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Scaling up and Replicating Effective Climate Finance Interventions

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in 2014 in response to a request from the Climate Change Expert Group (CCXG) on the United Nations Framework Convention on Climate Change (UNFCCC). The CCXG oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. Authors work with the CCXG to develop these papers in a collaborative effort. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the CCXG. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

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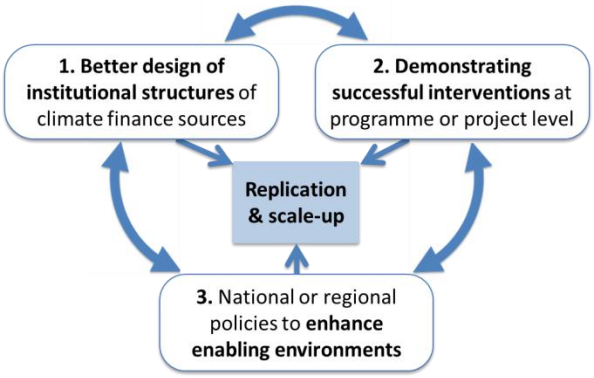
Executive summary

There is widespread recognition that climate finance needs to be scaled up from its current levels. However, there is no clear view on how developed countries can efficiently and effectively mobilise further climate finance to meet the needs of developing countries. Developed countries have committed to mobilise USD 100 bn per year of climate finance for developing countries by 2020 from a variety of sources. These include both public and private finance, thus the private sector is likely to play a significant role in the mobilisation of climate finance to meet this commitment.

This paper explores how scale-up and replication of effective climate finance interventions efficiently mobilise private climate finance. This paper uses the term "climate finance intervention" to refer to public interventions used to mobilise private finance that supports climate mitigation or adaptation activities, or both, in developing countries. The interventions examined in the paper have already been, or are being, scaled up or replicated. Scaling-up and replication of such climate finance interventions could be an efficient way to increase the private sector's interest in mobilisation of climate finance, and thus to make progress towards the USD 100 bn per year goal by 2020. The paper draws lessons from selected mitigation and available adaptation case studies at project- and programme-levels as well as from experience with international climate funds.

The paper examines three key aspects needed to scale up and replicate climate finance (Figure ES-1). The first is the institutional structures and decision-making framework of the climate finance source, its aims, the scale at which it operates and how barriers to scaling-up and replication have been addressed. Second, the paper explores how demonstrating effective low-carbon, climate-resilient technologies and systems can facilitate scale-up and replication. Third, the paper discusses the influence of policies to enhance domestic enabling environments for scaling-up and replication.

Figure ES-1: Three key aspects relating to scaling-up and replication of climate finance interventions



Based on its examination of the examples, the paper has identified four key lessons as follows.

It will be difficult to balance mitigation and adaptation finance mobilised by developed countries, at least in the short-term

Scaling up and replicating climate interventions will by definition increase the dissemination and deployment of existing, proven technologies and systems. The majority of public and private climate finance to date, as well as the case studies examined in this paper, has focused on mitigation. Thus, scaling up and replication of existing climate interventions in developing countries, which have successfully mobilised private climate finance would be likely to result in a continued focus on mitigation interventions. Indeed, the paper has found only a few examples of adaptation activities that mobilise private finance and have been scaled up or replicated.

Demonstrating that a particular intervention can function effectively in a given context is one of the elements that can facilitate scaling-up and replication. Ensuring that mitigation or adaptation activities are self-sustainable is the first step to encourage scaling-up and replication. However, there is a

difference in the ease of demonstrating self-sustainability (and therefore scaling-up and replication potential) between mitigation and adaptation interventions. In particular, it may be difficult to quantify or attribute specific benefits to specific adaptation interventions. This makes it harder for private actors to decide to invest in scaling-up and replication of such interventions, given that private sector actions tend to be driven by competitiveness, perceived risks and expected risk-adjusted returns.

Multiple instruments and multiple actors are needed to address multiple barriers

There are multiple barriers to scaling up or replicating specific mitigation or adaptation interventions. These barriers can relate to a lack of suitable policy frameworks, enabling environments, information on institutional structures and financial instruments, and implementation capacity.

Interventions are most likely to be successful if they accurately identify and target all key barriers by involving multiple stakeholders, and if they use multiple instruments to deploy low-carbon and climate-resilient goods and services. For example, the case studies examined in this report combined financial instruments with other interventions such as information exchange and capacity development (e.g. tea sector energy efficiency and renewable energy in India, and AdapCC); technical assistance (e.g. energy efficiency programme in China, and geothermal projects in Indonesia); and building and enhancing networks between different actors at different levels (e.g. solar home systems in Bangladesh). Facilitating co-operation and co-ordination among multiple actors around a geographical or sectoral focus, as well as different ministries within a country, could also enhance scalability and replicability of interventions.

Bridging the information gap is a key part of replication and scaling up

Information plays an important role in demonstrating what has worked and what has not. In order to ensure scaling-up and replication, different types of information are identified. The first is information on the project or programme itself and its environmental performance. This could also include information on technologies that the project or programme employed, since scalability and replicability can also highly depend on the quality of the technologies. The second type of information is on the financial structure of the intervention, the different instruments used to overcome economic and financial barriers, and the financial sustainability of the intervention. The third type of information needed is on the broader context within which the intervention is situated. This can influence what types of changes are needed in order to ensure that a successful intervention is successfully scaled up or replicated in a different context.

These three types of information can be generated by monitoring and evaluating the implementation, outputs, outcomes and impacts of a specific intervention – although identifying the wider and longer-term impacts can be far from straightforward (especially for adaptation). Some examples in this paper illustrate that a lack of information has been a major barrier to scaling up or replicating climate finance interventions. Information also needs to be properly disseminated to those seeking scaling-up or replication so that the information fits different contexts. Accurate and relevant project- and programme-level information is an essential input to providers of public and private finance for their decision making.

The interventions studied in this paper indicate that efficient communication channels to share and exchange information are also a key for scaling up and replicating climate finance interventions. The actors involved in large-scale and micro-level interventions will be different. However, good links between multiple actors – and different types of actors - are important for larger-scale interventions as well as interventions targeting small users (such as households). All case studies examined show the importance of ensuring good links between the project operators, local stakeholders, and the national government. This will ensure political buy-in, which is crucial for the integration of programme-level interventions in national strategies. The case studies also highlight that it is beneficial to involve both technical and financial experts in decision-making processes for allocating public climate funds to particular interventions.

Institutional structures and enabling environments have a significant impact on replication and scaling- up

Institutional structures of international climate finance sources, within which climate finance is allocated and delivered, can influence what climate finance is directed towards, who receives it, and the potential delay in doing so. Institutional structures specific to allocating and disbursing international climate finance thus facilitate (or alternatively, hinder) scaling-up and replication of climate finance.

The examples studied in this paper highlight that there are considerable variations in the decision-making frameworks for committing and disbursing different sources of climate finance (i.e. climate funds at various levels). This is in part related to the source of climate finance, the type of access to climate finance (indirect vs. direct) and the desired scale of intervention of the climate finance (project vs. programme). This causes variations in the number of steps involved in funding decision-making, the type of stakeholders involved (e.g. national governments, civil society organisations, financiers) and the frameworks for monitoring and evaluation. Speedy decision-making can be important for encouraging participation of the private sector in climate finance interventions. However, the institutional structures used by some key sources of climate finance can lead to significant delays in climate finance disbursement.

There are different means of accessing international climate finance sources, with different institutional implications at the national and international level. For instance, "direct access" and "enhanced direct access" (being considered by the Green Climate Fund) devolve responsibility for i.e. the design and implementation of interventions to the recipient country (and also fund management for the latter type). Direct access and enhanced direct access can increase the level of country ownership of funds and implementation of projects and programmes. They can also reduce transaction costs and delays associated with approval and disbursement of finance. This could facilitate timely access to funds, and therefore replication of successful interventions. However, there can also be delays associated with such access types, relating to the time needed to put in place national-level organisations with accredited fiduciary or other standards. This may make it more difficult for small or least developed countries to use this modality to access climate finance – at least in the short-term.

More generally, a country's policy, legal and investment frameworks will strongly influence its attractiveness to international sources of climate finance. Mitigation and adaptation interventions are more likely to be scaled up or replicated if they are aligned into larger programmes and/or policies, rather than remaining at a project level. Further, domestic capacities of a country will influence its ability to access, absorb, and channel climate finance. Efforts to fill capacity gaps in moving from planning to implementation can play an important role in enhancing such domestic capacities.

Way forward

Scale-up and replication of climate finance interventions to date have focused on only a few types of activities – mainly in the mitigation area, and in renewable energy and energy efficiency. The GCF Board has decided to have windows for adaptation and mitigation, that there will be "balance" in funding between them, and that adaptation finance will be allocated based on the urgent and immediate needs of vulnerable countries. Yet, mobilising private sector interest in the balanced provision may be difficult to achieve in practice.

Indeed, experience with private climate finance to date, i.e. from the Clean Development Mechanism (CDM) and highlighted by the case studies examined in this paper, has shown that most private sector climate finance is neither driven by considerations of geographical or sectoral balance, nor by principles such as equity and fairness. Therefore, while scaling-up and replication could facilitate efficient mobilisation of climate finance, they might also risk continuing the imbalance.

1. Introduction

Climate finance is needed in both sufficient quantity and quality in order to achieve the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) (Ellis et al., 2013). While there is widespread recognition that climate finance needs to be scaled up from its current levels, there is no clear view on how developed country Parties to the UNFCCC can efficiently and effectively mobilise further climate finance. There is as yet no single definition of climate finance (Caruso and Ellis, 2013).

At COP 15 in Copenhagen, developed countries agreed to mobilise USD 100 bn of climate finance per year by 2020 to meet the needs of developing countries. This was formalised as a commitment at COP 16 in Cancun. To achieve this commitment, activities for low-carbon and climate-resilient development need to be efficiently and effectively implemented at scale to make full use of scarce public finance resources. Previous work by the OECD and others has explored policy frameworks and enabling environments to facilitate further mobilisation of climate finance at the national, sectoral and policy levels (e.g. Kaminker et al., 2013; OECD, 2013a; Ranger, 2013; Corfee-Morlot et al., 2012; OECD/G20, 2012). However, further research is still needed to identify common project- and programme-level factors that facilitate mobilising climate finance. In doing so, it is also important to carefully look into how individual climate funds can better support further mobilisation of climate finance at project and programme levels.

