



WORLD BANK GROUP
Climate Change

Transformative Climate Finance:

A new approach for climate finance to
achieve low-carbon resilient development
in developing countries

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ACRONYMS AND ABBREVIATIONS

BAC	baseline and credit
BCA	border carbon adjustment
CIF	Climate Investment Funds
DFI	development finance institution
ESG	environmental, social, and governance
ETS	emissions trading system
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
GIB	green investment bank
IFC	International Finance Corporation
LCCR	low-carbon and climate resilient
MDB	multilateral development bank
MRV	measurement, reporting, and verification
NCE	New Climate Economy
OECD	Organisation for Economic Co-operation and Development
PMR	Partnership for Market Readiness
RBF	results-based financing
RD&D	research, design, and development
REDD+	reducing emissions from deforestation and forest degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks
SME	small and medium-sized enterprise
TA	technical assistance
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

Note: All currency given in U.S. dollars (\$ or USD) unless otherwise noted.

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EXECUTIVE SUMMARY

Climate finance has made significant progress in recent years. Building on years of increases, in 2017 and 2018 annual climate finance crossed the half-trillion dollar mark for the first time.¹ Climate-related development finance rose to \$55 billion in 2017. The establishment of the Green Climate Fund (GCF) and the Climate Investment Funds (CIF) has created institutions specifically designed to program dedicated climate finance. All of this has supported climate action in developing countries leading to decarbonization, increased resilience, co-investment, and job creation.

Despite this progress, more can be done to increase effectiveness of the climate finance system to support low-carbon resilient development. Global emissions continue to rise, having increased 50 percent in the last two decades, and developing countries still lack adequate resilience to respond to climate impacts. At the same time, many positive developments have created opportunities to deploy climate finance more effectively, including decreases in clean technology costs, increased political will, and realization of the economic benefits of clean development pathways.

The finite amounts of public climate finance must be deployed in more transformative and catalytic ways to bridge the sizable gap between available resources and needs. Even if all financing from the multilateral development banks (MDBs) was devoted to decarbonization and resilience, it would still meet less than 4 percent of finance needs for full climate transformation. Therefore, MDBs and other development partners must aim for a systemic approach that targets specific barriers that restrain the push for low-carbon, climate resilient development in order to unleash substantial additional spending from private and government sources. Much work has been done to spur such mobilization, but more can be achieved.

The impact of the coronavirus crisis only increases the need for a more transformative and catalytic climate finance system to build back better. National fiscal budgets and finance flows from development finance institutions (DFIs) will be under strain to mitigate the economic fall-out from the COVID-19 crisis. The national and international stimulus packages to combat economic slowdown are a chance to build back better, but only if each dollar of limited public funding for climate action can be leveraged with many more times funding from other sources.

This report analyses options to make international public climate finance more transformative. The report identifies eight sets of levers to drive climate action: project-based investments, financial sector reform, fiscal policy, sectoral policies, trade policy, innovation and technology transfer, carbon markets, and climate intelligence. It then examines how climate finance is deployed to address barriers to action for each lever and derives general principles for transformative climate finance based on this analysis relating to allocation of climate finance, use of different financial instruments and other improvements in modalities and processes.

This report is part of an ongoing multi-stakeholder process to improve effectiveness of international climate finance. It builds on previous work done by the World Bank² and others. The primary audience is the donor community, DFIs, and dedicated climate finance funds. It seeks to add value by taking a wide perspective on climate finance and, as such, is not an operational toolkit to be applied at the country level. A set of next steps is proposed for uptake of the climate finance principles at the country and institutional levels.

¹ Climate Policy Initiative. 2019. Global Landscape of Climate Finance 2019. London: CPI.

² World Bank. 2018. Strategic Use of Climate Finance to Maximize Climate Action: A Guiding Framework. Washington, D.C.: World Bank Group.

Current climate finance

The current climate finance system has achieved important successes, but has several traits that could limit its effectiveness. Tens of billions of dollars have been disbursed to help developing countries pursue clean development paths and increase resilience. This has led to many successful projects, important development co-benefits, and substantial mobilization of co-financing. The system works in many instances, but several attributes hinder its ability to catalyze the full volume and type of financing needed to achieve widespread transformational change:

- **Climate finance is typically allocated to projects rather than systemic interventions.** The predominant preference for climate finance is toward clean infrastructure projects. These bring important results but are not usually designed to change policies and ecosystems for a more transformative impact.
- **Climate finance is often allocated without full consideration of climate objectives.** More than 95 percent of international public climate finance is currently provided as development finance through established multilateral and bilateral DFIs. As such, its allocation naturally follows existing development mandates which may not fully prioritize climate needs.
- **Climate finance is allocated through a limited number of financial instruments.** Project-based loans and grants are currently the primary instruments to disburse climate finance. Other financial instruments, such as policy-based finance, results-based finance, equity finance, and guarantees, have been used with climate finance, but to a much lesser degree.



A new approach to climate finance

The following recommendations to enhance the climate finance system were derived from analyzing the different ways climate finance could be programmed to maximize transformative impact through eight specific climate levers. These recommendations are intended for DFIs that source and channel climate finance and dedicated climate finance funds. They may also be relevant for donor countries, which provide and influence climate finance.

- **Plan for the long term.** Climate finance should be programmed according to long-term strategies for low-carbon, resilient development of each recipient country. By identifying interim steps to achieve full-scale transformation, decision-makers can avoid finance allocations that deliver short-term results inconsistent with a long-term strategy. In the same vein, results-frameworks need to be revised for long-term transformative impact indicators.
- **Complement project-based financing with policy-based financing and strengthening of enabling environments.** The impact of climate finance can be enhanced by complementing project-based financing with more finance for activities that drive systemic change, primarily through enabling policy and environments to address barriers to transformation. A coordinated approach that uses multiple levers is the most effective.
- **Use a wider variety of financial instruments.** Instruments such as policy-based finance, results-based finance, equity finance, and guarantees are underutilized in current climate finance provision, which relies almost entirely on grants and loans for project-level interventions. Expanding their use where appropriate will enhance impact of climate finance deployed.
- **Enhance leverage on a wider, systemic basis.** Given the stark difference between available climate finance and needs for full decarbonization and resilience, public climate finance should be allocated to projects that have the greatest leverage of additional funds from other sources. The scope and impact of this leveraging should go beyond project boundaries to consider impacts across the economy. This requires development

of new methodologies and indicators to measure leverage

- **Invest in climate intelligence products.**

Climate intelligence products come at low cost but can have a powerful leveraging effect by demonstrating the benefits of climate action and providing the knowledge to implement it. They include physical climate impact and vulnerability maps; early warning technologies; monitoring, reporting and verification (MRV) methodologies and technologies to measure emission reductions; models and tools for long-term scenario simulation and planning; and physical and transitional risk assessment tools.

- **Understand and manage the political economy to ensure a just transition.**

Any transition from business-as-usual to a clean development trajectory will involve localized negative impacts on certain industries, workforces and regions. Welfare gains resulting

- from cleaner development must be used to compensate for these losses. Use of climate finance to support this process, even when not directly achieving climate results, is essential for successful clean development.

- **Differentiate support by income level and climate vulnerability.** The poorest countries are both most vulnerable to and least responsible for global climate change. While this extends to many middle income countries, they have a different climate change profile. More can be done to refine the differentiation of climate finance to match countries' specific needs and circumstances. This includes applying tiered conditionality for more advanced countries depending on their own efforts and orientation toward long-term strategies. Paired with enhanced donor coordination, such approaches can increase the impact of climate finance, in particular for mitigation.³



³ Strand, Jon. 2020. Transformational Climate Finance: Donors' Willingness to Support Deep and Transformational Greenhouse Gas Emissions Reductions in Lower-Income Countries. Policy Research Working Paper; No. 9251. Washington, D.C.: World Bank Group.



REPORT CONTEXT

The World Bank Group is undertaking analytical work to explore how international climate finance can more effectively assist developing countries to achieve low-carbon, climate resilient development.

This work is separate from, but complementary to, parallel work streams on aligning MDB financing with the Paris Agreement. While that work looks at the entirety of MDB operations, this analysis focuses on the use of climate finance for wider catalyzation of overall financing for climate action in developing countries. It is a part of the World Bank Group 2025 Climate Targets and Actions and builds on the World Bank 2018 *Guiding Framework for the Strategic Use of Climate Finance to Maximize Climate Action*.

The project is collaborative in nature, tapping sector expertise from the World Bank Group, other MDBs, the private sector, and governments. Two invitation-only events in Singapore and London in May 2019 and October 2019, respectively, brought these stakeholders together to test hypotheses and gather additional information. The events underscored the need to deploy finite public climate finance more transformatively and presented the many ways this is being pursued.

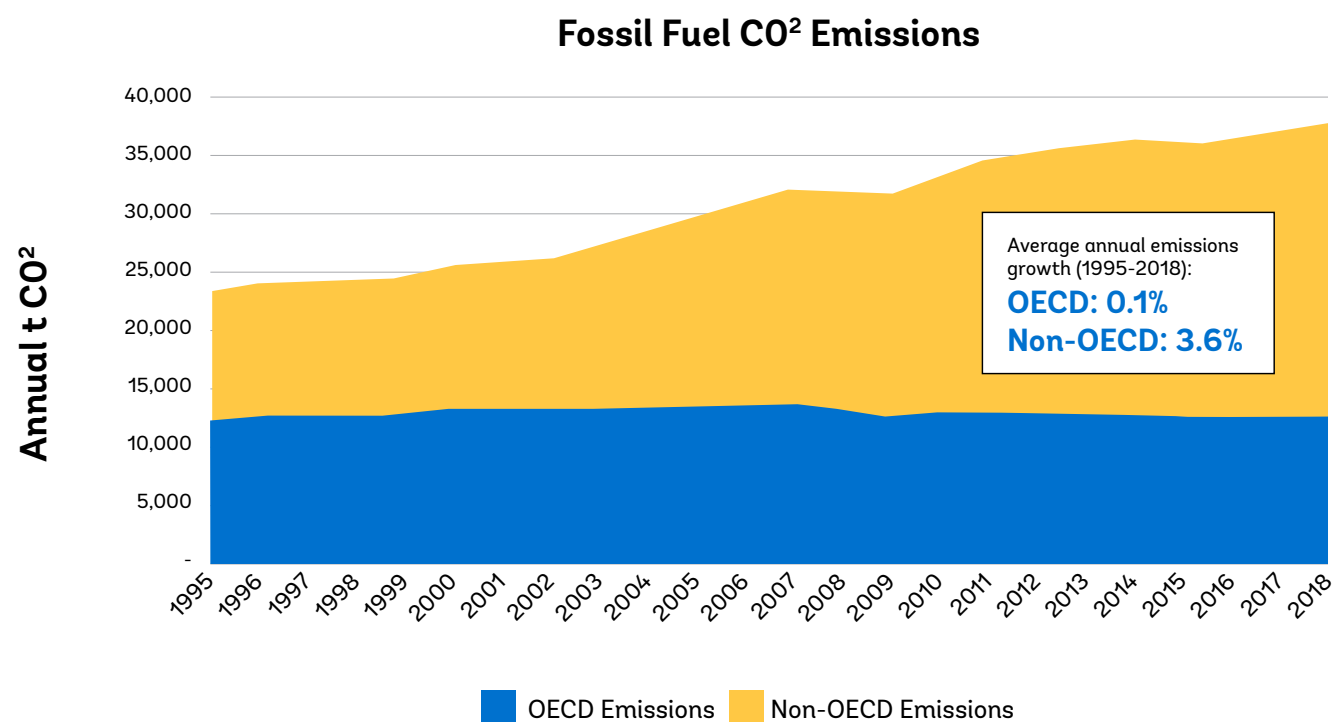
This synthesis report builds on two background papers: *Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action* in partnership with Vivid Economics and the Climate Policy Initiative, and *Transformational Climate Finance: Willingness to Pay among Donors to Support Deep and Transformational Greenhouse Gas Emissions Reductions in Lower-Income Countries* led by the Development Research Group of the World Bank. All analysis and findings herein are the responsibility of the Climate Change Group of the World Bank.

This work is intended to contribute to the ongoing debate on improving the effectiveness of different types of climate finance. The primary audience for this report comprises the donor community, DFIs, and dedicated climate finance funds. Findings and recommendations for further action may also be useful to other implementing agencies and recipient countries.

THE OPPORTUNITY FOR LOW-CARBON, RESILIENT DEVELOPMENT

Global greenhouse gas (GHG) emissions continue to rise, threatening major economic and environmental harm. Despite important developments of the past decade—including greater public attention to climate change, dire warnings from scientists, the passage of the Paris Agreement, advances in clean technologies, and increasing climate finance flows—global GHG emissions continued to grow driven by economic development in non-OECD countries as shown in Figure 1. Barring substantive changes in how climate change is addressed, GHG concentrations will continue to rise, temperatures will exceed targeted 1.5 and 2-degree Celsius limits, and climate impacts will be increasingly felt, with the poor and disenfranchised disproportionately affected.

Figure 1: CO₂ Emission Growth, 1995-2018



Source: Fossil CO₂ and GHG emissions of all world countries - 2019 Report, EUR 29849 EN, Publications Office of the European Union, Luxembourg, 2019; World Bank national accounts data, and OECD National Accounts data files.

As part of global climate change efforts, developing countries⁴ have an opportunity for low-carbon, resilient development that maximizes economic growth and modernization. Despite emitting less on a historical basis, the current size and growth rates of developing country emissions mean they must be part of the global climate solution. Fortunately, a pathway for low-carbon, climate resilient development also offers modern, efficient technology, growth in expanding sectors, job creation, and investment.

A successful transition to cleaner development pathways must also factor in the winners and losers through this process to ensure a just transition. In a full climate transition, workers in carbon-intensive industries and other “brown” sectors may face job displacement as regions dependent on fossil fuels experience dampening impacts on local economies. Government and international stakeholders must monitor people and regions negatively affected by a move to climate and clean energy modalities, and put in place programs to mitigate related damages and provide opportunities in the cleaner economy.



