Global Green Growth Institute

Mind the Gap

Bridging the Climate Financing Gap with Innovative Financial Mechanisms

Insight Brief 1 / November 2016

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Cover Photo: Construction in progress of a mass rapid transit line. Courtesy of ThamKC, iStock Photo.

Insight Briefs are based on GGGI's experience and analysis. GGGI will produce additional Insight Briefs from new insights gained while working to find ways to finance green growth.

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Executive Summary

In 2015, the international community convened at the Conference of Parties (COP) 21 in Paris and committed to limit global temperature rise to two degrees Celsius. It also pledged to support least developed countries (LDCs) and emerging economies in their efforts to mitigate and adapt to the impacts of climate change while still pursuing economic development.[1] At the Global Green Growth Institute (GGGI), we believe that the best path forward for policymakers, public financial institutions, and other stakeholders working for and with LDC and emerging economy governments is to pursue strong, inclusive, and sustainable "green growth," defined as economic growth that achieves – and, in many cases, is driven by – significant environmental protection.[2]

Yet public finance alone cannot provide the capital needed to finance all climate mitigation and adaptation projects, estimated to cost as much as USD 16.8 trillion total over the next fifteen years.[3] In a 2015 report, the United Nations acknowledged that the majority of future climate finance must come from the private sector, an understanding widely shared within the climate finance community.[4]

For public sector actors interested in bridging the climate financing gap, one of the most critical concerns is how to best use the pool of dedicated international and domestic public capital available, which is often designed specifically to catalyze significant private sector investment in climate projects. In GGGI's view, the public sector must adopt innovative solutions that address one of the most important underlying causes of private sector underinvestment: high investment risks.

As part of GGGI's Strategic Plan 2020 to accelerate the transition toward green growth, in this Insight Brief, we present the case for **innovative financial mechanisms**. Though widely discussed in the international community, our review of existing research reveals that such mechanisms are still relatively uncommon and that little information is tracked at the project level, which is where innovation in financial structuring actually occurs. However, when deployed in markets with robust financial policy frameworks in place – an important precondition – innovative financial mechanisms have demonstrated potential to successfully blend public and private capital as a means to mitigate high investment risks, thereby unlocking greater private sector investment in climate projects. To replicate this initial success and deploy them at scale, GGGI believes that policymakers, public financial institutions, and other stakeholders must first appreciate the function, characteristics, and use of such mechanisms, specifically in the context of the project development lifecycle.

We define innovative financial mechanisms as financial structures that, at a minimum:

1. Blend financial instruments;
2. Reduce specific investment risks; and
3. Leverage private capital.

Innovative financial mechanisms are necessary to advance climate projects in LDCs and emerging economies through several stages of financing: early stage, bankable, financed, and mature (i.e., operational). Each stage faces distinct investment risks and attracts different sources of capital. Without risk reduction, especially during earlier stages, most climate projects' investment profiles remain high risk and low return, which deter participation from private sector capital. Commercial investors (e.g., banks, private equity firms) will only consider investing once early stage projects reach bankability. Institutional investors (e.g., investment funds, insurance companies, pension funds, sovereign wealth funds), which have even lower risk tolerance, are only able to participate once projects are financed and reach maturity.

When applied strategically, innovative financial mechanisms address specific investment risks at each stage of project financing in order to mobilize limited public capital to catalyze much larger private investment from commercial and institutional investors. The key is to identify their optimal use.

Policymakers, public financial institutions, and other stakeholders know that they must leverage private investment, but are often unsure of where to begin. To assist them in this task, we have mapped each traditional financial instrument to five broad categories of risk (i.e., political, regulatory, technology, credit, capital markets) at every stage of project financing. GGGI believes that our focus on risk reduction by encouraging innovative structuring will provide the basis for future work to create a repository of the most effective innovative financial mechanisms used in climate projects around the world, including GGGI-supported projects. Finally, we have also provided three case studies to demonstrate the function, characteristics, and use of innovative financial mechanisms in practice and underscore their potential for catalytic and scalable impact.

1 Adoption of the Paris Agreement." United Nations Framework Convention on Climate Change (UNFCCC), 2015.
2 Jacobs, Michael. "Green Growth: Economic Theory and Political Discourse, Grantham Research Institute on Climate Change and the Environment." London, United Kingdom, 2012.
3 "Energy and Climate Change: World Energy Outlook Special Report." International Energy Agency (IEA), Paris, France, 2015.
4 "Trends in Private Sector Climate Finance." United Nations (UN), 2015.

Introduction

At the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP) 21 in Paris, 197 countries submitted their Intended Nationally Determined Contributions (INDCs) to mitigate and adapt to climate change. To date, over 100 countries have now submitted their Nationally Determined Contributions (NDCs) and ratified the Paris Agreement, which entered into force in November 2016.[5]

For least developed countries (LDCs) and emerging economies, in particular, NDCs represent an opportunity to move towards a new model of strong, inclusive, and sustainable economic growth – what we refer to at the Global Green Growth Institute (GGGI) as "green growth".[6] They also represent a challenge: how to unlock the investment needed to finance fundamental infrastructure and development projects (e.g., renewable energy generation, waste and water management, clean transportation) that will lift millions of citizens out of poverty while also meeting international commitments.

Wealthy industrialized nations have already pledged to support LDCs and emerging economies in mitigating and adapting to climate change, committing in 2009 to USD 100 billion per year in climate finance by 2020.[7] While public climate finance on this order of magnitude has begun to flow into infrastructure and development projects from several dedicated sources (e.g., multilateral and bilateral financial institutions, climate funds, national and subnational budgets), it is not sufficient on its own to supply the projected USD 16.8 trillion in climate finance required over the next fifteen years.[8] Therefore, to truly transform economies and improve lives on a global scale, policymakers, public financial institutions, and other stakeholders need to mobilize dedicated public capital to catalyze greater private investment.

Private sector underinvestment in climate projects is primarily the result of high investment risks, both real and perceived, that are common in emerging markets. Standard investment practices have proven unable to adequately mitigate such risks. Thus, accomplishing LDCs' and emerging economies' green growth objectives will entail identifying – and scaling – new approaches to project structuring and risk mitigation in order to attract significant funds from commercial and institutional investors.

In this Insight Brief, our aim is to advance the public sector's understanding of innovative financial mechanisms by examining their function, characteristics, and use in order to optimize their impact. Adopting a project finance perspective, our analysis will demonstrate how public sector actors can strategically use **innovative financial mechanisms** to address specific investment risks as a way to leverage private investment and, ultimately, bridge the climate financing gap.

Specifically, this work attempts to answer two key questions:

1. What makes a financial mechanism "innovative"?
2. How can innovative financial mechanisms be used most effectively to unlock significant private investment?

Box 1: A Note on Terminology

Below we have provided a definition for several common terms used throughout this Insight Brief:

Climate project refers to any climate change mitigation or adaptation project. However, this work focuses on mitigation projects that produce cash flows that are attractive to private investors.

Climate finance refers to all public and private investment, grants, and technical assistance for climate projects.

Financial instrument refers to a contract regarding a tradeable financial asset. Well-known financial instruments include equity, debt, guarantees, grants, and insurance.

Financial mechanism refers to a combination of financial instruments and structures used to finance one or more stages of a project.

Leverage, as we are using it in this work, refers to the ability of public capital to mobilize larger amounts of capital (especially private) for investment in a specific project. It has the same meaning as "catalyze".

It is critical to investigate these questions because, prior to adopting innovative financial mechanisms, policymakers, public financial institutions, and other stakeholders must first understand how they work. More importantly, in order to maximize the impact of limited dedicated climate funds, public sector actors must be able to structure innovative financial mechanisms to target and mitigate specific investment risks at each stage of project financing. If successful, such actions will allow climate projects to access much larger pools of private investment capital held by commercial and institutional investors.

