

Private Sector Investment in **Climate Adaptation in Developing Countries:**

Landscape, Lessons Learned
and Future Opportunities



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Foreword

For the past decade, year after year, annual temperature records have been broken with disturbing regularity.

As the Paris Agreement has entered into force, we must now double down on the urgency not just to reduce the amount of carbon released into the atmosphere, but also to help countries adapt to what can only be referred to as an epochal issue.

Tens of billions of dollars a year are required to help developing countries adapt to the current and future effects of climate change. Farmers will need more drought resistant seeds and better irrigation practices. Hydroelectric power plants will need to upgrade equipment and plan for more variable water supplies. Infrastructure such as roads and bridges will need to be better prepared for an increase in extreme weather events such as floods.

But public funds can only go so far in paying for these projects. The private sector must step in, at scale, to help close the financing gap.

At the Climate Investment Funds, in 2012, we took this impetus and created a dedicated window under our climate resilience program, the Pilot Program for Climate Resilience (PPCR), to specifically focus on private sector climate adaptation projects. And in the ensuing years of supporting our clients through multilateral development bank (MDB) partners in these projects, we have become increasingly aware of the challenges facing the private sector in making their operations more climate resilient.

As some of the earliest players in this market, we have now taken stock to learn more about what has worked thus far and what it will take to help increase the climate resilience of the private sector in developing countries. We have also looked at what Multilateral Development Banks are doing in the space, to gain a deeper understanding of how PPCR could better support these projects in the future.

Throughout this process, we soon realized that the lessons learned and operational implications go far beyond the Climate Investment Funds and our MDB partners. These are the lessons presented in this document.

I hope that this report will help inform practitioners on how to more effectively deploy resources towards private sector climate adaptation projects in the developing world. And I look forward to working alongside others to continue scaling up this important work.



A handwritten signature in black ink, appearing to read 'M. DUARTE', with a long horizontal line extending from the end of the signature.

Mafalda Duarte

Manager – Climate Investment Funds

Washington, DC, November 2016

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Executive Summary

There is an urgent need to **scale-up climate adaptation efforts**. While the focus of the Paris Agreement has been towards successfully securing a global commitment to reduce emissions, there is already significant climate change locked into the system. This will have significant, largely negative, socio-economic impacts, with estimates suggesting that temperature increases of two degrees Celsius could be associated with global GDP per capita losses of as much as 35 percent in 2100. Scaled-up adaptation efforts can make an important contribution in addressing some of these negative impacts, particularly in developing countries, but current spending does not come close to meeting need. Some estimates put the costs of adaptation in developing countries at around USD 140–300 billion a year by 2030, compared to reported annual adaptation flows within the same countries of around USD 20–25 billion at present.

The private sector will be a critical partner in closing this finance gap. There is an urgent need for the international community to engage all stakeholders in supporting climate adaptation. The scale of the funding challenge, and the dominance of the private sector in the delivery of goods and services where adaptation will be most needed, means that the private sector has a crucial role to play in addressing adaptation.

This report examines the evidence base on efforts to support private sector investment in climate adaptation. Analysis shows that multilateral development banks (MDBs) and the Pilot Program for Climate Resilience (PPCR), a funding window of the Climate Investment Funds (CIF), are at the forefront. In the challenging, complex field of private sector adaptation, MDBs are uniquely positioned to provide the technical and

financial support that lenders and investors need to overcome barriers to action. The PPCR draws on the comparative advantages of the five MDBs that implement its funding, and today is the only multilateral climate fund supporting private sector adaptation projects.

Landscape of private sector adaptation finance

There are multiple funding flows supporting private sector investment in climate adaptation but only some of these flows can be estimated. The private sector invests in adaptation using either internally generated resources or finance provided by either public or private bodies, including external intermediaries such as banks, private equity and multilateral development banks. Full estimation of flows in private sector adaptation is nearly impossible as there is limited transparency of many private funding sources. It is possible, however, to estimate the resources provided to the private sector from national governments, development finance institutions and climate fund intermediaries (international public adaptation finance).

In 2014, the latest year for which data is available, just 4 percent (USD 1.4 billion) of total reported international public adaptation finance was directed to the private sector.

Data collected by the Climate Policy Initiative (CPI) indicate that total adaptation spending from international public sources in 2014 was USD 25 billion. An estimated USD 1.4 billion, or 5.6 percent of the funds, went to financing adaptation in the private sector. Multilateral development finance institutions (DFIs) were the largest provider of this finance, providing USD 0.6 billion to the non-governmental organization (NGO) and private sectors. Of the multilateral DFIs, MDBs are likely to be the most active providers of private adaptation finance in developing countries¹.

MDB operational lessons

The predominant role of MDBs in supporting private sector climate adaptation projects in developing countries reflects the combined importance of both financial and technical capacity. MDBs offer the ability to address these different requirements in parallel, in a way that most other bodies are not in a position to match. Five operational lessons can be distilled from the experience of the MDBs² in supporting private sector adaptation:



1. Tools such as feasibility studies, business risk assessments, technical assistance and market studies can help address private sector knowledge gaps

Knowledge gaps are a significant barrier preventing the private sector integrating climate change risks into their businesses. Multiple tools have been used successfully, for example, business risk assessments have helped companies identify actions that would assist them to manage risks and opportunities associated with climate change. Other tools, such as feasibility studies, have been used to assess activities and business models that address the climate vulnerabilities of specific supply chains and build private sector demand overall.



2. Concessional finance is an important financing tool where returns are long and/or uncertain

Concessional finance can improve risk-reward profiles of projects to the point that they can draw in commercial investors, accelerating the entry of private sector financing to these types of investments. It can also be valuable where long term financing is unavailable, or unaffordable, through the market. MDBs continue to report the usefulness of concessional finance in developing capital intensive adaptation investments.



3. Intermediated financing can be an effective way to engage MSMEs in climate adaptation activities

Micro, small, and medium enterprises (MSMEs) face additional challenges incorporating adaptation into their business. Limited access to affordable finance, knowledge of climate change risks and technical resources present particular barriers for MSME adaptation investments. MDBs also often find that it is difficult to serve MSMEs directly due to the high transaction costs it imposes. Intermediated financing via a local bank or non-bank entity which on-lends to MSMEs presents one structure by which MDBs can support these entities. Two types of intermediated financing products are commonly supported: on lending and credit enhancement



4. Intensive, collaborative work with other stakeholders can help mitigate project risk and scale investments

Adaptation actions are often needed across whole supply chains. This risks making adaptation investments prohibitively complex for any one private sector party and can also require significant public support to help build confidence. Patient, intensive collaboration with multiple actors is often necessary to move private adaptation investments forward.



5. There is often value in having an explicit project facilitator role linking the public and private sector, which MDBs can help to play

MDBs occupy a unique position between the public and private sectors. They provide a platform which connects private sector actors with government that few other actors can achieve. The ability of MDBs to work with other organizations and coordinate multiple instruments to support projects, such as grants, concessional finance and guarantees, also means innovative projects can receive the specialized support they need.

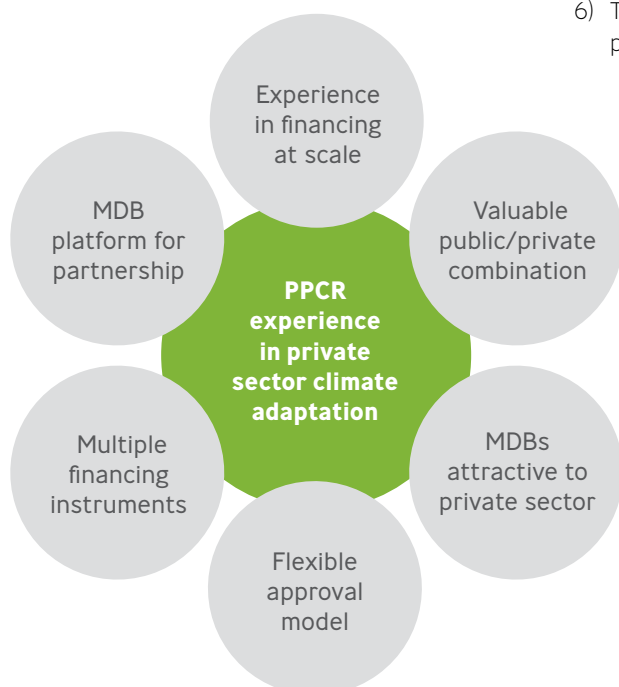
PPCR experience in private adaptation

The PPCR is currently the only multilateral fund that has supported private sector adaptation projects, and operates through many of these MDB operational lessons³.

Focusing exclusively on low income countries to date, and working through the MDBs, the PPCR has approved 13 projects totaling USD 86.3 million, with a further USD 60 million in the pipeline. By strategically applying PPCR concessional finance and technical advisory services, MDBs find that they can enhance their support for private sector adaptation. MDBs estimate that they could invest approximately USD 500 million of additional PPCR funds for private sector adaptation projects such as climate proof hydropower plants, climate resilient buildings investments, water efficiency and agribusiness investments.

The PPCR plays a particularly important role in supporting private sector adaptation within the current climate finance architecture. Some of the key advantages of the PPCR include the following:

- 1) Only the PPCR and, prospectively, the Green Climate Fund (GCF) direct this type of finance to the private sector for adaptation. Multiple funding channels, allowing experimentation, would be advantageous given how challenging private sector adaptation remains;
- 2) The combination of the PPCR's public sector engagement and its dedicated private sector window are a valuable combination in supporting private adaptation;
- 3) The role of MDBs as implementing entities of the PPCR (and the CIF more generally) is often attractive to private sector investments;
- 4) In turn, the PPCR approval model is flexible and aligns with MDB and private sector processes;
- 5) MDBs and the private sector value the ability to use multiple financing instruments under the PPCR; and
- 6) The PPCR offers a platform for partnership across MDBs.



Key lessons

This analysis suggests a number of lessons or next steps that different stakeholder could take to further advance private sector investment in climate adaptation in developing countries.



Donors

Donors should recognize that different funding arrangements and delivery vehicles will have different comparative advantages. It will be important to work through a wide array of modalities to drive the systemic change needed to move to a low-carbon, climate resilient world.

Within this context, there appears to be a particularly important role for the MDBs, often with the support of carefully calibrated concessional resources, to support private sector adaptation.

Given the challenge of engaging the private sector, there would be benefit in experimenting with a range of different modalities for channelling concessional resources to MDBs to understand which approaches are most aligned with existing business practices.



MDBs

MDBs may wish to focus their private sector adaptation activity in the areas where their comparative advantage is greatest. The analysis in this report suggests that these would appear to be in infrastructure financing, where there also appears to be a particularly pronounced adaptation financing gap, and in intermediated finance.

MDBs should recognize that private sector adaptation projects often require heavy transaction costs and a hands-on approach is needed to develop and facilitate them.

MDBs may wish to establish internal incentive mechanisms for encouraging the origination of private sector adaptation projects that reflects these additional transaction costs.



CIF

Building on recent changes to the PPCR's dedicated private sector window, especially regarding its geographic flexibility and scope to provide support for project preparation activities, the CIF may wish to consider further augmentation to allow for a systematic market-wide approach to identifying adaptation priorities within and/or across countries. This could include following a theme, such as climate insurance, climate resilient infrastructure or climate resilient buildings. Such an approach would sit closely with the programmatic nature of the PPCR's public sector activities.



Governments

Governments should seek to create a more conducive environment for private sector adaptation by providing climate and hydrological projections and data on the expected impacts of climate change, creating fora for public private dialogue on private sector adaptation, augmenting building and infrastructure standards and codes to enhance climate resilience, providing government incentives for financing adaptation activities, and improving the cost reflectivity of energy and water prices.

There is an urgent need to
scale-up climate adaptation efforts
in developing countries. The private
sector will be critical in providing
the required investments



Introduction

There is an urgent need for the international community to scale climate adaptation efforts. The Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (2014) reaffirmed that climate change is unequivocal and human influence is extremely likely to be the dominant cause. Even if countries meet the contributions identified under their Intended Nationally Determined Contributions (INDC) submitted in advance of the 21st Conference of the Parties (COP21) meeting in Paris in 2015, global temperatures are projected to rise 2.7°C compared with pre-industrial levels by 2100. This will have significant socio-economic consequences. Studies estimate there will be 0.2 to 2.0 percent decrease in global GDP per capita following a 2.5°C rise in temperatures (IPCC, 2014a). There are concerns, however, that the modelling approaches underlying these figures underestimate the losses from temperature increases (Dietz & Stern, 2014; Pindyck, 2015). A recent study employing a non-linear relationship between productivity and temperature changes, for example, estimated that a 2°C rise could result in up to 35 percent decrease in global GDP per capita in 2100 (Burke, Hsiang, & Miguel, 2015). Given the scale of estimated socio-economic impacts and concerns around model underestimation, there is an urgent need to focus on engaging governments, private investors and communities in activities that will support adaptation⁴ to these temperature changes.

Current public finance falls short of present climate adaptation costs and this gap will likely grow in the future. International public adaptation finance in 2014 from bilateral and multilateral sources was approximately USD 25 billion, with USD 22.5 billion going to developing

countries (UNEP, 2016)⁵. By contrast, current adaptation costs in developing countries for the 2010-2019 period are estimated to be annually USD 56-73 billion, suggesting an annual funding gap of USD 33-50 billion. Some of these costs may be met by domestic private and public sources; however, costs are expected to rise substantially in the future. One recent estimate of annual adaptation costs for 2030 places the total finance required for adaptation in developing countries at USD 140-300 billion per annum, approximately 6 to 13 times greater than the international public finance available today for adaptation (UNEP, 2016). While other estimates of future adaptation costs are lower (World Bank, 2010), there is a clear risk that there will be insufficient resources available for adaptation.

The private sector is a critical partner to address this adaptation finance gap. The Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have confirmed that both public and private funds have a role to play in delivering finance. This partly reflects the size of the financing need and the unlikelihood that public sources alone can fill it. The private sector⁶ may be the best placed to implement adaptation critical activities due to its dominance in many key industries that will need adaptation, or in sectors that can provide adaptation goods and services, including infrastructure, agriculture, water management and weather related services (Biagini & Miller, 2013). Moreover, limited availability of public finance and high debt levels of some developing countries means the private sector may be best placed to finance future assets that need to be made more climate resilient.



The global corporate community see extreme weather and climate change as a significant risk for future business. Climate change risks are becoming increasingly important for the corporate sector. In 2014, 91 percent of companies in the S&P Global 100 Index reported extreme weather and climate change impacts as current or future risks to their business (C2es, 2015). In 2015, 407 Global 500 companies identified a total of 1,016 climate-related physical risks to their businesses (Carbon Disclosure Project, 2015). The failure of governments and businesses to adapt to climate change is ranked by the World Economic Forum's annual Global Risks Report as a top five global risk by impact, and has done so since 2013 (World Economic Forum, 2016). A particularly major concern for companies is the effect of extreme weather on corporate supply chains (C2es, 2015).

The private sector uses different methods to address climate change risks but typically responds in a way which may miss some emergent risks, while the ability to respond is often limited in smaller actors. While global companies acknowledge the risk of climate change, they also report that it is difficult to assess and act on as a standalone issue (C2es, 2015). Instead, they manage climate change within existing corporate risk management processes, employing methods such as business continuity plans and vulnerability assessments (Agrawala, Carraro, Kingsmill, Lanzi, & Prudent-Richard, 2013; Averchenkova, Crick, Kocornik-Mina, Leck, & Surminski, 2016; C2es, 2015). This approach helps to translate climate change into existing business structures but may fail to take into account new and emerging climate risk. Small- to medium-sized enterprises (SMEs) are likely to face additional challenges incorporating adaptation into their business due to limited financial capacity, lack of awareness of climate change risks and access to technologies

(Trabacchi & Mazza, 2015). Historically, lenders have considered these types of investments risky and costly to serve, which increases the difficulty of securing finance.

Although adapting to climate change can make business sense, a number of barriers hinder the private sector's ability and motivation to undertake adaptation activities, especially in developing countries.

- 1) The actor must be aware of the risks and opportunities associated with climate change and have the capacity and expertise to identify opportunities (Fankhauser, Smith, & Tol, 1999). This is often lacking in developing country contexts where actors in the private sector have limited capacity and access to climate resilient technologies (Trabacchi & Mazza, 2015).
- 2) Adaptation investments tend to be cost-saving in nature which, for various behavioral reasons, may be less attractive than revenue generating investments (UNEP, 2016).
- 3) The benefits from adaptation investments tend to accrue in the longer term, but many private sector actors also have high discount rates, which place more value on the short term than might be desirable from a social perspective.
- 4) Funding constraints can also affect private sector adaptation. Adaptation investment can incur high-up front costs. For example, evaluating climate change risks can add 25 percent to the average cost of an environmental and impact statement (Iqbal & Suding, 2011; Trabacchi & Mazza, 2015). This can make it difficult to secure either external or internal finance for such investments, particularly if there is incomplete information or increased risk due to uncertain climate impacts.
- 5) In many countries, other generic investment barriers such as regulatory, political, economic and institutional weaknesses also limit private sector investment in adaptation, due to the increase in operational challenges and cost of doing business.

Evidence of private sector investment in climate adaptation is building but it is different to what the international community conceptualizes as adaptation financing. The evidence base for private sector adaptation is limited. Case studies collected to date are mostly from large international companies rather than the activities of SMEs in developing countries (Pauw, 2015; Surminski, 2013). The CTI Private Financing Advisory Network is developing a database of private adaptation in developing countries and the Private Sector Initiative of the UNFCCC Nairobi work program has collected IOI case studies submitted by businesses globally. An analysis of the latter's case studies found that private and public adaptation interventions complement one another but that the international climate finance community's concept of adaptation finance was disconnected from the private sector reality of implementing adaptation (Pauw, 2015). They suggest that the private sector is not motivated by climate change adaptation as a distinct challenge when undertaking adaptation activities. Instead, it sees adaptation as a risk management and business continuity issue, one of the many ways in which firms seek to protect revenues and prevent future cost increases in an uncertain future environment.

Public intervention can help stimulate private investments in climate resilience at scale.

Public financial institutions and regulatory bodies can help the private sector overcome barriers restricting investment in adaptation activities. They are able to provide the public goods of information about climate change and technical adaptation measures. They can also provide regulatory frameworks to incentivize private sector to invest, for example, pricing water at appropriate levels. Multilateral development banks (MDBs) are one of the most important intermediaries to connect public finance with private actors in developing countries due to their ability to deploy both financial assistance and advisory services to help overcome barriers to investment. Additionally, a number of public financing mechanisms have looked to consciously support private sector adaptation with dedicated financing, including the Climate Investment Funds' (CIF) Pilot Program for Climate Resilience (PPCR) and

the Green Climate Fund (GCF). The German Federal Ministry for Economic Cooperation and Development (BMZ), through GiZ, also implements a private sector advisory program to support micro, small and medium-sized enterprises (MSME) in assessing climate related risks and opportunities.