⁴ For purposes of this analysis, developing countries refers to non-Annex I countries per UNFCCC classification.

The scope and scale of changes needed for economies and societies to achieve low-carbon resilient development are immense, requiring substantive transformation of the involved economies. The climate change mitigation and adaptation actions required permeate nearly every aspect of economy and society (see Table 1). This relates both to sectors with direct impact on climate change (e.g., energy and agriculture) as well as those with second-order but no less profound impacts (e.g., urban planning and trade).

Table 1: Climate change demands action across socioeconomic sectors

Area	Mitigation priorities	Adaptation priorities
Energy System Transitions	• Increase low-carbon energy • Decrease shares of fossil fuels without carbon capture and storage • Scale up energy efficiency of generation, transmission, distribution, and storage	• Strengthen existing power infrastructure against extreme weather and temperatures • Improve water management within the energy system
Land and Ecosystem Transitions	• Support substantial forest preservation, reforestation, and afforestation • Reduce food waste and increase efficiency of food production • Encourage dietary shifts to reduce emissions and land-use pressures	• Increase efficiency of irrigation through water-efficient practices • Establish efficient livestock systems and adopt climate-smart crops and crop management approaches
Urban and Infrastructure System Transitions	• Implement technology-focused building measures including increased energy efficiency and fuel-switching • Promote shifts towards low- and zero-emission mass transit	• Promote smart cities through digital transformation and automation • Develop sustainable water management systems, support wastewater recycling and storm water diversion
Industrial System Transition	• Substantially reduce the emissions intensity of industrial production through energy efficiency, carbon capture and storage, and other technologies • Promote product substitution and circular production systems	• Prioritize infrastructure resilience and water management • Invest in technological innovation to improve efficiency of resource use

Source: Vivid Economics, based on IPCC.2018a. 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.

Transformation of this scale demands a high volume of investment. Cost estimates vary based on sectors covered, data, and methodologies used⁵, but there is broad consensus that investment needs for low-carbon, resilient transition in developing countries is measured in the trillions of dollars (not billions) and that current financial flows fall far short. Box 1 sheds more light on the resource requirements to address climate change mitigation and adaptation.

⁵ For more detail, see the background research to this report in Vivid Economics. 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

Box 1: Climate needs and climate finance

Climate needs refer to the resource requirements to address climate change mitigation and adaptation. Different metrics and methodologies can be used to estimate these resource requirements. Accordingly, a multitude of estimates are available in the existing literature on the subject.⁸ The metric used in this report is the annual volume of gross investments described in the 2016 New Climate Economy (NCE) report.⁹ It estimates \$ 4 trillion annual gross investment needs in developing countries' infrastructure up to 2030 consistent with a below two degrees global warming trajectory.

The NCE report argues that clean infrastructure is not more costly than business as usual because higher investments needs are compensated by fuel savings. The main challenge lies in shifting ongoing infrastructure investments from brown to green. On a global level, these shifts include a scaling-down of upstream fossil fuel investments by about 30 percent and a scaling-up of investments in energy efficiency and low-carbon energy generation, including renewables, by about the same percentage. This is a major change in investment structure up to 2030 and even more substantive changes are required beyond 2030.

Total current climate finance deployed in non-OECD countries are estimated to stand at about \$ 356 billion (annual average 2017-2018).¹⁰ These numbers include private climate finance, domestic public climate finance, and international public climate finance. This is less than 10 percent of the clean gross investment needs. This means that about 90 percent of business-as-usual infrastructure investments still needs to be shifted from brown to green.

International public climate finance was estimated at \$58 billion in 2017 following an increasing trend over the last two decades. Around 95 percent of this finance was provided as development finance with climate co-benefits (climate-related development finance) and the remaining through dedicated climate funds such as GCF, GEF, and CIF. Both types of climate finance are similar in structure: two-thirds were spent for mitigation and one-third for adaptation; more than 95 percent was delivered through loans and grants; and the regional allocation reflected general development needs.¹¹



⁸ For more details on this literature findings, see Vivid Economics, 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

⁹ New Climate Economy, 2016. The sustainable infrastructure imperative: Financing for better growth and development. Global Commission on the Economy and Climate.

¹⁰ CPI, 2019. Global Landscape of Climate Finance 2019. London: CPI.

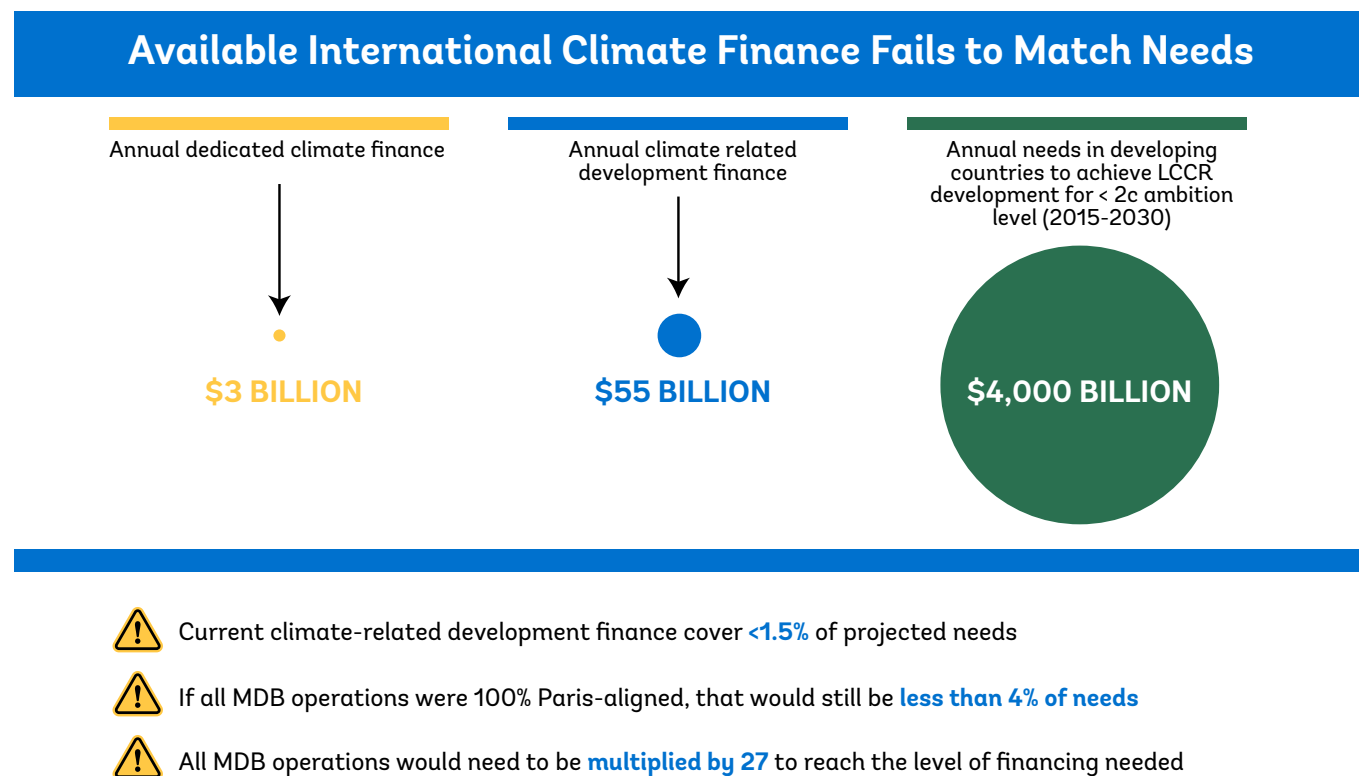
¹¹ Vivid Economics, 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

To understand better how to improve the effectiveness of climate finance, this report distinguishes four different types of climate finance.

- **Dedicated climate finance:** This refers to funding provided by (mostly OECD) governments at concessional or grant terms with the explicit goal to achieve low-carbon resilient development. Examples include funding channeled through the Climate Investment Funds (CIF), Global Environment Facility (GEF), Green Climate Fund (GCF), and other specialized facilities. Dedicated climate finance is managed under its own systems of governance and can be programmed to maximize climate impact as the primary goal.
- **Climate-related development finance:** This refers to funding provided by multilateral and bilateral sources with the primary goal of economic development in a climate-friendly way. Examples include on-balance-sheet MDB investments to governments or private companies. It is provided both at market (or near-market) terms for more developed countries and concessional terms⁶ for countries at lower stages of economic development. Climate-related development finance is maximized for development impact as the primary goal using development finance governance structures.
- **Private capital:** This includes financial flows from financial institutions and companies provided on a commercial risk/return basis to companies, governments, or individual projects for climate action. Examples include a company investing in a solar plant or a financial institution purchasing green bonds.
- **Government spending:** This includes domestic government budgets for climate-friendly activities. Examples include spending for a transportation project with enhanced resilience to climate impacts or a state-owned-enterprise building a hydroelectric plant.

Current and estimated future levels of international public climate finance fall far short of the amount needed to enable low-carbon, climate resilient growth in developing countries. In 2017 an estimated **\$55 billion** was provided in climate-related development finance and **\$3 billion** in dedicated climate finance.⁷ This is orders of magnitude less than what is needed to effect real change (see Figure 2).

Figure 2: Available international climate finance fails to match needs



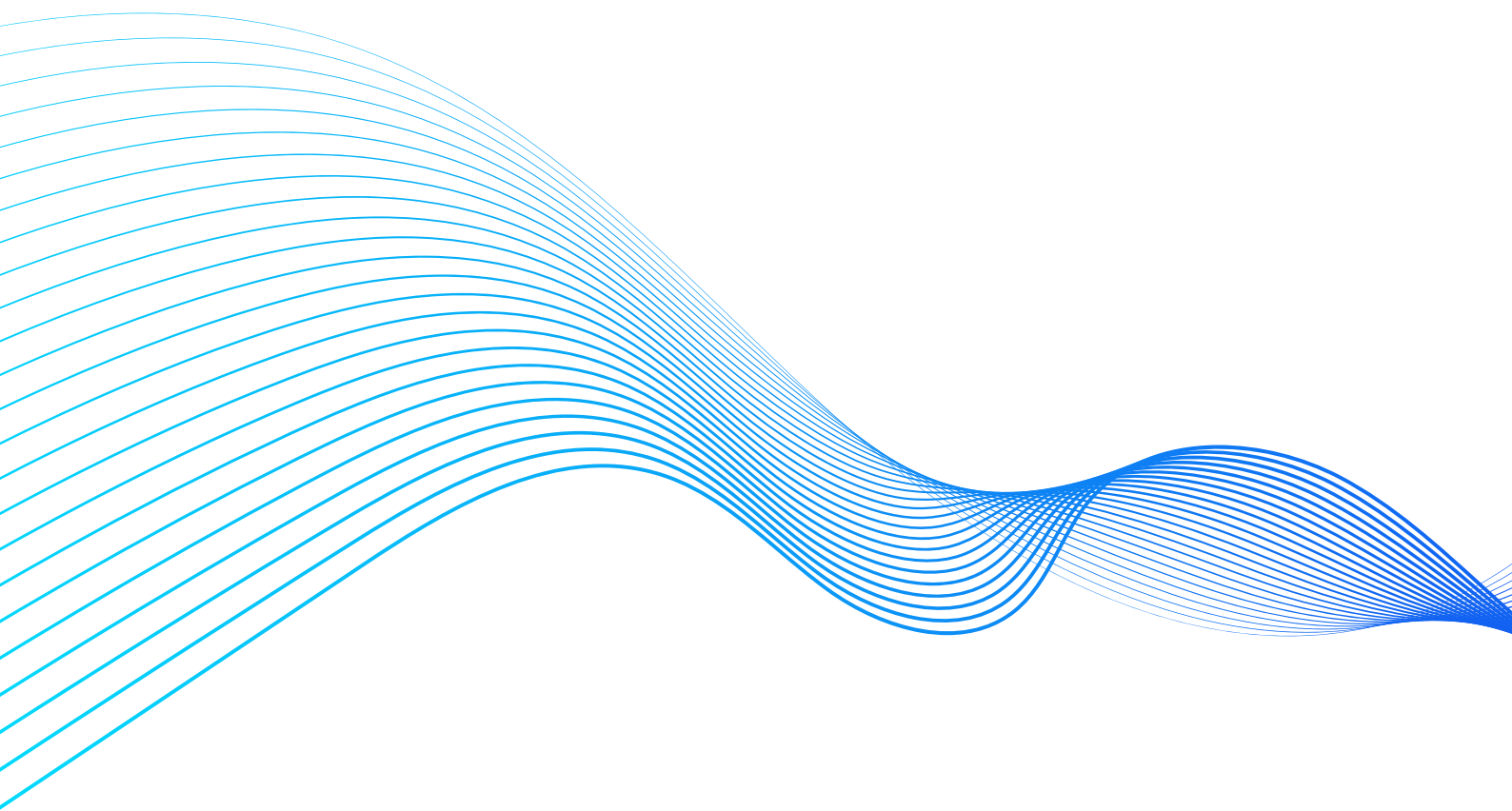
Sources: Vivid Economics. 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

⁶ Concessionality of climate-related development finance is determined solely by economic development stage of recipient country, not extent of climate impact.

⁷ Based on OECD. 2019. Climate Finance Provided and Mobilised by Developed Countries in 2013-17. Paris: OECD. and estimates in Vivid Economics. 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

Owing to the profound mismatch between the amount of funding available and the amount needed, international public climate finance must be deployed more catalytically to increase flows of private capital and government spending. While the last decade has seen a steady increase in international public climate finance, it is not realistic to expect levels to reach the trillions of dollars needed annually for the transformation in developing countries. To drive climate action, international public climate finance must go beyond the boundaries of the project it is directly supporting to act as a catalyst, or mobilizer, of domestic climate policies and other types of finance.

