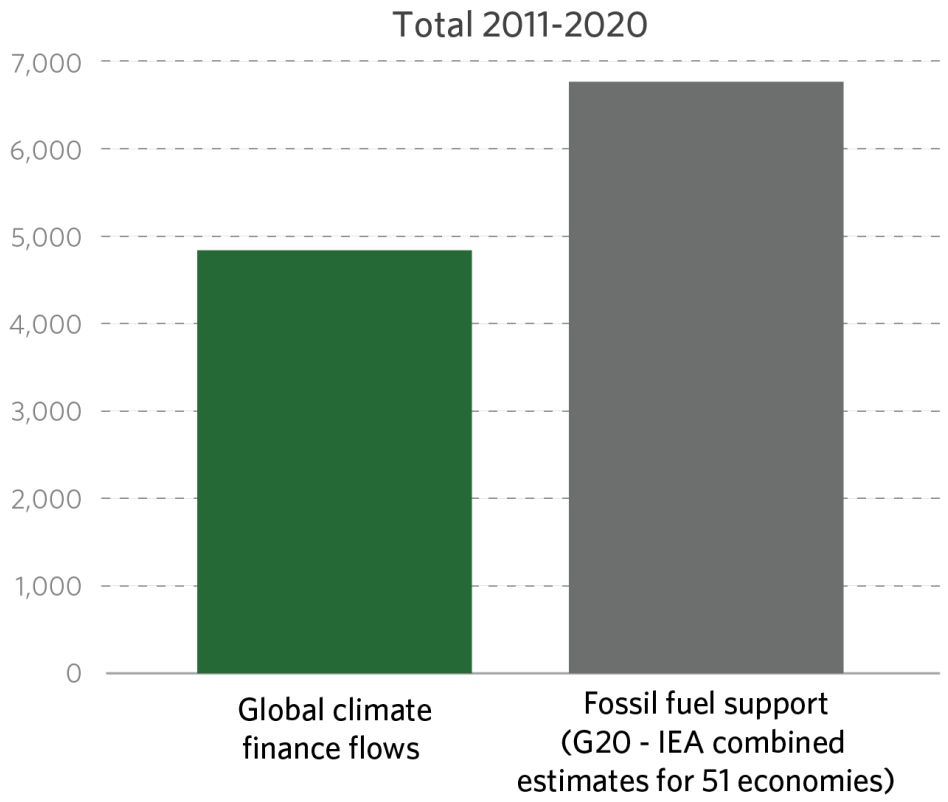
Table 1: Climate finance flows and needs by sector*

Segment	2019/2020 Investment ($bn/yr)	Implementation cost of Paris-aligned scenarios through 2050 ($bn/yr)			Progress against avg. scenario (%)
	Tracked	Lower bound	Average scenario	Upper bound	Tracked (%)
Climate Finance	**653**	**5,209**	**7,604**	**11,513**	9%
Mitigation & Dual Benefits	**603**	**5,034**	**7,350**	**11,181**	8%
Energy Systems	333	1,526	3,319	6,625	10%
inc. Renewable Energy	323	662	1,142	1,983	28%
Buildings & Infrastructure	51	480	800	1,119	6%
Industry, Waste & Water	10	280	369	458	3%
Transport	163	2,449	2,565	2,681	6%
AFOLU	10	298	298	298	3%
Adaptation	**49**	**175**	**254**	**332**	19%

Not all mitigation and multi-benefit climate finance can be allocated to the sectors shown in the table. The Mitigation & Multiple Objectives and Adaptation categories do not add up due to rounding. Data and knowledge on climate finance needs are evolving and their assessment will change with the course of actions taken by public and private actors and with more data becoming available. Adaptation finance needs may be underestimated as the latest available data is from 2016.* ***All references used can be found in Annex II.*

4. Continued fossil fuel support remains a barrier to achieving global climate goals

Figure 9: Fossil fuel subsidies vs climate finance (USD bn)



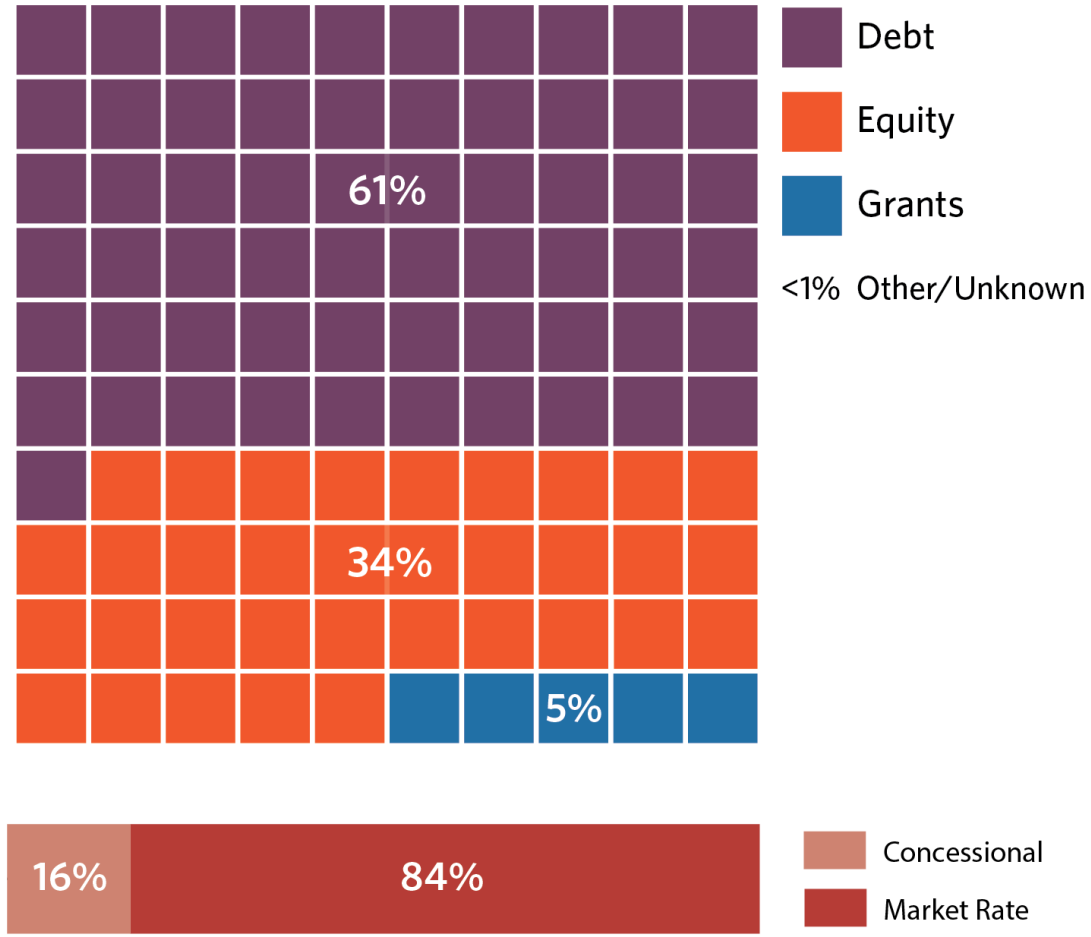
Source: Fossil fuel subsidies data by OECD Inventory of Support Measures for Fossil Fuels; global climate finance data is by CPI

- Fossil fuel subsidies only represent a partial picture of all financial flows supporting high emissions and business-as-usual finance flows.
- Even then, subsidies for 51 major economies[4] amounted to USD 6.8 trillion between 2011-2020, according to OECD and IEA (2022) – 40% more than climate finance.
- Global fossil fuel subsidies are projected to climb from USD 5.9 trillion (or 6,8% of global GDP in 2020) to 7.4% of global GDP in 2025 (IMF, 2022a), partly due to the current energy crisis.
- Although short term interventions are understandable (i.e. providing energy security for the most vulnerable), they delay the energy transition.
- Subsidies contribute to climate change by reducing the price of fossil fuels, thereby supporting greater production and consumption.
- The current energy crisis reinforces the need for a longer term just transition strategy to decouple dependence on fossil fuel based energy systems exposed to high price volatility.