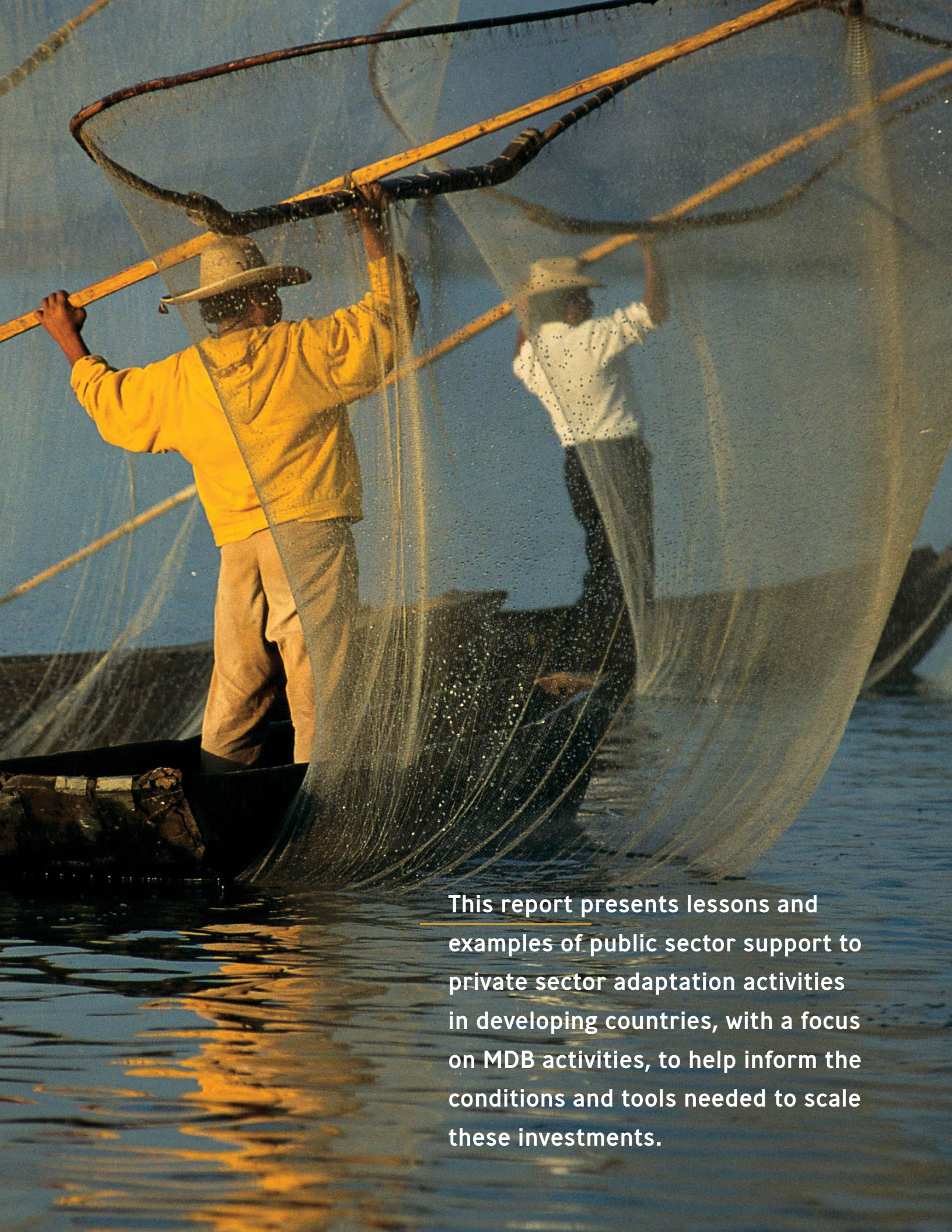
Within existing international public financing mechanisms, the PPCR has played the leading role in engaging the private sector in adaptation. There are currently six multilateral funds which have a focus on adaptation: The Least Developed Countries Fund, Adaptation Fund, Adaptation for Smallholder Agricultural Program, the Special Climate Change Fund, the GCF and the PPCR (Trabacchi, Brown, Boyd, Wang, & Falzon, 2016). Across the funds, a total of USD 8.7 billion has been pledged and USD 8.4 billion deposited for adaptation projects. To date only the PPCR has approved funding for investments in the private sector. This reflects the significant experience the PPCR has developed since its inception in 2008, but

the landscape may change as the GCF engages more closely with the private sector.

The purpose of this report is to present lessons and examples of public sector support to private sector adaptation activities in developing countries, with a focus on MDB activities, and understand the conditions and tools needed to scale this investment. At present, there remains limited empirical evidence on how much private sector adaptation is supported by the public sector and on the operational lessons that can be taken from this experience. This report aims to contribute to filling this gap and improve understanding among key stakeholders and organizations on best practices so that they can deploy these types of investments more effectively. It identifies some of the key gaps that exist in relation to private sector adaptation and the role that some of the most important players in the existing landscape of private sector adaptation might play in addressing them.

The report is structured as follows:

Section 2 presents a landscape of private sector adaptation finance, including an overview of key definitions, recent international adaptation spending and adaptation gaps	Section 3 provides detailed information on the experience of MDBs, the largest class of contributors within the international public adaptation financing community, and on PPCR investments in private sector adaptation	Section 4 sets out five operational lessons derived from the MDB experience, including case studies of private sector projects in the Central Asia and Central and South America regions	Section 5 outlines the potential comparative advantage of the MDBs and PPCR to fill some of these gaps	Section 6 concludes, identifying a series of lessons and possible next steps for a range of stakeholders
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This report presents lessons and examples of public sector support to private sector adaptation activities in developing countries, with a focus on MDB activities, to help inform the conditions and tools needed to scale these investments.

Landscape of private adaptation finance

There are multiple funding flows driving private sector investment in adaptation but only a few of these flows can be estimated.

The private sector invests in adaptation either using internally generated resources, or with finance provided by a variety of external intermediaries, including bilateral and multilateral development finance institutions, banks, private equity, venture funds, and institutional investor funds. Very few of these actors need to report on their adaptation investments due to the confidential nature of commercial terms and there is limited transparency on the categories of investment and whether they support adaptation priorities. In the case where these actors do report on their investments, such as commercial databases, it can be difficult to collect adaptation information, as they do with renewables investment, due to the challenges associated with identifying the part of the investment related to adaptation. Nonetheless, it is feasible to estimate the resources provided to support private adaptation from national governments, development finance institutions and climate fund intermediaries.

This section provides a brief overview of the overall landscape of international public adaptation finance with a focus on intermediated private financing through MDBs. It first identifies the data available documenting public financing of private adaptation and calculates the flows of finance from public bilateral and multilateral sources to the private sector. It then estimates the gap in adaptation financing, comparing international public adaptation finance with estimated adaptation costs in 2014. It assesses the adaptation gap by geography and sector to understand where international adaptation finance is most needed.

2.1 Landscape of international private adaptation financing

Figure 1 describes the landscape of international public adaptation finance directed to the private sector and highlights where data is available. It illustrates the pathways taken by international public finance to reach the private sector and highlights, in bold blue arrows, where data has been collated by Buchner et al (2015).

In 2015, around 5 percent (USD 1.4 billion) of total reported international public adaptation finance was directed to the private sector.⁷

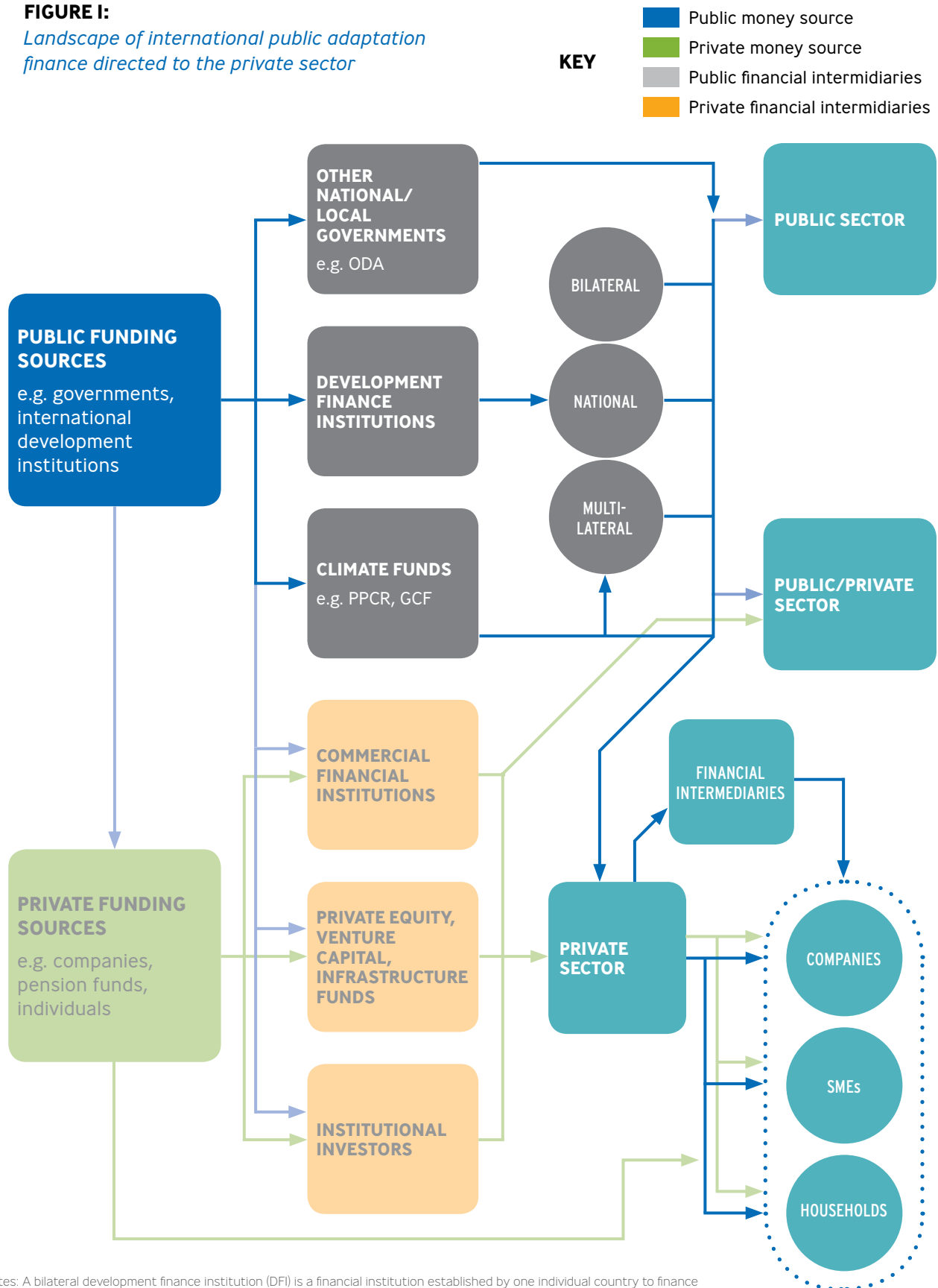
Data collected by the Climate Policy Initiative (CPI) indicate that total adaptation spending from international public sources for which data was collected in 2014 was USD 25 billion. As shown in Figure 2, an estimated USD 1.4 billion, or 5.6 percent of the total funds, went to financing adaptation in the private sector. In this dataset, the private sector was defined to include both non-governmental organizations (NGOs) and for-profit actors. Of the USD 1.4 billion, multilateral development finance institutions (DFIs)⁸ contributed USD 0.6 billion, bilateral climate-related development finance from governments and their aid agencies/ministries provided around USD 0.5 billion⁹; national DFIs provided USD 0.3 billion; and bilateral DFIs provided USD 15 million¹⁰. Multilateral DFIs were the largest provider of finance for adaptation to the for-profit private sector. Although there is no specific data specifying the breakdown of these flows across different DFIs, or geographically between developed and developing countries, it is likely that MDBs are the most active providers of private adaptation finance in developing countries and form the focus of this report.¹¹

Other public and private financial flows, although unable to be estimated, could be a significant source of adaptation investment.

The domestic private sector in many countries

FIGURE I:

Landscape of international public adaptation finance directed to the private sector



Notes: A bilateral development finance institution (DFI) is a financial institution established by one individual country to finance development projects in developing countries. A national DFI is a financial institution established by a country to provide finance for the purpose of economic development of the country. A multilateral DFI is a financial institution established by a group of countries to provide financing for the purpose of development, commonly in developing countries.

Sources: Adapted from Buchner et al (2015) to focus on private sector adaptation investment; Vivid Economics.

is likely to be making investments that enhance climate resilience. In addition, private financial flows to developing countries are significant. In 2015, foreign direct investment in developing countries reached a high of USD 741 billion, while individual remittances to developing countries reached USD 431.6 billion (Ratha et al., 2016). Such funding sources represent a significant source of finance for the private sector which are unable to be captured for the purpose of adaptation finance tracking. For example, remittances may help households and SMEs to make improvements in home and building infrastructure that are resilient to climate impacts.

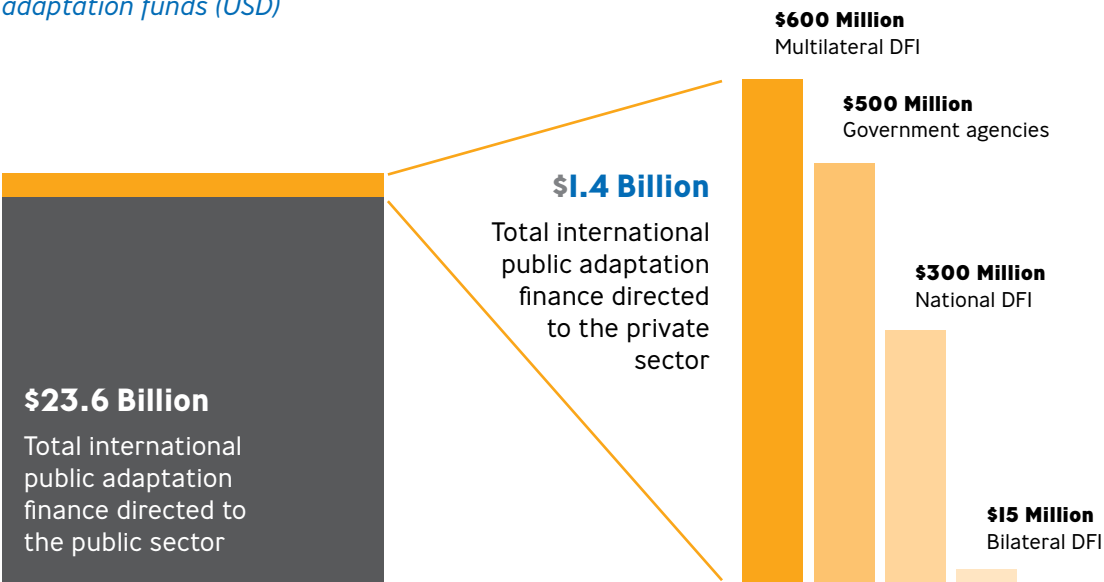
2.3 Current adaptation financing gap by sector and geography

This sub-section presents an analysis of the total gap between international adaptation spending, both public and private, and the

estimated costs of adaptation. An assessment of the overall gap can help inform where the need for private adaptation investment may be greatest. Specifically it compares adaptation spending estimates reported for 2014 by UNEP (2016)¹² and Buchner et al. (2015) with two global adaptation costs estimates¹³ reported by the World Bank (2010) covering the period 2010-2050¹⁴. These data sources are not wholly aligned by sector or geography so the adaptation gap has only been estimated where the data correspond; Appendix II provides more explanation of the mapping exercise. The analysis provides a useful point to compare sectoral and geographic financing priorities and reviews where there may be particular financing gaps.

The adaptation gaps are reported as a range to reflect two different climate scenarios under a 2°C temperature rise. World Bank (2010) assesses the annual costs of adapting to approximately 2°C temperature rise by 2050 across seven sectors and 144 low income and middle income countries.

FIGURE 2:
International public adaptation directed towards the private sector in 2014 was USD 1.4 billion, or 5.6% of the total adaptation funds (USD)



Notes: DFI means development finance institution.
Sources: Buchner et al (2015) and further correspondence with authors; Vivid Economics.

Multilateral development banks are
likely the most active providers of
private sector climate adaptation
financing in developing countries
and form the focus of this report



It provides two sets of cost estimates to reflect different climate scenarios with the same temperature increase: one set of estimates, provided by the Commonwealth Scientific and Industrial Research Organization (CSIRO), assess adaptation costs under dry global climate projections; the other set of estimates, provided by the National Centre for Atmospheric Research (NCAR), reflect adaptation costs under wet global climate projections¹⁵.

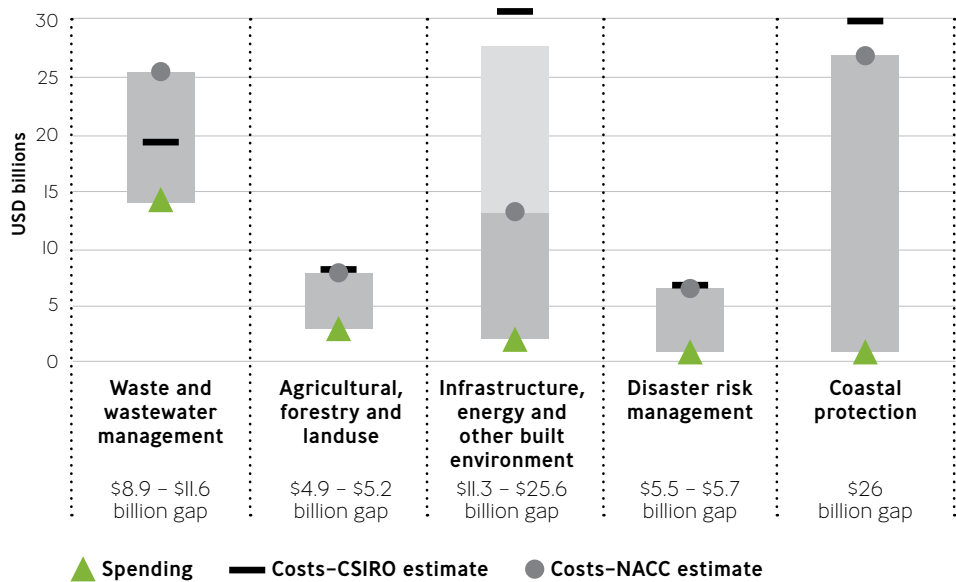
2.3.1 Adaptation gap by sector and geography

The adaptation gap is most pronounced in the Infrastructure, Energy and Other Built Environment and Coastal Protection sectors. Figure 3 describes the gaps in adaptation financing by sector in developing countries. It shows the Coastal Protection sector has the greatest adaptation financing gap, with an annual shortfall between current spending and what might be required until 2050 of around USD 26 billion. These costs relate to activities

such as building sea walls or relocating low-lying settlements. This is followed by the Infrastructure, Energy and Other Built Environment sector where the estimated annual shortfall is between USD 11.3-25.6 billion. This large range reflects significant uncertainty in the costs associated with making urban and transport infrastructure more climate resilient, the main focus of this sector. The Water and Wastewater Management sector has an annual shortfall of between USD 8.9-11.6 billion covering costs such as increased water storage and watershed management planning.

Of the regions for which geographic spending data was available, Latin America and the Caribbean and South Asia have the largest absolute adaptation financing gaps. As shown in Figure 4, of the regions that presented data, the estimated financing gap was largest in Latin America and the Caribbean with an annual gap of USD 14.7 – 18.1 billion. This was closely followed by an annual financing gap of USD 14.9-16.5 billion in South Asia. In Sub-

FIGURE 3:
Figure 3. Adaptation finance shortfalls in absolute terms in 2014 were most pronounced for developing countries in Coastal Protection and Infrastructure, Energy and Other Built Environment sectors (USD)

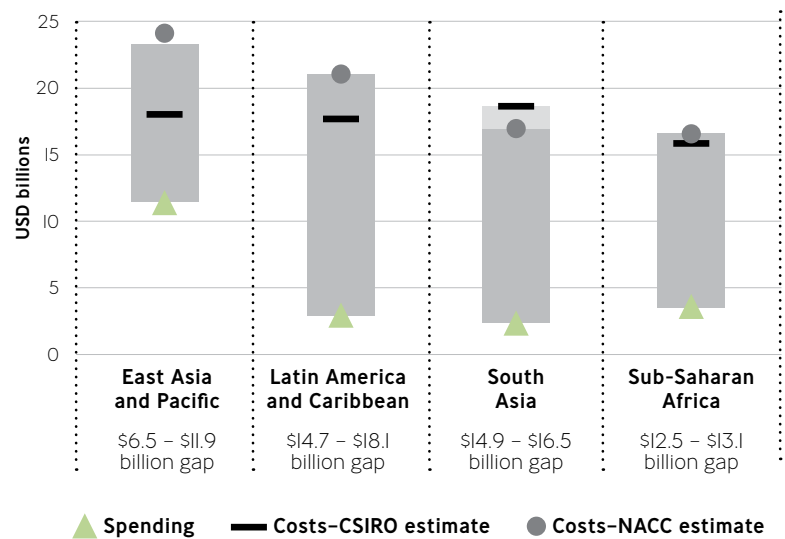


Notes: Spending means the amount of international public adaptation finance in 2014 directed to both public and private sectors, as described in Buchner et al (2015). Costs estimates refer to the average annual cost of adaptation for each year from 2010-2050 for seven sectors and 144 low income and middle income countries described in World Bank (2010). Estimates cover varying climate scenarios: dry global climate projections (costs estimate – CSIRO) and wet global climate projections (costs estimate – NACC).
Source: Vivid Economics



FIGURE 4:

Latin America, the Caribbean and South Asia face the biggest absolute shortfall in adaptation finance (USD)



Notes: Spending means the amount of international public adaptation finance in 2014 directed to both public and private sectors, as described in Buchner et al (2015). Costs estimates refer to the average annual cost of adaptation for each year from 2010-2050 for seven sectors and 144 low income and middle income countries described in World Bank (2010). Estimates cover varying climate scenarios: dry global climate projections (costs estimate – CSIRO) and wet global climate projections (costs estimate – NACC).