The design, programming, and implementation of international climate finance must evolve to help achieve transformational change. Climate finance can better catalyze, or leverage, domestic climate policies and other types of finance in the area of mitigation, and grow in volume and impact. Climate finance for adaptation and resilience can also be delivered in a more impactful way and at a larger scale.





A VISION FOR TRANSFORMATIVE CLIMATE FINANCE

In recent decades, a number of climate change-related dynamics have made low-carbon development more attractive and will allow public climate finance to have a more catalytic effect. These include the following:

- **Technological dynamism:** Many climate-friendly technologies have advanced to become commercial, and others show potential to do likewise.
- **Financial sector interest:** Investors are increasingly seeking clean investment opportunities to capture growth in climate-related sectors, protect against climate risks, and increase portfolio diversification. Large amounts of private finance receiving historically low returns could be tapped.
- **Job creation and investment:** Job creation in new fields and increased investment act as drivers for countries to pursue low-carbon growth.
- **Local pollution and co-benefits:** Countries are motivated to implement cleaner economies beyond climate reasons due to lower local pollution and other benefits.
- **Decades of experience:** Approaches to supporting catalytic climate action that result in economic growth now have decades of experience, which can be tapped to improve design

While these and other forces make low-carbon development more attractive, many barriers impede countries in their push to decarbonize. The appeals of low-carbon development include industrial development, greater economic efficiency, heightened energy security, increased foreign investment, and development co-benefits (e.g., energy access with off-grid solar). Nonetheless, all countries face barriers that impede that development path. Many such barriers are the same as those impeding overall economic development (e.g., institutional capacity or lack of knowledge and related planning) while others specifically relate to climate action (e.g., cost of integrating renewables into utility grids and lack of finance for greater resilience).

To achieve the required transformation, climate finance programming must have positive spillover effects beyond project boundaries to address systemic barriers to green development and induce additional financial flows even after public finance is exhausted. To achieve this, the climate finance must achieve some combination of the following spillover effects. Descriptions of transformational frameworks for climate action from different institutions are shown in Box 2.

Figure 3: Spillover Effects for Transformative Climate Action



Climate finance must also take a harder look at the political, social, and economic aspects of transformative climate action. Doing this right requires a deeper understanding of such transformative actions and their political, social, and economic dimensions. While some evidence and research has considered specific aspects of this topic, such as on socioeconomic implications of energy pricing reforms, a systematic and comprehensive analysis covering all relevant sectors of the economy and the major types of transformative climate action is still lacking.¹² Some climate funds have defined frameworks for achieving transformational change, as highlighted in Box 2. Major social dimensions of transformative climate action include impacts on the following areas:

- Distribution of income and wealth
- Employment, both in quantitative and in qualitative terms
- Asset valuation
- Gender and intergenerational relationships
- Urban and rural living, regional development
- Work and business culture
- Consumption patterns

¹² The World Bank intends to contribute to closing this knowledge gap through a forthcoming report on the societal dimension of transformative climate action.

Box 2: Understanding and assessing transformational change

A range of approaches and frameworks have been developed to identify and assess how climate finance can support transformational change. These can be helpful for thinking about how different levers can support transformational change.

CIF has developed a particularly useful framework for understanding transformational change across four dimensions,^a building on definitions used by the World Bank's Independent Evaluation Group.^b These dimensions can be assessed using indicative, contextualized signals of transformational change, which demonstrate progress toward transformation within each dimension at early, interim, and more advanced stages.^c

CIF dimensions of transformational change		
Relevance	The strategic focus, design, and nimbleness of initiatives to enable transformation	
Systemic change	Fundamental shifts in system structures and functions	
Scale	Contextually large-scale transformational processes and impacts	
Sustainability	The robustness and resilience of changes	
CIF signals of transformational change		
Early Preconditions for transformation are in place	Interim Interim outcomes external to the program boundaries are evident	Advanced Long-term, self-sustaining outcomes are materializing

The GCF approach to identifying paradigm shift (equivalent to transformational change) for potential investments considers the degree to which they can achieve sustainable development impact beyond a one-off project or program investment through replicability and scalability. This includes potential for knowledge and learning, contribution to the creation of an enabling environment, contribution to the regulatory framework and policies, and contribution to climate goals consistent with national strategies and plans.^d

The GEF similarly evaluates transformational change against a framework that includes the relevance of investment, the level of ambition and focus within an investment, the depth and scale of outcomes, and the sustainability of outcomes (including financial, economic, environmental, social, and political sustainability).^e



a Itad. 2019. Evaluation of Transformational Change in the Climate Investment Funds. Hove, UK: Itad.

b World Bank. 2016. Supporting Transformational Change for Poverty Reduction and Shared Prosperity: Lessons from World Bank Group Experience. IEG category two learning product. Washington, D.C.: World Bank Group.

c CIF & Itad. 2020. Signals of Transformational Change: Insights from the Evaluation of Transformational Change in the Climate Investment Funds. Washington, D.C.: CIF.

d GCF. 2015. Initial Investment framework: activity-specific sub-criteria and indicative assessment factors. GCF.

e Uitto et al. 2019. Evaluating transformational change: Lessons from international environmental funds. Evaluation for Transformational Change: Opportunities and Challenges for the Sustainable Development Goals. Exeter, UK: IDEAS. 105-130.

EIGHT CLIMATE FINANCE LEVERS

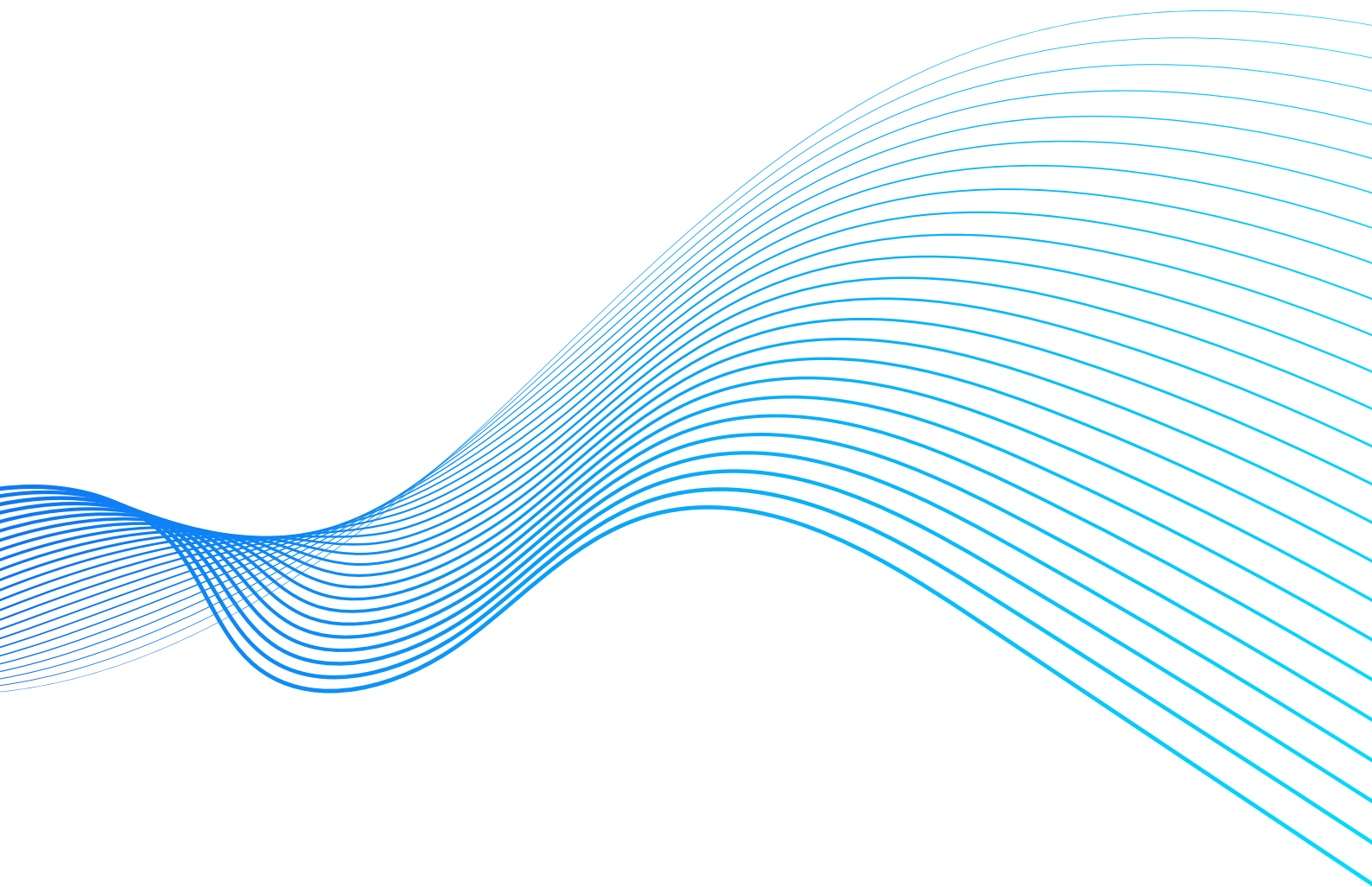
To understand how climate finance can be deployed more catalytically to drive the needed transformation, this analysis created a taxonomy of eight levers defining areas of focus. As shown in Figure 4, these levers are categorized according to theme.

Figure 4: Eight levers for transformative climate finance



Each lever was analyzed according to a standard methodology to allow comparisons and draw common lessons for climate finance programming. Sector-specific knowledge and experience was gathered on each of the eight levers by tapping broad stakeholder expertise. The methodology applied to each of the eight levers articulate how specific actions related to that lever can be catalytic, which barriers impede those actions, and which financial instruments can be deployed to address those barriers most effectively.

The full analysis of each levers is found in the background report.¹³ Table 2 summarizes the main interventions, barriers, and financial instruments associated with the levers, which are described more fully in Annex A of this report.



¹³ Vivid Economics. 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

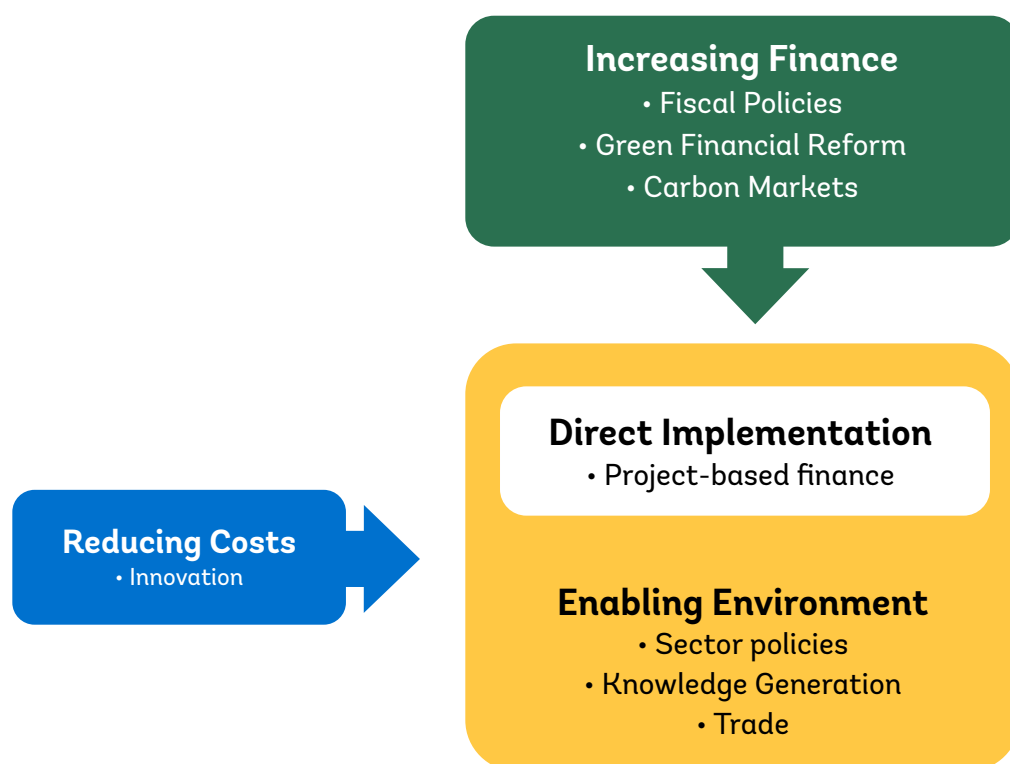
Table 2: Key actions, barriers, and finance instruments of the eight climate finance levers

Climate Lever	Main Interventions	Barriers to Action	Key Climate Finance Instruments
Project-Based Financing	- Invest in projects - Blended finance to manage risks - Manage risks and returns to enable private finance opportunities	- Capital constraints - Limited capacity to deliver effectively	- Investment financing for de-risking and crowding in other funding - Technical assistance for enabling investment
Financial Sector Reform	- Report and manage of climate risk - Regulate green assets - Deploy incentives for green investment - Integrate climate risks into financial sector prudential regulation	- Public finance and capital constraints - Limited institutional and technical capacity - Perceived conflict with development	- Technical assistance for improving governance, capacity, and expertise - Investment financing for catalyzing green investment
Fiscal Policy	- Implement carbon taxes - Reform subsidies and taxes to incentivize climate action - Adjust government procurement - Plan for climate impacts in fiscal planning	- Concerns on reducing international competitiveness and distributional consequences - Capital constraints	- Policy-based financing - Technical assistance for addressing knowledge and capacity gaps
Sector Policies	- Implement regulations conducive to low-carbon and climate resilient (LCCR) alternatives - Enforce green technology standards	- Information gaps to develop policies - Limited resources and institutional capacity to enforce regulation - Concerns on reducing international competitiveness	- Policy-based financing to create incentives - Technical assistance for knowledge sharing on policy development
Trade Policy	- Consider trade liberalization for environmental goods - Apply border carbon adjustments - Coordinate through climate clubs	- Tariff revenue reduction - Insufficient infrastructure - Technical and political challenges to policy design	- Trade finance for LCCR goods and services - Technical assistance for developing climate-friendly trade policy
Innovation	- Provide public funding for basic research - Implement tax credits for research and development - Develop technology transfer policy that targets appropriate cleantech and builds local capacity - Enforce intellectual property rights - Promote green procurement schemes	- Limited resources - Uncertain, long-term, and diffuse payoffs - Limited capacity to develop broader innovation ecosystem	- Investment financing for high-risk innovation - Technical assistance for early-stage innovation

Carbon Markets	• Establish domestic carbon markets • Link markets internationally	• Concerns on reducing international competitiveness and distributional consequences • Uncertainty around carbon prices • Limited capacity and knowledge	• Results-based financing for supporting market development • Technical assistance for establishing and linking markets
Climate Intelligence & Data	• Develop long-term planning tools • Provide policy risk information • Improve disaster risk management tools • Generate localized climate impacts and opportunities data	• Challenges to collect data and develop intelligence • Limited confidence in accuracy • Uncertain policy response	• Technical assistance for building capacity in measuring and using climate data

The analysis demonstrates how the levers interact in a complementary and holistic fashion. While analyzed (and often implemented) individually, the levers are synergistic. Since the levers can have multiple and different impacts depending on local conditions and implementation mode, the exact manner of their interaction differs by circumstances. Figure 5 shows one example of synergies among levers.