[4] These include Australia, Brazil, Canada, the People's Republic of China, Germany, France, United Kingdom, Indonesia, India, Italy, Japan, Korea, Mexico, Russian Federation, Republic of Türkiye, United States, South Africa, Algeria, Angola, Argentina, Azerbaijan, Bahrain, Bangladesh, Bolivia, Brunei Darussalam, Colombia, Ecuador, Egypt, Gabon, Ghana, Iraq, Iran, Kazakhstan, Kuwait, Libya, Malaysia, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Chinese Taipei, Thailand, Trinidad And Tobago, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Venezuela, Viet Nam

5. Concessional funding represented about 16% of total tracked climate finance

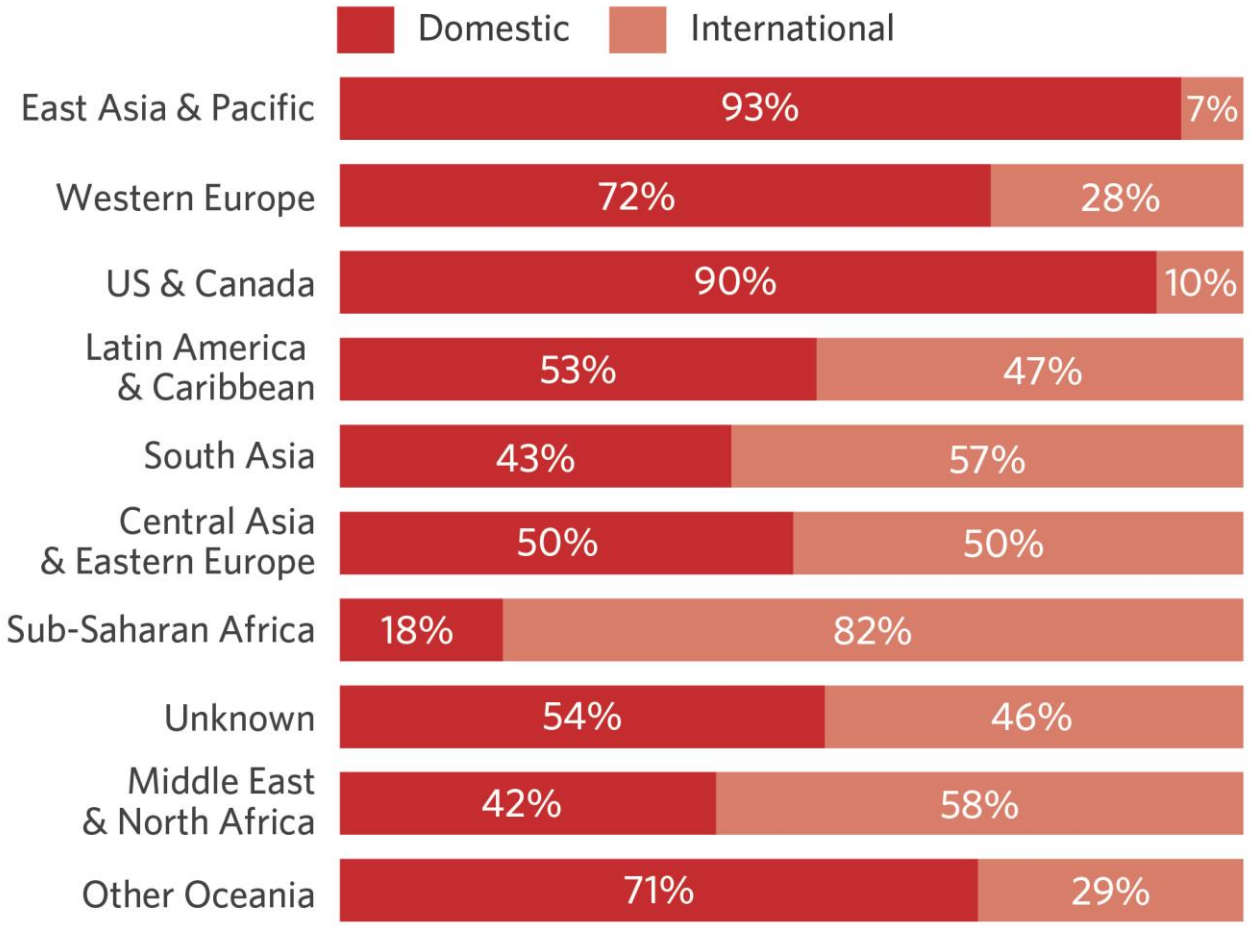
Figure 10: Climate finance by instrument (USD bn) between 2011-2020



- Concessional financing is crucial in managing risks and uncertainties related to nascent technologies and markets.
- Concessional funding was primarily led by National and Bilateral DFIs and governments provided in the forms of debt or grant. For example, Western Europe received 24% of the concessional funding through domestic finance in energy efficiency and transport sectors, whereas Latin America and Caribbean and Sub-Saharan Africa received 14% each of total concessional funding through international climate finance.
- Grant financing has been low but picking up gradually reaching almost USD 30 billion most recently. Most grant funding is sourced by governments for agriculture, cross-sectoral, and transport sector projects.
- According to Convergence (2021), the use of blended finance as a tool by investors remained limited despite its potential. Approximately USD 39.1 billion of blended finance from 2015-2020 was directed towards climate-focused opportunities.
- 80% of climate finance was provided in the form of debt or equity expecting market-rate returns on investment. These were mainly driven by corporates, National DFIs, and households investing in renewable energy and transport sectors in Western Europe, North America, and East Asia Pacific.

6. Most finance is concentrated in only a few regions

Figure 11: Climate finance regional distribution in 2011-2020 (%)



- 75% of all climate finance was concentrated in North America, Western Europe, and East Asia & Pacific (primarily led by China). Also, 76% of all climate finance flows were raised and spent domestically.
- Voluntary actions and domestic policies to reduce emissions in Western Europe, North America, and East Asia Pacific provided a significant push for the advancement of climate finance in those regions.
- For example, China set mandatory targets to reduce its national energy intensity. The identification of solar as a 'strategic industry' has led to immense government investment in manufacturing capability. China's own Feed-in Tarif policies have led to a 70x increase of installed solar capacity there since the beginning of the decade.
- Regions where the majority of low- and middle-income countries are located received less than 25% of climate finance flows.
- Across all regions, there is a lack of consistently collected data on domestic climate finance suggesting that countries do not systematically monitor climate expenditure against policy objectives.