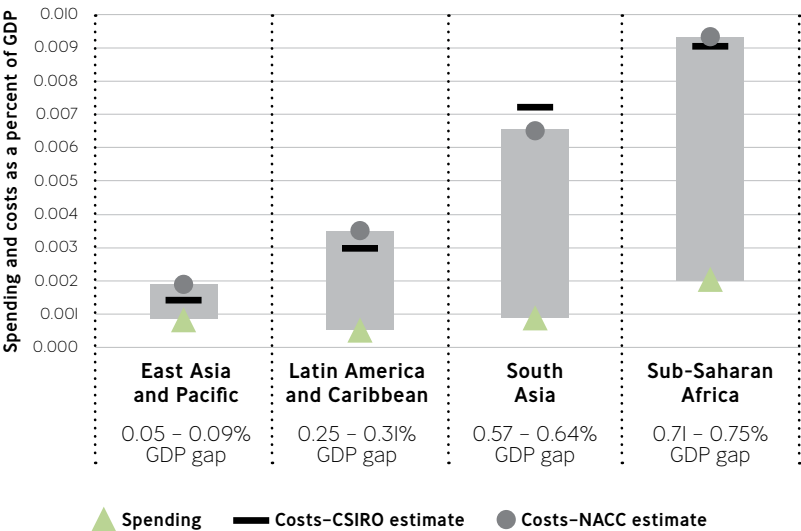
Source: Vivid Economics

Saharan Africa the gap is estimated to be USD 12.4-13.1 billion, and in East Asia and the Pacific a gap of USD 6.5-11.9 billion. The World Bank (2010) reports most adaptation costs in Latin America and the Caribbean relate to water supply, flood protection and agriculture. In South Asia, adaptation costs are driven by infrastructure and agriculture. In Sub-Saharan Africa adaptation costs arise in water supply, flood protection and agriculture (World Bank, 2010).

Relative to GDP, Sub-Saharan Africa faces the greatest adaptation gap. As shown in Figure 5, when converting the costs and spending estimates into percentage of GDP for 2014⁶, the most severe adaptation gaps lie in Sub-Saharan Africa, with a shortfall of financing equivalent to 0.71-0.75 percent of GDP. Not far behind is South Asia, with a shortfall of financing equivalent to 0.57-0.64 percent of GDP.

The analysis suggests that there is a significant risk of an adaptation gap emerging, which the private sector may have an important role in filling. Sectorally, the gap appears to be particularly pronounced in the Coastal Protection and the Infrastructure, Energy and other Built Environment sectors. Geographically, the gaps appear greatest in Latin America and the Caribbean and South Asia (although as a percentage of current GDP, the gap is greatest in Sub-Saharan Africa)¹⁷. In summary, there is an urgent need for the international community to scale climate adaptation efforts. Current international public adaptation spending is unlikely to meet the full costs of adaptation, leaving a gap in funding. To better understand how public financing can be efficiently deployed to mobilize private adaptation finance, this report turns to analyze the actions of the MDBs which have engaged the private sector the most to date.

FIGURE 5:
As a percent of GDP, the adaptation gap is most pronounced in Sub-Saharan Africa and South Asia



Notes: The GDP of each country included in World Bank (2010) estimates in 2014 were sourced from the IMF.
Source: Vivid Economics

3

MDB experiences in supporting private sector investment in climate adaptation

MDBs have a unique role in supporting adaptation investment in the private sector.

MDBs are an important intermediary connecting public finance with private actors in developing countries. They can provide financial assistance where there are high risk and weak institutions, generating externalities that promote economic and social development. They can also be instrumental in overcoming the risks the private sector might face associated with changes in government policies, as well as strengthening investment responses to reforms. In relation to adaptation to climate change, MDBs play a particularly important role in enhancing the private sector's awareness of climate change, providing financing for adaptation measures and piloting innovative approaches that address market gaps and enable further private investment.

This section provides empirical detail on MDBs' experience in supporting private sector adaptation. Although overall data on private sector adaptation is sparse, Section 2 found that multilateral DFIs are the most important providers of public finance to support private sector adaptation. Within this group, the five MDBs which participate in the PPCR are likely to be the most active in developing and middle income countries. They are the African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IDB), and World Bank Group, including its private sector arm, the International Finance Corporation (IFC). The following section examines the MDB portfolio of activity in more detail and considers the important role of the PPCR. This includes a high-level indicative overview of the potential future MDB private sector adaptation activity that might be supported by the PPCR.

3.1 Existing MDB experience in private sector adaptation

This sub-section presents an analysis of data provided by five MDBs on their recent portfolio of private sector adaptation finance projects. The data was obtained through a data request directed at the PPCR MDBs that support the private sector (AfDB, ADB, EBRD, IDB, and IFC as part of the World Bank Group) complemented by analysis of project documentation and interviews with MDB staff. Data from an earlier analysis of MDB private adaptation portfolios is also included where possible to draw out longer term trends (Vivid Economics, 2015).¹⁸ Private sector adaptation finance is defined as the component of MDB investment in the private sector that relates to making the investment more climate resilient. The full details of the information provided are in Appendix I. **In 2015, these five MDBs provided USD 106.9 million of finance to make private sector projects valued at USD 2.6 billion climate resilient.** The adaptation finance was used to build resilience into the overall design of these projects, for example, providing technical assistance to ensure the overall project can withstand expected and uncertain future climate change impacts and providing the funding necessary to cover the incremental cost of the resulting design adjustments. It was also used to reduce real and perceived risks of the private sector engaging in adaptation, for example, using financial instruments such as guarantees to lower a project's risk profile in order to demonstrate its credit worthiness. The total project value of these investments was USD 2.56 billion, of which MDBs contributed USD 646 million of their own finance. In addition to the USD 106.9 million of adaptation finance, four projects were supported by an additional USD 3 million of donor cofinancing and USD 4.1 million from the PPCR¹⁹.



MDBs can be instrumental
in helping the private
sector overcome risks
facing climate resilient
investments

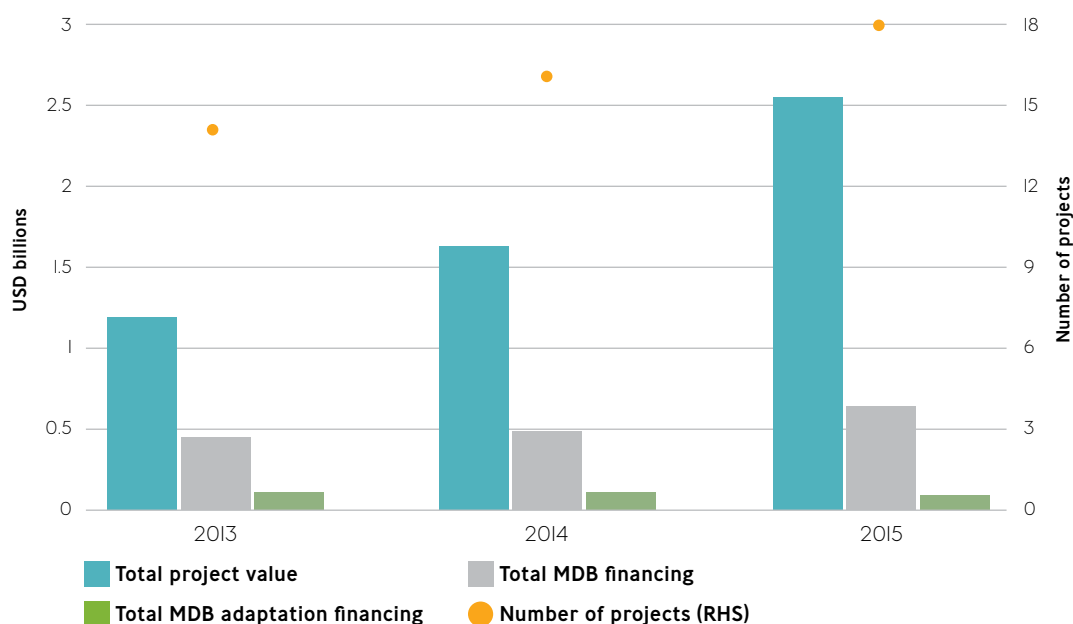
The amount of private adaptation finance provided by these five MDBs has remained broadly constant in recent years, although the ratio between adaptation finance and total project value has increased. As shown in Figure 6, in 2013 the finance provided by the MDBs associated with adaptation was USD 115.8 million, decreasing to USD 106.9 million in 2015. Over the same time period, the total finance MDBs provided from their own funds to projects with an adaptation component increased from USD 460.3 million to USD 646.9 million, while total project values increased from USD 1,204.2 million to USD 2,556.3 million. Many things may be causing this change, for example the cost of designing climate resilient projects may be decreasing over time, adaptation finance may be being directed to more costly projects or additional co-financing is being found for new projects. It may also just be a reflection of the relatively small sample size of MDB private sector adaptation projects.

Given the relatively small number of projects in any one year, the subsequent analysis aggregates the MDB's private sector adaptation financing activity over the three years for which data is available (2013-2015).

The projects have been anonymised, as some of the presented data is confidential. The sector classification follows the MDB Joint Report methodology (Multilateral Development Banks, 2015) which reports the geographic, sectoral and instrument coverage of these MDB's adaptation investments, as well as those of the European Investment Bank (EIB), although EIB's projects are not included in this analysis. Aggregating this activity allows for a more robust understanding of the portfolio of MDB private sector adaptation investment than might be gained from looking at one year in isolation.

FIGURE 6:

MDB adaptation finance ratio to TPV increased between 2013-2015



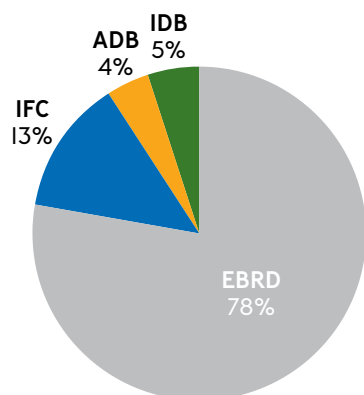
Note: RHS means right hand side, TPV means Total Project Value, Total MDB financing means the total finance provided by MDBs for projects that have an adaptation component, and Total MDB adaptation financing means the finance provided by MDBs for adaptation only projects or the components of projects which specifically address adaptation.

Source: Vivid Economics

The EBRD deployed 78 percent of the MDBs' private sector adaptation finance²⁰ in 2013-2015 (see Figure 7). The breakdown of these flows was:

- The EBRD deployed USD 267.1 million of private sector adaptation finance for 31 projects with an additional USD 25.1 million from the PPCR.
- The IFC deployed USD 44.6 million of private sector adaptation finance for nine projects with an additional USD 7.1 million from the PPCR.
- The IDB deployed USD 16.5 million of private sector adaptation finance for five projects with no PPCR funds.
- The ADB deployed USD 13.5 million of private sector adaptation finance for two projects with an additional USD 5 million from the PPCR.
- The AfDB reported one private sector adaptation project in 2013-2015 and used funds from the Global Environment Facility (GEF) to fund the adaptation component of this project.

FIGURE 7:
The EBRD deployed the most private sector adaptation finance over the period, followed by the IFC, IDB and ADB



Source: Vivid Economics

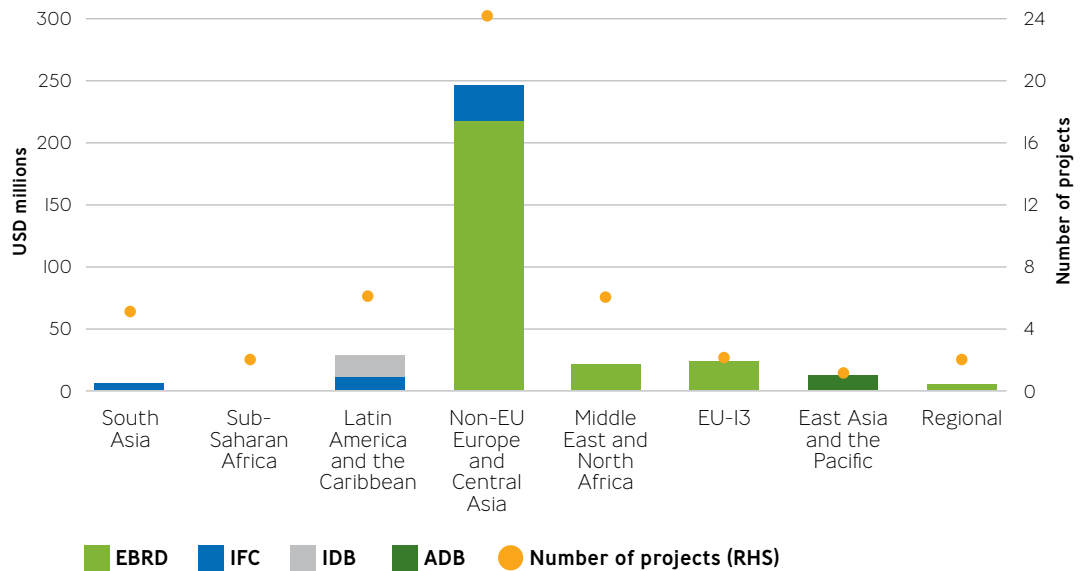
Consistent with the prominent role of the EBRD in private sector adaptation, the Non-EU Europe and Central Asia region received the most MDB adaptation finance. Figure 8 outlines the geographic grouping of MDB private sector adaptation in 2013-2015. Non-EU Europe and Central Asia received USD 246.2 million, of which USD 218.2 million was invested by the EBRD. This was followed by Latin America and the Caribbean which attracted USD 28.5 million from the IDB and IFC, the EU-13 which received USD 22.2 million and the Middle East and North Africa region which also received USD 21.7 million. East Asia and the Pacific received USD 13.5 million, regional projects received USD 5 million from the ADB and South Asia received USD 4.6 million from the IFC. Only two projects were located in Sub-Saharan Africa in 2013-2015; however, the adaptation component of these projects were supported solely by donors, rather than the MDBs which developed the projects.

Over the period 2013-2015, MDBs began making private adaptation investments in lower middle income and low income countries²¹. As shown in Figure 9, upper middle income countries received the majority of MDB private adaptation finance in 2013, totaling USD 86.5 million, or 75 percent of total MDB adaptation spending. Lower middle income countries received USD 29.0 million and low income countries just USD 0.3 million in the same year. By 2015, upper middle income countries received USD 61.1 million, lower middle income countries received USD 33.8 million and low income countries received USD 12 million. Only one project was in a high income country during this period (Poland—See Appendix I for project details).

In 2013-2015, the leading sector to receive MDB adaptation finance was the Agricultural and Ecological Resources sector, with a particularly pronounced focus on the water technologies. Figure 10 presents the breakdown of MDB private sector adaptation finance and number of projects by sector. This is also reflected in Figure 11 which shows that, by technology, water efficient technologies have been a particular focus of MDB private sector adaptation financing, accounting for USD 142.8 million across 19 projects. Another USD 48.5 million was invested in climate smart

FIGURE 8:

The Non-EU Europe and Central Asia region received the most MDB adaptation finance in 2013-2015.

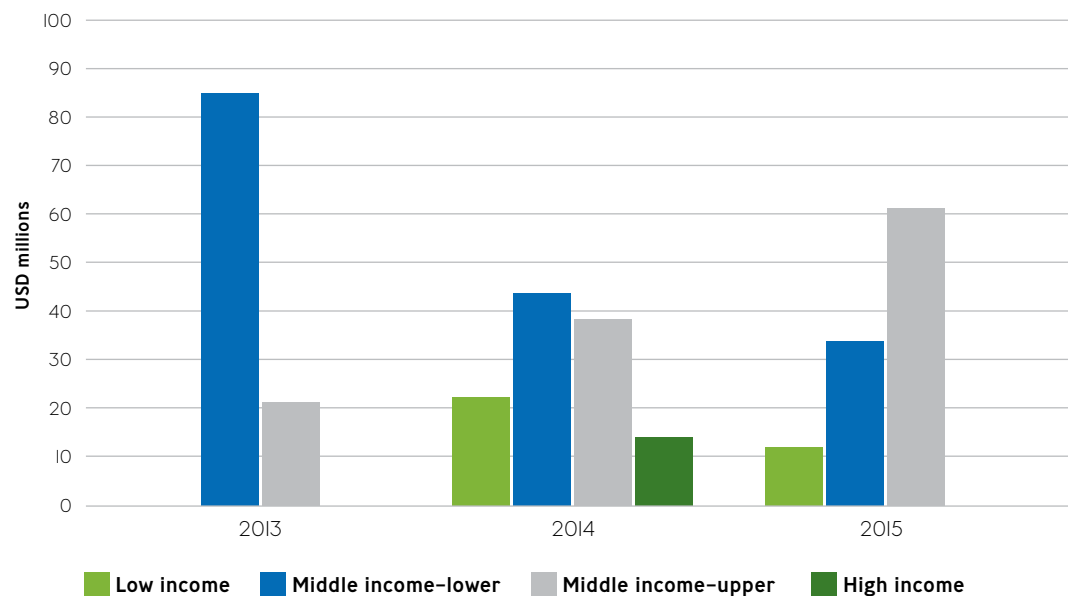


Notes: RHS means right hand side.

Source: Vivid Economics

FIGURE 9:

MDB private adaptation finance is greatest in upper middle income countries.

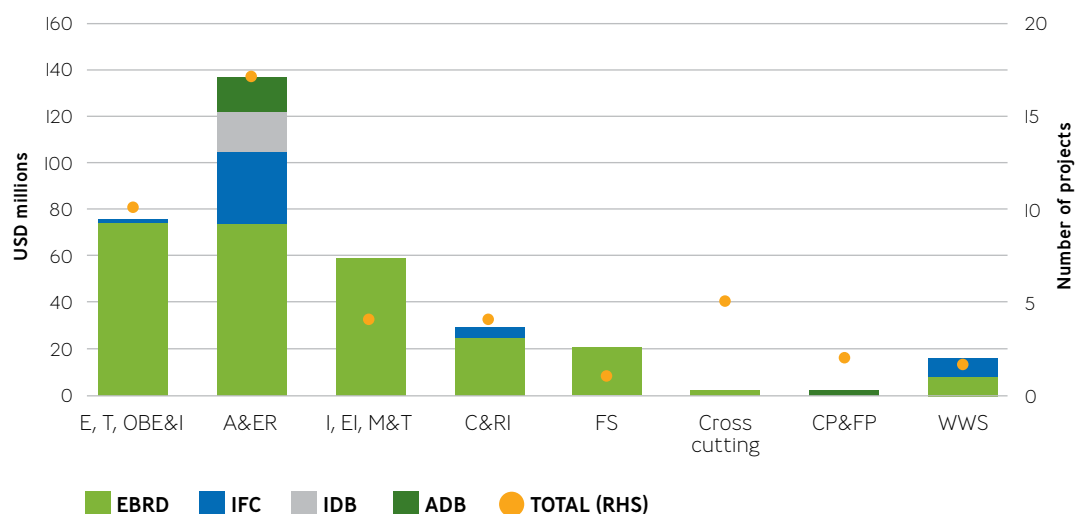


Note: Countries were grouped using the World Bank's country classification by income level.