Figure 5: Examples of lever synergies for systemic transformation



Analysis reveals the following common themes that run across all eight climate finance levers and can inform more transformative use of climate finance.

- **There are many different ways to catalyze further climate finance flows and actions.** While attention and the majority of public climate finance has gone to projects (primarily clean infrastructure), the other seven levers also offer attractive options to catalyze further climate finance and action.
- **Levers work best when deployed in a complementary fashion.** For purposes of this report, the levers were analyzed individually, but they work best in synergy. Often institutional structures lead to separate pursuit of each lever which obscures the full transformational effect achievable when deployed together. Box 3 offers an example of how levers have worked together for transformation in the energy sector. Sequencing of the levers is also important to maximize synergies.
- **Intermediate objectives needed for full transformation may not lead to immediate emission reductions or increased resilience.** Many levers require intermediate steps before full climate results are achieved. For example, innovation can take years of funding to produce superior technologies before deployment at scale can lead to direct climate results. Similarly, the production of climate intelligence and data can provide a consensus-driven roadmap for action, which can lead to transformation over the medium- or long-term.
- **There is a temporal aspect to the levers with their application changing over time.** The choice of levers and specific actions within each lever must change over time, beginning with transition from brown starting points and ending with phase-out of financial support as underlying barriers are addressed.
- **Deployment of climate finance for each lever must target specific barriers.** Each lever has barriers to transformation and climate finance should be deployed explicitly to address these.
- **Levers are at different stages of maturity and evolution.** Some levers are relatively well developed (e.g., project-based financing), while others are more nascent (e.g., green financial sector reform) or in transition (e.g., carbon markets), often due to changing regulations.
- **The effectiveness of each lever, or portfolio of levers, depends on country-specific circumstances.** While this report's global perspective gives an overview of the landscape of options, the actual potential of each lever can only be determined in local contexts.
- **All levers require managing social and political economy issues through a just transition.** Implementation of any lever must take into account social and political realities in countries and regions where they are applied. Choices for the allocation of public climate finance must ensure a just transition to mitigate economic and other harm that may befall communities in the climate transition.
- **Many levers require expertise and skills sets outside of clean infrastructure sectors.** While expertise in the front-line infrastructure sectors are key to mitigation and adaptation, many levers call for skills and experience in sectors not yet fully associated with climate action. For example, financial sector reform, trade, and fiscal policies all require expertise outside of infrastructure.
- **Debt investments are not always the best financial instruments for transformation.** Debt instruments for projects are the primary conduits for MDB financing and remain important tools for using public finance. However, transformation in many sectors requires other financial instruments, including equity investment, policy-based financing, technical assistance, early-stage risk capital, and guarantees.

Box 3: An example of complementary climate finance levers

The rise of renewable energy is a prime example of how the climate finance levers, when working together in a holistic fashion, can drive transformational change. The increase in technology capacity and drop in prices, often dramatic, have allowed the power sectors of many countries (both developed and developing) to achieve important results for low-carbon development. This story varies depending on the country and sector circumstances, but there are important commonalities that demonstrate how climate finance levers can be deployed and phased in to effect meaningful change.

Innovation has been essential to establish the basic science of renewable energy, commercialization of productive technologies, and further advances that have brought costs down to competitive levels and developed spin-off and niche products. **Sector regulation** has enabled grid access and net-back payments for renewable power producers. **Fiscal and incentive policies** in the form of tax credits and feed-in tariffs have been essential in boosting early large-scale production of renewable energy. **Climate intelligence** has been developed to provide information, such as geographical data on wind speeds and sun radiation, and spread knowledge of the technologies themselves and how they can be applied in different conditions. **Trade policy** that has hampered the spread of renewables, such as when countries enact tariffs on renewable technology imports to protect domestic industries, are increasingly being revised and new ones are being explored to encourage greater renewables deployment.

Support to **project-based financing** through blending with concessional funds has been instrumental in allowing many early-stage projects to proceed, building trust and track records needed by commercial lenders. Over time and with the maturing of technology and markets, soft-loan programs have been replaced by guarantees for commercial lenders, which have achieved higher leverage while saving on public spending.

Carbon markets have also played an important role in making attractive financing available for renewable energy projects, especially in the developing world where access to finance is often constrained. **Financial sector reform** is increasingly making funding available for renewable energy projects as green asset classes draw private investment.

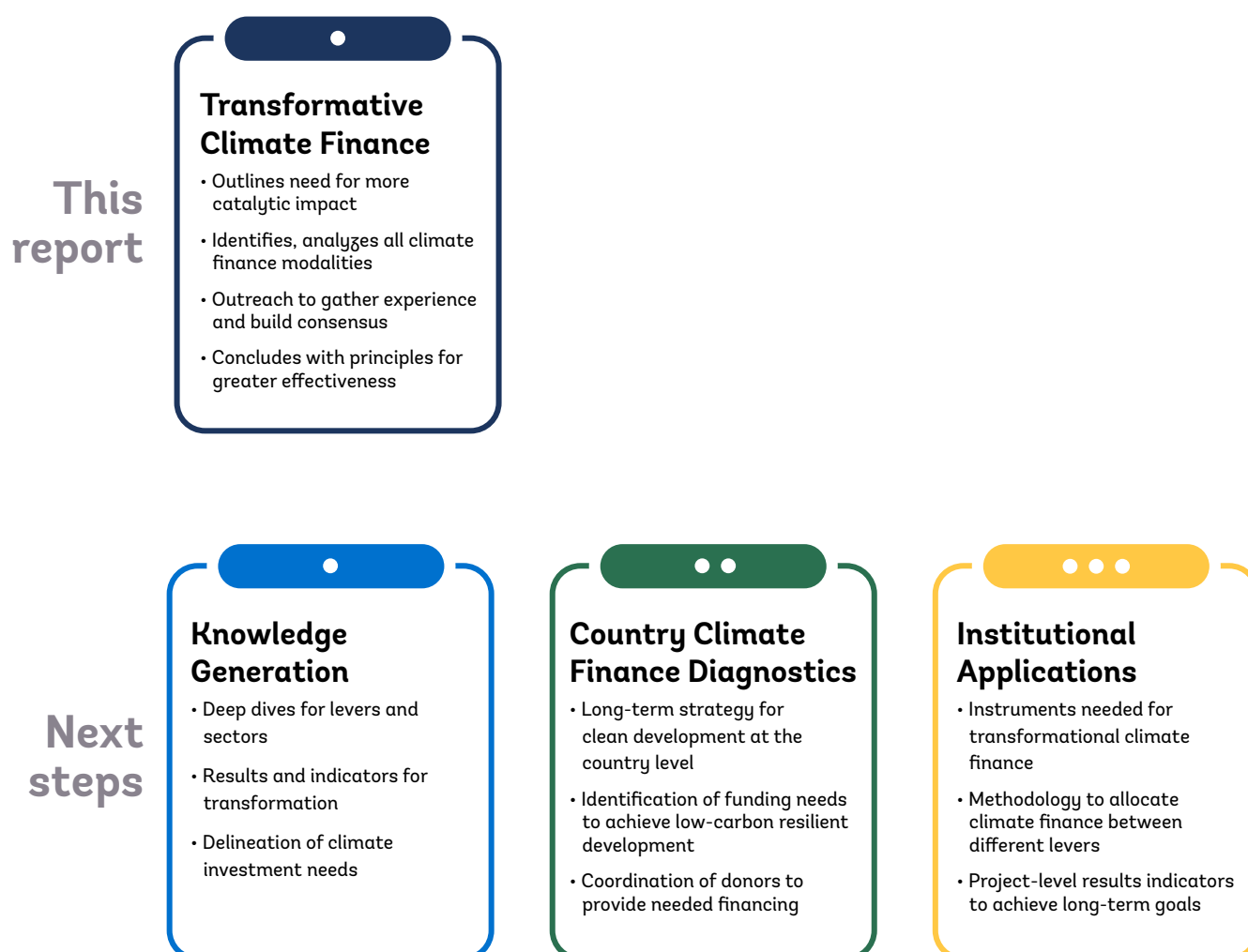
The combined, holistic use of all climate levers has led to a transformation in renewable energy technologies to the point where they are seen as commercially viable in most scenarios and attract large amount of private capital at commercial terms. This success can be replicated in other sectors if international climate finance follows similar approaches to catalyze transformational change.



NEXT STEPS

This report is part of an ongoing effort by the World Bank Group and others to deploy climate finance in a more transformative way. It takes a global view across multiple sectors and funding channels to arrive at guiding principles. To deepen the knowledge and apply these principles to both recipient countries and relevant institutions, the following steps are proposed, as illustrated in Figure 6.

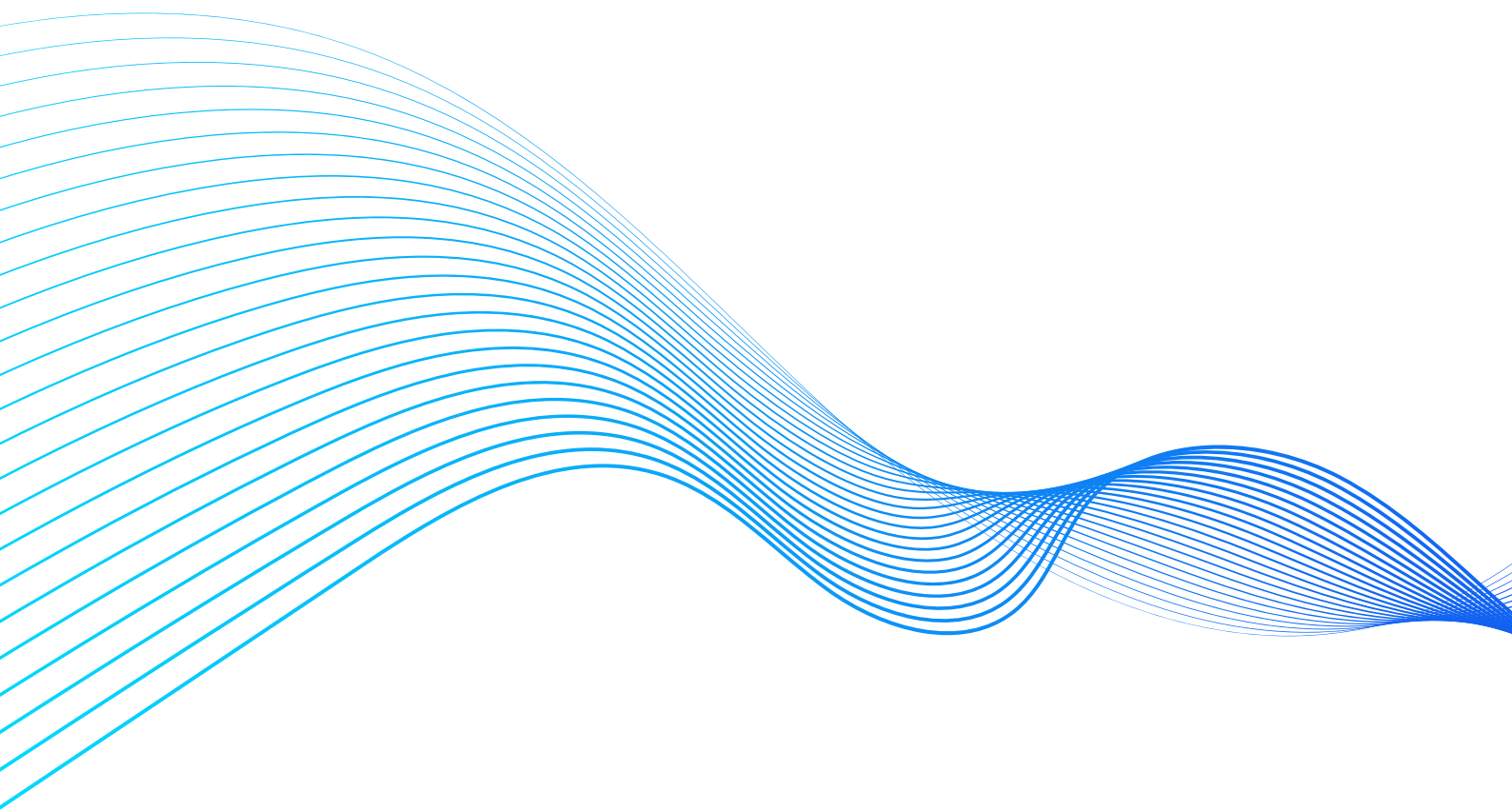
Figure 6: Next steps in realizing transformative climate finance



Knowledge Generation

While the breadth of this report precluded detailed analyses in specific sectors or topics, the work indicated areas where knowledge gaps remain.