GGGI is dedicated to supporting our member countries as they move towards a model of green growth. As part of our ongoing efforts to increase green investment flows and improve multi-directional knowledge sharing and learning, this Insight Brief will be the first in a series of examinations on how best to de-risk climate projects with innovative solutions that use a combination of public and private capital to identify optimal structures for financing climate projects. It is based on insights that GGGI has gathered as it works in countries around the world to develop bankable projects, financial vehicles, and financial mechanisms for green infrastructure.

5 UNFCCC 2015.; "The Paris Agreement." United Nations Framework Convention on Climate Change, http://unfccc.int/paris_agreement/items/9485.php.; "NDC Registry (interim)." United Nations Framework Convention on Climate Change, http://www4.unfccc.int/ndcregistry/Pages/All.aspx.

6 Jacobs 2012.

7 "Copenhagen Accord." United Nations Framework Convention on Climate Change, 2009.

8 "Climate Finance in 2013-14 and the USD 100 billion goal." Organisation for Economic Co-operation and Development (OECD), Climate Policy Initiative (CPI), 2015.; IEA 2015a.

1. The Climate Financing Gap

1.1. Current Supply of Climate Finance

To understand the scope of the challenge, it is important to first identify a baseline for the current supply of climate finance. Though measurements and projections on this scale are inherently imprecise, organizations have developed methodologies to track current climate finance investment:

- In the *2014 Biennial Assessment and Overview of Climate Finance Flows*, the UNFCCC estimated that total global climate financing in 2012 reached between USD 340–650 billion. Of that total, USD 40–175 billion flowed from developed to developing countries, while the balance of the financing was invested in developed countries.[9]

- The Climate Policy Initiative (CPI) calculated that there was USD 392 billion of climate finance investment in 2014 that it could verify, but suggested that total climate financing was likely much higher: at least USD 485 billion. Investment in countries outside of the Organisation for Economic Co-operation and Development (OECD) totaled USD 206 billion, while investment from public financial institutions totaled USD 151 billion.[10]

- Looking specifically at the energy sector – which accounts for almost 80 percent of all climate financing – the International Energy Agency (IEA) estimated that 2013 clean energy investment totaled USD 470 billion, roughly in line with UNFCCC and CPI estimates.[11]

- For climate change adaptation projects, public financing specifically for developing countries reached USD 22.5 billion in 2014.[12]

These data indicate that climate projects are accessing some measure of public and private capital. However, it is difficult to determine whether this level of funding is sufficient until we compare it with future demand for capital (i.e., the minimum amount of investment required to meet international climate change mitigation and adaptation goals).

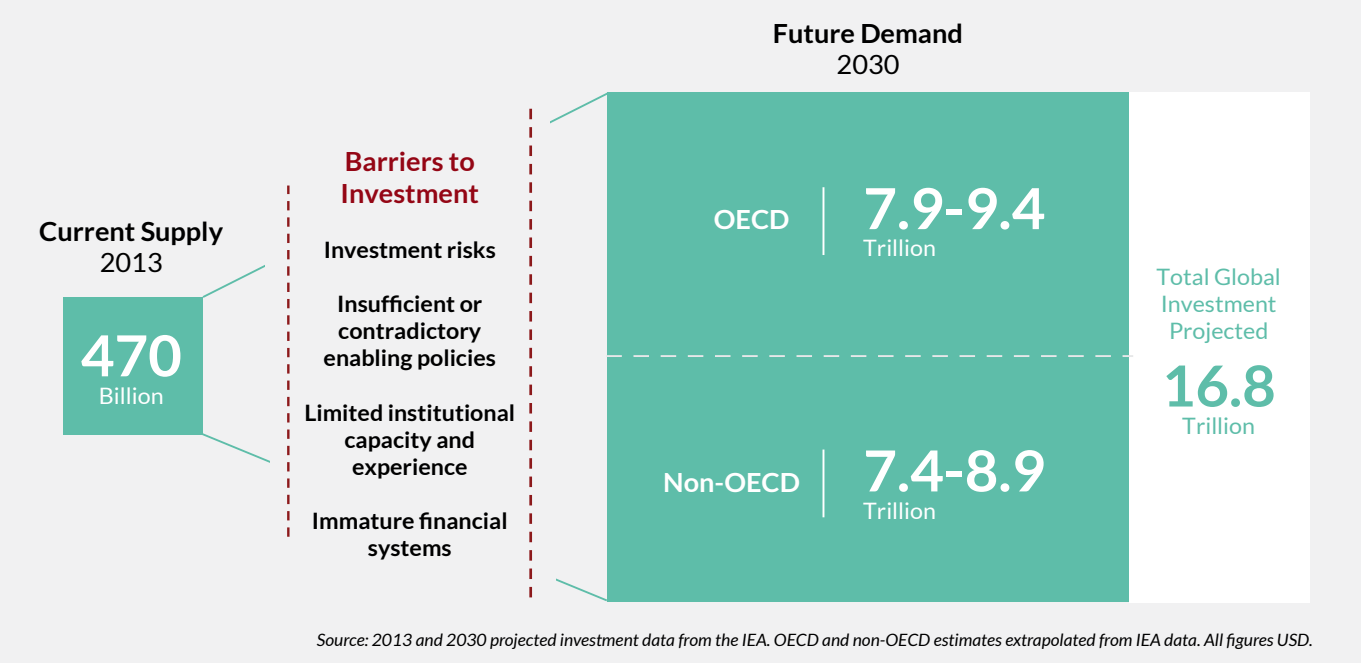
1.2. Future Demand for Climate Finance

It is even more difficult to forecast the precise amount of climate finance required to meet international sustainable development goals due to the macroeconomic variables involved (e.g., economic growth, population, rate of technological adoption). The United Nations Environment Programme (UNEP), the New Climate Economy, and several other organizations cite as a target an estimated USD 90 trillion in total infrastructure investment globally between 2015 and 2030, though this figure includes infrastructure projects unrelated or only tangentially related to climate change mitigation and adaptation activities.[13] Nonetheless, it is a staggering target when compared to historical totals.

Using the energy sector as a proxy for climate finance, the IEA provides a more precise target. It projects that total cumulative spending on renewable energy and energy efficiency during the next 15 years must reach USD 13.5 trillion in order to meet NDC targets. However, to stay below an atmospheric greenhouse gas (GHG) concentration of 450 parts per million, the IEA also presents a more aggressive scenario with an additional USD 3.3 trillion in new investment required by 2030.[14] Extrapolating from IEA data, GGGI determined that, of the USD 16.8 trillion in total, an estimated USD 7.4–8.9 trillion will be required for climate finance investment in non-OECD countries (see Figure 1).[15]

9 "2014 Biennial Assessment and Overview of Climate Finance Flows." United Nations Framework Convention on Climate Change (UNFCCC), 2014.
10 Buchner, Barbara K., Chiara Trabacchi, Federico Mazza, Dario Abramskiehn, and David Wang. "Global Landscape of Climate Finance 2015." Climate Policy Initiative (CPI), 2015.
11 IEA 2015a.; Buchner et al. 2015.
12 "The Adaptation Gap: Finance Report." United Nations Environment Programme (UNEP), Nairobi, Kenya, 2016.
13 "Better Growth, Better Climate." New Climate Economy (NCE), 2014.; "Progress Report on Approaches to Mobilising Institutional Investment for Green Infrastructure." Organisation for Economic Co-operation and Development (OECD), 2016.
14 "Energy and Climate Change: World Energy Outlook Special Briefing for COP21." International Energy Agency (IEA), Paris, France, 2015.
15 GGGI calculation based on INDC and 450 Scenarios in Figure 2.4 of IEA 2015a and data from pg. 4 of IEA 2015b. Range assumes 0/100 percent and 100/0 percent distributions of non-attributed projected funding between OECD and non-OECD groups.

Figure 1: Clean Energy Investment Gap



Source: 2013 and 2030 projected investment data from the IEA. OECD and non-OECD estimates extrapolated from IEA data. All figures USD.