This paper uses the term "climate finance intervention" to refer to public interventions used to mobilise private finance that supports climate mitigation or adaptation activities, or both. While recognising that climate finance interventions in general can include a broader range of public interventions, this paper selected examples of climate finance interventions that meet the abovementioned criteria.

This paper explores lessons learned from existing climate finance interventions in developing countries at project-, programmes-, and fund-levels, which have already been, or are being, scaled up or replicated. In particular, the paper looks into how further private climate finance can be mobilised through scale-up and replication of climate finance interventions, while recognising that actors in the private sector are not a homogeneous entity with a common interest.

This paper uses the terms "scaling up" and "replication" in the following ways:[1]

- **Scaling-up** refers to activities that attempt to expand an initial intervention in terms of e.g. greenhouse gas (GHG) emissions or energy consumption reduced, revenue generated, risks mitigated, stakeholders served or affected, money provided, assets, goods and/or services financed, and geographical or facility scale.
- **Replication** refers to activities that explicitly attempt to reproduce a specific intervention in a different location(s).

Further, scaling-up and replication are not the same, but might overlap. In some cases, replication can be one step to achieve scaling-up of a project or programme, whereas in other cases replication is completely different processes than scale-up.

Scaling up and replicating climate finance interventions that have been considered effective can be an efficient and effective way to facilitate increasing climate finance towards the USD 100 bn per year by 2020 commitment. Scaling up and replicating climate interventions can increase the dissemination and deployment of demonstrated technologies, systems and financial instruments. While innovative technologies and financial tools are also important to achieve low-carbon and climate-resilient development in the longer term, private investors are often reluctant to invest in technologies and

[1] The paper defines the terms "replication" and "scaling-up" so that they are consistent with terms used in relevant literature such as GIZ and Cafédirect (2010), UNEP (2011), van Oudenhoven, N., & Wazir, R. (1998), and McDonald (2006). GEF indicates that the first step in replication and scaling up is demonstrating that an intervention is "self-sustaining" (GEF, 2013).

systems whose risk-adjusted returns cannot be confidently estimated. Therefore scaling-up and replication could help the private sector to tackle the familiarity barriers to such newer measures and decrease the needs for public support in the long run. The GEF has been supporting climate interventions for two decades. The GEF's analysis indicates that for interventions to have impact, the progress of the activities supported by the GEF should be made through sustaining, mainstreaming, replicating and scaling up those interventions, as well as transforming markets (GEF, 2014). Nonetheless, a short-term focus on replicating and scaling up successful climate interventions that have mobilised private climate finance is likely to continue with a focus on currently-available mitigation interventions, such as renewable energy and energy efficiency.

This paper covers a wide variety of project-, programme- and fund-level mitigation and adaptation activities. They include activities in a variety of developing countries, are of various sizes and financial structures, and involve different sectors. The information was drawn from publicly-available sources (in particular, MDBs and climate funds), country-specific information sources, and interviews with key stakeholders. The paper also examines different implications of scalability and replicability for mitigation and adaptation activities. Although the paper explores both types, very few replicated or scaled-up adaptation examples were found. A likely reason for this is that, to date, there have been few adaptation interventions that generate revenue and are economically attractive. Further, there is less experience with developing and implementing adaptation interventions compared to mitigation – and therefore less experience with monitoring and evaluating the effectiveness of adaptation interventions. After taking all these considerations into account, two adaptation interventions were taken up in this report.

Section 2 outlines the scope of the analysis and the methodological framework used. Section 3 explores various aspects of institutional structures of climate finance sources, which can influence scaling-up and replication. Section 4 examines how demonstrating successful technologies and systems can provide useful information and lessons on whether and how such technologies and systems can be scaled up or replicated. Section 5 outlines the importance of policies to enhance enabling environments and capacities of institutions at various levels. Section 6 provides initial insights into factors that facilitate scaling-up and replication in the context of pursuing the USD 100 bn per year by 2020 commitment, building on the lessons learned from existing cases. The case studies used as illustrations are outlined in the main body of the paper, with more detailed explanation in the annex.

2. Methodology for analysis

2.1 Scope of the analysis

This paper analyses a variety of climate finance interventions where public interventions have been used at the project- or programme-level to mobilise private climate finance. Such interventions can include: capacity building; information-based instruments; regulatory instruments; market-based instruments (such as fiscal incentives and risk mitigation); grants; concessional and non-concessional loans (c.f. UNDP, 2011). The paper also draws on lessons from climate finance funds and facilities. The paper covers a wide range of examples of these interventions, and many of the examples combined several different interventions to tackle a range of barriers to scaling-up and replication.

Table 1 outlines the scaled up and replicated examples that are analysed in the paper, of which seven are mitigation activities and two are adaptation activities. The imbalance of mitigation and adaptation activities in this sample reflects the fact that evidence to date of scaled up and replicated climate finance interventions is largely focused on mitigation activities. As further discussed in Section 4.1, one major benefit for private actors when investing in adaptation is risk mitigation. The examples in this paper include an insurance scheme for agricultural producers and a series of measures to reduce risks that can affect the supply chain of the food and beverages industry. There may be more examples of scaled up or replicated "soft" adaptation measures that are mostly supported by public sector. These could include measures for empowering local communities and building institutional capacity and community assets, even if they are implemented in a different context (e.g. development

aid) and are not labelled as "adaptation". Such measures are mostly implemented by public sector and are therefore out of the scope of the paper.

Many of the examples in this paper have been supported by the Global Environment Facility (GEF). This may be because the GEF sets "scalability" and "replicability" as criteria to screen projects that it will support. In addition, it is also relatively easy to access the information on the projects' scaling-up and replication through the GEF's evaluation reports.

Scaling-up and replication could take place at various levels. First, certain types of interventions can scale up or replicate mitigation and adaptation activities at a programme or project level. Second, an intervention itself can be replicated or scaled-up in different geographical areas or at different scales. Third, both public sector and private sector can lead scaling-up or replication of activities. As shown in the following sections, all of those scaling-up or replication types could help developed countries efficiently increase climate finance to the level of the USD 100 bn per year by 2020 commitment.

Table 1. Summary description of replicated climate finance case studies explored in this paper

Name and country	Description of mitigation or adaptation activity (M: mitigation, A: adaptation)	Public actors (international)	Public actors (national)	Private and other actors	Climate finance interventions for the activities
CHUEE in China and Sustainable Energy Finance (SEF) in Philippine	Reduction of GHG emissions by disseminating energy efficiency technologies and services (M)	IFC, GEF, Gov. of Norway, Gov. of Finland	Chinese Ministry of Finance	Local financial EE equipment suppliers, energy management service providers, end-users	Concessional loans and grants for a partial credit guarantee programme (Risk Sharing Facility) and technical assistance and knowledge sharing
Weather index insurance initiative in India	Adapting to climate change by the insurance to insure farmers from the economic loss caused by high temperatures, increased drought, and flooding (A)	Commodity Risk Management Group of the WB	Federal government of India	ICICI Lombard GIC, BASIX	The government subsidies for the insurance premium and technical assistance from CRMG to design weather index insurance at the early stage
Energy Conservation in Small Sector Tea Processing Units in Southern India	Mitigation of GHG emissions from tea manufacturing process through EE and RE[2] measures (M)	UNDP, GEF	Indian Ministry of Commerce (the Tea board),	Local tea manufacturers, TIDE, local commercial banks	Grants for knowledge sharing, and awareness raising activities, adopting EE/RE technologies
Concentrated Solar Power (CSP) projects in Ain Beni Mathar and Ouarzazate, Morocco	Construction of the world's largest CSP projects in Morocco. In Ain Beni Mathar, one plant is in operation. In Ouarzazate, phase 1 is under construction; phases 2 and 3 are being planned (M)	AfDB, WBG/IBRD (e.g. CTF) EIB, AFD, KFW, EC NIF, BMZ	Moroccan Agency for Solar Energy, ONEE, Ministry of Interior	Private consortium for project implementation	Concessional loans and grants for incremental costs of the plants
Adaptation for Smallholders to Climate Change (AdapCC) in Africa and Latin America	Adaptation projects, including a multi-focal project on mitigation and adaptation components, financed in part via the voluntary carbon market. The mitigation part is reforesting highlands. The adaptation part is to help down-	GTZ (now called GIZ)		Cafédirect	Grants from Private-Public Partnership between GTZ(BMZ) and Cafédirect for technical assistance and project management (the sale of the voluntary carbon credits

[2] EE refers to energy efficiency and RE stands for renewable energies.

Name and country	Description of mitigation or adaptation activity (M: mitigation, A: adaptation)	Public actors (international)	Public actors (national)	Private and other actors	Climate finance interventions for the activities
	stream small-holders undertake adaptation measures. (A/M)				is also a source of the finance)
Energy Efficiency programme in Chinese Township and Village Enterprises	Mitigation by energy efficient technologies and products in the brick, cement, metal casting and coking sectors (M)	UNDP, UNIDO, GEF	Chinese Ministry of Agriculture	TVEs, Agricultural Bank of China, and Hongyuan Company	Grants for capability of adoption and dissemination of EE technologies, increasing financial accessibility, etc.
Geothermal power plants in Indonesia	Promoting geothermal energy to renewable energy share in the national energy mix (M)	Japan International Cooperation Agency (JICA),	Private project developers	Geological Agency (the Gov. of Indonesia)	Grants for development of a national geothermal road map, research on policies and regulatory frameworks (including FIT and a public fund for exploratory drilling) and capacity development Concessional loan for PLN and Pertamina for project development
Prosol Residential Programme in Tunisia	Mitigation activity to install Solar Water Heating systems (SWHs) to replace water heating systems run by fossil fuels (M)	UNEP, MATTM	Tunisian Ministry of Industry, Energy and Small and Middle Size Enterprises, ANME, FMNE, STEG (an utility company)	Local commercial banks, certified manufacturers, importers, and installers of the equipment	Grants for the subsidies to lower the upfront costs of installing SWHs and the interest rates
IDCOL Solar Home Systems, Bangladesh	Commercialisation of off-grid solar home systems in Bangladesh. (M)	Initially WB, IDA, GEF – subsequently GIZ, KFW, ADB, IDB.	IDCOL (a GOB owned financial institution)	Households, micro-finance institutions, NGOs	Grants for up-front costs and awareness raising activities