- **Deep dives for levers and sectors:** Certain of the eight levers for climate finance are relatively well-known (e.g., clean infrastructure projects) while others are still emerging (e.g., financial sector reform) or are in the process of evolution (e.g., carbon markets). Some require more knowledge on business models for using climate finance, a methodology to project emission reductions, and analysis of leverage effect of different types of action and which countries are most suitable.
- **Results frameworks and indicators of transformation:** Programming climate finance according to long-term strategies raises the issue of how to measure progress over the long-term. For mitigation, results are ultimately measured by abated GHG emissions, and for adaptation, by increased resilience to climate impacts. Short-term prioritization of such results can distort funding allocation from those most likely to lead to true long-term transformation. Knowledge is needed to define interim results that will lead to transformation. This can build on existing frameworks for identifying and tracking transformational change.
- **Analysis and delineation of climate finance requirements:** The literature that estimates the finance needed to achieve low-carbon, resilient development demonstrates the wide gap between funding needs and current availability. More work is required on the types of finance needed, and in which sectors and countries it will be required. Such work can help inform decisions on the scale and type of financing needed to achieve results in specific contexts.



Long-term Country Climate Finance Diagnostics

The scope of this report precludes application of the principles developed to specific countries. An important next step will be to analyze their implications for countries as they plan their long-term climate change strategies and how to finance them.

Long-term climate finance diagnostics must be undertaken jointly with host countries, DFIs, the local and international private sector, and other stakeholders. Together, they can establish a long-term strategy for decarbonization and resilience in line with development objectives. Decision makers can then identify the projects and other actions needed to achieve these goals, including working with different types of donors to determine best-fit financing volumes and types.

Institutional Applications

The conclusions and recommendations of this report relate to DFIs that program and deploy climate-related development finance and to organizations that control and allocate dedicated climate finance. While this report is not intended to be a blueprint for reform in these organizations, it does lay out clear guidance on areas and directions for improving efficacy of available climate finance. The next step will be for each institution to undertake a review of relevant practices and procedures to determine where changes can be made within the constraints and capabilities of each one.

This may include:

- Review of instruments needed for climate finance to have the most transformational impact
- Review of methodology to determine allocation of climate finance between different levers and sectors
- Review of project-level result indicators to ensure long-term goals are achieved via rigorous interim milestones



ANNEX: LEVERS FOR TRANSFORMATIVE CLIMATE FINANCE

This Annex summarizes¹⁴ eight transformative climate actions at multiple levels of decision making, and how each of these actions can be supported with a broad suite of climate finance instruments. Some actions aim to support the formation of enabling environments, including both policy and market development. Others set incentive frameworks and support decision-making. Still others provide direct financial support for activities to reduce emissions and support climate resilience.

1.

Project-Based Financing

Finance or project support to enable climate investments
e.g. wind plant, climate-resilient roads



2.

Financial Sector Reform

Financial sector regulations that catalyze green investment
e.g. regulations for green bonds, climate risks in portfolio assessments



3.

Fiscal Policy

Setting taxes and adjusting spending priorities to support climate action
e.g. green taxes/improved subsidy targeting, green procurement



4.

Sector Policies

Regulatory standards or information provision policies
e.g. energy efficiency standards, building codes



5.

Trade Policy

Trade policies to encourage exchange of LCCR products
e.g. carbon border tax adjustment, trade liberalization for LCCR products



6.

Innovation and Tech Transfer

Development of new, more effective and cheaper green technologies
e.g. demonstration plants, R&D, SME support, early/discounted financing



7.

Carbon Markets

System to define and trade mitigation outcomes for cost efficient mitigation
e.g. emission trading systems, baseline and crediting mechanisms



8.

Climate Intelligence and Data

Knowledge and planning tools to support policy and investment decisions
e.g. 2050 low-carbon resilience trajectories, NDC implementation plans



¹⁴ Full analysis and description of all eight climate levers is found in the background paper: Vivid Economics. 2020. Transformative Climate Finance: Options to enhance international climate finance flows for transformative climate action.

Each summary includes:

- **Interventions:** The different policy and support options available to deliver the climate action, and associated potential climate benefits
- **Barriers:** The challenges or barriers to delivering action through these policy and support options
- **Climate finance deployment:** The potential role and relevance of a range of climate finance instruments to address the barriers and support the climate action

A range of climate finance instruments are needed to support transformative climate action. These finance instruments include approaches that are well known, particularly grants and loans to support investments, and instruments that have been less frequently used, including results-based financing, guarantees or policy-based financing (see Figure 1). Even widely used instruments may need to be deployed in new ways to support transformational change.



Figure 1: Summary of climate finance instruments

Climate finance instruments		Description
Investment financing	Equity	The provision of public finance in the form of equity stake/shareholder investment to support an enterprise or one of a series of discrete projects.
	Investment loans	The provision of public finance in the form of loans to government projects, an enterprise, or a series of discrete projects.
	Investment grants	The provision of public finance in the form of cash, goods, or services, for which no repayment is required.
	Guarantees	The provision of support by a public actor to transfer certain risks from investors or national governments to the public actor.
	Intermediated financing	The provision of financial support through intermediaries such as banks, microfinance institutions, or other actors.
Results-based financing (RBF)		The provision of funds to a recipient linked to the achievement and independent verification of a pre-agreed set of results from an investment or policy, including prizes, competitions, and payments for investment and policy outcomes.
Policy-based financing		The provision of public finance conditional on the borrower fulfilling their policy commitments.
Trade finance		The provision of finance to bridge the gap in time between import payment and export receipt of payment.
Technical assistance (TA)		The provision of finance in the form of grants or non-financial assistance provided by specialists, to finance or provide support in the form of information sharing, expertise, skills training, knowledge sharing, or other consulting-type services.

Project-based Financing

Interventions

Project-based financing involves making financial commitments toward infrastructure projects to enable them to go ahead, often on terms not available from private capital providers. Project-based financing includes both financing for individual projects and for broader programs that consist of multiple projects or investments. It can support individual investments (or sets of investments) that deliver immediate climate benefits or broader systemic changes through spillovers. These can include demonstrating the commercial viability of low-carbon, resilient investment by unlocking private climate finance flows through strategically targeting barriers to investment, by overcoming network “lock-in” effects to create a rationale for private investment, or by investing in technologies or sectors to bring down future costs and move toward private commerciality.

- **Investing in climate projects that are under-provided by the private sector can provide immediate and long-term benefits.** The private sector may underinvest in projects that provide climate benefits because they will not be recompensed for all the benefits the projects provide to society, or due to informational barriers or other market barriers that limit investment. Public project-based financing may also be valuable in cases where there are long-term consequences to a lack of action, for example, by creating lock-in effects for emissions pathways or exposure to climate risks. Public project-based financing for these investments provides climate benefits that would otherwise not be realized, including both immediate benefits and long-term emissions and climate risk reductions (or it helps avoid greater emissions or exposure to physical climate risks).
- **Blending public finance with private investment can help reduce risks or increase returns to enable private finance flows.** Where private investments are not commercially viable due to high risks or non-commercial returns, blended finance can unlock private investment. Blended finance—co-investment of public capital alongside private capital—can be used to address misaligned risk-return profiles through tools that reduce risks, such as performance guarantees or first-loss investments, or augment returns through the use of low-cost debt or equity or guarantees of returns. It is best used where there is an expected transition toward full commercial viability in the medium term.
- **Short-term public investments can demonstrate opportunities and bring down costs to enable private finance at scale.** Where limited information is holding back private investment or the creation of markets, project-based financing on commercial terms can help jump-start private sector activity. Where technologies face cost barriers, strategic public investment to help advance technology development and bring down costs over time can enable future private investment.

Project-based financing can support a just transition by investing in new technologies and emerging sectors to create new economic activities that benefit communities disadvantaged by climate change. Project-based financing from international public investors typically requires compliance with various social and environment safeguards to reduce and manage the risk of negative impacts. This approach can be combined with an investment framework approach that takes social impacts of investments into account by selecting those that support a just transition, and by considering programs to offset or manage negative impacts.

Barriers

Governments and private actors both face hard capital constraints that limit their ability to finance project-based investments. This is particularly true for climate projects, as low-carbon investments are often more capital intensive or have less attractive risk-return profiles than brown projects. Climate resilient investments also typically involve higher up-front costs. Countries may be reluctant to invest scarce capital in climate projects. Private actors in developing markets may also face limited access to international lending/capital markets, while domestic lending/capital markets may be thin, with providers charging high interest rates or demanding other terms that make investment untenable.

- **A lack of knowledge among public actors about climate impacts, technology development, and the costs and benefits of investments hold back both public and private project-based financing.** Uncertainty around climate impacts, particularly at localized levels, and around the efficacy of climate mitigation and adaptation technologies can hinder project-level investment.
- **The knowledge and capacity to develop and deliver project-based green investments effectively are often missing among public and private investors and project developers.** Capacity constraints, including lack of knowledge about climate-friendly technologies, can limit both the development and design of climate projects and thus the pipeline of investable projects. A lack of familiarity or confidence with financing approaches or instruments can also hold back investment.
- **Policymakers may be concerned about real or perceived conflicts between climate investments and national development priorities.** This opposition may come from within governments, state-owned enterprises such as electricity or energy utilities or network managers, labor unions, and fossil fuel energy stakeholders.
- **Insufficient pipeline of bankable projects limits investment opportunities.** Early-stage project development confers high risk for private companies and skills mismatch for the public sector.

Climate Finance Deployment

Investment financing	Investment loans have been the most common form of project-based financing, reflecting their flexibility in supporting a wide range of projects on a wide range of terms. Loans can be structured flexibly to provide profiles that match client and project needs, based on the expected cash flow of the project and the ability to pay back over time. Refinancing activities can also encourage others to make primary investments as they provide confidence that capital can be recycled. Grants are well suited for projects that have a high priority and face high market barriers. Grants should focus explicitly on projects that provide large benefits or address critical risks but that face finance barriers. They should be tailored to target barriers that the private sector or governments cannot overcome without support. Equity investments can support climate action by enabling co-financing from more risk-averse investors. Equity investments are less commonly used than other investment tools but may be valuable for early-stage enterprises to provide growth capital to help enterprises harness climate investment opportunities. This may be particularly valuable in less developed financial markets. Guarantees can be effective at enabling investment and leveraging substantial volumes of co-financing. Guarantees enable project-based investors to transfer risks they cannot easily absorb or manage and are particularly effective at mobilizing investment. They should only cover part of potential losses to avoid encouraging over investment in risky projects. Financial intermediary funding can overcome specific access-to-finance barriers associated with reaching small and medium-sized enterprises (SMEs). Financial intermediary funding can also support deal flow generation and build knowledge through complementary technical assistance.
TA	TA is particularly important for ensuring that project-based finance supports transformational change, especially through helping to create a pipeline of investable projects and to develop long-term investment strategies consistent with low-carbon resilient development. TA is often needed to enable or improve outcomes from capital investments, and is often most successful when delivered alongside capital investment. In addition, TA can help to establish a project pipeline and generate deal flow, and to align this with long term pathways to scale up climate action.
RBF	RBF can provide an additional incentive to support investments that would be under provided by private investment. In addition, results-based project financing can support structural changes in markets leading to long-term climate results beyond the initial investment. For example, RBF can provide price signals for climate outcomes that can catalyze market development and crowd-in private investment finance. RBF payment flows over time can also improve maintenance of infrastructure investments. It is especially well suited to mitigation projects, but may be less suitable where results are difficult to measure.

Green Financial Sector Reform

Interventions

Green financial sector reform focuses on implementing regulations and policies that shift the financial sector toward catalyzing low-carbon, climate resilient investment in the real economy. Financial sector reform to boost climate action involves both managing risks arising due to climate change, and positioning the financial sector to take advantage of new investment opportunities and approaches. Climate change and associated policy and economic response create two key types of risks within financial systems: (a) transition risk, meaning exposure to abrupt policy, legal, technology, and market changes driven by and responding to the need to reduce emissions; and (b) physical risk, meaning exposure to climate impacts. Financial sector reform is required to manage these risks and to facilitate the allocation of resources toward low-carbon, climate resilient opportunities at the scale and speed needed to meet global climate change goals.

Reforming the financial sector can help provide avenues for investors who increasingly want to be able to invest in (and save via) green products with clear sustainability credentials, and help accelerate the growing trend towards climate investment. Climate and green sectors already provide enormous investment opportunities, with more than \$1 trillion flowing into climate-related projects worldwide,¹⁵ and could provide up to \$23 trillion in new opportunities in emerging markets by 2030.¹⁶ Financial sector reform can support and catalyze the shift toward climate investment, as green assets play an important role in catering to investors focused on environmental, social and governance (ESG) impact, improving market transparency, and instigating cultural change in the financial sector. For example, green bonds are potentially a strong tool in supporting financial sector reform, providing innovative opportunities for investors to channel investment capital into green and climate activities. Green loans that apply similar frameworks and systems have potential to support sustainable finance in markets where local financing needs are largely met by the local banking industry, as in many emerging and development markets. Despite the rapid growth in financial products, supply has not been able to keep up with demand for green investment and saving opportunities due to the actual or perceived cost of providing these instruments, the lack of clear regulatory frameworks, or, in some specific contexts, inadequate information about market demand. Tools such as taxonomies, climate benchmarks, green bond standards, or eco-labels for financial products can facilitate the further development of financial markets for climate finance.