CLIMATE POLICY INITIATIVE

Barriers to climate finance in emerging economies

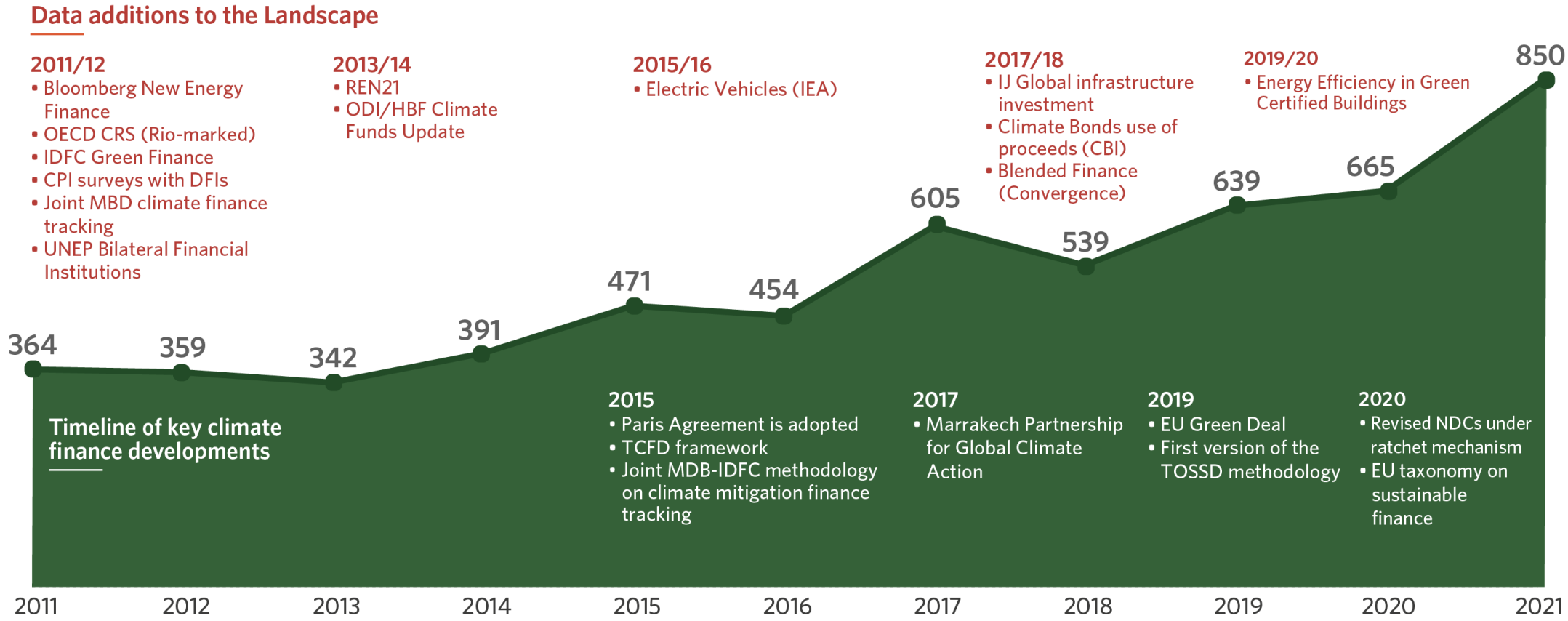
There is enough liquidity in global financial markets (USD 200 trillion held by investors in 2020), but barriers impeding deployment in many emerging markets persist.

- **The cost of capital is generally higher in emerging markets** compared to advanced economies. Additionally, the cost of capital for developing countries is increasing due to climate vulnerability (United Nations Environment Programme, 2018).
- **High up-front costs associated with mitigation and adaptation projects can act as a significant deterrent for private investment.** Up-front capital investment and long time horizons for large infrastructure projects contribute to this (IMF, 2022b).
- **Climate solution projects suffer from regulation uncertainty.** Cost overruns, delays, and permit risk limit the supply of high-quality climate solution projects.
- **DFI risk mitigation tools are being deployed at too small a scale**. Mobilized private finance has been increasing, averaging USD 48.6 billion over 2018-2020 (TOSSD, 2022). However, to meet needs, the public investment and/or the ratio of public to private investment, must further increase.
- **Lack of price signalling**, in the form of effective carbon markets (among others) reduces incentives for investors to provide capital to climate solutions.
- **Scarce public funding is being directed at subsidizing the fossil fuel industry in many emerging economies**. In Africa, annual climate finance over 2019/20 stood at USD 9.4 billion, while government subsidies for fossil fuels was USD 37 billion (CPI, 2022b).
- **Lack of local currency instruments** poses risks to foreign currency denominated investment. The current underdevelopment of domestic financial ecosystems and their ability to raise capital means that this risk is not easily mitigated.
- **Institutional reform takes time. Many of the underlying risks investors face in developing economies are structural.** Risks and uncertainty surrounding exchange rate fluctuation, regulatory environments, demand volatility, and others require long term solutions (IMF, 2022b)

7. Climate finance flows data are improving, but standardized information on its outcome and impact remain scarce

- Landscape analysis has evolved over the years with methodological advancements by reporting institutions and data additions. Nonetheless, climate finance trends were driven by increases in flows rather than increases in data additions. These helped improve a more granular understanding of global climate finance flows.
- Data gaps persist (Annex 3) and more efforts are now required to standardize understanding of climate finance impact and its outcome to climate goals.

Figure 12: Global Landscape of Climate Finance data and methodology improvements



4 key climate finance actions for this decade

2022 - onwards

Conclusion

In the last ten years, the world has learned valuable lessons and developed crucial capacity to move faster towards Paris alignment and net zero goals. Building on this effort, public and private actors must work closer together to drive technology costs down, lower the cost of capital, scale up investment at pace while redirecting flows away from high-carbon investments. Climate transition presents tremendous investment opportunities across a range of sectors and regions.

However, the current rate of increase of climate investment will fail to secure the low carbon and climate resilient development needed. Only through rapid acceleration—to reach seven times the current level of investment— and alignment of all finance flows with climate goals will we bridge the significant funding shortfalls. The funding landscape needs to go beyond incremental investment through traditional funding instruments, such as project-level debt, and increasingly embrace innovative financial instruments that unlock capital at scale.

Mobilization of private finance is crucial to achieving net zero goals. Historically, the public sector has facilitated this by funding initial research and development into unproven technologies and creating policy environments that encourage private investment and domestic public finance to scale up markets.

To minimize disruptions related to the much-needed transition, there is a need for a holistic systems view and an organized climate space, which breaks silos, brings in stakeholders who are not yet actively involved. These efforts should translate challenges and opportunities into implementable programs at sectoral, subnational, and national levels to mobilize international and domestic finance.

This final section proposes four key actions that, based on a decade of experience, will mobilize climate finance at scale to create a significant impact over this decade.