Source: Vivid Economics

FIGURE 10:

The Agricultural and Ecological Resources sector received the most MDB adaptation finance for the private sector between 2013 – 2015

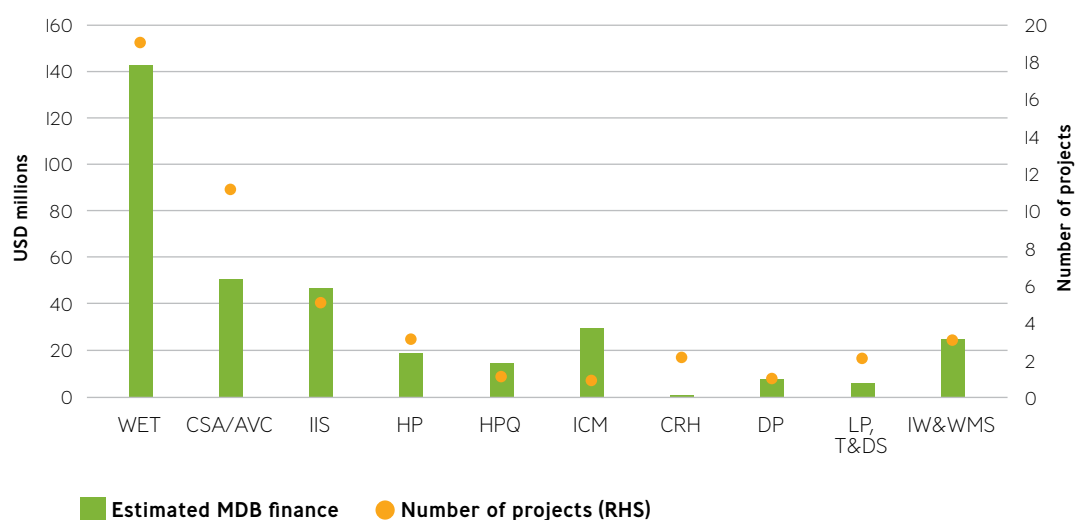


Note: RHS means right hand side. Sectors are as defined by the Joint MDB Report (2014). A&ER means Agricultural and Ecological Resources, E,T&OBEI means Energy, Transport & Other Built Environment Infrastructure, C&RI means Coastal and Riverine Infrastructure, FS means Financial Services, ICT means Information, Communication and Technology, I,EI,M &T means Industries, Extractive Industries, Manufacturing and Trade, W&WS means Water and Wastewater Systems, CP&FP means Crop Production and Food Production.

Source: Vivid Economics

FIGURE 11:

Water efficient technologies received the most MDB adaptation finance for the private sector in 2013-2015



Note: RHS means right hand side. WET means Water Efficient Technologies, CSA/AVC means Climate Smart Agriculture/ Agricultural Value Chain, IIS means Improved Irrigation Systems, HP means Hydropower, HPQ means Higher Port Quay, ICM means Improved Crop Management, CRH means Climate Resilient Housing, DP means Dry Process, LP,T&DS means Leak Prevention, Treatment and Demand Side measures and IW&WMS means Improved Waste and Water Management Systems.

Source: Vivid Economics

agriculture across 11 projects (a number of which had a water element), while USD 46.8 million was invested in five projects related to irrigation technologies and USD 19.1 million went to three hydropower projects. This prominent focus on water projects is consistent with the recent World Bank report which indicates that the impacts of climate change will be channeled primarily through the water cycle and that without further action, water scarcity could cost some regions up to 6 percent of their GDP (World Bank Group, 2016).

The most common instrument used by MDBs to deliver the adaptation component of projects between 2013-2015 were loans.

As seen in Figure 12, commercial loans were employed in 18 projects. This was followed by grants (5 projects), concessional loans (3 projects), technical assistance (3 projects) and equity (3 project). Five projects had a mix of instruments, usually a mix loans and grants, and 11 projects did not report on instruments.

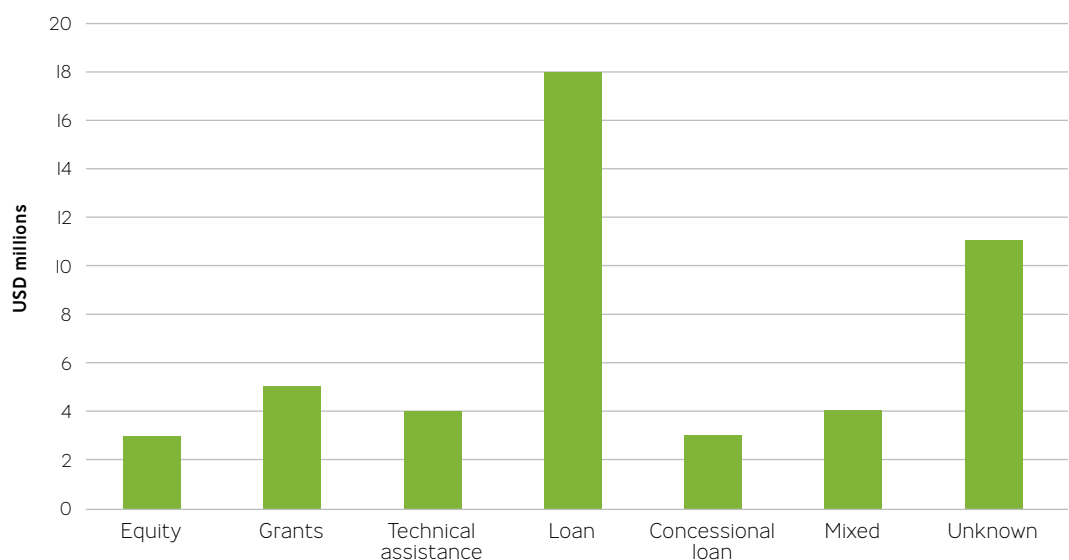
3.2 PPCR experience

The Pilot Program for Climate Resilience (PPCR) is a funding window of the Strategic Climate Fund (SCF) within the Climate Investment Funds (CIF) framework. Using a two-phase programmatic approach, the PPCR first assists national governments in integrating climate resilience into development planning across sectors and stakeholder groups. The result is a strategic program for climate resilience (SPCR). Second, the PPCR provides additional funding to put the program into action and pilot innovative public and private sector solutions to pressing climate-related risks²². Over the last four years, the PPCR has paid increasing attention to how it can support private sector adaptation. To date private sector projects have been funded through two mechanisms:

- 1) Endorsed SPCRs that specify a private sector project(s) as part of a country's overall PPCR program

FIGURE 12:

Loans were the most common instrument employed to deliver adaptation in MDB private sector adaptation projects



Source: Vivid Economics

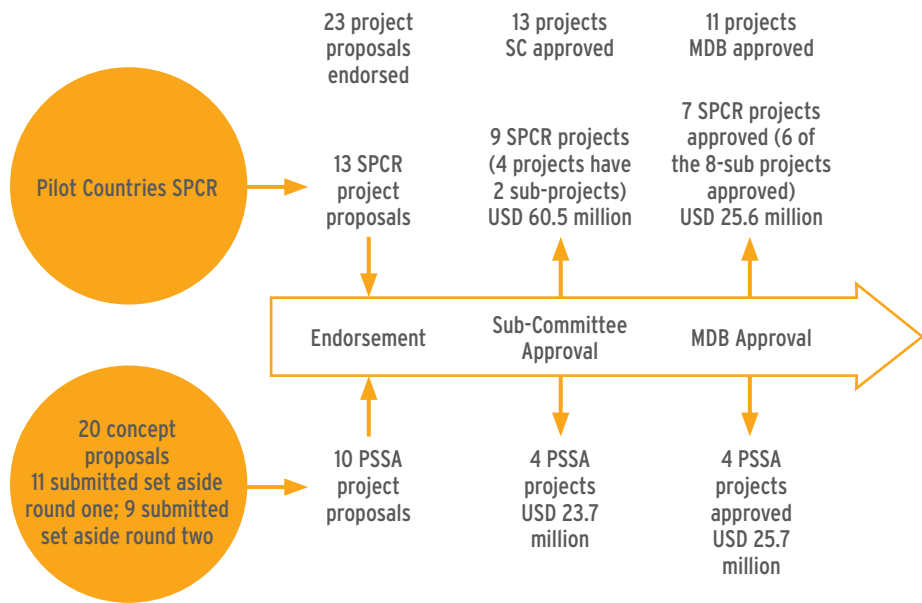
- 2) PPCR Private Sector Set Aside (PSSA), a competitive mechanism established in November 2012 to allocate finance to private sector adaptation projects or public sector projects that aim to enable private sector adaptation. Two rounds to solicit project proposals occurred in November 2013 and June 2014.

The PPCR has 23 private sector-focused projects in its pipeline, 11 of which have received final MDB approval to implement funding (totaling USD 51.3 million). Figure I3 shows the PPCR private sector portfolio has 23 projects in its pipeline at various stages of implementation. Of these, 13 projects have been endorsed for further development under countries' SPCRs and 10 projects have been endorsed under the PSSA²³. Following the two-step approval process of all CIF funding, the PPCR Sub-Committee has approved a total of USD 86.2 million for 13 projects (nine under SPCRs and four under the PSSA). Eleven of

these projects (seven under SPCRs and all four under the PSSA) have gone on to receive MDB approval, triggering funding implementation. In May 2015, the PSSA was expanded to support private sector operations under the PPCR on a rolling basis; however, due to lack of funds, no projects have been submitted under this program to date.

The amount of funding approved by the PPCR Sub-Committee for private sector projects has increased over time and is expected to increase further. As shown in Figure I4, compared to 2012, in which USD 9 million was approved under SPCRs, in 2015 the PPCR approved USD 35 million, with USD 10.8 million approved under the PSSA and USD 25 million approved under SPCRs. Projects seeking USD 36.5 million under the PSSA and USD 24.4 million under SPCRs are in the pipeline to be approved by the PPCR Sub-Committee. Of these, all the remaining proposals under the PSSA are expected to seek approval in 2016.

FIGURE I3:
Approval model of MDB private sector adaptation projects under the PPCR

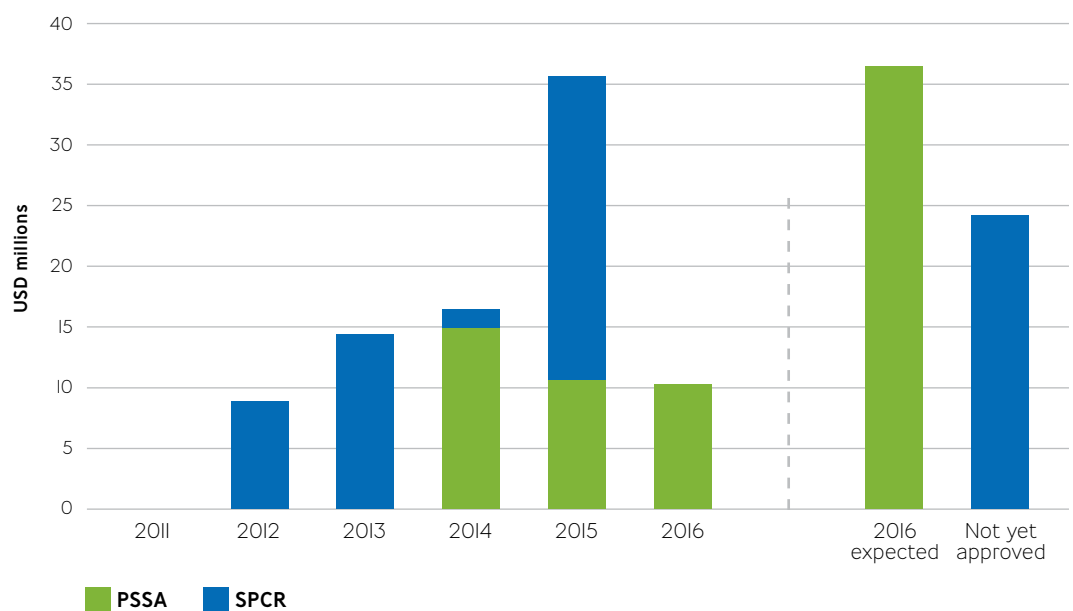


Notes: The amounts approved in Figure I3 differ to the amounts specified in Table I in Appendix I. This is because Figure I3 includes approvals across the lifetime of the PPCR, not just 2013-2015, and some approvals relate to a program of activities which have multiple sub-projects.
Source: Vivid Economics



FIGURE I4:

PPCR Sub-Committee approval of private sector projects has increased over time



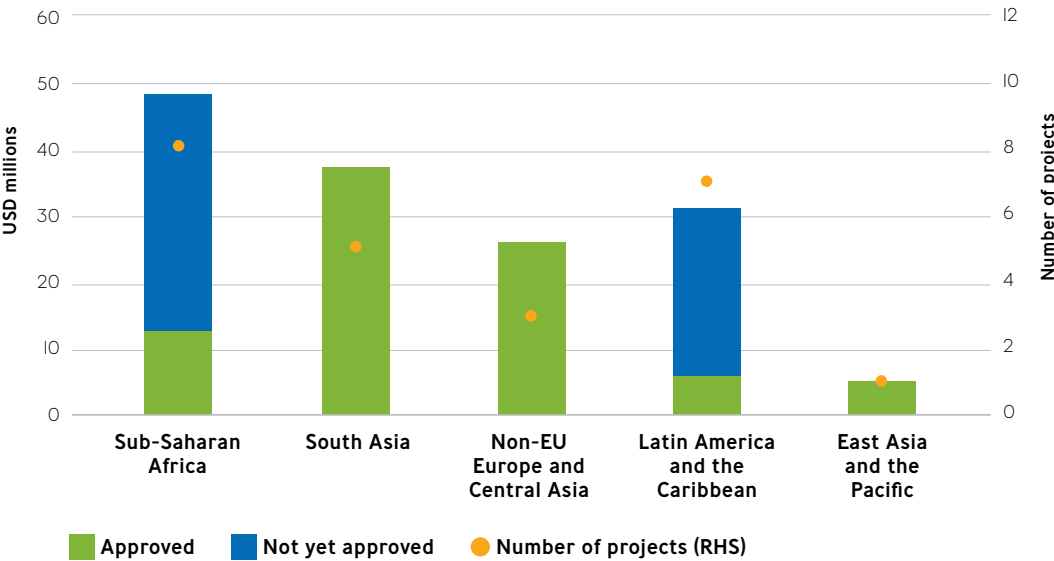
Source: Vivid Economics

The region with the most PPCR private sector proposals is Sub-Saharan Africa, however, to date, it has the least number of funds approved by the PPCR Sub-Committee. As Figure I5 shows, almost USD 50 million of resources have been proposed to support private sector projects in Sub-Saharan Africa but only a very small proportion of these funds have been approved. By contrast, South Asia has the second largest amount of funding proposals but has received the most PPCR funding, with USD 36.9 million approved for five private sector projects. Non-EU Europe and Central Asia is the second largest beneficiary, receiving USD 26 million for three approved projects. In both of these regions, all of the projects that have been identified have now secured approval. In Latin America and the Caribbean, one project for USD 5.8 million has been approved but there are another seven projects in the pipeline seeking USD 18.5 million of PPCR funding. East Asia and the Pacific has had USD 5 million approved for one project.

3.3 Future MDB pipelines

It is possible consider the future pipeline of private adaptation opportunities for the MDBs. As part of the data request, MDBs were asked to provide details of their future pipeline of private sector projects in eligible CIF countries, including the country, project activity, estimated total project value, estimated MDB financing and estimated needs for concessional funding. The data request was directed at eligible CIF countries because of changes made to the PPCR in May 2015, which, subject to certain rules, permits funding for private sector adaptation to be made available for use in all 72 countries in which the CIF operates, rather than just the countries where there is an existing PPCR program (see Appendix III for list of CIF countries).

FIGURE I5:
PPCR private sector funding is focused on Sub-Saharan Africa and South Asia

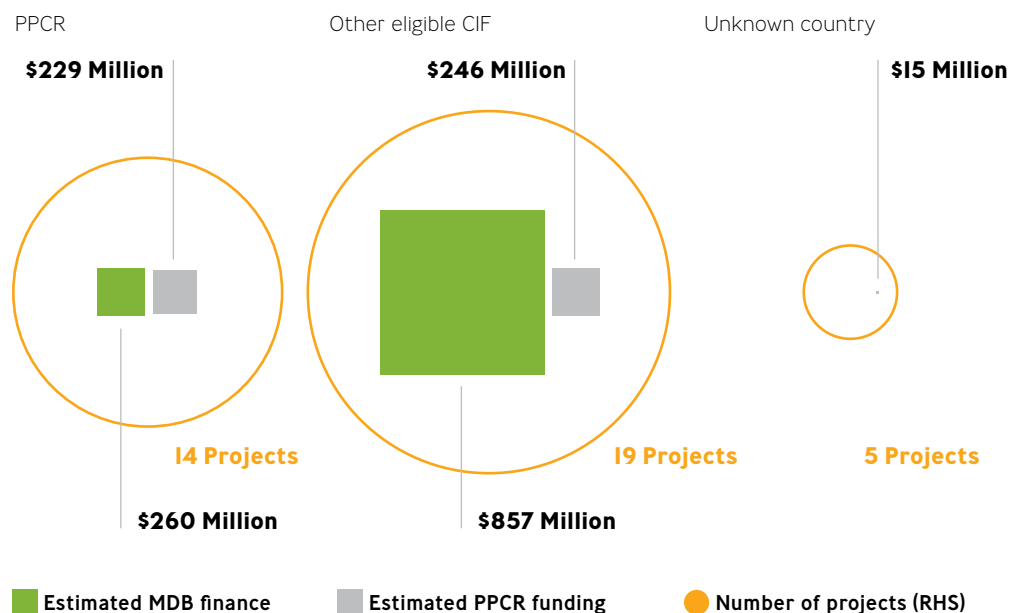


Note: RHS means right hand side.
Source: Vivid Economics

MDBs estimate that they can invest approximately USD 500 million of PPCR funds for private sector adaptation projects. MDBs report they have a pipeline of 38 projects which have a private sector adaptation component located in eligible CIF countries. They include investments in climate-proofing hydropower plants, climate resilient buildings, water efficiency and agribusiness. Of these projects, 21 provided project finance details indicating a total estimated need of USD 1.1 billion in MDB financing and an additional USD 500 million in PPCR financing. Specifically, the EBRD identified opportunities requiring USD 250 million of PPCR financing and the IFC identified opportunities that might account for USD 234 million of PPCR funding. The IDB and ADB estimated they might be able to deploy around USD 15 million and USD 11 million respectively. The AfDB has a pipeline but did not report PPCR funding estimates. In addition, timelines for when MDBs believe the PPCR funding will be needed were not provided.

The MDBs private sector adaptation pipeline appears further developed in other eligible CIF countries than PPCR countries. In terms of project number, the MDB pipeline of projects with a private sector adaptation component is fairly evenly split between PPCR and other eligible CIF countries. In terms of expected MDB co-finance, it is more heavily weighted towards other CIF countries. As shown in Figure 16, 15 pipeline projects are in PPCR countries, 18 project are in other eligible CIF countries and five project locations were not specified. Of the 38 pipeline projects, 21 have financing estimates. Seventeen of these projects are located in other CIF countries, with MDB financing estimates of USD 857 million and PPCR funding estimates of USD 246 million. Four projects are reported to be located in PPCR countries with MDB financing estimates of USD 260 million and PPCR funding estimates of USD 229 million. USD 15 million of PPCR funding is estimated for projects where the location was not specified.