Looking specifically at financing for climate change adaptation, estimates range from USD 70–300 billion per year by 2030, up to 13 times more than 2014 estimates. Moreover, adaptation costs will continue to rise, reaching an estimated USD 500 billion per year by 2050.[16]

1.3. A Gap and an Opportunity

When compared to projections, even the most optimistic estimates of current climate finance demonstrate that there is a sizeable gap. Our preliminary analysis indicates that total climate finance in non-OECD countries will reach USD 4.0–4.9 trillion from 2016 to 2030.[17] Compared with the total investment required over the next fifteen years, our estimate suggests that **the climate financing gap is USD 2.5–4.8 trillion**. Phrased differently, bridging this gap would require an additional USD 166–322 billion per year.[18] Moreover, if we use CPI's estimate of USD 151 billion in public climate financing in 2014, the gap increases to almost USD 400 billion per year.[19]

Given the uncertainty of the data and simple assumptions made, these calculations are meant to be demonstrative rather than precise. They illustrate that public financing, no matter how robust, will be insufficient to bridge the climate financing gap on its own.

Though the magnitude of the climate financing gap may seem daunting, it also represents an opportunity for public sector actors to mobilize the pool of dedicated public funding available for climate change mitigation and adaptation projects – found in multilateral and bilateral financial institutions, climate funds, national and subnational budgets, and other sources – to attract private capital looking to invest in large infrastructure and development projects. To do so, public sector actors must first appreciate the different types of investment risks present in climate projects, as well as private investors' risk-return expectations.

16 UNEP 2016.
17 GGGI projection assumes a 3-5 percent annual growth rate applied to data in Buchner et al. 2015.
18 GGGI calculation based on methodology from previous calculations derived from IEA 2015 a, IEA 2015b, and Buchner et al. 2015.
19 GGGI calculation based on methodology from previous calculations derived from IEA 2015 a, IEA 2015b, and Buchner et al. 2015.

2. Investment Risks and Investor Expectations

2.1. Increased Investment Risks

We know with certainty that the climate financing gap is not due to a lack of private investment capital. The OECD estimated that, in 2012, institutional investors (e.g., investment funds, insurance companies, pension funds, sovereign wealth funds) held close to USD 83 trillion in assets under management.[20] Yet climate projects in LDCs and emerging economies have struggled to attract commercial and institutional investors due to a number of barriers that increase the risks of investment. Ultimately, though, to bridge the climate financing gap, these projects need to be able to access the sizable pool of institutional investor capital.

Building on previous research from the United Nations Environment Programme (UNEP), CPI, the World Economic Forum, the International Renewable Energy Agency, and others, as well as our experiences advising national governments and de-risking projects, GGGI has identified the most common risks faced by climate projects in LDCs and emerging economies (summarized in Table 1).[21] We use this categorization as the basis for determining which financial instrument(s) to select to mitigate investment risks.

Table 1: Summary of Investment Risks

Category of Risk	Common Examples
Political Risk	Unstable political environment
	National and local security concerns
	Changes in national or local government support for climate projects
Regulatory Risk	Policies that promote business-as-usual "brown" growth (e.g., fossil fuel subsidies, restrictive permitting and licensing)
	Insufficient or contradictory enabling policies (e.g., feed-in-tariff, tax incentives)
	Weak legal frameworks and limited enforcement of regulations
	Regulatory changes that adversely impact projects
	Frequent changes to regulation that create instability
Technology Risk	Technology underperformance
	Limited in-country expertise in construction of climate projects
	Limited in-country expertise in operations and maintenance of technologies
	Inadequate supporting infrastructure (e.g., information and communications technology, transmission and distribution)
Credit Risk	Counterparty creditworthiness, risk of default or non-payment
	Counterparty expertise
	Limited national and local experience with project management
	End-user payment for public services
Capital Markets Risk	Immature national and local financial markets
	Limited market liquidity
	Currency fluctuations and depreciation
	High transaction costs

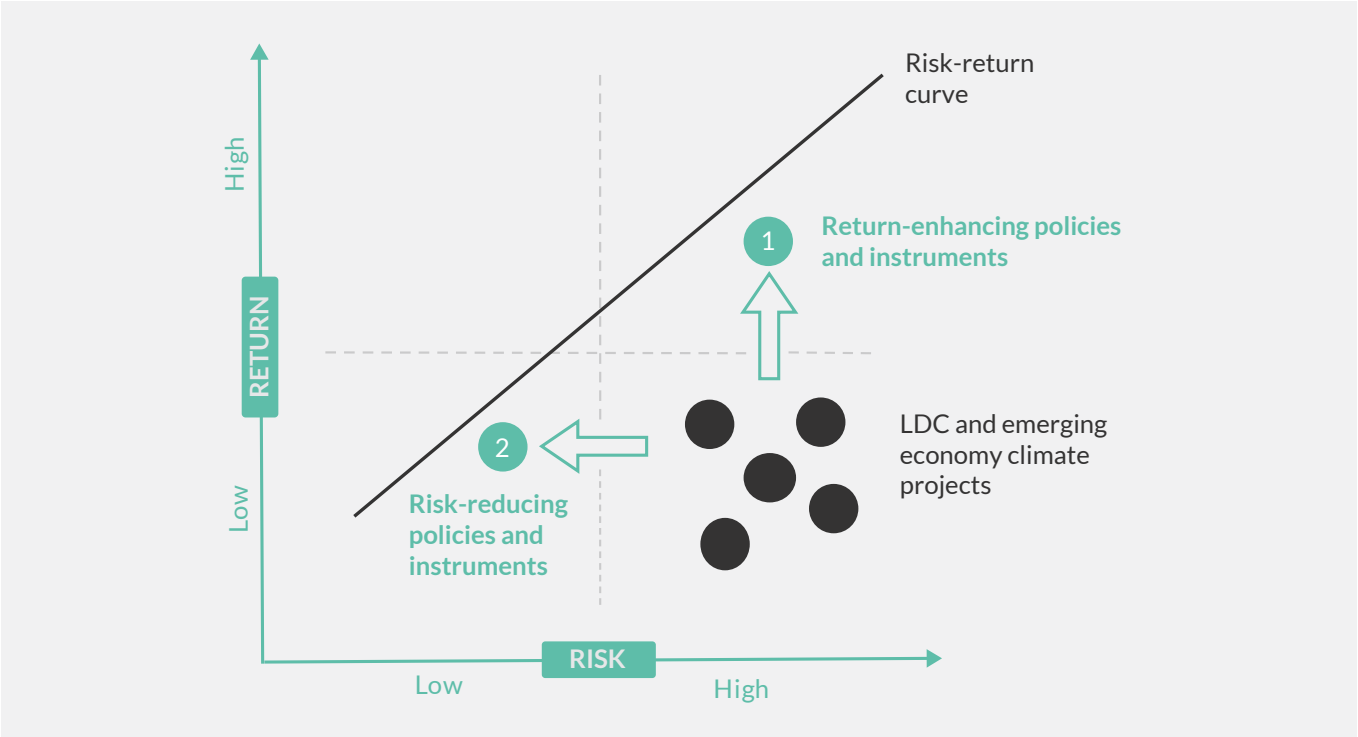
20 "Institutional Investors and Long-term Investment Project Report." Organisation for Economic Co-operation and Development (OECD), 2014.

21 UNEP 2016.; Buchner et al. 2015.; Frisari, Gianleo, Morgan Hervé-Mignucci, Valerio Micale, and Federico Mazza. "Risk Gaps: A Map of Risk Mitigation Instruments for Clean Investments." Climate Policy Initiative (CPI), 2013.; "Risk Mitigation Instruments in Infrastructure Gap Assessment." World Economic Forum (WEF), 2016.; Wuester, Henning, Joanne Jungmin Lee, and Aleksi Lumijarvi. "Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance." International Renewable Energy Agency (IRENA), Abu Dhabi, United Arab Emirates, 2016.