CLIMATE POLICY INITIATIVE

Four key actions to scale up climate finance this decade

Climate transition presents tremendous investment opportunities across a range of sectors and regions. However, the current rate of climate investment increase will fail to secure the low carbon and climate resilient development needed. To match the 20% year-on-year increase in climate finance needed through 2030, four key actions to focus on in this decade are:

1: Adopt holistic sectoral strategies. Current blind spots in our response to climate change must be acknowledged and addressed. This means building sector-wide decarbonization and resilience strategies that spur systemic transformations - from cradle-to-grave – and ensure implemented solutions are well integrated. It also means leaving no sector behind. From a climate perspective, AFOLU, buildings, and the industry sectors are particularly underfunded, despite the crucial role they play in our resilience to external shocks, our health and that of the biosphere, and in allowing a just transition.

2: Shift to a new finance paradigm. To implement holistic sector strategies, further public and private actor coordination is necessary. Every actor should know which part they can play and who they should be working with. But that alone will not be enough. Investors also need to look beyond short-term financial returns, use longer-term and multi-factor informed investment strategies, and explore innovative financial mechanisms that could be deployed at scale. And public financial institutions need clear mandates to mobilize further public and private finance.

3: Policies to create enabling environments for private finance mobilization. The successes achieved in the energy sector must be mirrored in other sectors and in emerging economies through a coordinated set of actions and policy decisions around reducing technology costs, providing incentives and risk sharing to promote innovation in hard-to-abate sectors and to scale proven technologies, redirecting fossil fuel support, and creating predictable environments that accelerate net zero transition.

4: Make decision-critical data on climate finance flows available: The public and private sectors should collaborate on a common definition of climate expenditure. This will help improve disclosure and build a climate investment data platform to channel climate finance to where it will have the most impact. Each actor has a role to play. Data on the quality of finance flows should improve through the development and consolidation of common methods and standards to understand the expected impact and its outcome level. In addition to regulators, initiatives such as GFANZ and TCFD, could support through detailed guidance on reporting investment in climate solutions, and a similar initiative should help foster action and knowledge sharing across the public sector.

CLIMATE POLICY INITIATIVE

Key Action 1: Adopt holistic sectoral strategies

With climate finance concentrated in just a handful of technologies, clear gaps appear within sectors. This demonstrates a disconnect between our current scattered response and the real-world necessities that we face.

Current blind spots in our response to climate change must be acknowledged and addressed:

- **Build sector-wide decarbonization and resilience strategies.** Narrow approaches to climate action reduce the effectiveness of implemented solutions. This calls for:
  - **Cradle-to-grave assessments**: Policy and investment should span the entire value chain to avoid loopholes that hinder both mitigation potential, adoption, and resilience, e.g., embodied carbon in new building construction.
  - **Integrated solutions**: Deployment of solutions should incorporate local needs and complementary, functioning systems in order to deliver the intended impact, e.g., EVs and public charging infrastructure; renewable energy and grid integration solutions (e.g., storage); to fully displace the use of fossil fuels.
- **Leave no sector behind: AFOLU, buildings, and industry need to be taken just as seriously.** These three pillars to local economies are severely underfunded in comparison to transportation and energy. Beyond their mitigation potential, solutions in these sectors contribute to:
  - **Building resilience to external shocks**: Local food systems become less vulnerable to droughts and floods; low-energy buildings significantly reduce energy demand; households become less impacted by energy prices, energy-efficient and locally-robust industries minimize supply chain disruptions.
  - **Delivering impact across the board**: from improved biodiversity (e.g., agroforestry), to job creation (e.g., building refurbishments, emerging industries), and health benefits (e.g., clean cooking, food security and quality).
  - **Enabling a just transition:** Holistic strategies include planning for job loss, revenue redistribution, and other just transition needs and impacts that may create implementation and adoption barriers if not proactively addressed across all sectors. A people-centered approach is needed.

CLIMATE POLICY INITIATIVE

Key Action 2: Shift to a new finance paradigm

To implement holistic sector strategies and reach the 20% year-on-year increase needed in climate finance through 2030, further public and private actor coordination is necessary. This includes innovative ways of doing finance.

- **To achieve scale, all actors should know which part they can play and who they should be working with**:
  - Through collaboration across value chains and across the public and private ecosystems, funders and investors should seek to build coherent and complementary portfolios of climate solutions that create credible transition pathways to functioning, low-carbon, and climate resilient systems.
  - In segments with significant technology, adoption and/or scale barriers, such as energy storage or industries with significant process emissions (e.g., cement, steel), concessional finance and other risk balancing mechanisms can spur innovation and cover high upfront costs.
  - All actors should be engaged proactively in the phase out of fossil fuels and other high emission assets to reach overall alignment of portfolios and policies, and urge peers, suppliers, and intermediaries to strive for the same goal.
- **Investors need to look beyond short-term financial returns.** Scaling climate finance will require renewed investment practices from both public and private actors. This includes:
  - Adopt longer-term and multi-factor informed investment strategies that incorporate the broader economic cost of continuing business-as-usual as well as the economic value of transforming systems towards decarbonization and climate resilience, e.g, finance effectiveness assessments, environmental valuation (biodiversity, ecosystem services, carbon and methane pricing).
  - Develop large-scale financial innovation mechanisms and platforms led by public and private sectors, such as the Global Innovation Lab for Climate Finance[5], that enable the replication of successful business models to unlock private investment.