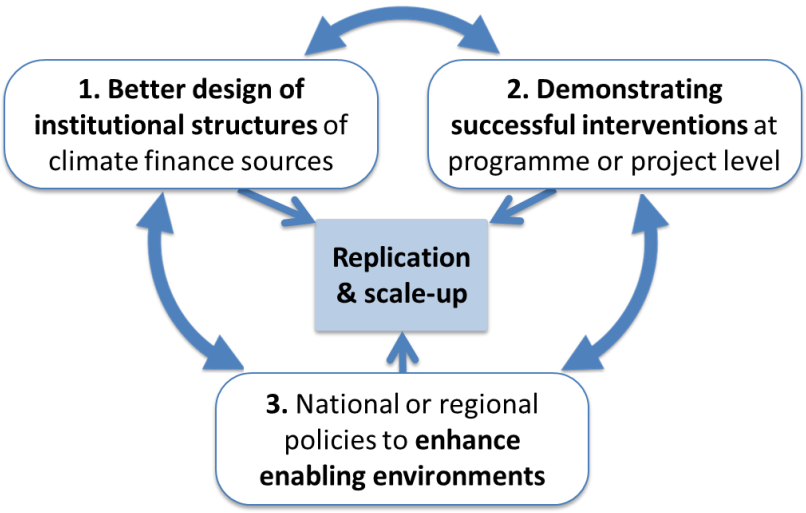
2.2 Methodological framework for analysis

The paper analyses lessons from three different aspects on how project-, programme-, or fund-level experience in climate finance interventions can be scaled up and replicated (see Figure 2). First, the paper examines ways in which the design of institutional structures for climate finance can influence replicability and scalability of interventions. This section draws on lessons mainly from public sources of international climate finance (i.e. various climate funds and facilities) rather than individual projects or programmes.

Second, this paper explores how demonstrating successful low-carbon and climate-resilient technologies and systems as well as financial instruments can facilitate scaling-up and replication. The section examines examples from three viewpoints; (i) designing a climate finance intervention that can help mitigation and adaptation activities to be self-sustaining, (ii) generating information on the activities through monitoring and evaluation; and (iii) disseminating the information so that it fits specific local needs and contexts.

Third, the paper explores the influence of policies aiming to enhance enabling environments for scaling-up and replication, including building capacities. To develop this methodological framework to analyse individual climate finance interventions, the paper draws upon previous studies on scaling-up and replication in the context of climate change related issues as well as development studies (e.g. OECD, 2013a; Agrawala et al., 2011; IMF, 2011; UNDP, 2011; Kok et al., 2008; Duflo, 2004; and van Oudenhoven and Wazir, 1998).

Figure 2. Three key aspects relating to scaling-up and replication climate finance interventions



These three aspects can be interlinked (shown as double-headed arrows in Figure 2). For instance, demonstrating particular low-carbon technologies could inform policy reforms within countries, while the institutional structure of a climate fund may affect ways in which actors involved monitor and evaluate the effectiveness of interventions. Suitable and stable policies could serve as a basis for designing and implementing institutional structures of climate finance sources and scalable or replicable interventions.

Whilst exploring these three factors individually, the paper highlights that interaction among them is essential to facilitate scaling-up and replication. Indeed, most of the case studies examined have been scaled up or replicated for multiple reasons. Thus, picking up one intervention as an example of a particular factor in the following sections does not mean that the scaling-up or replication took place only due to that particular factor.

2.3 Overview of roles of actors

Financing low-carbon and climate-resilient development in developing countries at the required scale involves a range of actors. While varying among the examples in the paper, the actors typically include providers of finance, governments, and project or programme proponents in scaling-up and replication. Better co-ordination and leverage of the capacities of these different actors to address specific barriers within certain market segments, technologies and countries will be a key factor in scaling up and replicating successful interventions.

Development finance institutions such as multilateral development banks (MDBs), national and bilateral financial institutions are a cornerstone of channelling international climate finance (CPI, 2013a). Instruments provided include grants; concessional and non-concessional loans; equity; de-risking instruments; and various climate funds (Venugopal et al., 2012). Some of the instruments have been found in scaled up or replicated examples studied in this paper, and summarised in Table 1. There are also emerging innovative financing instruments that could facilitate scale-up and replication, such as climate bonds, blended financing and green credit lines. Recipients of climate finance channelled by MDBs and bilateral financial institutions can also benefit from the technical expertise of international organisations and development agencies that accompanies funding.

MDBs have long been playing important roles in mobilising public finance in order to catalyse and scale up investments that would not otherwise happen (IFC, 2012). MDBs are also a key actor that co-ordinate different funds and institutions. Further, large MDBs may have in-house expertise that allows them to properly analyse risks of promising but unproven technologies or pioneer innovative, through relatively more complex, structured financial products.

Donor countries and their bilateral financial institutions (BFIs) may also be good sources of concessional finance that can reduce risk for others' financial inputs, and therefore increase such inputs. For example, this can be done by signing on for first-loss tranches of de-risking instruments developed by multilateral institutions (Frisari et al., 2013). Donor countries and BFIs can also be providers of grants. National development banks (NDBs) may bring a significant amount of local environmental and market knowledge to financing and developing a programme or project. NDBs may also be able to engage local financial institutions and SMEs (Smallridge et al., 2013), while regional development banks can be an important hub for dissemination of lessons learned from other countries with similar circumstances. Finally, private sector investors control considerably more assets than public actors, have already increased their climate-related investments in recent years (e.g. Buchner et al., 2011) and stand ready to invest once attractive risk-return profiles can be demonstrated.

National and local governments in developing countries play essential roles in setting long-term policy goals and enhancing enabling environments to address market failures that can hinder scaling-up and replication of both mitigation and adaptation activities. The roles of central and local governments include policy formulation and reforms such as:

- Fiscal instruments to create an appropriate price on carbon
- Regulatory framework to incentivise further private companies to enter into markets
- Promoting research and development
- Collecting and disseminating basic information on science and technologies needed for investors and project proponents.

Moreover, national and local governments are sources of significant financial support or in-kind assistance (CPI, 2013) that can help scale-up and replication through, for instance, subsidies and national climate funds.

Project and programme proponents initiate, develop and operate individual mitigation and adaptation activities with the support from providers of finance and governments where necessary. These proponents consist of various actors such as project/programme developers; project/programme operators; suppliers of mitigation and adaptation related goods and services; or purchasers of products from the projects or programmes (e.g. electricity). They can include private entities, public institutions and civil society organisations. As shown in Sections 3, 4 and 5, the examples in this paper have largely taken place with collaboration among different types of project proponents. Some scaling-up or replication activities may involve the same or similar proponents as those of the original activity, while others involve different project proponents who take lessons from pilot activities into account.

Participation by both technical and financial experts in finance allocation decisions has been found to be beneficial. For example, analysis of the European Bank for Reconstruction and Development (EBRD)'s industrial energy audit programme (D'Addario, 2013) highlights the advantages of including input from both financiers and engineers (technical experts) in the bank's appraisal process, including on-site visits. In particular, including information on energy efficiency ratings in loan evaluation documents raises the profiles of individual projects and increases the integration of energy efficiency concerns in assessments of financial performance.

3. Institutional structures for facilitating scale-up and replication

National, international and/or fund-level capacity and institutional structures can facilitate (or hinder) effective delivery and use of climate finance, and affect the level and mobilisation of private climate finance. Such frameworks therefore also influence the ease with which climate finance interventions can be scaled up and replicated.

This section outlines different institutional structures at the national and international level that have been used to allocate and deliver climate finance. In particular, this section explores how scaling-up and replication are affected by:

- The **aims** of the climate finance source. Some climate finance sources have specific focus on scaling-up or replication.
- The **decision-making framework of** the climate finance source, as this can affect the time, transaction costs and risks associated with climate finance allocation, and delivery; – and therefore influences the potential for private sector co-financing.
- The **scale** of climate finance interventions, in particular because large-scale and small-scale interventions target different user groups.
- How **multiple barriers to scaling up and replication** of climate finance are identified and tackled.

3.1 Link between the aims of climate finance sources, scaling-up and replication

The aims of climate finance funds largely determine the roles and functions of their institutional structures and thus affect scalability and replicability of climate finance mobilised by the funds. Specific aims (such as mobilising private investments) may foster scaling-up and replication in some cases. In other cases, the aims of the funds (such as support for developing national climate plans) or the type of funding (e.g. grants) may limit the short-term possibility of scaling-up and replication. A recent survey by Polycarp (2013) of public-private funds indicates that they focus on a relatively narrow range of activities. In particular, existing public-private funds tend to focus on mitigation activities such as renewable energy and energy efficiency.

Some sources of climate finance have scaling-up or replication as one of their aims. However, given the complex set of factors that are needed for scaling-up and replication, this does not necessarily imply causality between a specific climate finance intervention, and a subsequent intervention. It is even harder to identify the causal chain between a specific climate finance intervention and wider market or transformational change, or developments in national policy (although some evaluations have attempted to do this, e.g. MEM, 2008).

Some climate funds however have been established with the specific goal of effecting large-scale change – both for mitigation and adaptation. For example, the Climate Investment Funds (CIFs)[3] include a Clean Technology Fund (CTF), the objective of which is to mobilise large-scale funding for low-carbon technologies in developing countries (CIF, 2013). The CTF aims to mobilise climate finance from the private sector by identifying and then breaking down barriers to private sector involvement in climate interventions (CIF, 2013). For example, the CTF's involvement in the Ouarzazate solar power project aims to improve the policy environment for renewable energy projects in Morocco by establishing a supportive regulatory, legal and institutional framework (CIF, 2013). Triggering scaling up and replication can also be an aim of national climate funds, as is the case for the Indonesian Climate Change Trust Fund (Budiarjo, 2013).