2.2. Meeting Investors' Expectations

One of the most fundamental challenges for climate projects in LDCs and emerging economies is how to meet private investor risk-return expectations. As Figure 2 demonstrates, investors perceive these projects as high risk and low return. It is important for public sector actors to not only understand why climate projects in emerging markets are often perceived as high risk, but also why they are categorized as low return.

Figure 2: Risk-Return for Climate Projects



Climate finance typically funds large infrastructure and development projects, such as renewable energy generation facilities, which require substantial upfront capital expenditures, but produce stable cash flows over long time horizons. Once operational, these assets are relatively low risk and, thus, yield relatively low, yet stable, returns. Furthermore, many climate projects that provide a social benefit are subject to price regulation from public entities. Such regulation caps the rates that project operators can charge customers for services provided, which, in turn, limits investor returns.

Climate projects must appeal to two classes of investors: commercial and institutional. Of the two, commercial investors (e.g., banks, private equity firms) have shorter time horizons and are willing to invest in projects with relatively more risk coupled with higher returns. They are interested in investing in "bankable" projects, which are projects that have already addressed early stage risks. In contrast, institutional investors typically have a lower risk-return profile than commercial investors. They are attracted to projects with reliable long-term cash flows that they can match to their long-term liabilities.

For large infrastructure and development projects, the two classes of investment capital work together. If an early stage climate project reduces investment risks to a level that corresponds with commercial investors' risk-return expectations, commercial investors will provide debt and/or equity financing to capitalize the project. Once operational, climate projects' risk profiles reduce further. At this point, commercial investors want to exit the project and recycle their balance sheets, while institutional investors want to invest in stable, long-term assets. Through the process of refinancing, commercial capital is freed up to invest again in new climate projects, and institutional capital begins earning steady, low-risk returns.

Thus, for high-risk, low-return projects, the most immediate (and potentially most promising) opportunity for policymakers, public financial institutions, and other stakeholders is to lower risk, rather than enhance returns, as a means to meet commercial and institutional investors' expectations.

2.3. Enhance Returns, Reduce Risks

To encourage greater climate finance investment, public sector actors have several policy and financial instruments available to them, which fall into two broad categories:

1. **Return-enhancing instruments:** Return-enhancing instruments make projects more attractive to investors by providing them with additional returns, which increase projects' internal rate of return (IRR). They are usually financial policies (e.g., feed-in-tariffs, generation-based incentives, tax incentives, accelerated depreciation). However, an associated challenge with return-enhancing instruments is that such measures may lead to increased load on government treasury budgets.

2. **Risk-reducing instruments:** Risk-reducing instruments lower the investment risk of projects by compensating investors with additional financial and/or non-financial support, thereby better aligning investors' risk-return expectations. They can be financial policies (e.g., transparent investment policies, bankruptcy codes) or instruments (e.g., credit enhancement mechanisms, guarantees). One concern for policymakers, public financial institutions, and other stakeholders is that risk-reducing measures may lead to moral hazard, which is when investors and project developers who are covered by a risk-reducing measure have more incentive to take on additional risk. Thus, the implementation of risk-reducing instruments requires a strong risk management and evaluation system.

Policymakers, public financial institutions, and other stakeholders should consider both return-enhancing and risk-reducing instruments, as they often work in tandem to make investment in climate projects more appealing to the private sector. When exploring options, public sector actors should identify potential solutions that reflect the specific circumstances, challenges, and capabilities in each country and locality.

It is important to note that the most critical action public sector actors can take to reduce risk is to create a strong policy framework, which is a necessary precondition for using risk-reducing instruments. When supporting green growth planning and strategy in member countries, GGGI advises public sector actors to first focus on creating policy frameworks that reduce investment risks and create financial markets conducive to international and domestic private sector investment.

Policy conditions remain of critical importance to enable capital flows to underserved sectors and, thus, deserve additional research and analysis. However, this Insight Brief focuses specifically on the strategic use of innovative financial mechanisms in order to catalyze private investment in climate projects.

3. Innovative Financial Mechanisms

3.1. Definition

Over the last several years, innovative financial mechanisms have received increasing attention from international organizations working to bridge the climate financing gap for LDCs and emerging economies.[22] Several organizations have made valuable contributions to the collective understanding of innovative financial mechanisms, documenting barriers to wider adoption and highlighting their successful use through case studies.[23]

Table 2: Traditional Financial Instruments

Most of the financial mechanisms used by the public and private sectors are comprised of the following five instruments:		
Category	**Types of Instruments**	**Example Use/Benefits**
Grant	Technical assistance Grant capital	Provide early stage capital to advance project development
Equity	Equity investment Tax equity	Incentivize investment by sharing risks
Guarantee	Partial risk guarantee Sovereign risk guarantee Counterparty risk guarantee	Provide credit enhancement to reduce counterparty risk
Insurance	Technology performance insurance Interest rate insurance Foreign exchange rate insurance	Protect against unforeseen impacts (e.g., currency fluctuations, political risk, technology underperformance)
Loan	Senior debt Subordinated debt Quasi-equity	Take on a junior or senior position, depending on investor's risk appetite

Ultimately, the goal of these efforts is to identify ways to replicate and scale successful models globally in LDCs and emerging economies. An important next step is to analyze the function, characteristics, and use of innovative financial mechanisms in greater depth at the project level, rather than in aggregate. This work may uncover insights on the nature of risk reduction that inform the efforts of policymakers, public financial institutions, and other stakeholders to develop the financial capacity, policy frameworks, and indicative tools necessary to support the widespread adoption of innovative financial mechanisms for climate projects in LDCs and emerging economies.

Part of the challenge of scaling up the use of innovative financial mechanisms is recognizing what innovation means in this context. We propose the following as a definition of innovative financial mechanisms and a summary of their main characteristics:

"A novel structure or combination of traditional financial instruments that leverages greater investment from multiple investors (both private and public) by lowering the cost of capital through measures that mitigate one or more investment risks."

22 Buchner et al. 2015.; Frisari et al. 2013.; WEF 2016.; Wuester et al. 2016.; NCE 2014.; "Global Trends in Renewable Energy Investment." Frankfurt School – UNEP Collaborating Centre for Climate & Sustainable Energy Finance, Bloomberg New Energy Finance (BNEF), 2016.; Kehew, Robert, Tomoko Matsukawa, and John Petersen. "Local Financing For Sub-Sovereign Infrastructure In Developing Countries." The World Bank, 2005.; Hurley, Gail and Tancrède Voituriez. "Financing the SDGs in the Least Developed Countries (LDCs)." United Nations Development Programme (UNDP), New York, United States of America, and Agence Francaise de Développement (AFD), Paris, France, 2016.

23 Buchner et al. 2015.; Frisari et al. 2013.; WEF 2016.; Wuester et al. 2016.; NCE 2014.

Innovative financial mechanisms must, at a minimum, meet the following three characteristics:

1. **Blended Instruments:** Most climate projects are still funded through traditional financial instruments (see Table 2), mostly equity and loans. Conversely, innovative financial mechanisms combine different de-risking instruments – often including grants, guarantees, and insurance – to achieve a blended capital structure. The outcome is a lower overall capital cost for the project and blended returns for investors.
2. **Risk Reduction:** Innovative financial mechanisms are designed to reduce investment risks. A similar approach is used in traditional project finance, where risks are allocated to stakeholders best suited to meet that risk, effectively structuring the project deal to address each investor's distinct risk-return expectations.
3. **Leverage Achieved:** Innovative financial mechanisms achieve leverage by unlocking additional financing for projects from different capital sources, both public and private.