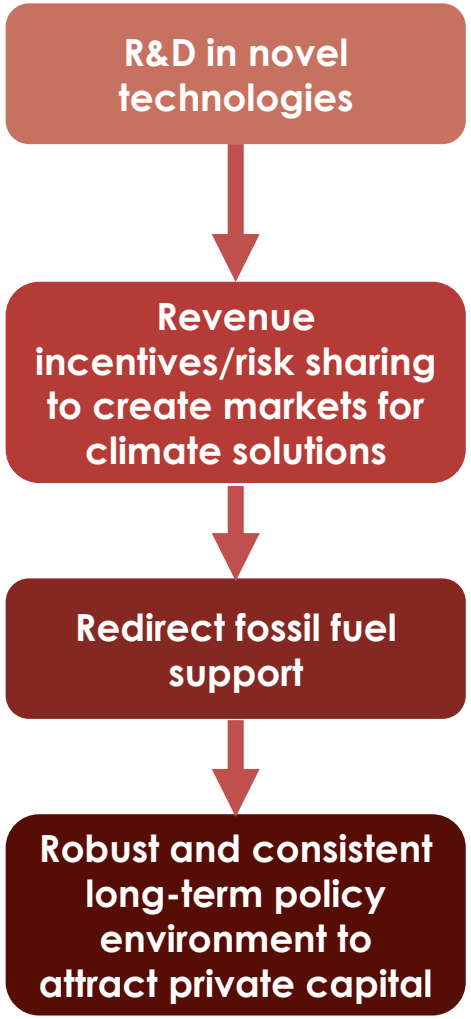
[5] https://www.climatefinancelab.org

CLIMATE POLICY INITIATIVE

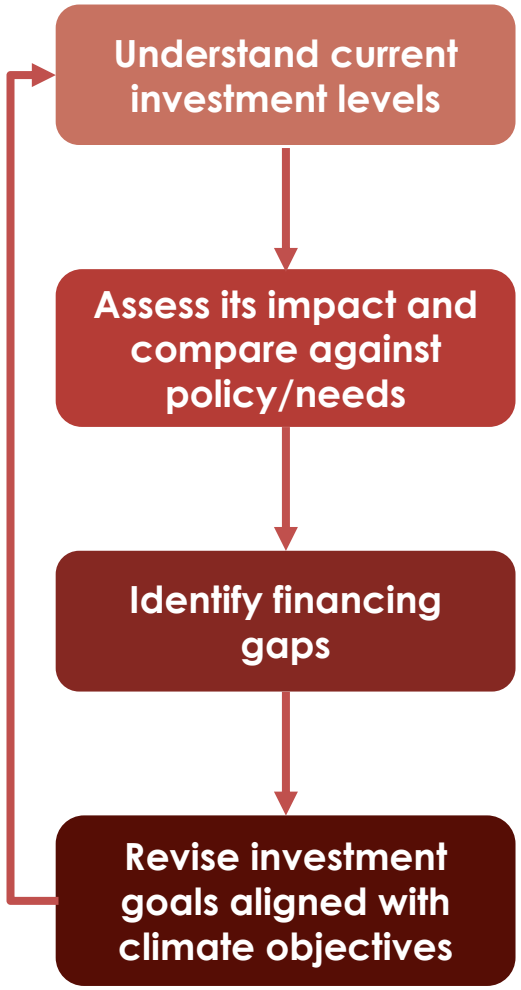
Key Action 3: Expand enabling environments through policies that mobilize private finance

The success achieved in the energy sector must be mirrored in other sectors and in emerging economies through a coordinated set of actions and policy decisions such as:

- **Grant funding in novel technologies** with a particular focus on reducing technology costs and innovating in hard-to-abate sectors such as aviation, steel, and cement.
- **Provide abundant, well-timed subsidies and public investment to proven technologies that need scaling.** This approach has helped novel technologies to become commercially viable and attractive to private capital (e.g., offshore wind, solar PV, batteries).
- **Reduce cost of finance through risk distribution**. Countries and development finance institutions with lower borrowing costs could underwrite some of the transition costs, particularly where higher risks make private capital unable or unwilling to invest, e.g., emerging markets and nascent technologies. Such risk sharing and management could come in the forms of guarantees, blended finance arrangements, and innovative financial mechanisms such as carbon markets.
- **For low and middle-income countries, general capacity building is essential.** While climate solutions can face specific issues, many underlying barriers to investment are present across development finance. Technical assistance and capacity building in these countries is key to providing a steady pipeline of climate projects suitable for investment.
- **Redirect Fossil Fuel support**. Long-term dependencies and investment on fossil fuel, such as subsidies or issuance of new licenses for exploration, should be redirected to low-emission alternatives to accelerate the transition to net zero. These long-term dependencies impede the development of low-emission technologies and lock in fossil fuel extraction and use for decades.
- **Create regulatory targets and a predictable environment that accelerate the net zero transition.** Legally binding national emission reduction targets, sectoral policies, and phasing out of high emission technologies (such ICE vehicles and gas fired heating systems) provide clear signals and a stable environment to the private sector that encourages investment in low-emission alternatives.



Key Action 4: Make decision-critical data on climate finance flows available



The public and private sectors should collaborate on a common definition of climate investment, including also considerations on the impact and quality. This will help improve consistent and comparable disclosure and build a climate investment data platform for investors to channel climate finance to where it will have the most impact. By building on existing and emerging best practices and taxonomies, each actor has a role to play:

International public climate finance providers (including development finance institutions, multilateral climate funds and governments)**:** Data on the quality of finance flows including impact and outcome level should improve through the development and consolidation of common methods and standards. These actors should encourage reporting of climate investment by their intermediaries and contribute to the development of common approaches, standards, or norms to enhance coherence of action.

Public domestic actors (including governments, ministries and subnational governments)**:** Regularly monitor climate expenditure to compare against country-specific climate objectives. By harnessing already existing green budgeting tools, such as climate public expenditure and institutional review, national climate finance tracking and emerging best practices in climate taxonomies, public domestic actors can and should track country level data. This vital information will help build a baseline of climate finance and identify key sectors and sub-regions that need the most funding and coordinate with private sector and international public climate finance providers to increase efficiency of flows.

Private sector: Whether through mandates, incentives, or guidance by regulatory bodies, or through voluntary initiatives, detailed climate investment reporting will increasingly become industry standard for the private sector. Private actors should invest in building capacity to report on climate expenditure. In addition to regulators, initiatives such as GFANZ and TCFD, for example, could support through detailed guidance on reporting investment in climate solutions.

Annexes

Annex 1: Updated view on Global Climate Finance Flows in 2019/20

- Total climate finance flows were USD 653 billion annual average for 2019/2020
- The numbers were updated following Rio marked climate related development finance data released by OECD DAC in June 2022.
- The CPI database was also updated through adding data points on energy efficiency in buildings by reviewing buildings level data per green building certificates
- Key impacts were as follows:
  - Public climate finance up from USD 321 billion to USD 335 billion
  - Private climate finance up from USD 310 billion to USD 318 billion
  - Adaptation climate finance up from USD 46 to USD 49 billion
  - Mitigation climate finance up from USD 571 to USD 586
  - Cross sectoral climate finance up from USD 15 to USD 17

CLIMATE POLICY INITIATIVE

Updated data tables for Global Climate Finance Flows in 2019/20

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

Actor	2019	20202019/2020 Average	
Private	303	333	318
Commercial FI	116	128	122
Corporation	118	132	125
Funds	8	3	5
Households/Individuals	51	59	55
Institutional Investors	3	5	4
Unknown	7	7	7.0
Public	337	332	334
Bilateral DFI	23	25	24
Export Credit Agency (ECA)	1	1	1
Government	35	30	32
Multilateral Climate Funds	4	4	4
Multilateral DFI	62	75	68
National DFI	160	130	145
Public Fund	2	2	2
SOE	12	13	13
State-owned FI	38	52	45
Total	640	665	653

CLIMATE POLICY INITIATIVE

Table A.2: Breakdown of global climate finance by use and sector (USD billion)

Sector	2019	20202019/2020 Average	
Mitigation	582	589	586
Agriculture, Forestry, Other land uses and Fisheries	7	9	8
Buildings & Infrastructure	33	57	45
Energy Systems	316	345	330
Industry	2	5	3
Information and Communications Technology	0	0	0
Others & Cross-sectoral	60	15	37
Transport	163	153	158
Unknown	0	1	1
Waste	1	2	2
Water & Wastewater	1	1	1
Adaptation	42	56	49
Agriculture, Forestry, Other land uses and Fisheries	4	6	5
Buildings & Infrastructure	1	1	1
Energy Systems	1	1	1
Industry	0	0	0
Information and Communications Technology	0	0	0
Others & Cross-sectoral	20	21	21
Transport	2	7	4
Unknown	0	0	0
Waste	0	0	0
Water & Wastewater	14	20	17
Multiple Objectives	16	19	18
Agriculture, Forestry, Other land uses and Fisheries	2	2	2
Buildings & Infrastructure	0	0	0
Energy Systems	2	1	2
Industry	0	0	0
Information and Communications Technology	0	0	0
Others & Cross-sectoral	9	7	8
Transport	1	1	1
Unknown	0	6	3
Waste	0	0	0
Water & Wastewater	1	3	2
Total	640	665	653