The CIFs also include a Pilot Programme for Climate Resilience (PPCR) which supports countries' efforts to integrate climate risk and resilience into development planning (CIF, 2013b). The PPCR aims to "initiate transformational change" by incentivising programme-level strategies for adaptation. Both the CTF and the PPCR focus their efforts on a specific set of countries. This will limit replication beyond these countries; at least within the context of the CIFs, unless other funds take lessons from the CIFs' pilot projects and replicate the projects in other areas.

As private climate finance accounts for the majority of international climate finance flows (CPI, 2013a), attracting private climate finance is an important element in replicating and scaling up climate finance interventions. Some sources of public climate finance have included mobilisation of private finance as one of their specific aims. This is not always straightforward as the aims of public and private climate finance may differ significantly. The ease of attracting private climate finance is influenced by a multitude of factors, depending on the type of intervention, the risks and returns associated with a specific technology, system and location (OECD, 2013a). There is a significant difference in levels of expected leverage between different climate funds – as well as between mitigation and adaptation interventions. For example, while the CIF's CTF is expected to have a leverage ratio of 1:8, the CIF's Forest Investment Program is expected to have a leverage ratio of 1:1.4 (CIF, 2013c). Co-financing for climate change projects in GEF-5 was 1:9.4, of which only a small proportion (15-16% of total co-financing) was from the private sector (GEO, 2013). This level was on average much lower for adaptation projects under the SCCF, where the private sector was estimated to contribute only 1% of total co-financing (GEO, 2013b).[4]

Several sources of climate finance including institutional investors or climate funds have maximum and/or minimum thresholds for financial contributions (disbursements) to a specific intervention.[5] These include the CIF's PPCR and the AfDB's Sustainable Energy Fund for Africa. Setting a minimum financial contribution will lead to a focus on larger-scale interventions, and thus will help reduce the importance of transaction costs. However, use of minimum contribution sizes renders small (but replicable) projects that are under this minimum threshold ineligible for support. In order to overcome the potential barrier of

[3] The CIFs are implemented jointly by MDBs (African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Bank, and the World Bank group. They include pledges and contributions (loans, grants, and capital contributions) of about USD 8 bn from 14 donor governments, as of 31 December 2013 (CIF, 2014a).

[4] Significant variations in co-financing levels at the individual project level were noted.

[5] There may also be minimum contribution sizes specified for individual climate funds.

overlooking small-scale interventions, some sources of climate finance focus specifically on small projects (e.g. the EIB's GEEREF) or on micro projects (e.g. the IDCOL solar home system project in Bangladesh).

The aims of specific sources of climate finance affect the allocation of climate finance. For example, the GCF Board has decided on the relative proportions of funding to be allocated to mitigation and adaptation interventions. Resource allocation procedures can cover a number of criteria, reflecting a range of strategic objectives that will influence the intended results of a project (Ellis et al, 2013). Some climate funds such as the GEF and the Climate Finance Innovation Facility[6] have taken into account scalability and replicability when deciding on which interventions to fund. Indeed, an independent review of partnerships between the World Bank Group and the GEF has found most evidence of scaling-up and replication for mitigation projects (IEG, 2013). The review also suggested that there were three types of activities which catalysed replication: "foundational" and enabling activities (e.g. policy frameworks), demonstration activities and investment. Further, the review indicated that these three types of activities would only lead to catalysis when implemented "in sequenced concert".

3.2 Decision-making framework

Steps to make decisions and time lags in decision-making framework

There are considerable variations among climate finance sources in the decision-making frameworks for allocating and disbursing climate finance. This is in part related to the source of climate finance, the type of access to climate finance (indirect vs. direct) and the desired scale of intervention (project vs. programme). There are also variations in the number of steps involved, and the type of stakeholders involved in decision making (e.g. national governments, civil society organisations, financiers). For example, the preparation of the NAPA (National Adaptation Programmes of Action) implementation projects under the LDCF already includes 20 separate steps (GEO, 2013b).

While a large number of steps in the allocation process (as in some MDB-run funds and the example above) can provide useful checks and balances, it can also increase the time taken to reach funding decisions. In turn, such time lags can delay project implementation (and therefore scale-up and replication). Long time lags may also be perceived by the private sector as increasing uncertainty regarding whether or not an intervention will go ahead. Time lags therefore increase the (perceived) risk of private sector participation, and consequently decrease their interest in participation. For example, an evaluation of the GEF indicates that the project cycle is "notoriously slow", taking 2.5 years for half of the concepts to become a reality, and with an average implementation time of five years (GEO, 2013c). The same evaluation indicates that the greatest potential for reductions in delays due to the project cycle would be to shift to approving programmes (rather than projects). Nevertheless, despite the long time lags, the evaluation (GEO, 2013c) indicates that only a very small percentage of GEF projects (7%) do not show evidence of broader adoption or environmental impact.

Asian Development Bank(ADB)'s analysis shows that an evaluation of the processing cycle for projects in "non-delegated" climate funds of the ADB has also found them to be "excessively long" (ADB, 2010). Such an institutional structure, where allocation decisions remain with the donor government and not allocated to the ADB, has been estimated to add another 19 steps and up to one year to the funding allocation process (ADB, 2010). To encourage participation of the private sector, however, speedy decision-making can be important (TAU and WCG, 2013). The more streamlined approach for climate

[6] The Climate Finance Innovation Facility (CFIF) supports finance and industry in renewables and energy efficiency. The CFIF was initiated by UNEP and the Frankfurt School, and ADB, BMU, KfW and UNEP are Investment Committee members.

finance allocation by some bilateral and multilateral financial institutions[7] has indeed been noted by them as an advantage (UNEP, 2011). Some of these funds such as NEFCO also note that implementation periods can be quite long (2.5-3 years for a "typical" implementation period) (NDF and NEFCO, 2012). Nevertheless, a balance is needed between streamlining allocation processes and ensuring the fiduciary standards as well as environmental and social safeguards of implementing agencies. Improving project or programme proposals prior to entering pipelines could also help to accelerate approval processes, which may need specific technical assistance for necessary documentation.

Ways in which climate finance is delivered

The means of delivering climate finance can affect the ease of scaling-up and replication in different ways. For example, climate finance can be delivered in different ways: direct investment (ex ante or ex post) in specific projects or programmes; indirect investments in intermediaries or sub-funds; and/or technical assistance and capacity building. The form of climate finance delivery determines the required institutional capacity to manage it. In particular, to implement an effective intervention with potential for scale-up and/or replication, a direct investment will require a good understanding of the specific intervention and its context.

If climate finance is used for direct investment, activities can be funded via top-down or bottom-up decision-making processes. Top-down processes include the Scaling Up Renewable Energy in Low Income Countries Program (SREP) and the PPCR, whereby a sub-committee (potentially also aided by outside experts) approves programming priorities (SREP, 2013). Other funds (e.g. the LDCF and the Adaptation Fund) have included bottom-up procedures, whereby project or programme proposals are submitted by implementing agencies or the country focal points and then reviewed (although in the case of the GEF, the Secretariat is playing an increasing role in developing and monitoring interventions). Scaling-up and replication can happen in both cases. However, scaling- up may be more likely to occur if a specific climate finance intervention is designed to fit within a broader programme or policy framework, as this would mean that the intervention is aligned with country priorities.

Climate finance for interventions can either be delivered up-front, ex post or both. There is increasing use of performance-based allocation (PBA[8]; ex post funding) by sources of international climate finance. For example, the GEF, AfDB's African Development Fund (ADF), ADB's Asian Development Fund, International Development Association of WB (IDA) and the Inter-American Development Bank's Fund for Special Operations all use an allocation formula that includes performance factors (GEO, 2013d). This can result in a more responsive allocation of climate finance, as well as a relatively frequent flow of climate finance. This responsiveness can help with scaling-up and replication of successful interventions. Of the funds above, IDA has the most frequent reallocation frequency (annual), whereas the GEF and ADF have a reallocation frequency of every four years and every three years respectively. However, while the use of results-based finance reduces risk for those providing climate finance in this manner, it requires the project operator to be able to assume some of this risk, as well as the initial capital expenditure costs (for a more detailed discussion see Caruso and Ellis 2013).

There can also be a link between the way in which climate finance is allocated, and extent of resource mobilisation (and therefore scaling-up and replication). Indeed, discussions on the ADF have highlighted that the PBA system increased donor confidence and increased the level of resources mobilised by the fund (GEO, 2013d). However, PBA systems also have the potential to lengthen the time lag between

[7] The research was conducted by UNEP in collaboration with Agence Francaise de Developpement (AFD), European Investment Bank (EIB), Japan International Cooperation Agency (JICA), KfW Entwicklungsbank (Germany's development bank), Nordic Environment Finance Corporation (NEFCO).

[8] A similar term, Results-Based Financing; RBF, also refers to an ex post funding approach. In this approach, payments are provided to service providers upon achievement of expected results.

performance and allocation if the performance-based indicators on which allocation is based focus on (longer-term) outcomes rather than (shorter-term) outputs (GEO, 2013d).

Climate finance access

There are three different types of access to international climate finance, with different institutional implications at the national and international level. These three are indirect access, direct access and enhanced direct access. ODI and UNEP (2011) outline three main institutional bodies involved in each of these different types of access to international climate finance. These are: an oversight body that develops strategies for the fund, is accountable to donors, and allocates funding; an implementing body that identifies, supervises and evaluates interventions; and an executing body which is i.e. responsible for the management and administration of day-to-day activities. Whether it is an international or national body that is responsible for these tasks will determine the type of access.

Most experience to date with allocating and disbursing climate finance has been with indirect (multilateral) access. Under this modality access, the climate fund and implementing body are at the international level – for example the GEF or CIF. In contrast, the body in charge of implementing the project is at national level. There can be different forms of such access, with varying numbers of steps in the allocation procedure. This type of access requires frequent communication between the national and international bodies involved in the climate finance intervention, which can lead to significant delays in implementation (as outlined above). For example, ADB's "delegated" funds have an estimated 14 fewer steps than their "non-delegated" funds, where approval is needed from the donor government (ADB, 2010). However, advantages of this type of access are that it allows for lessons learned in one jurisdiction to be replicated in another. For example, the same multilateral organisations involved in the China Utility-Based Energy Efficiency Finance Program (CHUEE) undertook a similar intervention in the Philippines. The Cafédirect project is another example, where GIZ and Cafédirect took a successful intervention and implemented it in a different jurisdiction.