As an illustrative example of an innovative financial mechanism, to capitalize the Global Climate Partnership Fund, Germany's Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety and KfW Development Bank provided an initial investment of USD 130 million in junior debt. As of 2015, this subordinated capital had attracted an additional USD 105 million in private capital from IFC and the German pension fund Ärzteversorgung Westfalen-Lippe, as well as USD 130 million from development agencies in Denmark, Austria, the Netherlands, and the United Kingdom.[24] The participation of public sector actors as junior investment partners insulated subsequent investors from a high degree of potential loss, which allowed multiple private and public investors to participate that otherwise may not have due to differing risk-return expectations.

Box 2: Using Leverage as a Standalone Metric

Many public financial institutions use leverage as a metric to measure the impact of capital deployed. Several research bodies have criticized the use of leverage as a singular performance and impact metric common to multilateral and bilateral financial institutions. The reason is that, unless there is a detailed assessment of a project's capital structure, it is difficult to determine which investor(s) and which instrument(s) played a "leveraging" role. To better understand sources of capital, the leverage metric requires a more nuanced analysis of multiple variables, such as private vs public, additionality of capital, and project stage, among other concerns. Without this analysis, it will be difficult for public sector actors to optimize the use of dedicated public capital.

References:
Griffiths, Jesse. "'Leveraging' private sector finance." The Bretton Woods Project, 2012.
"Additionality and Leveraging Private Finance." Friends of the Earth, 2013.
"Leveraging Private Finance: Lessons for Climate and Development Effectiveness." Friends of the Earth, 2012.
Brown, Jessica, Barbara Buchner, Gernot Wagner, and Katherine Sierra. "Improving the Effectiveness of Climate Finance: A Survey of Leveraging Methodologies." Climate Policy Institute (CPI), 2011.

3.2. Project Development Stages

As depicted in Figure 3, climate projects pass through four distinct stages of development:

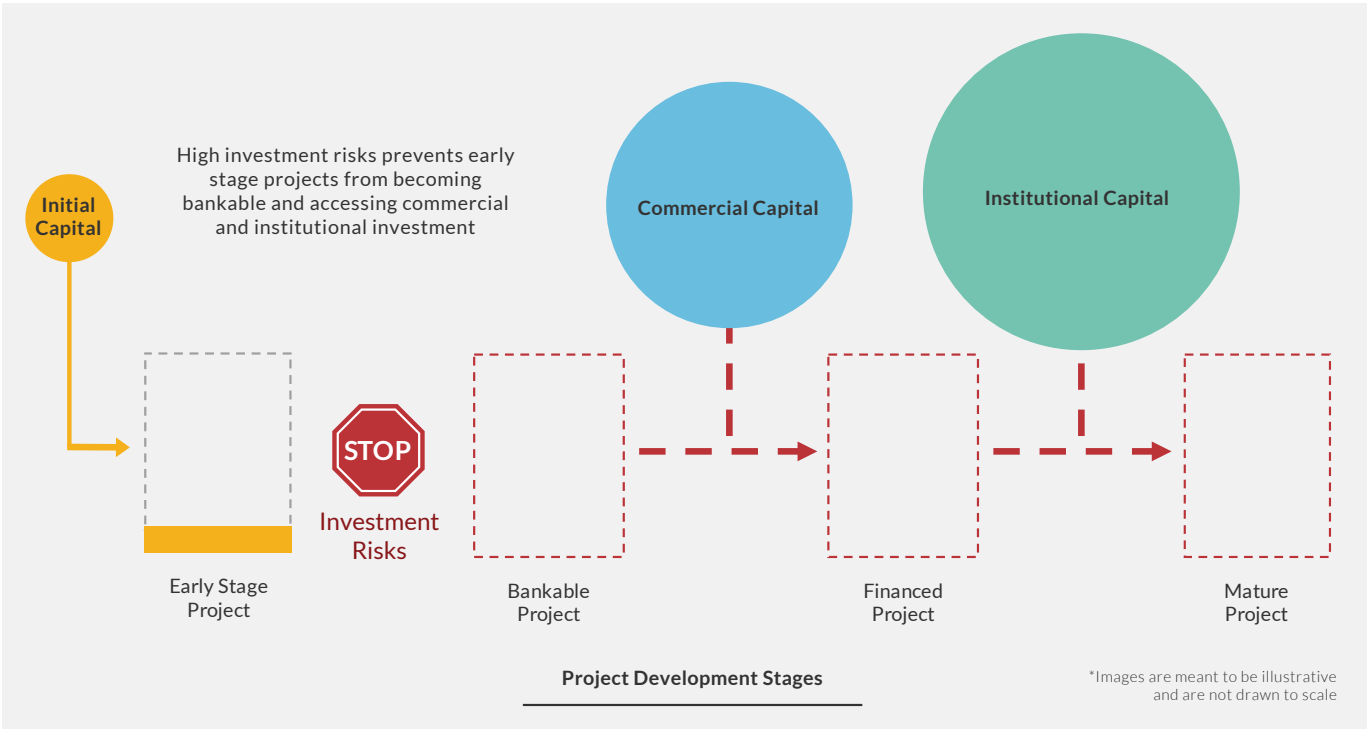
1. **Early Stage:** Projects that have initial capital and are undertaking business model development and planning activities
2. **Bankable:** Projects with a proven business model that have completed all planning activities and are ready to obtain commercial capital
3. **Financed:** Projects that have been capitalized and are ready to begin construction and/or implementation
4. **Mature:** Completed projects that are operational and looking for refinancing from institutional investors

All projects start out as a concept stemming from a critical unmet need, such as providing low-income populations with off-grid electricity, waste and water management, and ecological restoration, among many other needs. Early stage financing (e.g., equity and grants from philanthropic organizations, development financing institutions, venture capital, owner's equity) advances the project forward, but does not typically bring the project to a commercial scale.

At this stage, climate projects generally encounter difficulty accessing the large pool of commercial capital because the high investment risks involved prevent projects from being bankable, as well as increase early stage development costs. For a high-risk climate project to become bankable, project developers must address the specific risks involved that prevent the investment of commercial capital and, later, at the maturity stage, institutional capital.

24 "Mitigating Climate Change Together." Global Climate Partnership Fund Annual Report, 2015.

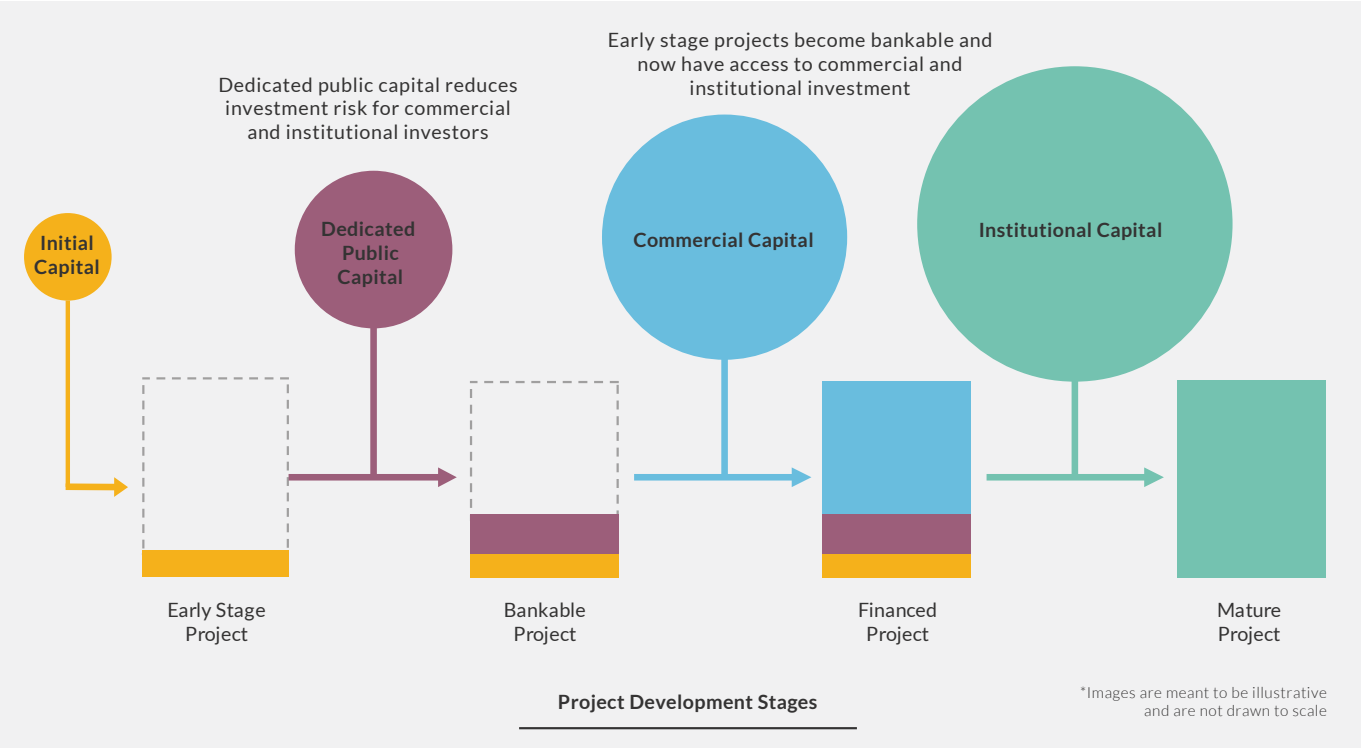
Figure 3: Investment Risks in the Project Development Process