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

Instrument	2019	2020	2019/2020 Average
Balance sheet financing (debt portion)	104	119	112
Balance sheet financing (equity portion)	142	170	156
Grant	31	29	30
Low-cost project debt	55	66	61
Project-level equity	56	46	51
Project-level market rate debt	246	225	236
Unknown	6	10	8
Total	640	665	653

Table A.4: Breakdown of global climate finance by public and private recipients (USD billion)

Recipient	2019	2020	2019/2020 Average
Private	327	371	349
Public	101	125	113
Public-Private	24	25	24
Unknown	188	144	166
Total	640	665	653

Table A.5: Breakdown of climate finance by OECD membership and region (USD billion)

Region	2019	20202019/2020 Average	
non-OECD	386	392	389
Central Asia and Eastern Europe	26	14	20
East Asia and Pacific	263	274	268
Latin America & Caribbean	22	22	22
Middle East and North Africa	15	15	15
South Asia	0	33	0
Sub-Saharan Africa	21	22	22
Transregional	9	12	10
OECD	244	266	255
Central Asia and Eastern Europe	8	12	10
East Asia and Pacific	13	10	11
Latin America & Caribbean	12	11	12
Middle East and North Africa	1	2	1
Other Oceania	0	8	4
US & Canada	90	74	82
Western Europe	110	150	130
Transregional	10	7	8
East Asia and Pacific	3	1	2
Latin America & Caribbean	4	0	2
Transregional	4	5	5
Total	640	665	653

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

Region	2019	20202019/2020 Average	
Domestic	495	494	494
non-OECD	297	282	290
Transregional	0	0	0
OECD	197	211	204
International	146	171	158
From Non-OECD to OECD	3	4	4
From Non-OECD to Transregional	3	3	3
From Non-OECD to Other Non-OECD	16	28	22
From OECD to Other OECD	44	51	47
From OECD to Transregional	7	4	5
From OECD to non-OECD	72	81	76
From Transregional to OECD	0	0	0
From Transregional to non-OECD	1	0	1
Total	640	665	653

Annex 2: Climate Finance Needs assessment

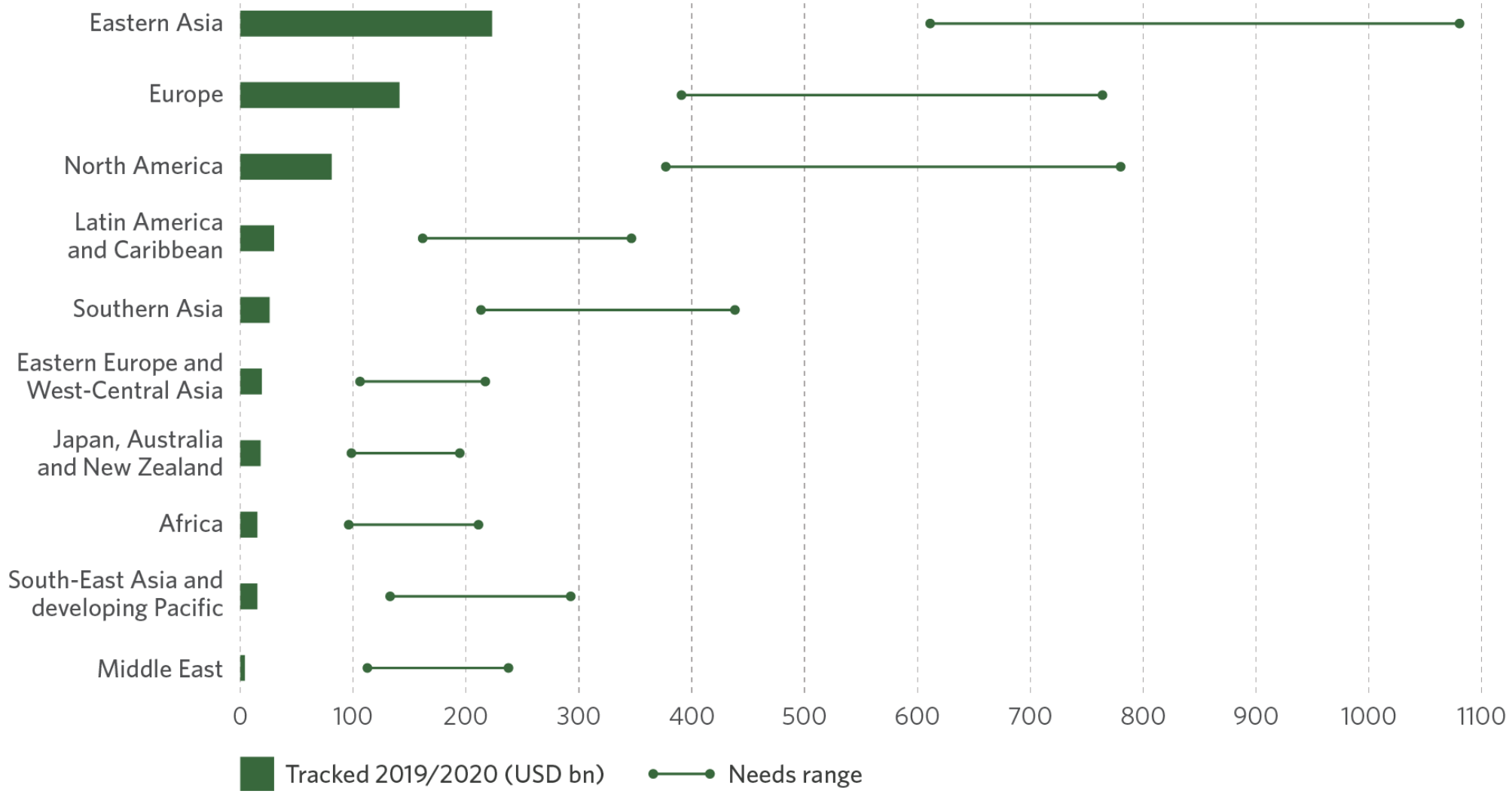
The studies on climate finance needs are relatively new and are continuously evolving. CPI built its assessment on climate finance flows based on the best publicly available resources that are comparable to the current climate finance flows tracked under the Global Landscape of Climate Finance. As more literature and knowledge build up and depending on the course of economic development (e.g. high inflation environment) and climate investment decisions made in the future, our climate needs assessment may change. The literature used to build the climate finance needs assessment in this study are as follows:

Table A.7: Literature review on climate finance needs assessment

Reference	Scope/coverage
Bloomberg New Energy Finance (BNEF), 2021. New Energy Outlook 2021.	Renewable power, Power T&D, CCUS, Integration solutions (Hydrogen, Pumped Hydro, Storage).
Bloomberg New Energy Finance (BNEF), 2022. Electric Vehicle Outlook 2022.	Battery electric vehicles.
International Energy Agency (IEA), 2020. Global EV Outlook 2020.	Battery electric vehicles.
International Energy Agency (IEA), 2019. The Future of Rail.	Rail transport.
International Energy Agency (IEA), 2021. Net Zero by 2050 A Roadmap for the Global Energy Sector.	Renewable power, Power T&D, Biofuels, CCUS, Integration solutions, Transport, Industry, Buildings, Distributed Renewables.
International Energy Agency (IEA), 2020. Outlook for biogas and biomethane.	Biofuels.
International Renewable Energy Agency (IRENA), 2021. World Energy Transition Outlook. Abu Dhabi.	Renewable power, Power T&D, Biofuels, CCUS, Integration solutions, Transport, Industry, Buildings, Distributed Renewables.
United Nations Environment Programme (UNEP), World Economic Forum (WEF), and The Economics of Land Degradation (ELD), 2021. State of Finance for Nature.	Re/Afforestation, Sylvopasture, Mangrove and Peatland restoration.
United Nations Environment Programme (UNEP), 2018. "The Adaptation Gap Report 2018." Nairobi.	Adaptation.
Harmsen, J. H. M., D. P. van Vuuren, D. R. Nayak, A. F. Hof, L. Höglund-Isaksson, P. L. Lucas, J. B. Nielsen, P. Smith, and E. Stehfest. 2019. Long-term marginal abatement cost curves of non-CO2 greenhouse gases	Methane abatement.
Kreibiehl, Silvie; König, Michael; Moon, Jongwoo (2022): Data for Figure TS.25 - Technical Summary of the Working Group III Contribution to the IPCC Sixth Assessment Report. MetadataWorks, 04 April 2022. DOI: 10.48490/dw6j-ef56	Regional split of climate investment needs

Annual investment needs through 2030 to decarbonize economies

Figure A1: Global Landscape of Climate Finance 2019/2020



Regional needs figures adapted from: Kreibiehl, Silvie; König, Michael; Moon, Jongwoo (2022): Data for Figure TS.25 - Technical Summary of the Working Group III Contribution to the IPCC Sixth Assessment Report. MetadataWorks, 04 April 2022. DOI: 10.48490/dw6j-ef56

Annex 3 – Methodological notes and additional information

Historical data

Data between 2011-2020 were based on previously published CPI reports from the Global Landscape of Climate Finance series. Data collection methodologies incrementally changed over the years. For this analysis, CPI backtracked the methodological changes based on the available data.

Climate Resilient Infrastructure Data

CPI undertook a study in 2022 (to be published in late 2022) to propose a new approach for tracking climate resilient infrastructure investments which looks at the full cost of the project rather than the incremental investment in resilience. This view enables an understanding of the share of investment in infrastructure that takes into account climate resilience in an attempt to bridge the knowledge gap on public and private sector investment in climate resilient infrastructure. The full cost data is slightly more accessible when attempting to fill in the private finance data gaps in climate resilience. Based on this analysis, CPI estimated that investment to improve the resilience of infrastructure remains low at only USD 31.3 billion annual average in 2019/2020. This includes USD 18 billion in CPI's tracked climate finance of which 64% were adaptation finance, 16% mitigation and 20% dual benefits finance. In addition, it includes USD 5 billion of newly tracked investments that undertook full or partial adaptation solutions. Water and wastewater sector received the largest share (42%, USD 13.1 billion) followed by agriculture, forestry and other land use (20%, USD 6.4 billion), transport (9%, USD 2.9 billion), energy systems (3%, USD 867 billion) while other cross-sectoral projects received 26% (USD 8 billion).

The approach used a broad definition of critical infrastructure to select 4 sectors namely water and wastewater, agriculture, forestry and other land use, transport and energy. A taxonomy of keywords was used to sift through previously tracked climate finance by CPI as well as other data sources including Global Water Intelligence and World Bank PPI to identify climate resilient infrastructure projects that undertook full or partial adaptation solutions. The keywords followed a broad typology of climate resilient infrastructure to tag projects as grey, green or blue infrastructure, building resilience of or through projects and doing hard or soft interventions. To calculate full cost of the project by multilateral development banks which report incremental adaptation investment, a resilience multiplier was used to calculate the full cost of the project. The resilience multiplier refers to the share of adaptation finance in the total project commitment made by multilateral development banks as reported in the activity level OECD-DAC database on climate-related development finance.

CLIMATE POLICY INITIATIVE

Common barriers in scaling climate finance in key sectors

Table A8: Examples of barriers in scaling climate finance in key sectors

Sector	Technical barriers	Commercial barriers	Other governance barriers
AFOLU	Informational barriers on climate solutions High technology costs in certain solutions	Limited access to insurance and guarantee schemes to cover default risk High transaction costs due small-scale and dispersed customers	Small scale agriculture: limited formal property rights limiting the ability of farmers to provide collateral to access finance
Adaptation & resilient infrastructure	Information asymmetries and knowledge gaps: lack of information on private sector investment Lack of climate data: limited information on location specific climate risk and vulnerability.	Insufficient capacity in financial structuring and metrics development Potential large upfront cost set against long payback times	Limited progress in investment ready national adaptation plans Inability to recognise environmental and social benefits of adaptation
Buildings	**New low-carbon buildings:** limited supply of technical skills and low-carbon construction materials. **Deep retrofits:** Lack of baseline performance data;	**New low-carbon buildings**: High investment costs compared to alternatives; Limited supply of dedicated financing instruments **Deep retrofits:** Lack of awareness of funding options; inability to pay for upfront costs; Split incentive between landlords and tenants	**New low-carbon buildings and deep retrofits**: lack of building regulation support; Lack of information standards and labelling
Energy	**Renewable power**: Difficult integration of variable renewable energy (VRE) in power grids due to lack of storage, transmission, and demand-side management capacity. **Biofuels & Biomethane**: Energy crops can compete with other agricultural land uses: food crops, livestock, textiles, etc.	Competition from the fossil fuel industry as they remain dominant players in the energy sector. Subsidies provided to conventional energy is much higher than that of renewable energy	**Biofuels & Biomethane:** Lack of regulation support on energy crops.
Industry	Process emissions from the manufacturing of key materials are hard to abate (cement, steel, iron, aluminum, etc.)	Lack of green solutions (e.g. green hydrogen) at the industrial scale	Strong regulatory framework face risk of relocation of production and carbon loopholes
Transport	**Electrification of road transport -** *Passenger*: The current availability of public charging infrastructure can slow deployment of Battery Electric Vehicles. *Freight*: long-distance heavy-road transport faces battery duration limitations. **Modal switch to rail transport –** *Passenger*: Suited to high activity areas. *Freight:* Suited to high freight volumes only need of multi-modal logistics to transport goods from terminals to final destination.	**Modal switch to rail transport -** *Passenger*: Urban rail infrastructure has expensive capital costs.	**Modal switch to rail transport –** *Passenger & Freight*: Cross-jurisdiction projects require central/national planning.

Data gaps in climate finance prevent global understanding on progress

Figure A3: Data gaps in Global Landscape of Climate Finance

- Understanding of climate finance flows is improving, but there are persistent data gaps. Without this data, it is difficult to measure progress against baseline and identify opportunities for scaling up finance in a more targeted manner.
- Public international climate finance has been advancing on its climate finance reporting methodologies which enabled providers to understand and prioritize their portfolio of climate investment. However, the same level of sophistication and consistency in reporting is lacking from the private sector as well as in public domestic budgets.
- Further effort is now required to understand the impact and outcome level of climate finance, define, report and track adaptation finance globally, bring private sector and domestic public actors to disclose direct investment in climate mitigation and adaptation

Annex 5 - References

Bloomberg New Energy Finance (BNEF), 2021. New Energy Outlook 2021. Available at: https://about.bnef.com/new-energy-outlook/

Bloomberg New Energy Finance (BNEF), 2022. Electric Vehicle Outlook 2022. Available at: https://about.bnef.com/electric-vehicle-outlook/

Climate Policy Initiative (CPI). 2021. Tracking Incremental Energy Efficiency Investments in Certified Green Buildings.