In direct access, it is bodies at the national level (rather than international level) that are able to access the climate funds and to implement projects. Such bodies can be state or non-state actors. Multilateral and bilateral funds, as well as private climate finance, can provide for direct access. There is growing experience with direct access in the climate finance sphere, which is used in the UNFCCC's Adaptation Fund.

"Enhanced direct access" devolves funding decisions to the national level. Thus, while there would be some international oversight, funds would be directed to an accredited (national) fund manager, which would then allocate to the (national) implementing body. Some climate funds are moving towards this access modality, e.g. the Indonesian Climate Change Trust Fund (whose interim trustee is UNDP).

Direct access and enhanced direct access to climate finance have several advantages, while having also challenges. In particular, they increase the level of country ownership of funds. This type of access can also reduce transaction costs and delays associated with approval and disbursement of finance. In theory, this could facilitate scaling-up and replication of private sector engagement, as the process is faster when deciding on which interventions to fund. However, there can also be challenges associated with such access types, relating to the time needed to put in place national-level organisations with accredited fiduciary or other environmental and social standards. This may make it more difficult for small or least developed countries to use this modality to access climate finance – at least in the short-term, since many of those countries lack sufficient institutional capacities having the necessary fiduciary standards. Further, providing direct access and enhanced direct access may introduce moral hazard into the monitoring phase since the recipients may have less incentive to report on negative results for fear of losing future funding.

3.3 Scale of interventions and type of project operators

The institutional structure needed to scale up or replicate climate finance interventions will vary. This depends on the scale of the intervention and type of project operators, as well as the country and investment context within which the intervention occurs. Thus, interventions that will be implemented by large-scale industry will need different types of institutional structure and will involve different actors to those focusing on households.

Interventions aimed at the household level often provide for local-level capacity building and information exchange, or micro-credit facilities (IDCOL, 2011). For interventions aiming at increasing deployment of technologies or systems at a micro level, good links between national and local-level institutions (or households) are useful. For example, the GEF Illumex project that involved increased deployment of energy-saving lamps in Mexico built on the established relationship between households and the national electricity utility (GEO, 2013e). However, creating and maintaining such links take time, and needs to be factored in to intervention design. Further, for links to be effective, they are likely to involve a wide variety of stakeholders (local financial institutions, NGOs, project operators. as was noted in the IDCOL Solar Home Systems project (Rabbi, 2013).

Local-level communication can also be important for larger-scale interventions in order to ensure that local stakeholders receive sufficient information to make informed choices about their possible participation in a climate finance intervention. For example, planning for the development of the world's largest concentrated solar power plant in Ouarzazate (Morocco) included consultations with local stakeholders such as local government authorities as well as non-governmental associations – and the need for regular communication between the project representatives and local participants was highlighted (AfDB, 2012).

Good links between multiple actors are also needed for larger-scale interventions. This is illustrated by some of the case studies examined in this paper, as well as from wider experience in mitigation and adaptation interventions (e.g. GEO, 2013e; IFC, 2013b). For example, part of the electricity production from the Ouarzazate intervention is to be exported to the EU. Close co-operation between Morocco and international partners was therefore needed (CIF, 2013d). The CHUEE energy efficiency intervention included establishing an institutional set-up for energy efficiency lending in the participating Chinese banks. This included the creation of a network between banks and energy management companies which played a "match-making and brokerage" role and thus helped the network members gain financing (IEG, 2010). The importance of good links has also been noted in other analyses.

For example, an analysis of GEF mitigation projects in China, India, Mexico and Russia (GEF, 2013e) highlights that the "probability for broader adoption increases with the effectiveness of the interplay between research institutions, companies and national certification and standardization institutions". This hypothesis is supported by both positive and negative examples elsewhere. For example, interplay between different actors in the very successful IDCOL Solar Home Systems intervention in Bangladesh was ensured by representatives from different bodies and organisations participating in various committees with oversight responsibilities in the project.[9] Similarly, one of the underlying principles of the AdapCC project[10] was building partnerships between different public and private actors. Such partnerships between

[9] For example, the Operations Committee (which monitors and manages the operational aspect of the programme) includes members from a government-owned financial institution (IDCOL) as well as the partner organisations, who are (i.e.) responsible for extending micro-credit to customers. The partner organisations are selected by a Selection Committee which has members from IDCOL, ministries and other government organisations (IDCOL 2011).

[10] The AdapCC project was carried out in Peru, Mexico, Kenya and Nicaragua and is focused on improving adaptation by smallholders of tea and coffee-growers to climate change. The project aims at both increasing mitigation and adaptation.

farmers, local institutions and international actors were found to help in the identification of adequate adaptation solutions (and how to combine mitigation and adaptation aspects of an intervention) – as well as improve information flow. In contrast, the Solar Power Subsidy Programme in Uganda has not been able to stimulate significant private investment, partly because of lack of awareness of consumers of the subsidy and insufficient technical expertise within the bank (GIZ, 2013b).

In order to facilitate scaling-up and replication, it is also useful to ensure good links between the project operators and the national government. This will ensure political buy-in, which is crucial for the integration of programme-level interventions in national strategies. It will also help information exchange, which can facilitate further replication efforts, e.g. if the government develops policies or modifies regulations and standards to encourage the deployment of a particular technology or system. This is true for both large and small-scale interventions and project operators. For example, significant groundwork to develop institutional frameworks was needed in the 1st phase of the (large-scale) Ouarzazate intervention, including a favourable regulatory framework for private sector engagement in the electricity market (CIF, 2014b; CPI, 2012c). The efforts made to ensure strong co-ordination of donors and the Moroccan government has also been highlighted (CPI, 2012) as essential to the successful implementation of the project. The small-scale AdapCC project also involved local public-scale institutions in order to ensure that results could feed back into local political and development strategies (GIZ, BMZ and Cafédirect, n.d.).

3.4 Tackling multiple barriers

A common characteristic of the replicated or scaled up climate finance interventions that were analysed in this paper is that they involve multiple stakeholders, use multiple instruments and target multiple barriers to increased deployment of climate-friendly systems. In this complex setting, a number of barriers to replicating and scaling up specific low-carbon and climate-resilient interventions can be identified. These include policy or regulatory-related barriers, such as the lack of an appropriate enabling environment, or the lack of political awareness of specific climate-friendly technologies and systems and how to integrate them into national strategies (see e.g. UNDP, 2011; OECD, 2012; Amin, 2013). Barriers can also be related to information availability, implementation capacity and economic and financial aspects of a specific intervention (UNDP, 2011; Corfee-Morlot et al., 2012).

For example, the IDCOL intervention tackles financial barriers as well as information-awareness barriers. The Ouarzazate intervention combined the development of a favourable policy framework for renewable energy with concessional finance that lowered cost barriers to development of CSP and good co-ordination of the different stakeholders involved. The CHUEE intervention combined measures to reduce the financial risk associated with energy-efficiency lending as well as of increasing awareness of the benefits of such interventions. Some of the interventions can be multi-focal (i.e. comprising both mitigation and adaptation components, such as one of the locations where AdapCC was implemented).

Several successful climate finance interventions have also used multiple means of targeting economic and financial barriers (as well as institutional, regulatory or information barriers). These include grants, debts (concessional and non-concessional loans), equity and risk-mitigation instruments. Which financial instrument(s) is appropriate for a particular intervention varies depending on the intervention type and context. For example, grants may be the most appropriate for interventions that do not generate a revenue stream (such as many adaptation interventions), for technologies that are not yet commercialised in a particular market (such as solar water heaters), or for interventions in least-developed countries.

The range of instruments used to lower financial barriers to scaling-up and replication of climate finance interventions can be illustrated with three interventions that target increased deployment of renewable

energy.[11] For example, the EBRD's Sustainable Energy Initiative (which has been extended to a third phase) uses multiple financial instruments as well as technical assistance and policy dialogue (EBRD n.d.). The PROSOL initiative to increase the deployment of solar water heaters (SWH) in Tunisia has resulted in the installation of 95 000 units, has been scaled up within Tunisia,[12] and has also been replicated in other countries (Ölz and Agbemabeise, 2012). This programme used both loans with interest rate subsidies and capital cost subsidies provided by Tunisian banks (financed by the Italian government) in conjunction with information campaigns, capacity building and domestic policy initiatives to establish a SWH market. Similarly, the IDCOL programme to increase household-level solar electricity systems in Bangladesh has led to the installation of more than 2 m such systems by 2012 (GIZ, 2013b), surpassing initial targets. As for the PROSOL intervention, IDCOL uses donor money to provide grants to reduce the credit cost of solar home systems and also provides some capital subsidies. Both programmes also require that the quality of the systems installed meets certain specified standards.

However, interventions that use credit-based schemes to enhance the uptake of solar systems are not always successful. For example, a scheme to increase the use of SHS in Uganda by using capital subsidies and grants resulted in "low interest" of end-users in the scheme (GIZ, 2013b). Poor quality systems, leading to low performance, were highlighted as one of the reasons for poor uptake (GIZ, 2013b).

Implementing activities with co-benefits may also help to address multiple barriers. For instance, finance directed towards biodiversity could also have synergies with mitigation and adaptation finance. Examples could include the mechanism for Reducing Emissions from Deforestation and Degradation (REDD+) and ecosystem-based adaptation, where actors may identify synergies between adaptation, mitigation and biodiversity. However, private financing is likely to face difficulties in finding possible activities from which private entities can expect attractive risk-adjusted returns. For further discussion on financing biodiversity and climate change related activities, see OECD (2013c).