FIGURE 16:
MDB pipeline is heavily weighted towards 'other eligible CIF' countries

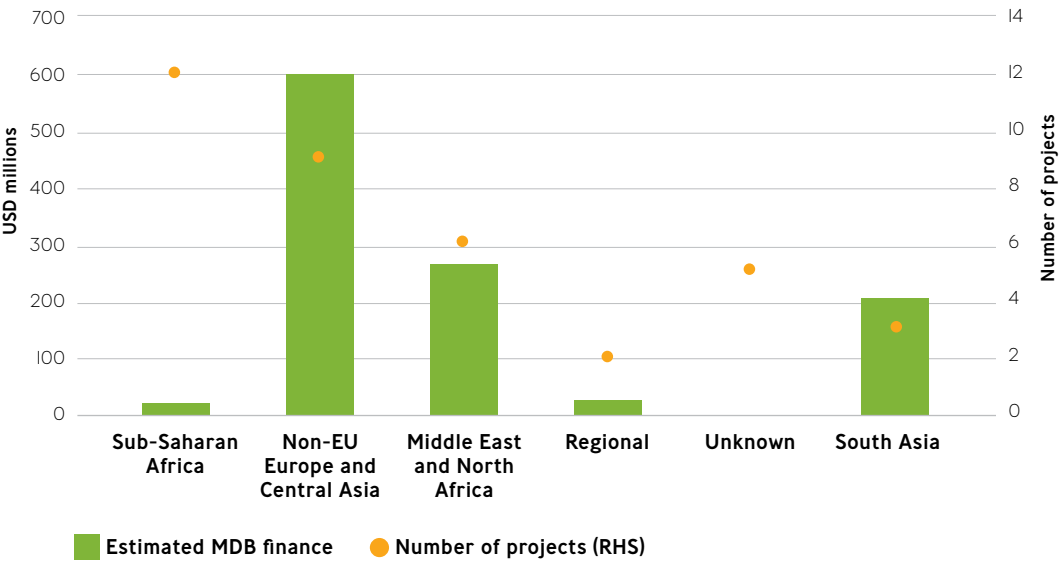


Note: RHS means right hand side. Other CIF means non-PPCR countries which are eligible for funds under the CIF. The sample of projects counted in number of projects is higher than the sample of projects for which project value estimates are available.
Source: Vivid Economics

Sub-Saharan Africa has the largest number of proposed projects with a private sector adaptation component, but Non-EU Europe and Central Asia has the largest developed pipeline by value. Figure I7 shows the MDBs are developing a pipeline of 12 projects in Sub-Saharan Africa, eight projects in Non-EU Europe and Central Asia, six projects in the Middle East and North Africa, with the remainder being regional projects or located in South Asia and Latin America and the Caribbean. For projects with financing estimates, the amount of expected MDB co-financing is highest in Non-EU Europe and Central Asia, followed by the Middle East and North Africa. The MDB co-financing associated with the pipeline in these two regions is more than USD 800 million.

The MDB private sector adaptation pipeline is diversified across sectors, with the largest expected MDB financing directed at the Energy, Transport and Other Built Environment sector and Infrastructure sector. Figure I8 presents the MDB financing of 21 projects in the pipeline which reported their private sector adaptation component by sector. The Energy, Transport and Other Built Environment and Infrastructure sector has the largest estimated MDB financing in the pipeline, totaling USD 366 million. This is followed by the Industries, Extractive Industries, Manufacturing and Trade sector and Water and Wastewater Systems sector, requiring USD 310 and USD 100 million of MDB finance, respectively. The Agricultural and Ecological Resources sector has the largest number of potential projects at 12, with the AfDB developing six, although these concepts are not yet fully costed.

FIGURE I7:
MDB private adaptation financing pipeline is largest in Non-EU Europe and Central Asia

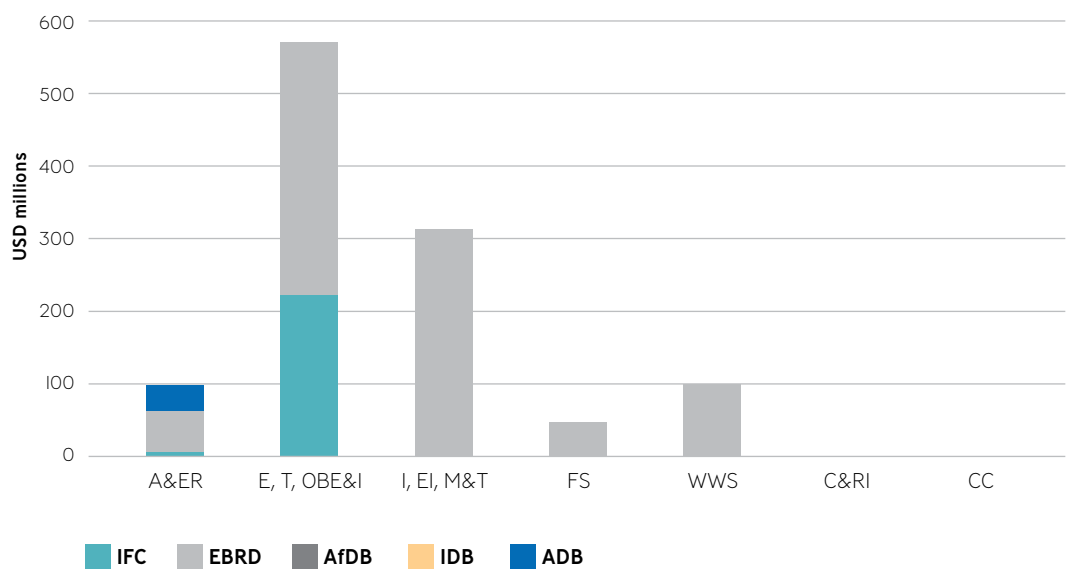


Note: RHS means right hand side. MDBs provided varying information about their pipelines. 38 projects were included when calculating the number of projects by geography. 21 projects were included when assessing MDB finance by geography as 17 projects did not provide project finance details.
Source: Vivid Economics



FIGURE 18:

Current MDB pipeline is diversified across sectors, with the most spending going to the Energy, Transport and Other Built Environment Infrastructure sector



Note: A&ER means Agricultural and Ecological Resources, E,T&OBEI means Energy, Transport & Other Built Environment Infrastructure, I,EI, M&T means Industries, Extractive Industries, Manufacturing and Trade, FS means Financial Services, W&WS means Water and Wastewater Systems, C&RI means Coastal and Riverine Infrastructure, CC means cross-cutting.

Source: Vivid Economics

As early movers, multilateral development banks have now generated key operational lessons for improving the climate resilience of the private sector in developing countries



4 Operational lessons

Drawing on MDBs' private adaptation experience, this section considers five operational lessons that have helped MDBs successfully address the barriers to private sector investment in climate adaptation and strengthen the enabling environment. MDBs have employed a number of approaches to originate, develop and implement adaptation projects in developing countries, including PPCR countries. This section is intended to facilitate the transfer of learnings to other actors seeking to stimulate private sector adaptation. It also aims to help governments understand and support the factors enabling successful MDB private sector adaptation investment, recognizing the funding constraints that the public sector may face.

THE FIVE LESSONS ARE:

- 1) *Knowledge gaps can be addressed using tools such as feasibility studies, business risk assessments, technical assistance and market studies.*
- 2) *Concessional finance is an important financing tool where returns are long and/or uncertain.*
- 3) *Intermediated financing can be an effective way to engage SMEs in adaptation activities.*
- 4) *Collaboration with other stakeholders can help mitigate project risk.*
- 5) *There is often value in having an explicit project facilitator role linking the public and private sector, which MDBs can help to play.*

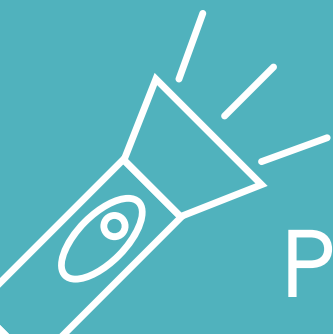
This list is not intended to be exhaustive, and it is also anticipated that further lessons will arise as more experience is gained. Nonetheless, they provide a summary of the key lessons emerging from current experience.

Lesson I: Private sector knowledge gaps can be addressed using tools such as feasibility studies, business risk assessments, technical assistance and market studies

Both the existing literature and MDBs identify knowledge gaps as a significant barrier preventing the private sector, in PPCR countries and beyond, from integrating climate change risks into their businesses.

The most important gaps relate to a lack awareness of the climate change risks a business may face, and an understanding of the technological and investment opportunities available to address these risks. MDBs report that in cases where a clear link can be made between climate impacts and business risk, project origination is very often successful. Some of the tools MDBs have employed to build knowledge and make this link include market studies, feasibility studies, business risk assessments and technical assistance.

Market studies have been used to inform the private sector, at a general level, of the risk of climate change to their business and adaptation actions that could help them improve climate resilience. As described in Project Spotlight I, an EBRD and IFC market study undertaken in Turkey helped companies identify actions that would assist them to manage risks and opportunities associated with climate change and led to the development of two EBRD credit lines providing finance for water efficient technologies (EBRD & IFC, 2013)²⁴. The EBRD also drew heavily from the Turkish study to develop its CLIMADAPT project in Tajikistan, described below in Project



Project Spotlight I

Model of a market study used to overcome data gaps restricting private sector adaptation investment in Turkey

The study offers a model for how technical assistance funds can be deployed within a broader investment platform to assist MDBs to originate private sector projects. The key steps were:



Engagement

The EBRD and IFC engaged with government through the Ministry of Environment and Urbanization, relevant private sector stakeholders, and international organizations to understand existing policy initiatives targeting climate resilience.



Identify knowledge gaps

In partnership with a local trade association, the two MDBs developed an adaptation focused survey and collected 128 responses from the trade association's members across numerous sectors. The survey findings identified specific barriers preventing businesses in Turkey from engaging with adaptation.



Assess climate vulnerability

The study completed an analysis of Turkish sectors which could be priorities for investments in climate resilience, using metrics of production value and employment numbers. The sectors were then ranked to establish their climate vulnerability. The five most vulnerable sectors were selected to develop a comprehensive list of potential adaptation actions.



Identify adaptation actions

Sector themed stakeholder workshops were undertaken in regions where the sector was vulnerable to a high number of climate hazards and there were numerous businesses. The workshops discussed vulnerabilities and business needs to build climate resilience and developed an initial long list of adaptation actions. These were then matched with the banking sectors of the international finance institutions leading to a refined shortlist of actions, which included the increased use of drought resistant seeds, reuse/recycling of process and grey water and minimizing flood damage.



Assess commerciality

The study estimated the market potential for each of these adaptation investments across the five sectors. This involved assessing technology options, investment potential and financial performance under different climate scenarios.





Spotlight 2, showcasing how the piloting of innovative projects in middle-income countries (where there are more bankable opportunities) can sometimes help subsequent implementation of similar projects in a less developed context. It may also offer a model to reduce the costs of overcoming data gaps in markets where adaptation technologies are nascent.

Building from market studies, feasibility studies can be used to assess activities and business models that address the climate vulnerabilities of specific supply chains and build private sector demand.

In many developing countries, the market for adaptation technologies is nascent; a challenge compounded by an underdeveloped formal private sector. For example, in Mozambique, smallholder farmers face multiple barriers to investing in irrigation including high equipment costs, limited capacity to operate the equipment and restricted access finance. An IFC project in Mozambique used a feasibility study to demonstrate the technical and financial viability of irrigating agricultural blocks for field crops, vegetables and tree crops (Climate Investment Funds, 2015b). A USD 0.58 million grant from the PPCR is helping determine the feasibility of building appropriate infrastructure in terms of water reservoirs and catchments that will enhance climate resilience for small scale farmers

Business risk assessments are a tool used to generate and discuss potential adaptation investments with specific private sector clients.

Many sectors are suitable for climate resilience assessments including energy production, agribusiness, manufacturing and companies and utilities that are water intensive. In an IFC port construction project in Colombia (IFC, 2011), a climate risk assessment indicated that the port was likely to face financial risk due to climate impacts in its goods handling, storage, and navigation and berthing activities. As a result, the client company invested USD 10 million in recommended adaptation investments. An EBRD project in Bosnia and Herzegovina also conducted an audit for a pulp and paper industry, stress testing water availability under different climate scenarios up to 2050. The

resulting EUR 11 million investment program prioritized water recycling and loss reduction, with a target of 6.3 million cubic meters a year in savings (EBRD, 2012). In both assessments, successful client engagement relied on identifying a range of adaptation activities and comparing them in terms of costs and benefits.

Climate risk assessments can also be useful vehicles for understanding decision making under uncertainty.

A typical barrier to private sector adaptation is that there is profound uncertainty about the precise impacts of climate at a local level. Risk assessments can make use of a variety of tools, including multiple scenarios, or more sophisticated techniques, such as robust decision making, to help private sector participants identify measures that can stand up to changing conditions. Assessments can also assist the private sector to uncover adaptation opportunities which they otherwise would not uncover within their normal course of business. They can help the private sector to develop business continuity plans for changes occurring beyond the asset level. For example, businesses that rely on inputs from supply chains which may be impacted by climate change are able to see how their business would need to change if the transport links failed or supply of a necessary input was constricted.

Technical assistance can support developing countries when there is a lack of technical capacity and data available to understand the range of climate impacts in the private sector under different climate scenarios.

These data constraints may impede the successful execution of a climate resilience assessment. For hydro-electric power plants, for example, there is often a lack of engineering studies at the right level of granularity to model changing water flow impacts on electricity production. Developing this data takes both time and expertise, which may be limited in many developing countries.

An EBRD project in Tajikistan successfully used technical assistance to incorporate climate change considerations into the design of the rehabilitation of the state-owned power utility's Qairokkum Hydropower Project (EBRD, n.d.). A key part of the project was modelling

future hydrology under a range of climate change scenarios to optimize productivity and reliability and ensure dam safety in extreme weather events such as floods (EBRD, 2012). The data required to model the future water inflows and electricity generation capacity however was not easily obtainable; significant resources were devoted to digitalizing missing data and modelling climate change information. Once this data was collected and modelled, it was possible to proceed with a USD 10 million loan from the PPCR and a USD 50 million loan from the EBRD to finance the first phase of upgrade measures for two of the six hydropower plant units. Although the technical assistance in this project was context specific and the data would have to be generated anew for another hydropower project, the project demonstrates the important role technical assistance can play. It has also helped to build expertise within the MDB to facilitate future hydropower technical assistance. IFC has undertaken a similar effort in Nepal for its hydropower sector with support from PPCR.

Lesson 2: Concessional finance is an important financing tool where returns are long and/or uncertain

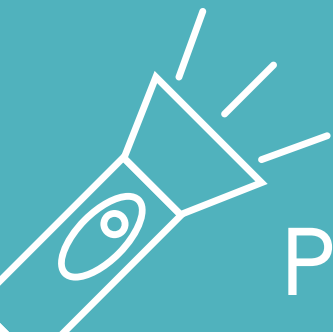
Concessional finance can play an important role in helping MDBs and others to deliver private adaptation investment. It can be used in private sector markets where the investment return on the project does not currently compensate investors for the risks they experience. Concessional finance helps improve risk-reward profiles of projects to the point that draw in commercial investors, thus accelerating the entry of private sector financing to these types of investments. It can also be valuable where long term financing is unavailable, or unaffordable, through the market. The terms of the loans can be calibrated to incentivize investment which would otherwise not proceed. MDBs continue to report the usefulness of concessional finance in developing capital intensive adaptation investments.

Long-lived infrastructure projects are particularly well-matched for adaptation-related investments and where MDB support may be most valuable. Roads, hydropower plants, ports, bridges and sea walls are examples of long-lived infrastructure where decisions made today can have long-term implications. They can have high upfront investment costs and returns from an adaptation investment are often unclear due to uncertain projections of future climate change. These are also sectors where MDB private sector activity is particularly pronounced (see Figure I8 and Figure I9). Concessional finance that offers long maturity periods, grace periods and more affordable terms can provide a better match to infrastructure investors' financing needs to overcome these barriers.

Concessional finance can also help MDBs address misalignments between creditors and the organization that has the ability to operate. For example, if an MDB provides a loan to a port terminal operator to finance greenfield expansion, it needs to ensure the entity responsible for the expansion has an interest in adaptation. In arrangements where the government owns the site but an operator builds the infrastructure, the incentives to invest in adaptation may be misaligned. In such cases, concessional finance can be a critical tool to bring mainstream investors into a project. It can also be used to educate them about the long-term benefits associated with resilience investments.

Furthermore, MDBs report the usefulness of concessional finance to minimize first mover costs when piloting innovating projects.

The IDB, for example, has offered a USD 5.75 million loan on concessional terms from the PPCR to the Jamaica National Building Society to on-lend resources to housing developers and construction companies for water efficient products (Climate Investment Funds, 2015a). Dedicated lending for water efficient technologies did not exist before the project was developed and it is intended to develop proof of concept for a viable market in new home buildings.



Project Spotlight 2

Funding adaptation in Tajikistan through a finance facility: a joint project between the PPCR and EBRD

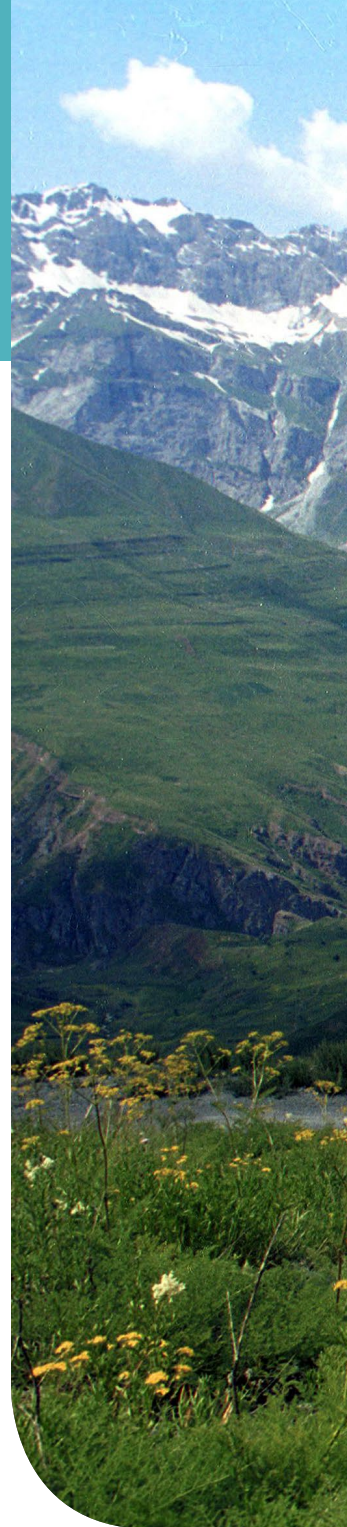
CLIMADAPT is a pilot climate finance facility developed in late 2015 by the EBRD. The project aims to finance sustainable technologies and practices for climate adaptation in Tajikistan. The Central Asian country is particularly vulnerable to climate variation due to its dependence on mountainous rainfall and snowmelt for its water supply. Increasing soil erosion is also affecting the agriculture sector, which accounts for over a quarter of its GDP (World Bank, 2015). CLIMADAPT is intended to build resilience among households, farmers and private businesses.

Effective climate resilience technologies do exist in Tajikistan, but market barriers have prevented their uptake to date. These barriers include a lack of finance for enterprises, high costs of technologies and scarce suppliers. CLIMADAPT aims to encourage the wider development of agricultural and energy efficiency technologies at a lower cost.