Four key interventions can help countries reform the financial sector to manage climate risk and support green investment:

- **Improving reporting and management of climate risks can improve transparency in the financial sector and enable investors to make informed decisions.** Disclosure of climate risks encourages investors to diversify their portfolios away from assets with high climate risk, improves investor-level sustainable investment decisions, and attracts buyers of low-carbon assets. Supporting disclosure and risk management may first require improving information and building climate expertise, as understanding physical and transition risks requires collecting and interpreting significant amounts of complex data. Harmonized reporting standards, possibly through the use of a climate taxonomy, can facilitate this.
- **Incorporating climate considerations into regulatory processes and financial institution management duties promotes financial stability by safeguarding against climate risks.** These interventions may include adjustments in typical regulatory activities such as regulations on capital requirements and liquidity requirements, as well as disclosure and supervisory activities. Prudential regulation like climate stress tests can improve financial sector stability and transparency, while regulators can also clarify the duties of investors and company directors to include a focus on climate risk management.
- **Defining and regulating green assets can encourage their provision and uptake.** The provision of green assets can be limited by a lack of supporting infrastructure. Key actions include establishing standardized definitions and supporting tools for green investment instruments and for measuring results of green activities.
- **Providing regulatory and financing incentives for green investment assets can support greater levels of investment.** Governments can support climate investments by establishing regulatory or fiscal incentives for steering investment toward green assets, for example through preferential tax treatment for income from green investments. At the same time, other public sector organizations can support private investment in line with green financial reform goals through project-based financing approaches discussed in the previous section.

¹⁵ IFC. 2017. Creating Markets for Climate Business: An IFC Climate Investment Opportunities Report. Washington, D.C.: IFC.

¹⁶ IFC. 2016. Climate Investment Opportunities in Emerging Markets: An IFC Analysis. Washington, D.C.: IFC.

Financial sector reform can support a just climate transition by encouraging incorporation of just transition issues into investors' decision-making and operating practices. In particular, investors can support a just transition by updating investment strategies and capital allocation to account for social impacts, by engaging with corporations to request ESG disclosure and make known investor preferences for equitable business practices, and by advocating for governments to legislate toward a just transition.

Barriers

Implementing sophisticated financial sector reform requires a high level of institutional and technical capacity, which may be challenging. Capacity building is often required across governments, regulators, banks, and other financial institutions to support governance and reporting, the regulation of and incentives for green asset classes, the provision of green finance, and the collection and interpretation of climate information.

Governments may face resource constraints that prevent them from implementing costly green financial sector reforms. There are two potential expenses associated with green financial sector reform: the cost of providing incentives for investing in green assets, and the cost of developing new regulations. Developing countries may be reluctant to put limited resources toward either cost, particularly for supporting relatively new initiatives like green bonds or climate risk disclosure.

Governments may face pushback from domestic financial market actors on increased regulatory requirements, and from policy actors on perceived conflicts with national development. Domestic financial institutions may lobby against financial regulation that is perceived to impose increased reporting or fiduciary requirements on them, citing increased costs, loss of competitiveness, or increased transaction costs. More broadly, there may be concerns about promoting a shift toward green investment if this is seen as conflicting with development priorities.



Climate Finance Deployment

TA	TA is a key instrument used to address the institutional capacity issues that hinder a wide range of potential financial sector interventions. TA to support financial sector reform ranges from supporting the design and implementation of new regulations or financial institutions, to helping organizations meet new regulatory requirements. Assistance can be provided to an individual country or government, in the form of, for example, best practice guidelines or knowledge sharing networks. TA can also be combined with other forms of support, most notably funding via financial intermediaries, to increase the efficacy of both interventions.
Policy-based financing	Policy-based finance can be used to drive improvement in governance and reporting. Climate finance can help accelerate the pace of transition to a mandatory reporting regime by providing a combination of financial and technical assistance/incentives to governments with a paucity of experience with the relevant regulation. While there are no current examples in the financial sector, the use of policy-based finance is likely to grow as climate risk disclosure is more widely implemented.
Investment financing	Investment financing can strengthen national green finance capacity alongside incentivizing individual investments. A range of investment instruments—including equity, loans, grants, guarantees, and intermediated financing—can all play a role in supporting shifts in the financial system through demonstration effects and scaling up specific green-financing volumes to support on-the-ground shifts in financing activities. Direct financing for pilot projects perceived as too risky by private financiers (through public grants, loans, or equity) can spur investment in new green markets and green asset classes by changing perceptions of risk. Public capital is not under the same high pressure for return as private capital, and can therefore be employed to test new green technologies and innovations that private investors deem risky due to their novelty. By demonstrating commercial viability through public investment, private capital can be mobilized to fund subsequent rounds of investment or similar projects. Guarantees can be used to build investor confidence on the viability and attractiveness of low-carbon, climate-resilient investment. Climate finance can be channeled through financial intermediaries to enable on-lending for domestic green financing activities by local institutions with low-carbon expertise and/or greater familiarity with local contexts. Climate finance can support the establishment of green bond markets through the issuance or purchase of green bonds or be used to capitalize new institutions to promote market-level change.

Fiscal Policies

Interventions

Fiscal policies—setting taxes and adjusting spending priorities—can support climate action by incentivizing mitigation and adaptation and by providing funding and investment toward these activities. Climate-friendly fiscal policies can help overcome barriers that hold back socially and economically beneficial investment in emissions reduction or climate adaptation. They can ensure that actors incorporate the social cost of activities in their decisions, and provide other incentives to invest in climate mitigation, adaptation, and climate risk management. The most important interventions include the following:

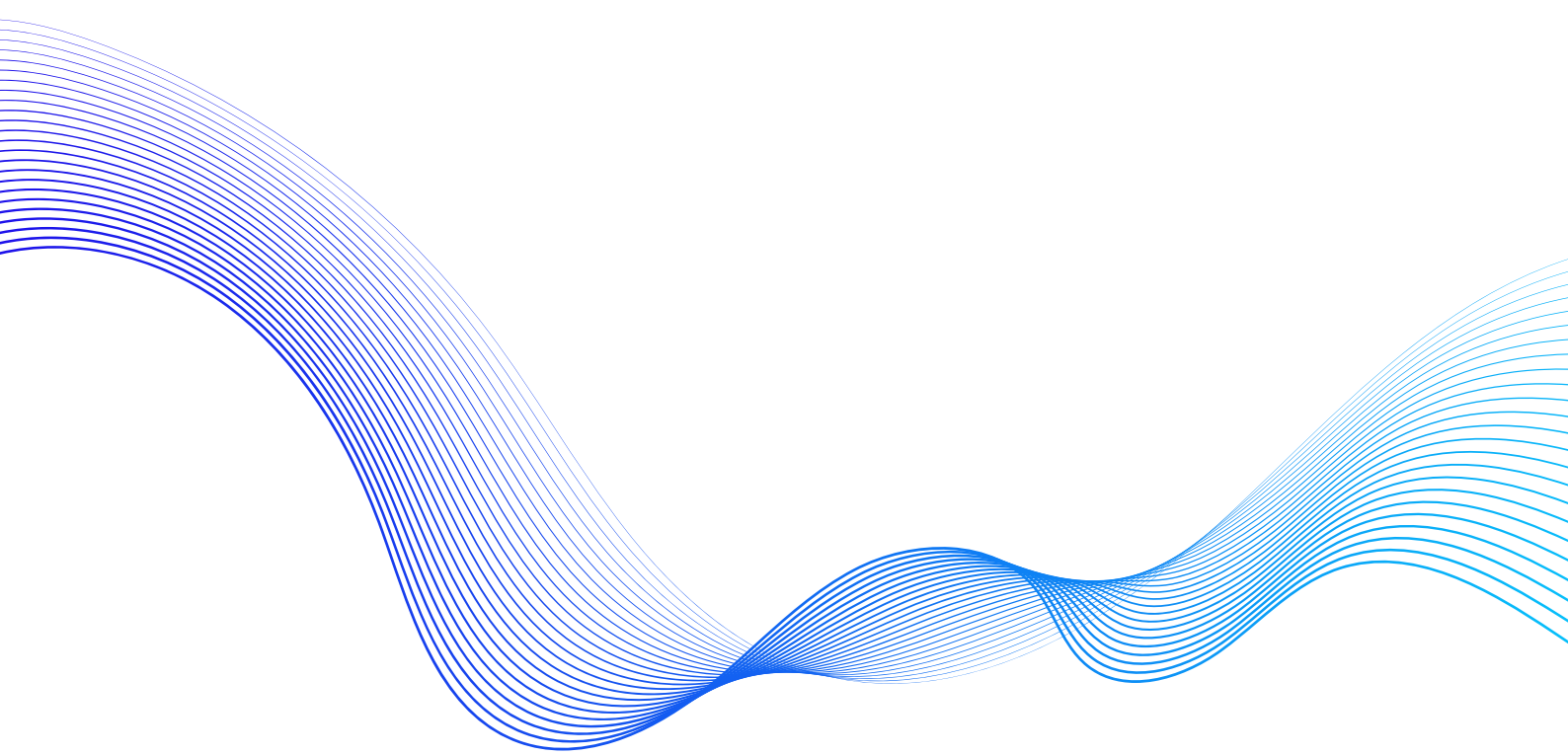
- **Removing or reducing fossil-fuel subsidies:** Fossil fuel subsidies encourage the over-use of these energy sources. Their removal can reduce emissions substantially, including by spurring investment in energy efficiency measures or clean energy. Countries may also have opportunities to reform subsidies in other sectors, particularly agriculture, to support climate action.
- **Carbon taxes:** Carbon taxes use price signals to discourage emissions intensive activity while promoting innovation and investment in cleaner, more efficient technologies. They are highly flexible and can be applied within specific sectors or across the whole economy. They can also be imposed at various points in the supply chain: at the point of fossil fuel extraction or importation, at the point of use in industry or energy production, or at the point of use by consumers.
- **Subsidies and tax incentives for climate action:** These include tax reductions, subsidies, or loan guarantees that help overcome barriers to investment in climate mitigation and adaptation. Governments can use a combination of fees on high-emission activities with rebates on low-emission activities (known as feebates) to promote mitigation within specific areas, such as supporting shifts from high-emitting vehicles toward low-emissions vehicles.
- **Government procurement and investment processes:** Governments can incorporate a “shadow price of carbon” into their decision making and investment appraisal processes or use their procurement power to encourage the market penetration of low-carbon, climate resilient products.
- **Integrating climate considerations into planning:** This includes integrating climate change into fiscal frameworks and strategic investment decisions, managing climate risks through the use of disaster and climate risk management financing tools, or increasing governments’ ability to cope with climate impacts by expanding their fiscal buffers.

In order to support just transition, fiscal policies, such as fossil fuel subsidy removal or carbon taxes, need to incorporate support for workers and social groups likely to be negatively affected by such policies.

Carbon taxes and fossil fuel subsidy removal have the potential to penalize workers in emissions-intensive industries (and particularly those that are both emissions- and labor-intensive). Policies to manage these potential risks include well-funded and well-developed programs to support displaced workers, for instance, by investing fiscal resources to support new industries and providing enhanced social protection to workers in old ones. Fiscal policies can also allow for the recycling of revenues to support low income groups impacted by climate change or climate policies (such as new taxes or reduced public support for energy consumption).

Barriers

- **Concerns about competitiveness of domestic industries and costs for low-income groups may hold back climate fiscal policy reform.** Subsidy reforms or introduction of carbon taxes may be limited by concerns that they may reduce international competitiveness and increase costs for carbon-intensive industries like cement, steel, and aluminum. Many developing countries rely on these to build infrastructure and fuel economic growth. If companies relocate or costs increase as a result of fiscal policy reforms, this could reduce overall economic performance and social welfare, particularly lower-income households and disadvantaged groups.
- **Apprehension and resistance from key groups about the scale of these impacts can act as a further political barrier to action.** Domestic emissions-intensive industries and consumers that currently benefit from fossil fuel subsidies are likely to oppose fiscal policy reforms.
- **Limited information, uncertainty, and constrained capacity can also limit fiscal policy reform.** Uncertainty around the policy actions of trade partners and competitiveness concerns may hamper the implementation of a carbon tax or the reduction of subsidies if governments are hesitant about bearing first mover costs of pioneering carbon taxes. Similarly, implementing climate-sensitive fiscal planning requires an understanding of expected climate impacts and their implications across the economy. Uncertainties around how and when climate impacts will be felt in specific countries and their implications may limit countries' ability to integrate these factors into strategic fiscal planning. Designing and implementing climate-sensitive fiscal policies and fiscal planning requires high levels of institutional capacity, which may be lacking.
- **Countries may also be reluctant to invest scarce capital in providing climate subsidies and tax incentives or bearing any additional costs of green public procurement.** In cases where fiscal policy reform would lead to an increase in government spending or reduction in taxation, action may be limited by challenges accessing affordable capital, by hard capital constraints, or by concerns over accruing climate debt.



Climate Finance Deployment

TA	TA can help governments overcome multiple barriers to introducing fiscal policy reforms. It can provide governments with the information they need to introduce efficient and effective fiscal policies. It can also help governments overcome technical challenges in designing fiscal reforms by providing expertise and sharing best practices. TA should be flexible and tailored to the local context. Political economy challenges can often be addressed by working through institutions responsible for the planning and execution of national policies, strategies, and initiatives, informed by countries' political economy contexts.
Policy-based financing	As the implementation of fiscal policy actions and reforms is driven by public sector policy action, instruments that support the policy development process may prove critical. Policy-based financing can help overcome the cost to government of designing and implementing new policies. It can be used to address capacity or information constraints within governments or to help meet the costs of providing subsidies or incentives as part of environmental taxation policy reforms. Providing explicit financial incentives for policy action can help overcome political economy barriers to policy development. While current examples are limited, linking financial resources to changing fiscal policies, finance may help improve the efficiency of policymaking and strengthen institutions.
RBF	RBF programs may help prepare the way for carbon pricing regimes, including carbon taxes. Some climate RBF explicitly aims to support long-term, self-sustaining carbon pricing by building up the number of players engaged in results-contingent activities, building demand for technologies and supporting the creation of the infrastructure needed to support carbon pricing. In a policy support context, RBF approaches also have the benefit of reducing risks of policy reversal associated with upfront payments to support policy action.



Sector Policies

Interventions

Sector policies for climate action are policies focused on a specific sector to reduce emissions or promote resilience. Even when there are price incentives to mitigate emissions and adapt to climate change, firms and individuals may not invest in low-carbon, climate resilient (LCCR) technologies due to lack of information on market alternatives and their benefits and other non-price incentive structures that limit climate action. There are three main forms of policies that target specific sectors: regulatory standards, information provision, and network integration. Incentive schemes are also typically sector specific, but are subsumed under the Fiscal Policies lever in this report.