4. Demonstrating successful climate finance interventions

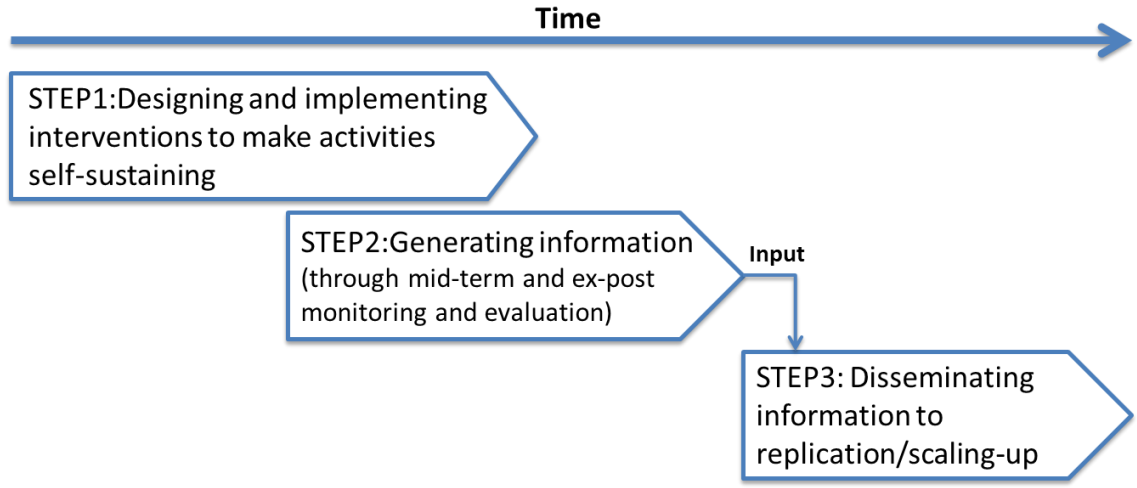
Demonstrating that a particular mitigation or adaptation activity can function effectively in a given context is key for scaling-up and replication. For instance, EBRD has applied the concept of the demonstration effect as one of the bank's criteria to appraise transformational impacts of climate related projects the bank invests in. The EBRD's criteria on demonstration effect include the effect of new products (e.g. new energy efficiency tools and services), new ways of financing, and new laws and compliance with them (Peszko, 2013).

This paper discusses three aspects of the demonstration effect: Section 4.1 elaborates on the aspect of designing and implementing interventions to enhance self-sustainability of mitigation and adaptation activities. It underscores that interventions that can contribute to self-sustainability of projects or programmes can increase private sector's interest in mobilising further investment in scaling-up or replication, given that the private sector mainly focuses on the risk-adjusted return of projects (OECD, 2013b; GEF, 2013). Section 4.2 analyses how information useful for replication and up-scaling can be generated through monitoring and evaluation. Finally, section 4.3 explores the importance of disseminating the information so that it fits specific needs of those who seek scaling-up or replication (See Figure 3).

[11] As most funding for adaptation interventions has involved solely public sector monies, there is less experience with mobilising private sector finance for adaptation activities. There is therefore also less experience with replicating and scaling up public-private adaptation activities.

[12] The initial programme (2005) targeted residential solar water heaters, and was subsequently extended in 2007 to tourism-related complexes (e.g. hotels) and extended again in 2008 to industries using solar thermal heat in their processes (Ölz and Agbemabeise 2012).

Figure 3. Components of the demonstration process of successful interventions



4.1 Interventions to make mitigation and adaptation activities self-sustaining

Designing and implementing a climate finance intervention that helps mitigation or adaptation activities to be self-sustaining is the first step in encouraging the private sector to invest in scaling-up and replication. In many cases (especially for mitigation), financial sustainability is a major element to make programmes and projects self-sustaining. The Annual Impact Report by GEF explicitly refers to ensuring self-sustainability as a step that comes before scaling-up and replication (GEF, 2013). Examples of interventions to enhance self-sustainability include the energy efficiency programme with a partial guarantee scheme (CHUEE supported by IFC and GEF) and the weather index insurance by ICICI Lombard GIC and BASIX. Both of the interventions have increased the financial attractiveness of activities (e.g. energy efficiency measures for CHUEE; and weather index insurance for crop production for ICICI Lombard GIC) for the actors involved (e.g. end-users, producers of goods and services, and local financial institutions).

There is a significant difference in the ease of demonstrating the self-sustainability (and therefore scaling-up and replication potential) between mitigation and adaptation activities. In general, self-sustaining mitigation projects or programmes are revenue-generating. Sustained revenue generation can increase investors' confidence in initiating or engaging in scaling up or replication, based on their own criteria about risk-adjusted returns

Further, designing financially sustainable interventions involves identifying and assessing mitigation or adaptation activities, and the market barriers and risks surrounding them. Previous studies have discussed various barriers that impede low-carbon and climate-resilient investments by different private sector investors with different risk appetites, investment preferences and constraints (e.g. Kaminker et al., 2013). Examples from such studies include insufficient carbon pricing; unpredictable, fragmented, complex and short duration policy support; a lack expertise and resources; and competition for capital with other traditional infrastructure assets.

The design process also needs to consider the roles and capacities of different types of public and private actors in enhancing financial sustainability of targeted activities. These actors could include private sector investors (domestic and international), multilateral financial institutions, bilateral financial institutions (BFIs), national as well as regional development banks and project developers. The capacities of each of these actors vary in terms of technical expertise, ability to analyse and reduce risks, access to investment capital and knowledge of the local context (for further discussion, see section 5). The following examples

suggest that strategically analysing policy environment and designing a financially sustainable programme or project can help both private and public actors facilitate scaling-up and replication.

A mitigation example such as CHUEE has combined a partial credit guarantee[13] programme for participating Chinese commercial banks to finance EE projects in China with technical assistance and knowledge sharing for other participants (IEG, 2010). CHUEE has been designed and successfully managed to financially benefit commercial banks (by risk mitigation), its marketing partners[14] (by marketing support), and energy end-users (by opportunity for cost reduction). Having been evaluated as a financially sustainable programme to save energy and reduce GHG emissions (IEG, 2010), CHUEE I has been scaled-up to CHUEE II, and replicated as the Sustainable Energy Finance (SEF) programme in the Philippines (IEA, 2011). The total funding has increased from USD 60.6 m (CHUEE I) to USD 180.5 m (CHUEE II) with a decreased share of grants. (For further information, see example 1.1. in the annex)

Experience from CHUEE also suggests that an intervention could be scaled up or replicated while decreasing the share of public support, if it is self-sustaining. The CHUEE's experience indicates that having a strong business model with appropriate public sector risk coverage could increase confidence among private investors on the profitability of CHUEE's energy efficiency measures. In turn, such increased confidence could contribute to leveraging further private financing and thus make the mitigation activities more financially self-sustainable. Similarly, grants available as part of the IDCOL solar home systems (SHS) intervention in Bangladesh decreased as the project progressed (e.g. the total grant available per SHS for the first 20 000 units was EUR 90, but decreased in steps to EUR 22 for subsequent units).

Indeed, previous studies have argued that the public sector can play a role in designing interventions to remove barriers to private investment in the context of private sector investment in green infrastructure (e.g. Kaminker et al. 2013; OECD/G20 2012). Such interventions include;

- Levelling the playing field between green and brown infrastructure projects (e.g. by putting a price on carbon, and eliminating inefficient support for fossil fuel production or consumption);
- Addressing unintended consequences of various policies on green investment;
- Supporting development of financial instruments,
- Vehicles and approaches that facilitate green investment; and
- Using public money in targeted cases to change the risk-return profile of green investments and thereby draw in private finance.[15]

The role of public actors looking to facilitate scaling-up and replication involves designing interventions that strike the right balance among the following functions;

- Adequately incentivising private finance, assuming appropriate risk with public money;
- Ensuring that the cost of public financing is justifiable; and

[13] A partial credit guarantee is a credit enhancement tool that involves a legal commitment that one party will cover the outstanding debt obligations of another. Partial credit guarantees and other credit enhancement mechanisms often allow the guaranteed party to access debt financing at more favorable terms.

[14] Marketing partners are companies that manufacture, sell and deliver energy efficiency products. They benefit from increased sales of their products through CHUEE.

[15] Kaminker C et al (2013) and OECD/G20 (2012) outlines policy recommendations to encourage green investments by institutional investors, such as; ensuring a stable and integrated policy environment, addressing market failures, providing a national infrastructure road map, facilitating the development of appropriate green financing vehicles infrastructure road map, reducing the transaction costs of green investment, promoting public-private dialogue on green investments, promoting market transparency and improving data on infrastructure investment

- Not crowding-out private finance or leading to market arbitrage caused by public interventions.

  Put another way, public interventions need to be designed to provide a sufficient level of support that can crowd-in sustainable private investments, whilst not distorting a market by providing finance which is greater than necessary to induce the intended investment (EBRD, 2013).

Box 1: Example: Blended climate financing with the principle of minimum concessionality

One example of the climate funds that aim to scale up climate finance with the principle of minimum concessionality is the blended finance by IFC. Blended finance refers to funds invested at concessional, or below market, rates alongside IFC's own funds to support investments in particular sectors, which would not otherwise happen. Blended funds include (e.g.) loans, equities and guarantees. IFC has worked with banks to develop sustainable energy finance portfolios in Indonesia, Mexico, Vietnam and Colombia. IFC only uses this kind of donor-funded investment when investments can lead to commercial sustainability within a certain time frame, typically within five to eight years. For more information on the mechanism of blended finance by IFC and specific examples, see IFC (2012).

In contrast, adaptation activities in developing countries are often not revenue-generating or are accompanied by high investment risks. Adaptation activities may reduce business risks faced by private entities, but risk reduction itself is not always core business interests of the private entities. Such characteristics of adaptation activities make it harder for private actors to decide to invest in scaling-up and replication of such activities. This may be one of reasons that there are few scaled up or replicated adaptation activities that involve private investment.

Indeed, the benefits of adaptation activities are often reductions in expected losses, whereas costs are the investments needed for adaptation measures (Bresch, 2014). Although businesses are accustomed to dealing with risks in many ways, it is not easy for them to identify the tangible benefits to convince private investors to mobilise further finance for scaling-up and replication of adaptation, due to the following reasons. First, defining benefits per se is not easy because climate change is uncertain and successful adaptation tends to be hard to measure, report and verify (Lamhauge et al. 2012; Pauw et al. 2011). Even if adaptation benefits could be identified and reported, the costs might remain with the investor, whereas a wider community may benefit (Abadie et al., 2012). Second, there can be a significant time lag between adaptation investments and benefits. Thus, even if such benefits are monetised and remain with investors, they may be small because of the discount rate used for cost benefit analysis. Such challenges often lead to the perception that provision of many elements of adaptation is primarily or exclusively governments' responsibility (Biagini and Miller, 2013) due to their public goods nature. Therefore, scaling-up and replication for adaptation interventions may need different approaches than for mitigation.