3.3. The Role of Risk Mitigation

Innovative financial mechanisms using dedicated public capital can provide the missing piece – risk mitigation – that enables commercial capital to finance a bankable project (see Figure 4). This investment, in turn, can mobilize and carry projects to maturity, which provides an opportunity for institutional investors to participate and acquire these operational, cash-generating assets once they have proven to be stable. **The key for innovative financial mechanisms is to identify and address risks at an early stage in order to catalyze greater future investment from the large pools of commercial and, eventually, institutional capital. This is critical because accessing institutional capital, in particular, demonstrates scalability.**

Figure 4: Risk Mitigation in the Project Development Process



3.4. Investment Risks at Each Stage of Project Development

With an understanding of the critical features and roles of innovative financial mechanisms, it is essential for public sector actors to next examine how different stakeholders (e.g., development financial institutions, multilateral and bilateral organizations, policymakers) can use – or incentivize use of – innovative financial mechanisms to meet specific risk-reduction needs at an early stage in order to make projects bankable.

Figure 5 shows that, as a project progresses through the stages of development, both the associated risks and overall risk profile of the project change. Each of the broad risks associated with climate projects has a different profile over the project's development lifecycle. For example, credit risk associated with counterparties is highest at the early stage of the project, but goes down gradually over time as the project develops further. Similarly, technology risk is medium throughout the first three project development stages due to the uncertainty of project performance and replicability. However, once a mature project is operational, the risk profile drops from medium to low, which still accounts for the risks associated with maintenance and potential performance degradation over time.

Figure 5: Mapping Risks to Project Development Stage

3.5. Using Innovative Financial Mechanisms

Several studies have pointed out how different financial instruments have been used as risk reduction tools.[25] In this Insight Brief, we are expanding on this work by mapping each financial instrument to the broad categories of risk found in climate projects for each stage of project development. The resulting tool, in Figure 6, provides a guideline to design and deploy innovative financial mechanisms in climate projects for the highest risk stages of project development: early stage, bankable, and financed.

Figure 6: Mapping Financial Instruments to Project Stages and Investment Risks

25 Buchner et al. 2015.; Frisari et al. 2013.; WEF 2016.; Wuester et al. 2016.; NCE 2014.

Public and private investors can use this tool to identify which innovative financial mechanisms are the most appropriate at mitigating specific investment risks at any stage of the project, depending on their respective objectives and investment mandate.

It is also critical to recognize that different instruments can be used to mitigate the same risk, depending upon the development stage of the project. For example, grants can be effective at mitigating credit risk associated with counterparty risk during the early stage of project development because they help prove business models and provide technical assistance. However, grants are less effective in later stages because commercial investors believe that grants distort the market and leave no space for investments, a practice known as "crowding out". Instead, junior loans can be an effective instrument to reduce counterparty risk and mobilize capital towards the project at later stages, as investors are more comfortable with other investors taking subordinate positions alongside them through financial instruments, such as equity and concessional loans.

In the case of technology risk, insurance products (encompassing financial and manufacturing guarantees) can be effective at providing commercial investors protection from technology underperformance. Yet, for new, unproven technologies, grants can be more effective at an early stage to help create performance factors and develop a proven track record for the technology, which are necessary to demonstrate the viability of the technology to commercial investors.

Another important observation is that the use of grants becomes less effective after the early stage of project development, due in large part to the relatively small size of grant capital as compared to capital requirements in later stages of development, in addition to the inability of investors to recover grant funding. For example, the KawiSafi Ventures Fund, which funds off-grid solar energy installations in several countries in East Africa, has a total project investment of USD 110 million. Of that total, only USD 5 million is from grants for technical assistance to project developers. The remaining USD 105 million is equity financing to be used for actual off-grid solar and similar projects, where the vast majority of the financing is required – and where investors expect to earn a return through repayments from end-users.[26] Hence, it is more strategic to use grants at the early stage of project development to push projects towards bankability, at which point larger equity and loan instruments are able to fully finance the project and, thus, the sector at large.

The challenge of financing energy efficiency projects offers an illustrative example of how to use different financial instruments at different stages of project development. Energy efficiency projects struggle to overcome a series of common investment risks, two of the most difficult of which are:

1. Technology risk from energy efficiency equipment underperformance relative to projected energy and cost savings; and
2. Credit risk of energy service companies (ESCOs).

Figure 6 indicates that, for early stage and bankable projects, insurance can be an effective financial instrument to provide risk coverage for technology. In the later stages, guarantees and loans can be effective at reducing credit risk, such as counterparty risk.

Looking at a real-world model for reducing energy efficiency technology risk, the Danish Energy Agency developed an energy efficiency insurance product called Energy Savings Insurance, which the Inter-American Development Bank (IDB) implemented in collaboration with The Global Innovation Lab for Climate Finance.[27] This innovative insurance mechanism ensures the performance of energy efficiency projects and can absorb up to 80 percent of technology underperformance risk. The instrument is expected to drive USD 10–100 billion in investment by 2030 from multiple investors.

26 "Funding Proposal Summary for FP005." Acumen proposal to the Green Climate Fund, 2015.; "Project FP005: KawiSafi Ventures Fund in East Africa." Green Climate Fund, http://www.greenclimate.fund/-/kawisawi-ventures-fund-in-east-africa.

27 "Energy Savings Insurance." Climate Finance Lab, http://climatefinancelab.org/idea/insurance-for-energy-savings.

4. Innovative Financial Mechanisms in Action

Recent examples of public and private sector climate finance demonstrate that innovative financial mechanisms are already being used to finance climate projects in different parts of the world. In this section, we present three case studies to highlight the use and effectiveness of such mechanisms.