- **Regulatory standards can address behavioral barriers that prevent beneficial investments in mitigation and adaptation technologies.** Regulations can embed technology standards into production where price incentives are not sufficient to reach desired outcomes. This includes fuel efficiency standards or regulations on investing in infrastructure for electric vehicles. These regulations can help increase the uptake of LCCR technologies.
- **Regulatory standards can also be used to integrate energy efficiency and climate resilience considerations into new infrastructure, especially in the buildings and transport sectors, which has the additional benefit of locking in technology of the future.** These regulations may be particularly important when producers or investors may be uncertain of the benefits of adaptation or mitigation investment. For example, building developers may lack the incentives or information to install efficient boilers and air conditioning systems. Regulation can help lock in certain emissions and adaptation standards, making them part of long-lasting infrastructure.
- **Information policies can effectively address barriers to investment where there is limited awareness of technologies and their (future) benefits, even when accounting for carbon costs.** Even if abatement technologies are profitable, they are not always adopted due to a lack of awareness about their existence and benefits. Similarly, firms and consumers may not adequately account for the future impacts of climate change due to lack of information on or uncertainty around impacts and responses. Information policies can support investment in LCCR goods and services and reduce the cost of searching for economically beneficial alternatives.
- **Regulations can ensure that new, cleaner technologies have a fair opportunity to compete against incumbent, often dirtier, technology options.** As technologies change, failure to change the accompanying regulations can advantage incumbent technologies. Updating regulations to account for new, cleaner technology is necessary for their introduction and widespread deployment.

Sector policies can complement price mechanisms to address possible unwanted distributional impacts of carbon pricing and support a just transition. Policies that increase the costs of carbon may also have distributional impacts by raising energy prices in the short term. The design of carbon pricing mechanisms can help reduce this, while sector policies can complement efforts to support a just transition. For example, industrial and residential energy efficiency regulations can help keep energy use and carbon costs low, ensuring employment retention and reducing energy bills.

Barriers

- **Governments may lack the information needed to implement efficient sector-specific policies.** Developing efficient emissions reduction standards requires knowledge on where barriers to action persist and the level at which to set standards. In addition, adaptation policies require an understanding of exposure to climate risks and population vulnerabilities.
- **Supporting the implementation of sector-specific policies can be challenging for countries with limited resources and hard capital constraints.** It may be difficult for financially limited countries to implement sector policies that are costly to the public sector to impose, monitor, and enforce. For example, developing building regulations requires the public sector to have the funds and institutional capacity to monitor construction and enforce standards.
- **Policymakers may be opposed to implementing policies that are perceived to put domestic industries at a disadvantage in international markets.** Policies that impose (or are perceived to impose) additional costs on an individual sector may be vulnerable to coordinated campaigns and lobbying.
- **Incumbents benefitting from existing regulations can fight and hamper change.** Certain industries gain advantages from status quo and can influence political decision-making to resist regulatory change.



Climate Finance Deployment

TA	TA can help governments overcome multiple barriers to introducing sector-specific policies. Knowledge and best practice sharing can provide governments with the information they need to introduce efficient and effective sector-specific policies, as well as to overcome political resistance to implementing these policies. TA can also help capacity-constrained governments overcome the technical challenges of designing these regulations. There are multiple examples of climate finance supporting knowledge sharing for sector-specific policies in the energy and agricultural sectors, such as the Nationally Determined Contributions Support Facility, which has supported sectoral policies, including promoting mitigation through energy efficiency standards. TA should be flexible and tailored to the local context. Political economy challenges can often be addressed by working through institutions responsible for the planning and execution of national policies, strategies, and initiatives, informed by countries' political economy contexts.
Policy-based financing	Policy-based financing, including loans, grants, and guarantees, can help capacity-constrained governments introduce sectoral policies. Governments may face obstacles to introducing sectoral policies due to technical feasibility constraints, lack of resources, and policy risk concerns. Climate finance in the form of loans, grants, or guarantees for the development and implementation of specific sector policies can help overcome these barriers. In the context of adaptation policy, understanding where climate vulnerabilities are the highest is key to implementing efficient and effective policy. Investment instruments can support the necessary scoping activities, such as climate and population data collection and spatial risk assessment, as a precursor to introducing key adaptation policies. Policymakers may also face political obstacles to introducing sectoral policies that require re-allocating resources or creating new sources of revenue, which can be addressed with policy-based finance. Financial resources can supplement budgets and increase the political viability of expensive policies. By linking financial resources to sectoral policies, finance can help improve the efficiency of policymaking and strengthen institutions. Grants and loans may be used to address capacity or information constraints within governments or be used as part of sector policy reforms. Policy-based guarantees may also be used to support government funding for sectoral policy reforms and can, in principle, include requirements for specific sector reforms supporting climate action.
RBF	Linking financial support to policy action can reduce the resource and political constraints to introducing sector-specific policies. There are a small number of existing initiatives using RBF to link financial incentives to sectoral policy development. These include sector policies targeting electricity grid strengthening and renewable energy quality standards, the REDD+ partnership targeting sector policy reforms, and RBF for implementing deforestation regulatory policies. Additionally, the Energy+ Partnership policy results-based financing initiative aimed to incentivize governments to implement sector policy reforms, including targeting energy efficiency regulatory standards. As with fiscal policies, RBF approaches for sector policy development also have the benefit of reducing risks of policy reversal associated with upfront payments to support policy action.

Trade Policies and Green Trade

Interventions

Trade policy refers to regulations, agreements, and institutions that impact imports and exports - the policies that create the environment in which all importing and exporting businesses operate. Well-designed trade policies are important to reduce the environmental risks associated with globalization and international trade, which may otherwise exacerbate climate change.¹⁷

- **LCCR trade liberalization:** This reduces the barriers to the exchange of LCCR goods and services through import tariff reduction, increasing trade capacity and reducing non-tariff barriers to trade such as import inspection regulations. Liberalizing trade in LCCR goods and services can increase the volume of trade in these goods and services and reduce their cost as inputs to production. This can also provide consumers with more cost-effective options.
- **Trade policy as a lever:** For example, trade policy can be used to encourage domestic climate action through the formation of climate clubs. Climate clubs can develop trade agreements that reward groups of countries that commit to climate action and penalize countries that do not.
- **Border carbon adjustments (BCAs):** BCAs place an import tariff on emissions-producing goods from countries with lower carbon prices. This both reduces the risk of competitiveness concerns in the country with the higher carbon price, and, in the country with the lower carbon price, encourages the export of less emissions-intensive goods to avoid the BCA. They can also incentivize climate action to capture carbon revenues domestically rather than facing tariffs.

Trade liberalization policies and leveraging trade for climate action need to consider just transition aspects. Liberalized trade in LCCR goods may contribute to structural unemployment by facilitating shifts in sectoral production. Support may be needed to help countries adjust to the socioeconomic implications.

Barriers

Many countries face technical, feasibility, and political constraints to implementing trade policy that supports climate action. The following financial, institutional, and technical challenges can prevent even mutually beneficial trade policy from being implemented.

- **Many countries have limited financial and institutional resources.** Liberalizing trade may eliminate an important source of government revenue from import tariffs, especially for lower income countries.
- **Countries may lack the institutional, policy, and physical infrastructure to capitalize on the gains from LCCR goods trade liberalization policies.** Countries need to develop strong institutions and infrastructure in order to capitalize on the gains from trade in LCCR goods and services.
- **Even countries with strong institutions face both technical and political challenges designing border carbon adjustments and trade policies that are both beneficial and WTO compliant.**
- **Countries may face political opposition to LCCR goods trade liberalization policies due to concerns over competitiveness of domestic industries.** Political opposition may also impede leveraging trade for climate action.

¹⁷ There are several pathways by which increased trade might have negative environmental consequences on the environment. Climate-friendly trade policies, accompanying regulatory policy support and international cooperation, can reduced the risks of environmental degradation associated with increased trade and economic growth.

Climate Finance Deployment

Trade finance	Export credits can be targeted at enhancing trade in LCCR goods and services. Export credits are government-provided financial instruments that support domestic export industries by mitigating the risk of trade transactions where there can be a significant time lag between shipping and payment(OECD 2003). The full range of export credit instruments can be leveraged to support LCCR goods and services and designed to provide preferential treatment to low-carbon sectors. Export credit agencies can also support the development of LCCR export industries by making credits conditional on performance standards aligned with climate action goals. Climate finance can also complement trade finance provided by banks and foreign exchange facilities. Climate finance providers can partner with international banks or local financial institutions to increase the capacity of banks to provide trade finance for LCCR industries. For example, the International Finance Corporation (IFC) Global Trade Finance Program provides preferential treatment for trade in LCCR goods and services under its Climate Smart Trade Initiative. Foreign exchange facilities, which provide credit in the form of loans or guarantees to cover foreign exchange obligations, can similarly be leveraged to provide preferential treatment to LCCR sectors.
Policy-based financing	Policy-based finance and incentives can promote introducing trade liberalization policies that lower the tariff and non-tariff barriers to trade in LCCR goods and services. Climate finance can support governments in reducing the severity of operational licensing, removing minimum investment requirements and similar barriers that raise the cost of importing LCCR goods and services. Climate finance can also be made conditional on the adoption of environmentally-friendly practices within the value chains of products and services covered by international trade agreements, in effect, making policy-based financing results-based.
TA	TA can support countries to build the policies, capacity, and infrastructure for trade liberalization in LCCR goods and services. Developing countries may face capacity constraints in reaping the benefits from trade due to lack of institutional and physical infrastructure. A key program of work within aid for trade includes the deployment of technical assistance for trade-related capacity building. TA also has the potential to support countries in integrating LCCR trade development into national agendas or developing BCAs or trade agreements that incentivize climate action.
Investment financing	Investment financing, including grants, loans, equity, and guarantees, can be provided to projects that facilitate trade liberalization policies for LCCR goods. While investment financing has not traditionally been used in an explicitly LCCR goods and services trade policy context, aid for trade finance has been leveraged to support developing countries in building trade capacity and infrastructure needed to benefit from trade liberalization. Aid for trade funding can be used to build trade infrastructure necessary for LCCR trade and ensure that physical infrastructure is made climate-resilient.

Innovation and Technology Transfer

Interventions

Climate innovation relates to the development of new goods, services, technologies, and business models that support climate action. Innovation includes the development of new products or inventions, as well as the concept of technology transfer, which refers to the dissemination of knowledge, skills, and physical technologies between and within countries. Innovation and transfer of technologies and business models can play a critical role in delivering transformational change. By facilitating the provision of LCCR goods and services at lower cost and improved quality or convenience, countries can more easily shift to low-carbon, resilient development pathway.

The innovation process and interventions to support it differ widely across countries at different stages of development. The innovation chain is a complex process encompassing activities from basic research to commercialization of technology in local contexts. Activities at the early stage of the innovation chain tend to be more heavily concentrated in developed countries. As technologies are transferred to less developed countries, there are opportunities for further innovation and commercialization. Governments of both developed and developing countries can deploy a range of policies to increase the domestic supply and demand of innovation.

- **Supply side measures include a wide range of policies that reduce the costs or otherwise make it easier to undertake climate innovation.** These include public funding or tax credits for research and encouraging technology transfer through policy and developing international partnerships for research, design, and development (RD&D).
- **Demand side measures are policies that increase the returns that the private sector can realize from undertaking climate-related innovation.** These include strengthening intellectual property rights, procurement schemes, and prizes that provide financial incentives, as well as other climate policies like energy regulations that stimulate demand for LCCR technologies.

Innovation, and policies to support it, can support the just transition if public interventions support technologies and sectors that advantage the poor and disenfranchised. In the short-term, some innovations may provide benefit to higher income groups, such as electric vehicles, while others support lower income groups, such as the development of drought-resistant seeds. In the longer term, climate innovation and the new sectors it stimulates will be vital to providing new economic opportunities.

Barriers

A range of barriers can hold back government and international support for climate innovation. These include the following:

- **The benefits of supporting innovation and implementing innovation policies are diffuse and long-term, whereas the costs are direct and short-term.** Investing in innovation may have uncertain payoffs and lead to long-term spillover benefits that are difficult to identify and quantify. This may prevent public sector support for innovation and make expenditure difficult to justify in an environment of competing short-term financing requirements. This is a particularly salient issue for countries with limited resources and hard capital constraints.
- **Limited capacity to implement innovation policies and to develop the broader ecosystem that supports innovation, and/or to respond to the incentives that policies create, can limit both the creation and successful execution of such policies.** The success of innovation policies is reliant on the capacity of government institutions to develop and implement effective policies, regulations, and financing schemes and for the private sector to respond to those incentives.¹⁷
- **Limited pre-existing innovation communities in developing countries could lead to a low innovation trap due to the lack of an established constituency pressing for innovation support.** There is likely to be greater interest in policies to support innovation, such as intellectual property rights regimes or financial incentives, when there is a pre-existing innovation community or constituency that stand to benefit from such policies. This feedback loop can go the other way when limited support for innovation leads to a small innovation sector and little interest in innovation support policies.

Climate Finance Deployment

A range of different climate finance tools can help overcome these barriers. Given the complexity in developing a robust climate innovation ecosystem that cuts across basic science, financial markets, public and private actors, and consumer uptake, most climate finance instruments have relevance for supporting climate innovation at national and global levels. Tailoring and prioritizing uses of climate finance for maximum benefit requires considering both the particular circumstances of each country and the maturity of the technologies being considered.