Nevertheless, some adaptation actions are "low-regret" or "no-regret". Such actions have relatively low costs relative to their benefits and co-benefits in either short-term or predicted future.[16] No- or low-regret adaptation interventions can be relatively easy to involve private sector financing, as some forms of adaptation activities may be sensible risk management measures for private sector enterprises. Examples include insurance and early warning systems (Ranger, 2013). Due to such characteristics, no- or low-regret adaptation can be one of priority areas for facilitating scaling-up and replication. Examples include the

[16] Martin (2012) outlines no-regret and low-regret adaptations as follows; No-regret actions are cost-effective under current climate conditions and are consistent with addressing risks of climate change, they possess no hard trade-offs with other policy objectives. Low-regret actions are relatively low cost and provide relatively large benefits under predicted future climates.

scaling-up of the rainfall index insurance by ICICI Lombard GIC and BASIX. However, it should be noted that although low- or no-regret measures are important, a focus on them might fail to anticipate and reduce future climate risks which involve greater uncertainty (ibid.). As the case of ICICI Lombard and BASIX shows, many of the low-regret measures might be initiated to deal with weather-related losses, rather than with long-term climate change. This could even cause maladaptation if people rely on their insurance rather than reduce the actual risk. However, in the case of ICICI Lombard and BASIX, the insurance offered opportunities for adaptation as it has a 'risk discovery function'. Farmers also learned about climate change and started to think of their agricultural production from a risk perspective (Hess, 2014). This could help them to take measures to reduce risks and to keep their insurance premium low.

In 2003, ICICI Lombard General Insurance Company Ltd [17] (ICICI Lombard GIC) formed a partnership with BASIX with the technical support from Commodity Risk Management Group of the World Bank (CRMG) to pilot the sale of rainfall index insurance contracts to small farmers in Andhra Pradesh, India. At present, approximately 12 m farmers have the weather index insurance in India, and replication is ongoing in, amongst others, Malawi, Kenya, Mexico, Tanzania, Uganda and Morocco, albeit with mixed success (Hess, 2014).

This weather index insurance project illustrates that it has created a new and innovative business opportunity for business risk management, and its commercial viability of the project has ensured self-sustainability and led to scaling-up of the sales of their insurance products. Withey et al. (2009) claim that traditional crop insurance products had not been commercially viable in most Indian rural settings, and thus, had rarely helped Indian farmers overcome weather risks. To tackle this barrier, ICICI Lombard GIC and BASIX started an insurance based on a weather-risk index, a pre-defined correlation between crop yields and rainfall. The design of the weather index insurance has enhanced the financial benefit for the actors involved. Despite a range of costs to design index-based weather insurance product, ICICI Lombard GIC sees a strong profitability potential for weather insurance (Manuamom, 2007).

Public support for the project, such as technical assistance by Commodity Risk Management Group of the World Bank (CRMG) and subsidies by the federal government of India, have contributed to enhancing the self-sustainability of the insurance and thus scaling-up (Hess, 2014; ICICIC Lombard GIC, 2005). CRMG contributed to an initial research to develop the crop loan insurance and risk management product, and to the gradual scaling-up by supporting promotion activities (Hess, 2003). As Pierro and Desai (2011) claim, significant investment in research and start-up phase are necessary to develop such index-based weather insurance, and international reinsurance companies may be reluctant in covering these costs. Further, the subsidies by the federal government of India for premium of the insurance have made the insurance more affordable for farmers, which accelerated the sales of the insurance since 2008. (For further information, see example 1.2. in the annex)

The aforementioned mitigation and adaptation examples suggest that it could be important to use public climate finance interventions (i.e. concessional or non-concessional) that enhance the self-sustainability of individual activities. Which type of instrument is appropriate will depend on the project context. For instance, CHUEE in China has largely employed a market based-instrument (i.e. the partial credit guarantee) to reduce the risks for commercial banks. The IDCOL SHS in Bangladesh project has benefitted from grants provided by multilateral donors for financing part of the up-front costs of installing the systems. Hence, the appropriate use of different public climate interventions could also be an important factor for increasing confidence of private sector in further investment without crowding out private finance.

[17] This is a joint venture between ICICI Bank and Lombard, Canada.

Box 2: An example of encouraging private finance in adaptation activities

There can be ways by which more private finance may support adaptation activities, and subsequently scale up or replicate those activities. For instance, Atteridge (2010) suggests that debts can be used to enable instruments for both publicly and privately-initiated adaptation activities. Those instruments can include direct project lending and credit lines to local financial institutions. It may be financially attractive for both international and domestic private financiers to provide loans for local public institutions in developing countries. For public authorities, costs of inaction for flood prevention infrastructure or disaster preparedness planning can outweigh the costs of such projects. In such cases, seeking loans from private financial institutions can be a rational way for public entities to finance those projects (Atteridge, 2010). In terms of this paper's focus, climate finance interventions that have already been scaled up or replicated and have involved public interventions to encourage private finance, the research for this paper has faced difficulty in finding examples that satisfy these criteria. However, having recognised that adaptation interventions in which international public finance is used to mobilise private climate finance are still at an early stage in evaluating, replicating or scaling up, it is worthwhile continuing discussion on the topic about possible financial instruments to encourage private financing.

4.2 Generating information through monitoring and evaluation

Different actors involved in climate finance may differ in how they would view that an intervention has been a success (see e.g. Caruso and Ellis, 2013 and Ellis et al., 2013). However, undertaking monitoring and evaluation of the effectiveness of an intervention is an important step in generating information. Monitoring and evaluation can help to enhance transparency for donors and recipients; to track mobilisation of resources and demonstrate meaningful usage of financing; and to facilitate learning processes among actors involved (Ellis et al. 2013 and Roehrer 2013).As such, monitoring and evaluation are therefore useful in identifying which interventions could benefit from being scaled up or replicated.

Monitoring and evaluation of climate interventions can generate information relevant to considerations of replicating and scaling up such interventions[18]. Indeed, in the context of development interventions, UNDP (2009) mentions that evaluating pilot initiatives is essential for scaling-up and replication since the output is a useful source of knowledge on what worked and did not work in the initiatives.[19] Thus, monitoring and evaluation are an important pre-requisite for mobilising climate finance at scale. In addition, monitoring and evaluation to produce information may also facilitate to build up political will to scale up and replicate climate finance interventions (CCXG, 2014).

Accurate and relevant project- and programme-level information is an essential input to individual providers of finance to make decisions as well as to host-countries to design development strategies. For financiers, it helps to better align risk-perceptions in markets with reality on the ground. Therefore, data on technology or financial risks as well as financial viability of programmes and projects obtained through

[18] This can include issues related to technology performance and adoption, mobilised investment, estimated GHG reductions or improvements in resilience, enhanced awareness, observed/estimated economic impact on relevant sectors, and relevant domestic policies (for more detail, see Ellis et al. (2013) and Lamhauge et al. (2012)

[19] This UNDP's insight can also be applicable to climate finance contexts. Actors in climate change community and those in development community as well as those in private sector19 tend to share certain perspectives and common ground on what they consider important as a result of climate finance. For further information, see Ellis et al., (2013)

monitoring and evaluation can help to inform both sides of the risk-return equation for those considering follow-on investments. On the host country's side, the information is also useful in order to see how a particular climate finance intervention is consistent with the aims of national or sub-national development strategies, and on whether these development strategies need to be altered in order to allow more investments in low-carbon or climate resilient interventions.

Mid-term or ex-post monitoring and evaluation, or both, can be integrated in the design of a climate finance intervention to promote scaling-up and replication. For example, the GEF Small Grant Program (SGP) in India also suggests that monitoring and evaluation are built in the on-going projects, and scaling-up is justified based on lessons learned (SGP India, n.d.). Examples in this paper (e.g. the tea sector energy efficiency and renewable energy project in India, CSP projects in Morocco, and AdapCC) show that both structured monitoring and evaluation frameworks at a fund- or national-level, and less-structured project-specific monitoring and evaluation processes can be useful for scaling-up and replication. For instance, evaluations based on the GIZ's evaluation format used in the AdapCC project informed the project stakeholders of potential for scaling-up and replication. Similarly, less structured monitoring and evaluation as well as regular monitoring to obtain information during the energy efficiency and renewable energy programme for the tea sector in India were also of important sources for the government to decide on replication.

While ex-post monitoring and evaluation can provide a wider range of information obtained throughout the whole intervention, regular as well as mid-term monitoring and evaluation can also be useful especially for generating more up-to-date information and interim results. Regular and mid-term monitoring and evaluation can help considerations for replicating projects or programmes, which may start before the initial intervention is completed. In addition, some climate finance interventions may take a long period of time, and thus timely information provision can provide useful feedback for the interventions themselves as well as valuable information for those seeking replication. For instance, KfW's experience shows that even in the case of recently launched interventions for which it is difficult to draw lessons from the ex-post evaluation, there can be opportunities to gain useful information from mid-term monitoring and evaluation (Enting, 2014). Hence, regular as well as mid-term monitoring and evaluation can inform actors interested in scaling-up or replication of what is currently functioning and what risks they should bear in mind. The examples in this paper have highlighted that few monitoring and evaluation systems are being developed specifically for scaling-up and replication, yet insights can be gained from some climate funds that have conducted monitoring and evaluation in the middle of their interventions. For instance, nearly a half of CIF projects included a mid-term or impact evaluation in the course of projects (ICF international, 2013).

Ex-post monitoring and evaluation generally encompasses more comprehensive processes to assess the effectiveness of climate finance interventions, which often involves independent assessors. The focus of climate finance effectiveness may vary among different stages of project or programme development (Ellis et al, 2013). Hence, ex-post monitoring and evaluation can provide more detailed information on how activities could be effectively implemented and functioned at different stages within a project or programme lifecycle. Further, ex-post evaluation after a few years could also track the consequence of climate interventions after their completion, and give insights into their long-term environmental impacts and financial sustainability. This could be particularly important for adaptation interventions, given that there can be a significant time lag between adaptation investments and benefits. With regard to the ex-post evaluation, projects supported by GEF and UNDP are required to undergo a "Terminal Evaluation" (TE). TE includes information on the project's replicability, scalability and lessons learned as well as recommendations for a way forward.