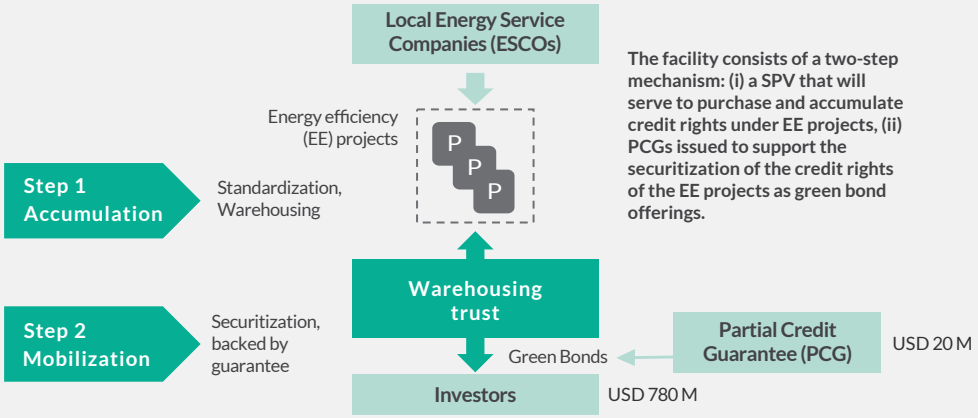
Case Study #1: Green Bonds Facility for Energy Efficiency Projects in Latin America

IDB is developing a green bonds facility to provide capital towards energy efficiency projects in Latin America and the Caribbean (LAC). The financial mechanism enables additional capital to flow towards energy efficiency projects by mitigating the technology and credit risks associated with such projects. It also enables participation from multiple investors through capital markets.

Background: Financial institutions in the LAC region rarely provide financing to energy efficiency projects because of the high uncertainty of expected returns and high project structuring costs. This high level of uncertainty is largely due to limited historical data available on energy efficiency project performance, costs embedded in structuring project finance, and the perceived high uncertainty on the savings to be generated as a result of such projects.

Innovative Financial Mechanism: In the LAC region, IDB is tackling this problem by using loans and guarantees to open up access to additional domestic and international investors. This financing can meet the capital availability challenge by issuing asset-backed securities. Guarantees can provide external credit enhancement for respective securities to match commercial investors' risk appetite. In late 2015, the Green Climate Fund (GCF) approved the facility for funding, and it is now being operationalized. Under this arrangement, IDB will structure and issue green bonds from a portfolio of energy efficiency projects, and GCF will provide credit enhancement through a USD 20 million partial credit guarantee. If the facility is operationalized for the entire LAC region, GCF will provide a loan of USD 195 million.

Figure: Green Bonds Facility for Energy Efficiency Projects in Latin America



Initially, this facility will enable the flow of USD 50 million to energy efficiency projects in Mexico. Once established, IDB expects to fund energy efficiency projects in other LAC countries, as well. In total, IDB envisions that the facility will mobilize USD 780 million from capital markets.

Innovation: This mechanism meets all three characteristics of an innovative financial mechanism:

1. **Blending:** By standardizing projects and securitizing cash flows, this facility opens up participation from both domestic and international investors to buy green bonds.
2. **Risk Reduction:** The use of a partial risk guarantee provides necessary credit enhancement to the securities issued to investors, thereby addressing the technology and credit risks associated with projects.
3. **Leverage:** With USD 215 million in loans and guarantee-backed green bonds, this project leverages an additional USD 780 million from investors who would otherwise not be willing to invest in these projects due to the investment risks associated with energy efficiency projects.

References:
"Funding Proposal Summary for FP006." Inter-American Development Bank (IDB) proposal to the Green Climate Fund, 2015.
"Innovations Live: Effective solutions to climate change in Latin America and the Caribbean." Inter-American Development Bank (IDB), 2014.
Maria Tapia Bonilla, email message to authors, November 7, 2016.

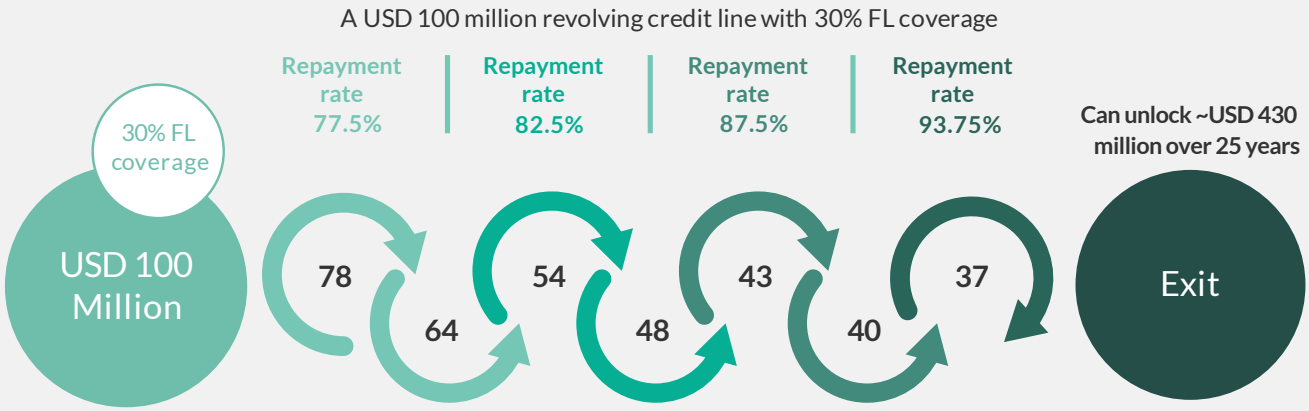
Case Study #2: Finance Facility for the Off-Grid Energy Sector in India

GGGI is working with the Ministry of New and Renewable Energy (MNRE) in India to design a blended facility that will unlock debt capital for the Indian off-grid energy sector (OGE). The blended facility opens up lending in the sector to flow towards OGE sector companies by mitigating associated credit risks.

Background: Indian OGE sector companies looking to expand their business operations struggle to access debt capital from traditional lenders (e.g., domestic financial institutions). OGE is a relatively new undertaking in India, and there is little data available on previous performance and outputs. Without this information, lenders are unable to gauge the real risks of making an investment, so they perceive the sector as high risk. Moreover, several additional factors increase the perceived and real risks for OGE, including uncertain revenue streams, high upfront capital needs for start-up, high operational costs, high maintenance costs, and high logistical requirements. These issues make it difficult for OGE companies to obtain the growth capital they need.

Innovative Financial Mechanism: In order to reduce the perceived risks and mitigate real risks in the short term to attract debt capital, GGGI is creating an innovative financing facility specifically tailored to the OGE sector. It is comprised of a first loss (FL) capital reserve and a revolving credit line. Through this facility, capital is provided to domestic financial institutions to open lending to the OGE sector, while commensurate risk coverage is provided through the FL reserve. The revolving credit line allows for the facility to be re-used, enabling the long-term availability of financing. With a FL capital pool to absorb initial losses to loan portfolios, financial institutions' confidence in OGE sector companies increases, as does their willingness to lend. Over time, as the sector matures and financial institutions gain experience in financing OGE, they will better be able to price risk and lend capital. After the FL capital pool is initially funded by concessional capital, it can be "topped-up" by the government based on actual losses and requirements. Hence, the concessional capital kick-starts sustainable financing for the sector.

Figure: Finance Facility for the Off-Grid Energy Sector in India



Innovation: This mechanism meets all three characteristics of an innovative financial mechanism:

1. **Blending:** The facility blends capital from various sources: the FL capital pool could be co-financed by the MNRE and concessional finance, while the credit line is financed by commercial financial institutions.
2. **Risk Reduction:** The use of FL capital provides risk reduction (both perceived and real) for domestic financial institutions.
3. **Leverage:** With an initial USD 30 million in public capital for the FL capital pool, this mechanism mobilizes USD 100 million in additional financing in the short term. In the long term, it has the potential to activate more than USD 400 million in climate finance.

Case Study #3: Climate Investor One's "Complete Lifecycle" Facility

Climate Investor One is an innovative financial facility that came out of a competition hosted by the Global Innovation Lab for Climate Finance. Through its three-fund structure, it uses blended finance to provide a "complete lifecycle" financing solution tailored to address different investment risks at different stages of project development.