¹⁷ "A recent study on adaptation and innovation has, e.g., shown that innovation on adaptation is primarily concentrated in high-income countries and in general not transferred to lower income countries. For more detail see: <http://documents.worldbank.org/curated/en/648341591630145546/pdf/Invention-and-Global-Diffusion-of-Technologies-for-Climate-Change-Adaptation-A-Patent-Analysis.pdf>"

Investment instruments	Equity or debt investments on commercial or concessional terms can overcome the lack of access to capital that often holds back innovation. Climate action projects, including innovation, have higher real and perceived risk than projects with a proven track record. This can make it difficult for such projects to access external finance, a barrier capital-constrained domestic governments are hard pressed to overcome. Climate finance provided through various investment instruments at favorable terms can offer financing at a cost that allows innovative projects to proceed. Commercial or near-commercial term public investments and international RD&D partnerships can also leverage further private sector investment in innovation. Grants can also be used to overcome barriers in accessing finance. A number of existing climate finance initiatives provide grants to help with the development of innovative projects, including the Africa Clean Energy Facility and the US-India Clean Energy Finance Initiative. Grants can be particularly valuable in bridging the viability gap for innovative projects that often arises at the early stage of the innovation chain.
TA	TA can improve policies for innovation and support the private sector in undertaking innovation. TA can provide governments with market intelligence to set up efficient and effective innovation policies. It can also support the private sector by providing talent development, strategy and business model development, assistance on getting regulatory approvals, access to finance linkages, and setting up partnerships. TA covers a broad set of interventions that need to be tailored to the receivers' needs and fit the context targeted by the innovation. International RD&D partnerships can be an effective way of encouraging knowledge sharing and technology transfer. These partnerships are often implemented through a combination of TA and investment financing instruments. Innovation partnerships, which deploy technical assistance via knowledge sharing and by partnering with local stakeholders, can increase the impact of innovation efforts. The effectiveness of these partnerships depends on the level of engagement of local stakeholders in order to develop technologies that are relevant to local needs and priorities.
RBF	RBF can help support innovation by boosting the low returns that climate-related innovation faces due to difficulty in appropriating the benefits of innovation, lock-in, or and similar effects. Results can be characterized by specific innovation outputs or can be designed to encourage experimental business design. Innovation prizes and competitions are an important form of RBF used in developed countries but, to date, have been used less frequently to stimulate innovation in developing countries.
Policy-based finance	Policy-based finance has the potential to provide governments with incentives to provide a stable policy environment that fosters innovation. The general stability of the policy and regulatory environment can stimulate private sector investment in new technologies. Environmental policy stability is necessary for inducing private sector investment in climate-related technologies. Policy can also support innovation by legitimizing new technologies through their identification in regulations. While this instrument can be used in principle to support climate innovation, there are few examples of its use in practice.

Carbon Markets

Interventions

Carbon markets are an efficient, cost-effective, and flexible way to manage the unpriced costs of carbon.

By putting a price on carbon emissions, carbon markets create clear economic incentives for emissions mitigation. Carbon markets are generally considered to be the most cost-effective way reducing emissions (alongside carbon taxes) as they do not require governments to have detailed knowledge of where and how emissions reductions should be delivered or whether governments or consumers should bear the attached costs. The immediate adjustments to incentives provided by carbon markets can support substantial mitigation in the near term. A careful market design can also help steer the economy towards long-term transformational change.

Policy makers can support climate action through establishing domestic carbon markets or by linking two or more existing carbon markets to achieve greater scale and more efficient mitigation. There are two broad design options for carbon markets:

- An **emissions trading system (ETS)** or cap and trade system is one where the total volume of emissions in a jurisdiction is limited, and each firm has a set of tradeable emissions allowances. If a firm's emissions exceed the allowances allocated to them, they are required to either reduce their emissions or purchase more allowances from another firm that has emitted less than the permissible amount, resulting in a market price for emissions. Examples of this system include the European Union ETS established in 2005.
- A **baseline and credit (BAC) system** is one where no limit on emissions is explicitly specified. Instead, an emissions baseline, typically in terms of emissions intensity, is established for an industry or jurisdiction. Firms with emissions intensity below the baseline earn credits, which can then be sold to firms with emissions intensity above the baseline at a market price. Examples of domestic BAC systems include the Brasil Marta Viva (BMV) Standard, J-VER in Japan, and Panda in China.

Governments may choose to link carbon markets across jurisdictions to support lower cost emissions reductions across linked markets. Linking carbon markets can increase the cost-effectiveness of emissions reductions, support investment into lower income countries, and support international cooperation. In addition, linking carbon markets can help address competitiveness concerns of implementing domestic climate policy and avoid carbon leakage.

Some carbon markets allow for offsets, whereby emission reductions achieved outside of the system can count towards the emission reductions achieved by entities within the system. In deciding whether and how to allow such offsets, policymakers need to be confident that they represent additional emission reductions that would not have been realized without the carbon market.

Carbon markets can be designed to support a just transition. Transitioning to a LCCR economy necessitates sectoral shifts, which can have negative consequences on workers in high-emissions industries. Carbon markets can be designed to avoid penalizing labor-heavy industries by, for example, providing free emissions allocations to industries where there is a risk of job loss or lack of competitiveness. In addition, carbon market revenues can be used to support the growth of alternative industries and fund the development of re-skilling programs and other enabling conditions that support the just transition.

Carbon markets must be carefully designed to deliver their potential benefits and to avoid creating perverse incentives. For carbon markets to effectively and efficiently reduce emissions below the business as usual baseline, they must be designed to ensure additionality, minimize leakage, and retain domestic

competitiveness. Care must be taken to avoid incentives that inflate emissions immediately before the introduction of a carbon market in order to make it easier to reduce emissions when the market begins operation. Carbon offset mechanisms must be designed to reduce the risk of crediting non-additional emissions reductions. Carbon markets must also avoid providing perverse incentives for emissions reduction in the short-term at the expense of long-term emissions reductions, or unintended negative outcomes, for example, by promoting investments in efficiency improvements of coal fired power generation that lock out shifts towards renewable generation. Finally, carbon markets must be designed to reduce the risk of leakage (when a policy results in emissions increasing in countries or regions that have less stringent environmental policies) and to safeguard the competitiveness of domestic industries.

Barriers

- **Uncertainty around carbon prices and competitiveness concerns can hamper the implementation of a domestic carbon market.** Implementing an ambitious climate policy can lead to a loss of domestic industrial competitiveness and carbon leakage if emissions-intensive industries choose to relocate to a less stringent policy environment. Governments may be reluctant to pioneer carbon markets in their regions if they cannot be certain of the stringency of trade partners' carbon pricing policies.
- **Lack of experience and capacity limit both the public and private sector in engaging in carbon markets.** In the public sector, developing countries face capacity barriers to designing and managing complex carbon market mechanisms. In the private sector, industries and companies may lack of experience with monitoring and reporting emissions, price-based signals and engagement with a carbon marketplace, and designing investments to deliver emissions reduction.



Climate Finance Deployment

Climate finance instruments to support policy development and capacity building in the public sector and to incentivize private sector engagement can promote carbon market development. Investment instruments can be used to support the price incentive provided by carbon markets, while price guarantees enacted through financial derivatives (like put options) may also help overcome risks of volatile carbon prices.

RBF	RBF is a powerful instrument for supporting the development of carbon markets. It can be used to facilitate action both domestically and internationally. There are three avenues by which RBF can help establish and expand climate markets: facilitating a private sector response to environmental pricing, supporting domestic policy processes and building targeted implementation capacity, and developing MRV systems that are needed in both RBF and carbon markets. RBF can also support emissions reduction policies through policy crediting, the crediting of emissions reductions from policy actions.
TA	Technical assistance and capacity building are vital to the establishment, development, and linking of carbon markets. ETS design is a complex undertaking, and poor design can have damaging financial and political repercussions. It needs to take into account national circumstances, which may include a government that does not possess the expertise to design and implement carbon markets. Climate finance can have a significant impact by providing TA to overcome this barrier. Furthermore, linking carbon markets across jurisdictions will necessitate supranational coordination. TA can be provided at a national or international level, and to governments or the private sector. It can take the form of developing MRV systems, collating international best practices, and funding pilot systems, among other interventions. The Partnership for Market Readiness (PMR), administered by the World Bank, is one of the largest providers of TA for the development and implementation of carbon markets. The PMR supports countries to develop the foundational infrastructure for carbon pricing, including carbon markets. This includes work on developing GHG baselines, systems for MRV, offset standards, and helping launch pilot programs.
Investment financing	Investment financing through loans, grants, and guarantees can be used to reduce the risks of delivery on carbon assets. In cases where carbon markets are linked across geographies, or where international offsets are used, emission reductions are generally purchased by buyers in industrialized countries from sellers in developing countries. In these cases, buyers may lack confidence in the regulatory systems for the transfer of the compliance asset in seller countries or may be wary of political risk. Guarantees backed by climate finance can be used to compensate buyers in case of failure to deliver the purchased emissions reductions. In addition, investment loans and grants can incentivize the development of offset projects where there are capital constraints associated with their financing. Other climate finance-supported instruments (such as derivatives) can be used to overcome the disincentive created by low or volatile carbon prices. These instruments, while not formally classed as guarantees, can be used to provide certainty around prices for emissions credits or emissions allowances from domestic ETS and BAC systems, or for internationally traded offsets.

Climate Intelligence and Data

Interventions

Climate data and intelligence can support action among both public and private actors to deliver transformative mitigation and improve planning for climate resilience. Climate data is any information related to GHG emissions sources, emissions reduction targets and trajectories, technology development, physical climate changes, population vulnerabilities, and more. Climate intelligence is the suite of models, tools, and other ways in which climate data is used to estimate the physical impacts of climate change, to inform the development of policy scenarios for mitigation and adaptation, and to help understand the economic costs of public and private actions.

Climate change adaptation and mitigation decisions span across two dimensions: decisions related to the physical climate risk and to implementing the transition to a low-carbon economy, and decisions made by the public and the private sector. Climate intelligence and data can support decision making across these dimensions in the following ways:

- **Planning tools to support public sector transition planning:** Climate intelligence tools can inform on long-term emissions strategies and the required economy-wide climate action.
- **Policy and regulatory risk information to support private sector transition actions:** Climate intelligence and data tools support long-term investment decisions on both risks and opportunities that arise from the transition to a low-carbon and climate resilient future.
- **Disaster risk management tools to support public management of physical risk:** Climate intelligence and data on physical risks supports the public sector in understanding and managing climate impacts and informs their resilience strategies.
- **Localized climate impacts and opportunities data to address asset-level physical risk:** Climate intelligence and tools can alert public and private asset owners and managers to understand their exposure to physical climate impacts and respond accordingly.
- **Data and information on co-benefits and on approaches to support a just transition:** Climate data and tools can help public and private actors identify potential groups that may be vulnerable to negative impacts from the climate transition and to the physical impacts of climate change, and to devise response strategies.

Barriers

Despite the necessity of climate intelligence and data, action to provide it is often limited. Climate data is often, but not always, considered a public good. As such, the private sector is a tepid actor because organizations that develop data cannot always ensure they will be able to control access or recoup their investment. As a result, climate intelligence and data are often funded by the public sector, which can be limited by financial resources, technical capacity, and uncertainty over the value of the investment.

- Collecting climate data and developing climate intelligence tools can be challenging for countries with limited financial resources. Additionally, there may be uncertainties surrounding the use of the data and the benefits of investing in tools, which may further compound the challenge of justifying public expenditure.
- Climate data is inherently complex; collecting and transforming it into climate intelligence requires significant technical expertise across disciplines.
- Uncertainty around the need to incorporate climate or ESG into decision-making can deter companies and public institutions from investing in climate data and intelligence. Furthermore, uncertainty regarding the stringency, swiftness, and stability of policy response to climate change can also deter investment assessments or tools to support the low-carbon transition.



Climate Finance Deployment

Grants and technical assistance are key climate finance instruments to support the generation and uptake of climate intelligence and data. There is also a more limited role for equity and debt investment financing instruments to incentivize private investment in climate intelligence, and for policy-based financing to support uptake of climate intelligence by integrating its development into broader policy programs.

TA	TA is well-suited to transfer knowledge, expertise, and skills; it can play a key role supporting the development of climate intelligence and data and its use in decision-making. Climate information is inherently uncertain and complex, and its collection and interpretation require significant technical expertise from a range of disciplines. Using TA enables donors and investors to focus on working with organizations to show them how they can use climate intelligence to build and manage their own climate resilient infrastructure. Local capacity to develop and use climate intelligence and data can be built up using TA suited to the goals of the beneficiary. National-level climate finance trackers can be developed. TA for climate intelligence can also support decision making in the face of uncertainty. Private sector parties can use TA to turn uncertainty into risk management, drawing on climate intelligence. TA and knowledge sharing to conduct robust climate risk assessment is particularly impactful in contexts where long-term, high-quality records of climate statistics are not readily available.
Investment financing	Equity investments, loans, and grants can be used to support the development of tools or open-source data that are in the public interest, including fundamental scientific research on global emissions trajectories, which aid both mitigation and adaptation efforts. In order to support effective climate actions at different scales, climate data needs to be rich, comparable across different geographies, and readily accessible. Given constraints to private delivery of climate information on commercial terms and likely access restrictions on any such data that is privately produced, it is key for governments and international organizations to consider their role in providing this data. For example, grants have been fundamental in developing integrated assessment models. Investment instruments can also be used to fund physical infrastructure for climate intelligence and data gathering projects or tools to support decision-making. Equity, loans, or grants can be used to fund expensive infrastructure needed for local information gathering (e.g., automatic weather stations or hydrological monitoring systems) and technical work on modelling impacts based on this information. These instruments overcome the income and access barriers to producing and maintaining good climate data and intelligence tools.
RBF	Prizes and competitions can mobilize participants and capital and set a problem-solving agenda. RBF in the form of prizes can incentivize the development of innovative climate information products. This may include new methods of collecting, interpreting, or visualizing data and, in developing countries, new ways to communicate information to remote communities. Innovation prizes are likely to be most successful when supported by other climate finance instruments that support their uptake.
Policy-based financing	Policy-based finance can be used to incentivize a broader focus on climate intelligence and data that goes beyond project level. Resource-constrained policymakers may lack the incentives to use public funds for capital intensive and technically difficult data and tools. This can be overcome by explicitly requiring the collection of climate data or development of climate tools as part of a wider development program.