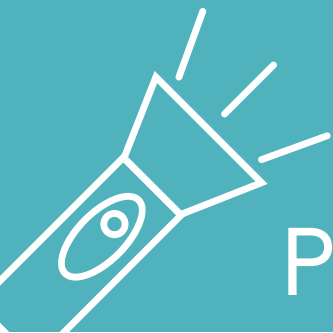
The project is funded through commercial loans worth USD 5 million from the EBRD and concessional loans worth USD 5 million from the PPCR. These funds are channeled through local financial institutions (FIs), which have the relationships and expertise required to engage with the local community needed to identify and support the final investments. The three FIs selected in late 2015 were Bank Eshkata (the country's fifth largest bank by assets), IMON International and HUMON (the first and third largest non-bank microfinance institutions in Tajikistan, respectively). The EBRD also has an equity stake in both Eshkata and IMON. The first disbursement of finance for these institutions to on-lend to households and businesses took place in the second quarter of 2016. Loans are made in local currency (Tajikistan somoni).

The FIs will offer loans to support a range of investments associated with agricultural sustainability and energy efficiency. Project leads meet monthly with civil society, private sector and other representatives, to ensure the most suitable technologies are deployed for the local community. Examples of suitable renovation projects include new orchards, rainwater harvesting systems, improvements in window and door insulation, and drip and sprinkler irrigation. The CLIMADAPT facility provides information about renovation projects and how to apply for finance from one of the FIs.

The project has also involved technical assistance provided by a range of international stakeholders including the UK's DFID (€300,000) and the EBRD Early Transition Countries Fund (€1.95 million). The technical assistance is intended to support the FIs as they integrate climate spending into their banking operations and will allow a comprehensive Market Demand Study to be completed.







Project Spotlight 3

IFC and IDB cooperating with ECOM in rural adaptation: coffee 'rust' project to provide assistance to smallholder farmers in Nicaragua

Together IFC and IDB have facilitated a long-term lending facility of up to USD 30 million for the renovation of over 5,000 hectares of coffee plantations that have been affected by La Roya in Nicaragua. This orange fungus, known as 'the rust' in Spanish, blights coffee farms where it kills plants and withers leaves. The effect is more pronounced following heavy rainfall. When Columbia was affected in 2008, its annual output was cut from 12 million bags to 7 million in just one year (Stone, 2014).

The first project approved by the facility has been funded using a combination of loans, a first loss guarantee and private sector contributions. The IFC long-term loan is USD 12 million of the total. IDB is also providing a long-term loan of the same value. Exportadora Atlantic S.A, a subsidiary of ECOM, has offered a USD 3 million long-term loan. The coffee roaster and retailer Starbucks will purchase the certified coffee produced by the project. A further partner, the Global Agriculture and Food Security Program, is providing a 25 percent first loss guarantee for IFC and IDB's investment, which will lower risks and the level of interest rates charged to farmers.

The primary recipients of funding will be approximately 500 farmers, who will be able to replant their land. The project partners will invest directly in farms which can use the long-term finance to replace the old, diseased plants with disease-resistant varieties. Atlantic will act as the agent to identify borrowers based on agreed eligibility criteria, make and service the loans.

Atlantic will also coordinate advisory services and technical assistance on agronomic and climate best management practices, ensuring farm renovation takes place sustainably. This is funded by a grant worth USD 326,705 from the Multilateral Investment Fund, which will support the Atlantic team in managing and allocating the credit portfolio. IFC expects the project to increase the average yield of these farmers, currently averaging around 10 quintals/ha, by a factor of three. The funding partners hope to overcome the challenge of inefficient supply chain structures between farmers and exporters in Latin American agriculture. The project represents a scalable model of climate-smart renovation that could be replicated in other countries and by other coffee traders.





Lesson 3: Intermediated financing can be an effective way to engage MSMEs in adaptation activities

MSMEs are difficult to engage in climate adaptation; intermediated financing may be a solution. MSMEs are likely to face additional challenges incorporating adaptation into their business. Limited access to affordable finance, knowledge of climate change risks and technical resources present particular barriers to adaptation investment. MDBs also often find that it is difficult to serve MSMEs directly due to the high transaction costs this would impose. Intermediated financing via a local bank or non-bank entity which on-lends to MSMEs presents one structure by which MDBs can support these entities. Three of the four projects recently approved under the PPCR PSSA, involve an intermediated financing structure to support MSMEs' access to climate resilience technologies. The IDB has also developed a technical cooperation program, EcoMicro, to develop green finance products for Latin American and Caribbean microfinance institutions (Multilateral Investment Fund, 2016). Similarly, under the PPCR in Bangladesh and Nepal, IFC is developing investments in private equity funds that will finance adaptation investments by SMEs.

Two types of intermediated financing products are commonly supported: on lending and credit enhancement. On lending products (credit lines) offer concessional terms to intermediary banks for specific credit lines. These banks can then on-lend to final clients on more affordable terms. This increases MSME access to finance and allows the financial intermediary to offer terms which align with the payback profile of investments. Credit enhancement mechanisms are offered to

financial intermediaries to reduce their risk of providing capital to targeted sectors. Examples include first loss provisions, contingent loans or guarantees for default risk. Over time, these can help alter local banks' perception of borrowers' credit risk, and hence the terms needed to support adaptation products.

It can be important to build capacity of the intermediary. When providing credit lines, it is often important to build the capacity of local financial intermediaries, such as banks and fund managers, to understand the adaptation investment's risk profile as the intermediary retains responsibility for overall portfolio management and for environmental and social assessment, risk management and monitoring. Building this relationship with the lending facility can take time and require ongoing technical assistance to develop appropriate products. An EBRD project in Tajikistan provides an example of an intermediated financing facility involving both on-lending and a specialized technical assistance facility as set out in Project Spotlight 2.

The impact on the community can be substantial. Intermediated financing allows MDBs to reach actors within the private sector that are most vulnerable to climate change. MSMEs are important drivers of local growth and employment. Credit lines that help these entities to invest in climate adaptation build resilience of the community, including individuals and households. The CLIMADAPT financing facility in Tajikistan offers credit to financial intermediaries in order to offer finance to both households and businesses for sustainable technologies.

Lesson 4: Intensive, collaborative work with stakeholders can help mitigate project risk and scale investments

Patient, intensive collaboration with multiple actors is often necessary to move private adaptation investments forward; MDBs can support these investments by supporting stakeholders throughout project design and implementation.

In many instances, adaptation actions are needed across whole supply chains. This risks making adaptation investments prohibitively complex for any one private sector party and can also require significant public support to help build confidence. MDBs can play a role connecting stakeholders in order to mitigate their individual risk profile and hence to enable adaptation investments across the supply chain.

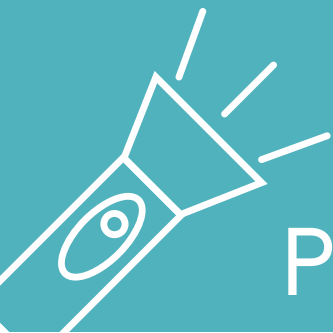
One example is a long term lending facility set up by the IFC and IDB with one of the world's biggest coffee traders, Ecom Agroindustrial Corporation Ltd (ECOM). It offers long term credit and technical assistance across the coffee supply chain to renovate plantations, adapt to the effects of climate change and gain knowledge of better farm management practices. Within the ECOM lending facility, the first project to be funded will be in Nicaragua, described in Project Spotlight 3. Other projects are expected to be developed with ECOM subsidiaries in Costa Rica, Honduras, Mexico and Peru. Collaboration between these stakeholders permitted a combination of concessional finance, guarantees, company contributions and private sector commitments to buy the certified coffee to ensure that the project was bankable with acceptable project risks for each player.

Underpinning the facility is the long term collaboration between the two MDBs and ECOM. The IFC has four previous investments with ECOM, totaling USD 154 million, and six active investments in the coffee sector. It is also planning additional projects in the cocoa sector. The IDB has two other investments with ECOM, totaling USD 43 million. MDB representatives reported that these existing relationships helped to build trust supporting the complex financing structure that needed to be adopted.

Lesson 5: MDBs can add value playing a project facilitator role

MDBs occupy a unique position between the public and private sectors. They offer a platform to connect private sector actors with government that few other actors can achieve. The benefits of increasing policy consultations with government and facilitating dialogue between the sectors often results in improved governmental transparency and accountability and better understanding in the private sector of government objectives and policy. MDBs report that in situations where good links are required between all project participants to embed adaptation into a supply chain, the involvement of an international finance institution can increase buy-in at all levels and improve coordination of multiple interventions. Indeed, some private sector participants in developing countries feel that MDB involvement is crucial to enable the political environment, for example, by lobbying governments to engage in the area of work and influencing political actors who are not incentivized to act.

The ability of MDBs to work with other organizations and coordinate multiple instruments to support projects, such as grants, concessional finance and guarantees, means innovative projects can receive the specialized support they need. Multiple instruments are often required to develop projects that face first mover challenges or where investment is needed across multiple points a supply chain. Coordination of these inputs is a critical component for success. For example, the IDB has played a coordinating role to support the actions of multiple stakeholders in its Adapta Sertao project, described in Box 4, which presents several lessons for developing agricultural value chain projects in the future. Private sector participants in the project report that the involvement of the IDB has been critical for structuring the business framework and setting an objective other partner organisations can work towards.



Project Spotlight 4

Building resilience in agricultural value chains in rural Brazil: the IDB funding a regional cooperative project

In 2014, IDB pledged a grant of USD 1.3 million through the Multilateral Investment Fund to support the Adapta Sertao project in Brazil. The semiarid Sertao region, primarily savannah and sparse forest, is notably vulnerable to climate change and hosts 50 percent of the country's poorest population (Cesano, 2013). Average temperatures have increased by around 2°C and rainfall has decreased by around 30 percent over the last 50 years. Local farmers, who make up 10 percent of the population, are particularly exposed to these effects due to their reliance on irregular rainfall and inefficient irrigation. Often farmers will respond by moving further away from crops and clearing more space for herds of animals in order to increase their yield. The resulting deforestation increases soil erosion, further worsening local water resources. The cycle is one of climate degradation and poverty.

The Adapta Sertao project aims to break this cycle and improve the livelihoods of Brazilian farmers. It began in 2006 with technology trials in five farms to assess the climate resilience potential of efficient drip irrigation technology. Phases 2 and 3 saw these tests expand to 40 and then 100 farms, applying new technologies and processes in the milk and lamb production chains. The method used to select technologies is known as MAIS – Modulo Agroclimático Inteligente e Sustentável (Climate Smart and Sustainable Agricultural Production System).

The principal organizations involved are the Brazilian NGO REDEH (Human Development Network) and six farming cooperatives. IDB supports the coalition to coordinate with other entities, including Bahia SENAR (the National Service of Rural Learning) which provides technical assistance and Banco do Nordeste, which agreed to provide a line of credit to fund projects on 700 farms (without guarantee for those valued under USD 10,000). The IDB addition to the project increases the scale of the scheme considerably and offers an important link between the 'macro and micro' of the project.

Financial, technical and organizational assistance are the key elements of the project. One example of the upgraded process at work is the use of palma forrageira, a Brazilian cactus which can store water far more effectively than physical storage alone, and also serves as an important animal feed. Using the cactus in place of a rainwater tank incurs around half the cost per cubic meter of water and generates almost three times the net annual profit, with equivalent fixed costs. Farmers are trained in how to use these alternative methods, and their cooperatives are strengthened to ease the process of taking products to market.

The project is on course to produce results, with greater clarity expected after the roll-out of MAIS during Phase 4. Most equipment starts to pay off between one and three years after implementation. Around 30 percent of the farmers working with vegetables see gains in net income of 30 percent. A similar proportion show very substantial improvements in their quality of life, with 40 percent showing some improvement. Other results will be forthcoming. Although it is too early to posit the factors that affect how a farm performs after implementation, the project represents a leading example of sustainable and resilient practice led by a local coalition and sets out a model to build resilience at a community level.





The PPCR operating model of having the MDBs as implementing entities is efficient and attractive for private sector investments



5 Comparative advantage of MDBs and the PPCR

Different actors will need to focus on their comparative advantage if the adaptation financing gap is to be effectively closed. The public good nature of many adaptation goods and services and the need to ensure that the most vulnerable benefit from improvements in climate resilience means that the public sector will always have an important role to play in building resilience. At the same time, the financing strength and expertise in the private sector will also need to be harnessed. To do so, sustained long-term strategies are essential, starting with technical assistance and advisory services to develop the market infrastructure and alleviate information or knowledge gaps. This section assesses the comparative advantage of MDBs and the PPCR in engaging in private sector adaptation.

5.1 MDB advantages

There are three main ways the public sector can stimulate private sector engagement (Kaminskaite-salters & Department for International Development (UK), 2009) auctioning of emission rights etc:

- 1) It can influence private investment that will occur without public intervention to ensure that it is climate resilient. For example, the development of housing can be influenced through regulations to be more climate resilient. (Type 1—Private investment that will happen anyway)
- 2) It can mobilize private sector financing of adaptation that could occur but currently is not due to high risks, high transaction costs and short time horizons (Type 2—Private investment that will not happen without support)
- 3) It can partner to deliver public support where private adaptation will not occur, for example, investing in research and development of technologies that will

benefit all of society, such as free climate models and data for public use in climate change adaptation planning (Type 3—Investment in public goods)

MDBs can play a role in relation to all three of these activities, but are arguably best placed to mobilize private sector financing of adaptation that might not occur without support. MDBs can play a role advising developing countries to develop regulation and build knowledge and information for adaptation planning (type 1). They can also act as vehicle for the delivery of the grant resources of others (type 3) where this matches with their technical expertise. However, as MDBs cannot introduce regulation directly and are not in a position to provide significant grant resources for public goods, their competitive advantage when stimulating private sector investment in adaptation lies in the second approach. There are many reasons for this investment not taking place, including biases in the private sector against activities with uncertain and/or long-term paybacks (Pauw, 2015; Pegels, 2014). A combination of financing capacity and technical expertise can help overcome these barriers.

MDBs provide a powerful combination of financial and technical capacity that is likely to be crucial for scaling-up private sector adaptation. The operational lessons of this report point to the significant levels of technical expertise to successfully engage the private sector in adaptation, especially in developing countries. For example, a business assessment of water availability involves an understanding of the business needs, local regulatory context, climate scenarios and technology opportunities in order to develop adaptation priorities. This often needs to be combined with financial expertise, as overcoming financing hurdles also requires a sophisticated understanding of climate scenarios and how these can affect risk/

return profiles. This combination of expertise is reflected in, and continues to grow as a result of, the predominant role that MDBs have played in facilitating private sector adaptation to date. Figure 2 in section 2.2 shows that MDBs have intermediated more public finance for private sector adaptation than any other public body.

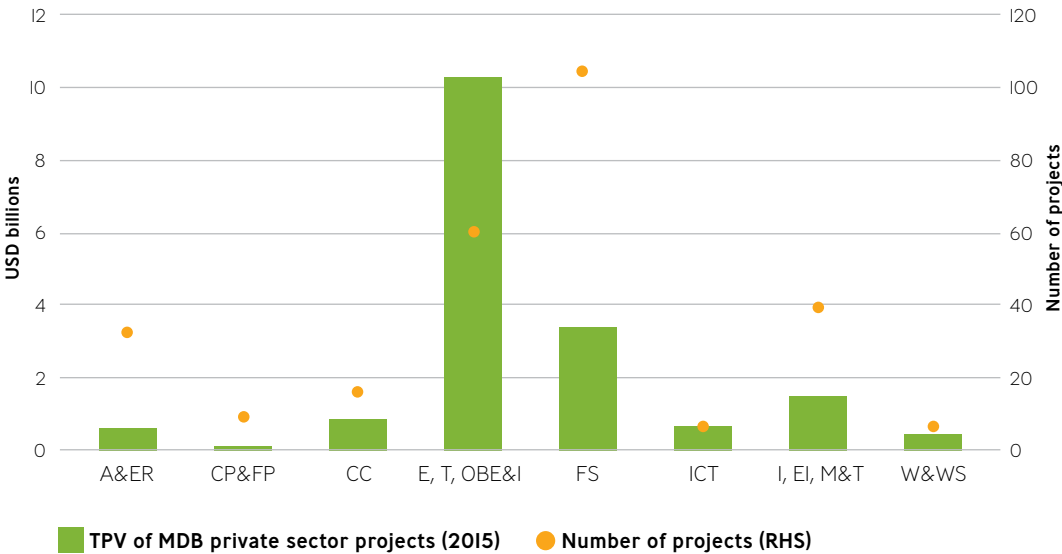
In addition, MDBs may have comparative advantage in delivering private sector adaptation finance in the Energy, Transport and other Built Environment and Infrastructure sector, one of the key sectors where the current adaptation gap is greatest. As shown in Figure I9, according to MDB data published by the International Aid Transparency Initiative (IATI), in 2015 MDBs invested the majority of their private sector portfolios, by total project value and number, in the Energy, Transport and Other Built Environment and Infrastructure sector and Financial Services sector. Total project values were USD 10.3 billion and USD 3.4

billion, respectively. This is likely to increase as infrastructure investment over the next 15 years accelerate. One source estimates around USD 54 trillion will need to be invested in infrastructure in emerging and developing countries to meet global growth expectations over the next 15 years (ODI, 2016; The Global Commission on the Economy and Climate, 2014).

5.2 PPCR advantage

There is likely to be a continued important role for concessional finance in supporting private sector adaptation activity. One of the key operational lessons from MDBs’ practical experience to date is that concessional finance is a critical tool to engage the private sector in adaptation, especially in low-income countries. It is therefore relevant to consider the different sources of concessional finance within international climate finance landscape, especially from among the climate funds focused on adaptation.

FIGURE I9:
In 2015, MDBs’ private sector portfolios were invested mostly in the Energy, Transport and Other Built Environment Infrastructure sector and Financial Services sector



Note: RHS means right hand side. TPV means Total Project Value. A&ER means Agricultural and Ecological Resources, E,T&OBEI means Energy, Transport & Other Built Environment Infrastructure, I,EI,M&T means Industries, Extractive Industries, Manufacturing and Trade, FS means Financial Services, W&WS means Water and Wastewater Systems, C&RI means Coastal and Riverine Infrastructure, CC means cross-cutting.

Source: Vivid Economics

Although there are a number of different bodies providing concessional adaptation finance, only the PPCR and, prospectively, the GCF are directing this finance to the private sector for adaptation. As shown in Figure 20, while to date, a total of USD 8.7 billion has been pledged and USD 8.4 billion deposited for adaptation projects in multilateral funds²⁵, only the PPCR has approved concessional funding for private sector adaptation. The challenges that these other funds have had in engaging the private sector is noted in some of their literature. For example, the Adaptation Fund notes that *'there are not many practical examples of the private sector committing to provide additional funds to Adaptation Fund activities yet'* (UNFCCC, n.d.). The GEF which administers the Special Climate Change Fund and Least Developed Country Fund reports that *'the GEF Private Sector Strategy is mostly focused on climate change mitigation and other GEF focal areas, which do not include adaptation'* (GEF, 2012).