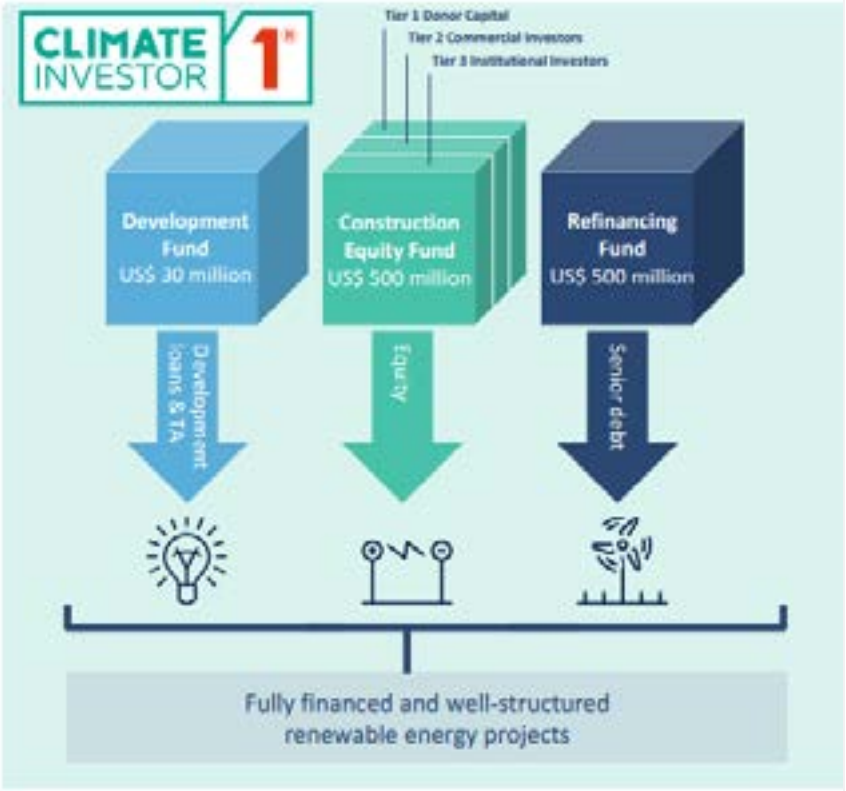
Background: Most large renewable energy generation projects (e.g., solar PV, solar thermal, onshore wind, run-of-river hydro), particularly in LDCs and emerging economies, face high uncertainty during early stage development, caused by a number of potential investment risks. Prior to investing, prospective investors want to know that other investors will participate in later stages, a form of capital markets risk. This makes it difficult for a project to "line up" capital, most notably from commercial investors at the bankable and financed stages and institutional investors at the mature stage.

Innovative Financial Mechanism: Climate Investor One is a "complete lifecycle financing for renewable energy" facility targeted at renewable energy projects in LDCs and emerging economies. It is comprised of three separate funds, each designed to manage the risks associated with different stages of project financing:

1. A USD 30 million Development Fund for early stage projects;
2. A USD 500 million Construction Equity Fund for bankable and financed projects (the first USD 100 million of which is a FL tranche); and
3. A USD 500 million Refinancing Fund for mature projects.

Once the facility has been fully capitalized, it will mobilize public sector grants from several donor governments to leverage private capital from pension funds, asset managers, insurers, and similar sources. The facility is structured using different tranches of capital that appeal to institutional investors' differing risk-return profiles.

Figure: Climate Investor One



Innovation: This mechanism meets all three characteristics of an innovative financial mechanism:

1. **Blending:** The facility blends grant capital, equity, and preferred mezzanine capital, which allows different investor classes to participate at the stages that match their risk-return expectations and requirements.
2. **Risk Reduction:** The complete lifecycle structure mitigates process risk because it provides a mutual "line of sight" between financing stages, enabling earlier investors to move forward with investment.
3. **Leverage:** With an initial USD 130 million in public financing, Climate Investor One estimates that it will leverage up to USD 2 billion in private capital by 2020.

References:
"Complete Lifecycle Financing for Renewable Energy." Climate Investor One, http://www.climatefundmanagers.com/.
"Climate Investor One." The Global Innovation Lab for Climate Finance, http://climatefinancelab.org/idea/fmo-climate-development-finance-facility/.

Image courtesy of Climate Fund Managers (CFM)

5. Insights

Evidence from several case studies shows that, in order to scale up climate finance, private capital needs to be leveraged by using public capital, particularly from the pool of dedicated climate finance. Our analysis and experiences with our emerging portfolio of climate projects suggest that policymakers, public financial institutions, and other stakeholders are unsure of how and when to do so.

In this Insight Brief, we present the case for using innovative financial mechanisms to mitigate investment risks for climate projects in order to mobilize capital and carry projects to maturity. Novel financial instruments and structures (e.g., grants, first and second loss reserves, revolving loan funds, guarantees) are necessary to de-risk early stage and potentially bankable projects, attract commercial investment, and, eventually, create long-term, stable, return-generating assets that appeal to institutional investors.

We have identified several insights related to innovative financial mechanisms that should inform the efforts of policymakers, public financial institutions, and other stakeholders to maximize the impact of dedicated public funds to leverage private investment capital for critical climate change mitigation and adaptation projects.

Blend Multiple Financial Instruments: One of the most effective ways to attract private investors is to blend multiple financial instruments into a project's financial structure or, for companies, into the capital structure. Investment risk is not a uniform concept that can be addressed uniformly. Moreover, financial instruments are designed for specific purposes and offer investors different risk-return profiles, thus work best at addressing different investment risks when used in combination. When designing innovative financial mechanisms, public sector actors must carefully consider which financial instruments are the most appropriate to mitigate each type of investment risk.

Use Distinct Financial Instruments for Each Stage of Project Financing: It is critical for policymakers, public financial institutions, and other stakeholders to recognize that climate projects have multiple stages of project financing, each with different capital requirements, investment risks, and potential investment partners, among other variables. To make projects bankable, early stage projects require capital, often in the form of grants or concessional loans, to support project preparation and technical assistance. Yet, this is not enough. They often require a guarantee or insurance instrument to reduce the cost of capital from potential commercial investors. Conversely, bankable projects most often seek financing for project finalization and capital expenditure costs through a combination of loans, equity, and hybrid instruments. Public sector actors may not be able to provide all types of financing needed for the full lifecycle of a project, which would require them to find additional public or private investors.

Use Public Capital Strategically: Innovative financial mechanisms blend public and private investment capital. With private sector investors limited by their IRR hurdle rates and risk-return requirements, public sector actors must recognize the critical role public capital should play in enabling climate projects that provide public benefit. As discussed earlier, grants are often appropriate to mitigate early stage investment risks. However, rather than default to grants, public sector actors should examine the specific circumstances of each climate project or project type (e.g., sectors, technologies, financial capabilities, potential partners, local market conditions) to determine the most appropriate financial instrument(s) to use. Though the prospect of taking on additional risk with public capital through guarantees, equity, and other financial instrument is daunting to public sector actors, it is critical that they allocate dedicated public climate funds appropriately to best match risk-return expectations for commercial and institutional investors and, thus, maximize the impact of dedicated public climate finance.

6. Next Steps

This Insight Brief assesses the design and characteristics of innovative financial mechanisms and makes a first attempt at creating guidelines for how to use them strategically. By mapping investment risks to each stage of the climate project development process, we have provided insight into which financial instruments are most effective at mitigating specific risks at each stage. This mapping exercise can serve as a tool for policymakers, public financial institutions, and other stakeholders interested in using public capital to "crowd-in" investment from the private sector.

Looking ahead, GGGI believes that a crucial next step will be to **create a repository of the most effective innovative financial mechanisms** used in climate projects in LDCs and emerging economies. At present, investors must develop tailored and contextualized investment approaches for each climate project financed, even though climate projects in LDCs and emerging economies face fundamentally similar types of investment risks. A detailed dossier of examples from climate projects will give both public sector actors and private sector investors the ability to identify and replicate innovative financial mechanisms with characteristics that match the profile of new investments under consideration, which will further accelerate the deployment of dedicated public capital at scale.

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