CPI, 2022a. The Landscape of Methane Abatement Finance, Climate Policy Initiative. Available at: https://www.climatepolicyinitiative.org/publication/the-landscape-of-methane-abatement-finance/

CPI, 2022b. The Landscape of Climate Finance in Africa, Climate Policy Initiative. Available at: https://www.climatepolicyinitiative.org/wp-content/uploads/2022/09/Landscape-of-Climate-Finance-in-Africa.pdf

CPI, (Upcoming) 2022. Tracking Investments in Climate Resilient Infrastructure: A Tracking Methodological Brief

Convergence, 2021. The State of Blended Finance 2021. Available at: https://www.convergence.finance/resource/the-state-of-blended-finance-2021/view

Hallegatte, Stephane; Rentschler, Jun; Rozenberg, Julie. 2019. Lifelines : The Resilient Infrastructure Opportunity. Sustainable Infrastructure;. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/31805

Harmsen, J. H. M., D. P. van Vuuren, D. R. Nayak, A. F. Hof, L. Höglund-Isaksson, P. L. Lucas, J. B. Nielsen, P. Smith, and E. Stehfest. 2019. Long-term marginal abatement cost curves of non-CO2 greenhouse gases. Environmental Science & Policy 99:136–149. doi: 10.1016/J.ENVSCI.2019.05.013

Inter-American Development Bank (IDB), 2019 Joint Report on Multilateral Development Banks Climate Finance. Available at: https://publications.iadb.org/en/2019-joint-report-on-multilateral-development-banks-climate-finance

International Energy Agency (IEA), 2019. The Future of Rail. Available at: https://iea.blob.core.windows.net/assets/fb7dc9e4-d5ff-4a22-ac07-ef3ca73ac680/The_Future_of_Rail.pdf

IEA, 2020a. Global EV Outlook 2020. Available at: https://iea.blob.core.windows.net/assets/af46e012-18c2-44d6-becd-bad21fa844fd/Global_EV_Outlook_2020.pdf

IEA, 2020b. Outlook for biogas and biomethane. Available at: https://iea.blob.core.windows.net/assets/03aeb10c-c38c-4d10-bcec-de92e9ab815f/Outlook_for_biogas_and_biomethane.pdf

Annex 5 - References

IEA and Centre for Climate Finance and Investment (CCFI), 2021. Clean Energy Investing: Global Comparison of Investment Returns, Available at: https://www.iea.org/reports/clean-energy-investing-global-comparison-of-investment-returns

IEA, 2021b. Net Zero by 2050 A Roadmap for the Global Energy Sector. Available at: https://www.iea.org/data-and-statistics/data-product/net-zero-by-2050-scenario

IEA, 2022a. Financing Clean Energy Transitions in Emerging and Developing Economies. Available at: https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing-economies

IEA, 2022b. Global EV Outlook 2020. Available at: https://www.iea.org/reports/global-ev-outlook-2022

IEA, 2022c. Renewable Energy Market Update – May 2022. Available at: https://www.iea.org/reports/renewable-energy-market-update-may-2022

International Monetary Fund (IMF), 2021, World Economic Outlook, Available at: https://www.imf.org/en/Publications/WEO/weo-database/2021/October

IMF, 2022a. Fossil Fuel Subsidies. IMF. Available at: https://www.imf.org/en/Topics/climate-change/energy-subsidies.

IMF, 2022b. Mobilizing Private Climate Financing in Emerging Market and Developing Economies. Available at: https://www.imf.org/en/Publications/staff-climate-notes/Issues/2022/07/26/Mobilizing-Private-Climate-Financing-in-Emerging-Market-and-Developing-Economies-520585

International Renewable Energy Agency (IRENA), 2021. World Energy Transition Outlook. Abu Dhabi. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/IRENA_World_Energy_Transitions_Outlook_2021.pdf

IRENA (2022), Renewable Power Generation Costs In 2021. https://irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jul/IRENA_Renewable_Power_Generation_Costs_2021.pdf

IRENA (2018), Renewable Energy Policies in a Time of Transition. https://www.irena.org/publications/2018/apr/renewable-energy-policies-in-a-time-of-transition

IRENA (2015), Renewable Energy Integration in power grids. Available at: https://www.irena.org/publications/2015/Apr/Renewable-energy-integration-in-power-grids

Kreibiehl, Silvie; König, Michael; Moon, Jongwoo (2022): Data for Figure TS.25 - Technical Summary of the Working Group III Contribution to the IPCC Sixth Assessment Report. MetadataWorks, 04 April 2022. DOI: 10.48490/dw6j-ef56

Annex 5 - References

D. Z. Islam, 2014. Barriers to and enablers for European Rail freight transport for integrated door-to-door logistics service. NewRail - Centre for Railway Research, Newcastle University. Available at: http://transportproblems.polsl.pl/pl/Archiwum/2014/zeszyt3/2014t9z3_05.pdf

Network for Greening the Financial System, 2022. Not too late – Confronting the growing odds of a late and disorderly transition. Available at: https://www.ngfs.net/sites/default/files/media/2022/09/07/not_too_late_-_confronting_the_growing_odds_of_a_late_and_disorderly_transition.pdf

OECD-IEA. 2022. "Support for fossil fuels almost doubled in 2021, slowing progress toward international climate goals, according to new analysis from OECD and IEA." OECD-IEA. https://www.oecd.org/newsroom/support-for-fossil-fuels-almost-doubled-in-2021-slowing-progress-toward-international-climate-goals-according-to-new-analysis-from-oecd-and-iea.htm.

TOSSD, 2022. Available at: https://www.tossd.org/docs/Infographic_Mobilised_Private_Finance_TOSSD.pdf

United Nations Environment Programme, Imperial College Business School, SOAS - University of London, 2019, Climate Change and the Cost of Capital in Developing Countries: Assessing the Impact of Climate Risks on Sovereign Borrowing Costs. Available at: https://wedocs.unep.org/handle/20.500.11822/26007;jsessionid=B9F791105579889173B442D0018F1AF7

United Nations Environment Programme (UNEP), World Economic Forum (WEF), and The Economics of Land Degradation (ELD), 2021. State of Finance for Nature. Available at: https://www.unep.org/resources/state-finance-nature

United Nations Environment Programme (UNEP), 2018. "The Adaptation Gap Report 2018." Nairobi. Available at: https://www.unep.org/resources/adaptation-gap-report-2018#:~:text=This%20is%20the%20fourth%20edition,to%20achieve%20a%20societal%20goal.

Contact –

CPI: climatepolicyinitiative.org

The Lab: climatefinancelab.org

Global Landscape of Climate Finance: climatefinancelandscape.org

@climatepolicy

@climatepolicyinitiative

CLIMATE POLICY INITIATIVE