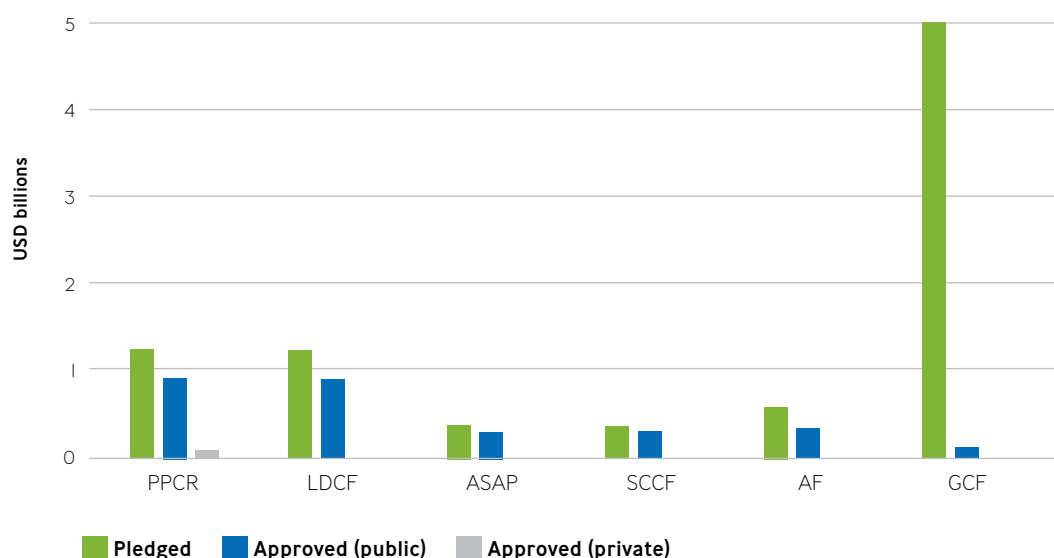
In light of the fact there is only one other provider of concessional financial resources for private sector adaptation, there are a number of reasons to suggest that there may be an important role for the PPCR, at least in the short-medium term.

The MDB-driven approach of the PPCR, coupled with the PPCR's public sector engagement and dedicated private sector window, are a valuable combination supporting private adaptation. The PPCR model has two key features which enhance its ability to successfully engage the private sector:

- i) The PPCR offers the strongest platform within the climate fund landscape to deploy funds through the largest private sector adaptation investor group, the MDBs. This strengthens existing MDB engagement with government, civil society and the private sector, and in the case of PPCR pilot countries, also helps

FIGURE 20:

Only the PPCR has approved investment in private adaptation projects to date



Source: Adapted from Trabacchi et al., (2016) to focus on private sector adaptation; Vivid Economics

to build the enabling environment for the development of private adaptation activities by integrating private sector adaptation activities into national adaptation plans and priorities.

- 2) The PPCR engages directly with governments through the SPCR process and offers a dedicated private sector funding facility, the PSSA. This approach supports the on-going public dialogue often needed to facilitate first-mover projects in the private sector. Although the expansion of the PSSA to other low and middle income eligible CIF countries has not yet been utilized due to lack of funding, the recent changes to the PSSA make the development of regional projects more feasible and allow MDBs to demonstrate and pilot innovative projects in a wider range of countries.

The combination of an MDB driven approach and public engagement with a private sector facility offers a powerful support to project development and scale up of adaptation in both low and middle income countries. Moving forward, there may be scope to use market studies or other interventions to build the private sector enabling environment in countries and regions where no SPCR has been developed.

The ability to use multiple instruments under the PPCR is highly valued by MDBs and the private sector. Examples of instruments offered under the PPCR, and the CIF more broadly, include guarantees, subordinated loans, contingency grants and local currency tools. MDBs report that this array of financial instruments allows the MDBs to back novel projects and select the risk bearing instrument most appropriate for the context. Although the PPCR has provided only loans and grants for private sector projects to date (including local currency lending), MDBs value this additional potential flexibility.

The flexible PPCR approval model aligns with MDB and private sector processes. One of the lessons learned from previous experience with the PPCR PSSA process is that it can be difficult to engage the private sector in a competitive process when private sector sponsors are uncertain about how long it will take for their project to be approved and if it will receive funding. The PPCR has reformed the PSSA to address this by permitting rolling applications, removing the time restrictions placed on project proposal development and generally moving towards a more flexible model. Although no project proposals have been submitted since these changes due to lack of funding, MDBs report that these reforms could significantly enhance the capacity of the PPCR to engage private sector actors in adaptation. By contrast, other climate funds such as the GCF have similar modalities to the former PPCR PSSA process where significant project development was required before making an application and there is uncertainty regarding funding. This may be unattractive for the private sector and could cause difficulties generating deal flow.

The operating model of the CIF at-large, including the PPCR, of having the MDBs as implementing entities is efficient and attractive for private sector investments. The CIF operates on the principle of delegated authority to the MDBs, meaning MDBs follow their own operating policies and procedures to implement projects co-financed by the CIF. This approach helps keep transaction costs to MDB project teams (and to private sector clients) relatively low since there are no secondary and additional due diligence requirements or policies. This aligns closely with private sector project and decision cycles.

The PPCR offers a unique partnership across MDBs. The ability to convene MDBs and coordinate their efforts is unique to the CIF and the PPCR. This coordination promotes institutional learning, facilitates mainstreaming of new financing and allows MDBs to collaborate more easily, both at an institutional level and on the ground. The PPCR is also the only institution that offers support across all the main financing instruments that MDBs currently use to invest in adaptation.



Private sector adaptation remains challenging; some operational lessons are emerging but the scope of these lessons are limited. With other funding bodies not yet having approved a private sector adaptation project, multiple funding channels, allowing experimentation, could be advantageous.

Private investments in adaptation are complex. Scale up and replication in the private sector will often require long lead-times and for projects to be fronted with technical assistance. This analysis finds the PPCR has leveraged significant MDB funds from the adaptation finance received from the PPCR. The MDBs have also estimated they have 21 private sector adaptation-related projects in the pipeline with MDB financing requirements of USD 1.1 billion and PPCR requirements of around USD 500 million. In the short term, multiple funding channels would be advantageous to ensure there are no resource uncertainty or investment gaps in the MDBs private adaptation pipelines and to maximize the opportunity for learning.

Although the PPCR has various strengths in relation to supporting private sector adaptation, it still also faces numerous challenges. Enabling private adaptation in developing countries, particularly low income countries, is challenging given limited capacity, knowledge gaps, financing constraints and the risk/return profiles of the private sector. While there have been recent changes to the PPCR modalities to engage the private sector and overcome these barriers, they remain untested. Concerns remain that the PPCR may not be able to fully address gaps in the enabling environment needed for private sector adaptation investment and that this may limit the ability of the fund to generate scale. Heavy transaction costs associated with some private sector adaptation projects may make them difficult to integrate into MDB business models, even with concessional funding.

There is an urgent need to scale up adaptation efforts, especially in the private sector. Lessons from the MDBs can help inform these investments



6 Conclusion

There is an urgent need to scale-up adaptation efforts. While the focus of the Paris Agreement has been around successfully securing a global commitment to reduce emissions, there is already significant climate change locked-in to the climate system. This will have significant, largely negative, socio-economic impacts with estimates suggesting that temperature increases of 2°C could be associated with GDP per capita losses of as much as 35 percent. Scaled-up adaptation action can help avoid many of these negative impacts, but there is very likely to be a large and growing adaptation finance gap. While comprehensive data is difficult to come by, some estimates put the costs of adaptation in developing countries at around USD 140-300 billion by 2030 a year, compared to reported annual adaptation flows of around USD 20-25 billion at present.

All parties will have a role to play in closing this gap, including the private sector. The public good nature of many adaptation goods and services, plus the need to ensure that the most vulnerable are protected from climate impacts, necessitates an important role for the public sector. At the same time, both the scale of the funding challenge, and the dominance of the private sector in the delivery of goods and services where adaptation will be most needed, means that the private sector will also have a crucial role to play.

There are a number of barriers that need to be overcome in supporting private sector adaptation, especially in developing countries. The private sector needs to be aware of the risks associated with climate change and have the capacity and expertise to identify the associated opportunities, a capacity requirement that is often lacking in both developed and developing markets. In addition, adaptation investments tend to be cost-saving rather than revenue generating which, for behavioral reasons, may make them

less attractive to the private sector, especially if the cost savings are only realized in the medium-term and in a context in which actors have high discount rates. Funding constraints can also be significant given adaptation investments often require high-up front costs. In many countries, other investment barriers such as regulatory, political, economic and institutional weaknesses also limit private sector investment in adaptation.

MDBs have been at the forefront of working with the private sector on adaptation. The public sector will often need to work with the private sector in order to overcome these barriers. To date, MDBs have more experience than any other public institutions in performing this role in developing countries. The data in this report suggests that they have been consistently channelling around USD 100 million of annual adaptation finance to the private sector for adaptation in recent years, making projects with total values many times this amount more climate resilient. This activity has been led by the EBRD, but with other MDBs playing a growing role. Through a range of different financial instruments, MDBs have supported many different types of investment although with a particular focus on improving resilience to water shortages. Geographically, while MDBs originally focused their private sector adaptation activities in middle income countries, there has been an increase in efforts focusing on low-income countries. A growing element of this investment has been supported by concessional resources such as those provided by the PPCR, in particular funding for upstream technical assistance that is needed in these countries to enable private sector investments. MDBs report a robust pipeline of prospective adaptation investment opportunities if concessional resources were made available in a manner that suits their business models.

Next Steps

A review of the MDB experience in delivering adaptation projects coupled with a broader review of the climate finance landscape for private sector adaptation suggests a number of lessons or next steps to further advance private sector adaptation in developing countries.

Donors



Donors should recognize that different funding arrangements and delivery vehicles will have different comparative advantages. It will be important to work through a wide array of modalities to drive the systemic change needed to move to a low-carbon, climate resilient world.

Within this context, there appears to be a particularly important role for the MDBs, often with the support of carefully calibrated concessional resources, to support private sector adaptation. The operational lessons of this report suggest that private sector adaptation can be held back by a combination of shortages in technical expertise, financial expertise and financial capacity. MDBs offer the ability to address these different challenges in parallel, in a way that most other bodies are not in a position to match.

Given the challenge of engaging the private sector, there would be benefit in experimenting with a range of different modalities for channelling concessional resources to MDBs to understand which approaches are most aligned with existing business practices. At present the PPCR is the only international climate fund with a consistent track record in delivering private sector adaptation (through MDBs) and the robust demand for concessional resources to support private sector adaptation.

MDBs



MDBs may wish to focus their private sector adaptation activity in the areas where their comparative advantage is greatest. The analysis in this report suggests that these would appear to be in infrastructure financing, where there also appears to be a particularly pronounced adaptation financing gap, and in intermediated finance.

MDBs should recognize that adaptation projects are often heavy on transaction costs and require a particularly hands-on to project development. The operational lessons identified in this report suggest that some of the most successful MDB private sector adaptation projects have required intensive collaboration with a wide range of stakeholders, with MDBs playing an important project facilitation role.

MDBs may wish to establish internal incentive mechanisms for encouraging the origination of private sector adaptation projects that reflects these additional transaction costs.



CIF

Building on recent changes to the PPCR's dedicated private sector window, especially regarding its geographic flexibility and scope to provide support for project preparation activities, the CIF may wish to consider further augmentation to allow for a systematic market-wide approach to identifying adaptation priorities within and/or across countries. This could include following a theme, such as climate insurance, climate resilient infrastructure or climate resilient buildings. Such an approach would sit closely with the programmatic nature of the PPCR's public sector activities.



Governments

Governments should seek to create a more conducive environment for private sector adaptation by, for example, providing climate and hydrological projections and data on the expected impacts of climate change; creating fora for public private dialogue on private sector adaptation; augmenting building and infrastructure standards and codes to enhance climate resilience; providing government incentives for financing adaptation activities; and improving the cost reflectivity of energy and water prices.

Appendix I

Table I sets out MDB private sector adaptation financing activity over 2013 – 2015. The data were obtained through a data request directed to the MDBs, complemented by previous analysis presented in earlier Vivid Economics analysis (Vivid Economics, 2015). It contains details on MDB project activity, including the total project value, MDB finance share, MDB adaptation finance share, donor co-financing and PPCR co-financing.

TABLE I:

A detailed overview of the 2013 – 2015 MDB private sector adaptation finance portfolio

Bank, year	Project Activity	Country	Sector	Adaptation technology	TPV (MDB finance share), USD m	MDB adaptation finance, USD m	Donor co-financing and other climate funds USD m	PPCR co-financing USD m	Finance instruments for MDB adaptation share
IFC (2013)	Promoting Climate Resilience Agriculture	Nepal	A&ER	Climate smart agriculture	2.3 (0)	0	0	2 ²⁶	grant
	Climate Resilience Housing	Nepal	E, T, OB E&I	Climate resilient housing	0.8 (0.3)	0.3	0.7 (multiple donors)	0.1 ²⁷	grant
	Promoting Climate Resilient Agriculture and Food Security	Bangladesh	A&ER	Climate smart agriculture	3.8 (0)	0	0	3.1	grant
	Investing in climate resilient seeds	Kazakhstan	A&ER	Climate smart agriculture	70 (20)	20	0	0	equity
	Improved water and waste management systems	Turkey	WWS	Improved waste and water management systems	11.3 (8)	8	0	0	loan

Table I continues

TABLE I (CONTINUED):*A detailed overview of the 2013–2015 MDB private sector adaptation finance portfolio*

Bank, year	Project Activity	Country	Sector	Adaptation technology	TPV (MDB finance share), USD m	MDB adaptation finance, USD m	Donor co-financing and other climate funds USD m	PPCR co-financing USD m	Finance instruments for MDB adaptation share
EBRD (2013)	Seed production	Ukraine	A&ER	More efficient irrigation	59 (8)	1		0	
	Oilseed processing	Romania	A&ER	Dry process	319 (52)	8		0	
	Sugar production, trade and other agriculture	Serbia	A&ER	More efficient irrigation	65 (65)	32		0	
	Juice production	Morocco	A&ER	Water efficient technologies	6 (5)	0.5		0	
	Real estate development	Jordan	E, T, OB E&I	More energy and water efficient cooling system	282 (75)	8		0	
	Grain and poultry production	Ukraine	A&ER	More efficient crop management	94 (94)	3		0	
	Dairy products and juices	Egypt	A&ER	Water efficient technologies	128 (68)	2		0	
	Waste water and water supply	Kazakhstan	WWS	Leak prevention, treatment and demand side measures	33 (13)	1		0	
	Municipal services	Western Balkans	WWS	Leak prevention, treatment and demand side measures	130 (52)	5		0	
IFC (2014)	Hydropower	Nepal	C&RI	Hydropower	28 (4)	4	0	0.3 ²⁸	equity
	Resilient housing	Bangladesh	C&RI	Climate resilient housing	0.9 (0.3)	0.3	0.7 (multiple donors)	0.2 ²⁹	grant
	Improved irrigation systems	Niger	A&ER	Improved irrigation systems	1.9 (0)	0	0.4 (multiple donors)	1.5	grant

Bank, year	Project Activity	Country	Sector	Adaptation technology	TPV (MDB finance share), USD m	MDB adaptation finance, USD m	Donor co-financing and other climate funds USD m	PPCR co-financing USD m	Finance instruments for MDB adaptation share
EBRD (2014)	Coal briquettes production*	Mongolia	E, T, OB E&I	Water recycling/ reuse	10 (10)	5.0		0	loan and grant
	Plant construction*	Georgia	C&RI	Additional water reservoirs	538.2 (90)	11.1		0	loan
	Water and sewage operations*	Jordan	WWS	Leak-prevention, treatment and demand side measures	7.9 (3)	0.1		0	loan
	Oil & gas production*	Kazakhstan	I, EI, M&T	Water recycling/ reuse	183.6 (98.1)	17.6		0	loan
	District heating and cooling*	Jordan	E, T, OB E&I	Water efficient technologies	105.5 (30)	10		0	loan
	Resource efficiency credit line*	Turkey	FS	Water efficient technologies	64.7 (64.7)	21		0	loan
	Harbour expansion*	Poland	C&RI	Higher port quality	467.1 (41)	14.2		0	loan
	Residential buildings credit line *	Turkey	E, T, OB E&I	Water efficient technologies / improved irrigation	60 (48)	4.8	12 (CTF)	0	loan
	Water harvesting	Turkey	Cross cutting	Improved irrigation systems	38.8 (38.8)	0.3		0	loan
	Hydropower*	Tajikistan	E, T, OB E&I	Hydropower turbine and dam safety upgrade	71 (50)	4		21	mixed: loan, concessional loan and grant
ADB (2014)	Agribusiness	Cambodia	A&ER	Agricultural value chain resilience	33.8 (13.5)	13.5	10 (AFD)	5	mixed: loan, grant, equity
IDB (2014)	Coffee plantation renovation*	Nicaragua	A&ER	Climate smart agriculture	30 (12)	12	12 (another MDB)	0	loan and first loss guarantee
	Resilient agriculture	Brazil	A&ER	Climate smart agriculture	3.1 (1.2)	1.2	1.9 (Fundo Clima and other donors)	0	technical assistance
IFC (2015)	Coffee plantation renovation	Nicaragua	A&ER	Climate smart agriculture	30 (12)	12	0	0	loan

Table I continues

TABLE I (CONTINUED):*A detailed overview of the 2013-2015 MDB private sector adaptation finance portfolio*

Bank, year	Project Activity	Country	Sector	Adaptation technology	TPV (MDB finance share), USD m	MDB adaptation finance, USD m	Donor co-financing and other climate funds USD m	PPCR co-financing USD m	Finance instruments for MDB adaptation share
EBRD (2015)	Resource efficiency capex programme	Turkey	I, EI, M&T	Water efficient technologies	68.8 (55.5)	7.32		0	loan
	Residential sustainable energy financing facility	Turkey	E, T, OB E&I	Water efficient technologies	64 (51.3)	7.6	12.8 (CTF)	0	loan
	Processing plant	Kazakhstan	I, EI, M&T	Water efficient technologies	260.6 (102.3)	23.21		0	loan
	Fruit and vegetable production	Tunisia	CP&FP	Water efficient technologies	4.4 (4.4)	1.11		0	loan
	Hospital construction	Turkey	E, T, OB E&I	Water efficient technologies / insulation	1228.2 (145.3)	21.60		0	loan
	Energy efficiency and waste-to-energy projects.	Turkey	I, EI, M&T	Water efficient technologies	112.5 (112.5)	11.25		0	loan
	Water and energy efficiency lending (1)	Tajikistan	Cross cutting	Water efficient technologies	3.1 (1.5)	1.53		1.5	concessional loan
	Water and energy efficiency lending (2)	Tajikistan	Cross cutting	Water efficient technologies	3.1 (1.5)	0.51		1.5	concessional loan
	Water and energy efficiency lending (3)	Tajikistan	Cross cutting	Water efficient technologies	2 (1)	0.51		1	concessional loan
	Tourist resort construction	Jordan	E, T, OB E&I	Water efficient technologies / insulation	291.8 (61.4)	3.68		0	loan
	Hospital Construction	Turkey	E, T, OB E&I	Water efficient technologies	443.8 (83.2)	11.2		0	loan
	Upgrade water supply	Kazakhstan	A&ER	Water efficient technologies	18.5 (10)	2.28		0	unknown
ADB (2015)	Agribusiness	Regional Asia (Cambodia, Laos, Myanmar)	A&ER	Climate smart agriculture	2.5 (0)	0	3 (Canadian Climate Fund, Asia Clean Energy Fund)	0	

Bank, year	Project Activity	Country	Sector	Adaptation technology	TPV (MDB finance share), USD m	MDB adaptation finance, USD m	Donor co-financing and other climate funds USD m	PPCR co-financing USD m	Finance instruments for MDB adaptation share
IDB (2015)	Resilient agriculture	Paraguay, Argentina, Bolivia	CP&FP	Climate smart agriculture	2.8 (1.7)	1.7	1.1 (Avina Foundation)	0	technical assistance
	Resilient agriculture	Nicaragua	A&ER	Climate smart agriculture	2.6 (1)	1	1.6 (Ingemann, Humboldt Center)	0	technical assistance
	Resilient agriculture	Honduras, Nicaragua, El Salvador	A&ER	Water efficient technologies	5.6 (2.2)	0.6		0	technical assistance
AfDB	Agro-forestry	Africa	A&ER	Climate smart agriculture	12 (0)	0	12 (GEF)	0	Equity
Grand total					5,404.9 (1,611.8)	296.3	68.1	37.2	

Note: * indicates projects included in data analyzed in Vivid (2015). Some figures have changed since this report was published due to adjustment of project design.

Figures have been displayed to the nearest decimal point. The grand total reflects the sum of figures in the decimal point format they were submitted.

A blank space indicates where no information was provided. 0 indicates that no funds were provided.

The ADB (2015) project was developed by the ADB but it did not use any of its own finances to invest in the adaptation component of the project. Two EBRD (2015) projects in Tajikistan have provided the same amount of debt financing to two financial institutions. The AfDB (2015) project was developed by the AfDB but was funded through the Global Environment Facility.

A&ER means Agricultural and Ecological Resources, CP&FP means Crop production and Food Production, CC means cross-cutting, E,T&OBEI means Energy, Transport & Other Built Environment Infrastructure, FS means Financial Services, ICT means Information, Communication and Technology, I,EI,M&T means Industries, Extractive Industries, Manufacturing and Trade, C&RI means Coastal and Riverine Infrastructure, W&WS means Water and Wastewater Systems.

The amounts listed in the PPCR co-financing do not total the same amount approved by the PPCR, described in Section 3.2, as projects in that section were approved outside of 2013-2015 period.

Source: Vivid Economics

Appendix II

The data used to estimate the gap in adaptation financing set out in Section 2.3 has been sourced from three main sources: B. K. Buchner et al. (2015), UNEP (2016) and World Bank (2010).

B. K. Buchner et al. (2015) estimate public adaptation finance spending in 2014 for eight sectors.³⁰ These were then matched to estimates in World Bank (2010) by sector, in accordance using the correspondence below. Three sectors from B. K. Buchner et al. (2015) were not matched to sectors in World Bank (2010): Policy, National Budget Support & Capacity Building; Industries, Manufacturing and Trade; and Other.

TABLE 2:

Comparison of sector descriptions in sources used to calculate adaptation gap

Buchner et al (2015) sectors	World Bank (2010) sectors
Water & wastewater management	Water
Agricultural, forestry & land-use	Agriculture; Fisheries
Infrastructure, energy & other built environment	Infrastructure
Other	N/A
Disaster risk management	Extreme Weather
Policy, national budget support & capacity building	N/A
Coastal protection	Coastal
Industries, manufacturing and trade	N/A

Source: Buchner et al (2015) and World Bank (2010)

A similar matching approach undertaken in Appendix I was used to assess the adaptation gap described in Section 2.3 by geography. As shown below, UNEP (2016) estimated spending for four geographies, while the World Bank (2010) estimated adaptation costs for 144 developing countries. These were grouped in accordance with the areas covered in the Joint MDB Report (2015) and compared to UNEP (2016), where estimates were available.

TABLE 3:*Comparison of geographic descriptions in sources used to calculate adaptation gap*

UNEP (2016) geographies	World Bank (2010) geographies
East Asia & Pacific	Cambodia, China, Fiji, Haiti, Indonesia, Kiribati, Lao PDR, Malaysia, Marshall Islands, Micronesia, Fed. Sts., Mongolia, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Suriname, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam
Latin America & Caribbean	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Uruguay, Venezuela
South Asia	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
Sub-Saharan Africa	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Congo, Rep., Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Source: UNEP (2016) and World Bank (2010)

Appendix III

List of 72 CIF Countries and Regions		
Algeria	Honduras	Niger
Armenia	India	Nigeria
Bangladesh	Indonesia	Papua New Guinea
Benin	Ivory Coast	Peru
Bhutan	Jamaica	Philippines
Bolivia	Jordan	Rwanda
Brazil	Kazakhstan	Saint Lucia
Burkina Faso	Kenya	Samoa
Cambodia	Kiribati	Sierra Leone
Cameroon	Kyrgyz Republic	Solomon Islands
Chile	Lao PDR	South Africa
Colombia	Lesotho	St. Vincent & The Grenadines
Congo Republic	Liberia	Tajikistan
Democratic Republic of Congo	Libya	Tanzania
Dominica	Madagascar	Thailand
Ecuador	Malawi	Tonga
Egypt	Maldives	Tunisia
Ethiopia	Mali	Turkey
Gambia	Mexico	Uganda
Ghana	Mongolia	Ukraine
Grenada	Morocco	Vanuatu
Guatemala	Mozambique	Vietnam
Guyana	Nepal	Yemen
Haiti	Nicaragua	Zambia

References

- Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., & Prudent-Richard, G. (2013). *Private Sector Engagement in Adaptation to Climate Change* (OECD Environment Working Papers No. 39). *OECD Environment Working Papers*.
- Averchenkova, A., Crick, F., Kocornik-Mina, A., Leck, H., & Surminski, S. (2016). Multinational corporations and climate adaptation – Are we asking the right questions? A review of current knowledge and a new research perspective. *Wiley Interdisciplinary Reviews: Climate Change*. <http://doi.org/10.1002/wcc.402>
- Biagini, B., & Miller, A. (2013). Engaging the private sector in adaptation to climate change in developing countries: importance, status, and challenges. *Climate and Development*, 5(3), 242–252. <http://doi.org/10.1080/17565529.2013.821053>
- Buchner, B. K., Trabacchi, C., Mazza, F., Abramskiehn, D., & Wang, D. (2015). *Global Landscape of Climate Finance 2015*. Venice.
- Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*, 527, 235–250. <http://doi.org/10.1038/nature15725>
- C2es. (2015). Weathering the Next Storm : a Closer Look At Business Resilience, (September). Retrieved from <http://www.c2es.org/publications/weathering-next-storm-closer-look-business-resilience>
- Carbon Disclosure Project. (2015). *CDP Global Climate Change Report 2015*. Retrieved from <https://www.cdproject.net/CDPResults/CDP-Global-500-Climate-Change-Report-2012.pdf>
- Cesano, D. (2013). *The PROADAPTA SERTAO project*. Helsinki. Retrieved from <http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38214303>
- Cesano, D., Maia, A., Burney, J., Cezar, I., Corral, T., Ravelo, C., & Rueda, J. L. (2014). *Adapta Sertao: Improving Small Farmers' Adaptive Capacity in Semi-arid Brazil through Community Based Adaptation (CBA)*.
- Climate Investment Funds. (2015a). *Financing Water Adaptation in Jamaica's New Housing Sector*. Retrieved from <https://www-cif.climateinvestmentfunds.org/projects/financing-water-adaptation-jamaica's-new-urban-housing-sector>
- Climate Investment Funds. (2015b). Program Approval Request - Mozambique. Retrieved July 20, 2016, from http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/IFC_PPCR_Mozambique_Project_Proposal_PUBLIC.pdf
- Dietz, S., & Stern, N. (2014). Endogenous growth, convexity of damages and climate risk: how Nordhaus' framework support deep cuts in carbon emissions. *The Economic Journal*, 125. <http://doi.org/10.1111/eoj.12188>
- EBRD. (n.d.). *Case Study, Qairokkum Hydropower: Planning ahead for a changing climate*. London. Retrieved from https://www-cif.climateinvestmentfunds.org/sites/default/files/knowledge-documents/cs_qairokkum_web_0.pdf
- EBRD. (2012). *Sustainability Report 2012 Summary*. Retrieved from <http://www.ebrd.com/news/publications/sustainability-report/sustainability-report-2015.html>
- EBRD & IFC. (2013). Climate Risk Case Study. Pilot Climate Change Adaptation Market Study: Turkey.
- Fankhauser, S., Smith, J. B., & Tol, R. S. J. (1999). Weathering climate change: Some simple rules to guide adaptation decisions. *Ecological Economics*, 30(1), 67–78. [http://doi.org/10.1016/S0921-8009\(98\)00117-7](http://doi.org/10.1016/S0921-8009(98)00117-7)
- GEF. (2012). *Private Sector Engagement in Climate Change Adaptation: Prepared by the GEF Secretariat in Collaboration with the International Finance Corporation*. Washington D.C. Retrieved from [https://www.thegef.org/gef/sites/thegef.org/files/documents/Note on Private Sector.pdf](https://www.thegef.org/gef/sites/thegef.org/files/documents/Note%20on%20Private%20Sector.pdf)
- IFC. (2011). *Climate Risk and Business: Ports*. Retrieved from http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/cb_home/publications/climaterisk_ports
- IPCC. (2014a). *Climate Change 2014 Synthesis Report*. Geneva. Retrieved from <https://www.ipcc.ch/report/ar5/syr/>
- IPCC. (2014b). Working Group II of the Fifth Assessment Report—Technical Summary, (October 2013), 1–76. Retrieved from <https://www.ipcc.ch/report/ar5/wg2/>
- Iqbal, F., & Suding, P. (2011). *Options Paper: Reducing Climate Risk in IDB Operations* (Environmental Safeguards Unit No. 488). Retrieved from <https://publications.iadb.org/handle/11319/5622?locale-attribute=en>

REFERENCES

- Kaminskaite-salters, G., & Department for International Development (UK). (2009). *Meeting the Climate Challenge : Using Public Funds to Leverage Private Investment in Developing Countries. Section 4 – Spending public finance to leverage private investment: specific instruments for specific challenges*. London. Retrieved from <http://www.lse.ac.uk/GranthamInstitute/publication/meeting-the-climate-challenge-using-public-funds-to-leverage-private-investment-in-developing-countries/>
- Multilateral Development Banks. (2015). *Joint Report on Multilateral Development Banks' Climate Finance 2014*. Retrieved from <http://www.worldbank.org/climate/MDBclimatefinance2014>
- Multilateral Investment Fund. (2016). Latin America: EcoMicro. Retrieved July 20, 2016, from <http://www.ecomicro.org/>
- ODI. (2016). *Adaptation finance and the infrastructure agenda* (No. 437). London. Retrieved from <https://www.odi.org/sites/odi.org.uk/files/resource-documents/I0489.pdf>
- OECD. (2016). Purpose codes: Sector Classification. Retrieved June 14, 2016, from <http://www.oecd.org/dac/stats/purposecodessectorclassification.htm>
- Pauw, W. P. (2015). Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries. *Climate Policy*, 15(5), 583–603. <http://doi.org/10.1080/14693062.2014.953906>
- Pegels, A. (2014). *Green Industrial Policy in Emerging Economies*. (A. Pegels, Ed.) (1st ed.). Routledge. Retrieved from http://samples.sainsburysebooks.co.uk/9781136024009_sample_838396.pdf
- Pindyck, R. S. (2015). *The Use and Misuse of Models for Climate Policy* (EEE No. 21097). Retrieved from <http://www.vox.com/2015/12/8/9869918/economists-climate-consensus\papers3://publication/uuid/5E4BB530-946D-4E38-8A17-3AADB2797DA5>
- Ranger, N., Harvey, A., & Garbett-Shiels, S.-L. (2014). Safeguarding development aid against climate change: evaluating progress and identifying best practice. *Development in Practice*, 24(4), 467–486.
- Ratha, D., De, S., Plaza, S., Schuettler, K., Shaw, W., Wyss, H., & Yi, S. (2016). *Migration and Remittances : Recent Developments and Outlook. Migration and Development Brief* (Vol. 26). Retrieved from <http://hdl.handle.net/10986/24012>
- Stone, D. (2014). Fungus, Climate Change Threatening Big Part of Global Coffee Supply. Retrieved June 23, 2016, from <http://news.nationalgeographic.com/news/2014/05/140531-coffee-rust-columbia-brazil-cost-problems/>
- Surminski, S. (2013). Private-sector adaptation to climate risk. *Nature Climate Change*, 3(11), 943–945. <http://doi.org/10.1038/nclimate2040>
- The Global Commission on the Economy and Climate. (2014). *New Climate Economy Technical Note: Infrastructure investment needs of a low-carbon scenario*. Retrieved from <http://static.newclimateeconomy.report/wp-content/uploads/2015/01/Infrastructure-investment-needs-of-a-low-carbon-scenario.pdf>
- Trabacchi, C., Brown, J., Boyd, R., Wang, D., & Falzon, J. (2016). *The role of the Climate Investment Funds in meeting investment needs*. Retrieved from https://www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/joint_ctf-scf_tfc_l6_inf_5_cpi_cif_gap_analysis_final.pdf
- Trabacchi, C., & Mazza, F. (2015). Emerging solutions to drive private investment in climate resilience, (June), 40.
- UNEP. (2016). *The Adaptation Finance Gap Report 2016*.
- UNFCCC. (n.d.). Annex 7 to the Adaptation Fund Submission to the Standing Committee on Finance. Retrieved June 23, 2016, from https://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/annex_7_af_experience_with_private_sector_in_project_implementation.pdf
- Vivid Economics. (2015). Building an Evidence Base on Private Sector Engagement in Financing Climate Change Adaptation.
- World Bank. (2010). *Economics of Adaptation to Climate Change: Synthesis Report*.
- World Bank. (2015). Agriculture value added (%GDP). Retrieved April 22, 2016, from <http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>
- World Bank Group. (2016). *High and Dry: Climate Change, Water and the Economy*. Washington D.C. Retrieved from <http://www.worldbank.org/en/topic/water/publication/high-and-dry-climate-change-water-and-the-economy>
- World Economic Forum. (2016). *The Global Risks Report 2016 11th Edition*. Geneva. Retrieved from http://www3.weforum.org/docs/GRR/WEF_GRR16.pdf

Endnotes

- 1 Although the World Bank does not provide investment to the private sector.
- 2 This report looks at the following MDBs, all of which implement the PPCR: African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, and World Bank Group, including the International Finance Corporation.
- 3 The Global Environment Facility (GEF) has also supported an AfDB private sector project with adaptation co-benefits, however, as the funding supported an existing equity investment made by the AfDB in 2014, it was not considered to have been approved as a private adaptation project by the GEF.
- 4 Adaptation has a myriad of meanings. It has been defined as *'the process of adjustment to actual or expected climate change and its effects'* (IPCC, 2014b). There are multiple terminologies used in the literature to distinguish between different types of adaptation, including reactive adaptation, anticipatory adaptation, autonomous adaptation, planned adaptation, no regrets or soft adaptation, hard adaptation. See (UNEP, 2016) for an explanation of the first four categories of adaptation and (Agrawala et al., 2013) for an explanation of the last two categories. The majority of adaptation activities analyzed in this report are planned and hard adaptation.
- 5 It is not appropriate to compare either of these figures with the goal of USD 100 billion referred to in international agreements as the public adaptation finance includes all (tracked) resources allocated to adaptation, not that mobilized by developed countries to support activities in developing countries. The USD 100 billion goal also covers both mitigation and adaptation.
- 6 There are multiple definitions of the private sector within the literature. Some definitions class all entities not owned or controlled by government as private entities, including households, local businesses, corporations, private financiers and NGOs. Other definitions restrict the concept of the private sector to include only those entities that aim to realize risk-adjusted returns (i.e., profits) and are incorporated under law (Averchenkova et al., 2016). This paper relies on an expanded definition which includes all entities other than governments.
- 7 This dataset used an expanded definition of the private sector, including NGOs.
- 8 The multilateral DFIs were AfDB, ADB, EBRD, IDB, IFC, European Investment Bank, World Bank (IDA and IBRD), Development Bank of Latin America, ECO Trade & Development Bank, Nordic Investment Bank, North American Development Bank and the OPEC Fund for International Development.
- 9 It is understood that the vast majority of this amount was directed to international, national and local NGOs.
- 10 No project level data is available in relation to spending by national and bilateral DFIs. In addition, an absence of project level data means that the geographic or sectoral split of this spending, or the associated private sector co-financing, is not available. Nor is the split between for-profit private sector able to be disaggregated from NGOs.
- 11 These MDBs are the African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IDB), and World Bank Group, including the International Finance Corporation (IFC). See Section 3.1 for additional details
- 12 See Section 3.2.4 of UNEP (2016) for estimates by geography.
- 13 World Bank (2010) defined adaptation cost as the cost of development initiatives needed to restore welfare to levels prevailing before climate change, not as optimal levels of adaptation. The one exception was coastal zones, where adaptation costs were defined as the cost of measures to establish the optimal level of protection plus residual damage.
- 14 Vivid Economics recognises there are a number of criticisms to the modelling approach taken by World Bank (2010) and more receive estimates, such as UNEP (2016), suggest costs scenarios will in fact be much higher than those reported by earlier models. World Bank (2010), however, continues to be the most comprehensive assessment of adaptation costs using both a top down and bottom up modelling approach. This analysis therefore uses these costs estimates to uncover comparative sectoral and geographic indicators of adaptation financing gaps.
- 15 The estimates used by World Bank (2010) were selected to reflect the range of precipitation extremes in climate models to reflect the uncertainty in future climate projections under the same temperature increase. The NCAR and CSIRO models were the wettest and driest global scenarios at the date of publication.
- 16 2014 GDP estimates were taken from the IMF World Economic Outlook Database available at: <http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx>.

- 17 There are a few caveats to this analysis. First, the adaptation costs used in this analysis reflect an average estimate for the period 2010-2050 at 2005 prices. Most adaptation costs are likely to accrue towards the end of this period as the impacts of temperature rise accelerate, therefore, the estimates may overstate the adaptation costs for 2015 and the adaptation financing gap. On the other hand, more recent adaptation costs estimates suggest adaptation costs leading out to 2030 and 2050 are significantly higher than those presented in World Bank (2010). Costs presented in 2015 are also likely to be higher than those presented (which use 2005 prices). Second, a different definition was used by World Bank (2010) to calculate the adaptation costs of the Coastal Protection sector: adaptation costs were calculated as the cost of measures to establish the optimal level of protection plus residual damage, while the other sectors' adaptation costs were calculated as the costs needed to restore welfare to levels before climate change. Third, the costs used for this analysis were derived from a set of growth estimates which may not account for recent global developments.
- 18 This analysis excludes the European Investment Bank as it is not an implementing entity of the PPCR. The headline numbers of this report are therefore not comparable to those reported in the previous Vivid Economics analysis.
- 19 It should be noted that the adaptation finance reported here differs to the total adaptation finance reported by the MDBs in the 2015 MDB Joint Report (Multilateral Development Banks, 2015) mostly because of the latter's inclusion of technical cooperation projects and private finance provided by the Multilateral Investment Guarantee Agency (MIGA), a member of the World Bank Group.
- 20 Calculated using the joint MDB methodology for climate change adaptation finance tracking, as set out in Annex B of the 2015 Joint Report on MDB Climate Finance. See <http://www.ebrd.com/cs/Satellite?c=Content&cid=I395252044964&d=&pagename=EBRD%2FContent%2FDownloadDocument>
- 21 Countries were grouped using the World Bank's country classification by income level. See <http://data.worldbank.org/about/country-and-lending-groups>.
- 22 PPCR pilots have been initiated in 19 countries and regions: Bangladesh, Bolivia, Cambodia, Caribbean Region (Dominica, Grenada, Haiti, Jamaica, St Lucia, St Vincent and the Grenadines), Mozambique, Nepal, Niger, Tajikistan, Yemen, Zambia and the Pacific Region (Papua New Guinea, Samoa and Tonga). 10 countries have also recently been added to the PPCR. These are Bhutan, Ethiopia, Gambia, Honduras, Kyrgyz Republic, Madagascar, Malawi, Philippines, Rwanda, and Uganda.
- 23 This includes one public sector project in the PSSA that aims to enable private sector adaptation.
- 24 Accessible here: <http://www.ebrd.com/downloads/sector/sei/turkey-adaptation-study.pdf>
- 25 Pledges and deposits to the GCF are divided by two to reflect the objective that 50 percent of its resources will be allocated to adaptation.
- 26 This project was developed under a proposal approved by the PPCR in 2012. A total of USD 9 million of PPCR funding was approved.
- 27 Ibid.
- 28 Ibid.
- 29 This project was developed under a proposal for resilient housing approved by the PPCR in 2013. A total of USD 0.4 million of PPCR funding was approved.
- 30 See Figure 10 of Buchner et al (2015).



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