Some climate finance interventions point out that a lack of information has been one of major barriers to scaling up and replicating climate finance interventions. A case study on Program Solaire (Prosol) in Tunisia has been seeking to achieve transitioning households away from water heaters run on fossil fuels to solar water heaters (SWHs) (CPI, 2012a). Predecessor projects of Prosol had suffered from insufficient information on financing options and reliable technologies and thus failed to mobilise longer-term results

(CPI, 2012a). OECD (2013b) also argues that a shortage of objective information, data and skills to assess transactions and underlying risks impedes institutional investors from investing green infrastructure. A lack of information can also be a key barrier to private entities in scaling up their adaptation-related activities (PwC, 2014). In addition to a lack of information, there are a number of challenges in evaluating climate finance effectiveness in light of scaling-up and replication. For example, in the context of development studies, Duflo (2004) suggests that difference between pilot and regular projects, costs, reluctance, technical capacity, and uncertainty could be barriers to evaluating the effectiveness of pilot programmes and projects to achieve scaling-up.

How to make full use of monitoring and evaluation for scaling up and replicating climate finance interventions is still unclear. For instance, given that low-carbon and climate-resilient investment is highly case-specific, especially for adaptation projects, it is often difficult to establish standard procedures for monitoring and evaluation to measure the benefits from those projects (Pauw, 2014). This issue may affect the ease with which private sector investors learn and interpret key lessons from preceding activities and make investment decisions for scaling-up and replication. In addition, different monitoring and evaluation systems between donor agencies and implementing institutions often exist, and can result in delays in facilitating scaling up climate finance interventions (Amoah, 2014).

The energy efficiency (EE) and renewable energy (RE) intervention in the tea industry in some parts of Kerala, India, highlights ways in which information from the ex-post and mid-term monitoring and evaluation can be important inputs to the national-level decision-making processes. This intervention, which includes project participants from the Government of India, UNDP and GEF, used information from monitoring and evaluation of the pilot project for decisions by the Indian government on replicating the project in the Indian state of Assam. This intervention was designed and implemented to reduce GHG emissions and energy consumption for tea manufacturers in Kerala state during the period between 2008 and 2012. The information obtained had led to explicit knowledge-sharing tools such as the evaluation report and a variety of useful tutorials and the web-based knowledge-sharing platform (i.e. EnConTea). These tools have informed policy makers and energy end-users of the cost-efficiency and GHG reduction potential of the technologies employed. Since the government has decided to replicate the project under the National Development Plan, this example also illustrates that experiences at a project level have been shared at a national level, and used for planning replication elsewhere in the country. (For further information see example 2.1. in the annex).

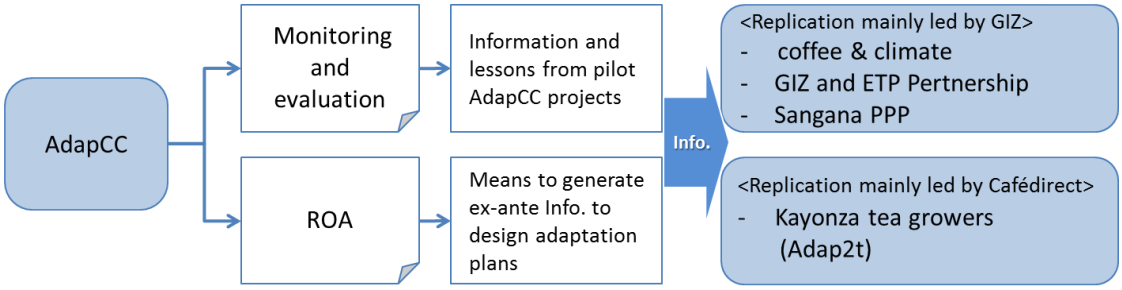
In Morocco, information gathered from monitoring and evaluation of the Integrated Solar Combined Cycle (ISCC) plant project in Ain Beni Mathar provided valuable information for decision-making process on subsequent scaling-up as Noor I Concentrated Solar Power (CSP) project in Ouarzazate. These CSP projects highlight how lessons obtained through mid-term or ex-post monitoring and evaluation of a pilot project could be useful for relevant actors in replication/scaling-up. Documents relating to monitoring and evaluation of the CSP programmes (e.g. World Bank 2011; World Bank 2013) suggest that the information from the ISCC in Ain Beni Mathar has been an important factor for deciding to launch similar CSP projects in Ouarzazate. For instance, the World Bank (2011) stressed in its project appraisal on Noor I that lessons learned about CSP during the project preparation and construction of the IISC plant have increased the confidence of a relevant government agency on the technology and led to launching the Moroccan Solar Plan and Noor I project in 2009. Moreover, a number of site visits took place to share knowledge with other national and international professionals (World Bank, 2013). (For further information, see example 2.2. in the annex)

In terms of adaptation, the Risk and Opportunity Analysis (ROA) as well as the final project evaluation and the final report of the AdapCC initiative[20] show how information useful for scaling-up and replication

[20] A British Fairtrade company for hot beverages, Cafédirect, and the German Gesellschaft für Technische Zusammenarbeit (GTZ) formed a PPP to implement the pilot initiative called the Adaptation for Smallholders to Climate Change (AdapCC) pilot initiative in Latin American and South African countries from 2004 to 2007.

of adaptation interventions could be generated. The ROA is a transferable tool that GTZ[21] and Cafédirect have used during and after the AdapCC to generate information necessary to design adaptation plans and measures. The ROA was also used and further developed for replication, for example by a project called Adap2t (in Uganda and Kenya), and a partnership called "coffee & climate" (Brazil, Tanzania, Guatemala, Honduras, El Salvador and Vietnam). The final report of AdapCC based on GTZ's evaluation formats contributed to the replication through the Adap2t, the projects by coffee & climate, the partnership between ETP and GIZ (Kenya), and the Sangana Public-Private Partnership (PPP) (Linne, 2014) (see Figure 4).

Figure 4. Procedure to replicate the AdapCC projects



The final report explicitly proposed options on how to scale up the pilot initiatives under AdapCC. One example is a concept called 'multiplying institutions' which is formed in the small-scale coffee and tea sector both within the Cafédirect producer partner network and within the wider coffee and tea sector in particular in Latin America and East Africa[22]. This concept explores how the potential project developers and other relevant actors could scale up and replicate the initiatives at different levels. Indeed, GIZ has replicated adaptation projects through further developing partnerships in the tea and coffee sector such as Sangana PPP, ETP partnership and various producer organisation affiliated to Cafédirect (Linne, 2014). (For further information, see example 2.3. in the annex)

4.3 Disseminating information

In many cases, information generated by monitoring and evaluating the effectiveness of interventions needs to be disseminated to actors seeking scaling-up or replication so that it fits specific needs of and circumstances surrounding the actors (Kok et al. 2008; Burton and van Aalst 2004; UNDP 2009; SBI & UNEP 2011). Indeed, discussion at the CCXG Global Forum in March 2014 also confirmed that replication is not just copying, and thus needs to be modified to local contexts (CCXG, 2014). In other words, information generated through monitoring and evaluation may not fit different contexts as it stands. Following the information dissemination process, the design of the interventions may need to be tailored or altered as necessary.

Given the greater degree of geographical and socio-economic difference, this may be particularly important for replication activities, whilst it is also meaningful for scaling-up. The International Institute for Sustainable Development (IISD) claims that "success factors for an initiative will be grounded in the local context" (IISD, 2010). McDonald et al. (2006) also mention that there needs to be significant modification for producing "identical results" when contexts vary between pilot and scaled-up interventions. Indeed, the importance of providing lessons learned is recognised by a number of climate funds. For example, the CIF have various products including Knowledge Management Program and CIF

[21] GTZ is now called GIZ.

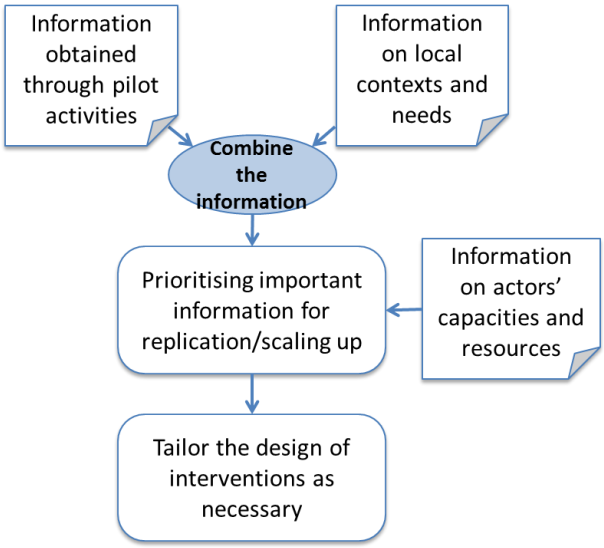
[22] Some potential partners were already identified, e.g. through GIZ's co-operation in the Sangana PPP.

communication strategy that are used to capture, develop and disseminate lessons (ICF international, 2013).

The extent to which disseminating information promotes or leads to scaling-up and replication can hinge on understanding a wide range of different interests and circumstances between pilot and replicated/scaled-up activities. Examples of the differences include geographical characteristics, and different interests, needs and capabilities of local stakeholders. Policies, regulations, and institutions as well as political preference can vary from one country to another. In terms of local markets, market structures and financial instruments available can also be different between preceding and subsequent programmes or projects.

Different types of actors or communities may also have different priorities on the type of information that they need for further mobilisation of climate finance. (Ellis et al., 2013). Following the further understanding of those differences above, actors seeking scaling-up and replication (e.g. private investors, project developers and local governments) may need to prioritise particular lessons from pilot activities. In doing so, such actors also need to take into account their capacities and resources (e.g. financial and human resources, accumulated know-how and internal or external networks). (see figure 5)

Figure 5. The role of information dissemination in scaling-up and replication



There may be barriers to disseminating information from pilot to subsequent activities, and the barriers may differ between replication and scaling-up activities. Replication attempts may face difficulties in utilising the lessons due to the differences induced by working in different geographical contexts, including political, economic and climatic differences. On the other hand, larger scale activities may require more complex financing instruments, or see greater uncertainty caused by longer construction periods and different technological specifications, as well as a larger amount of resources.

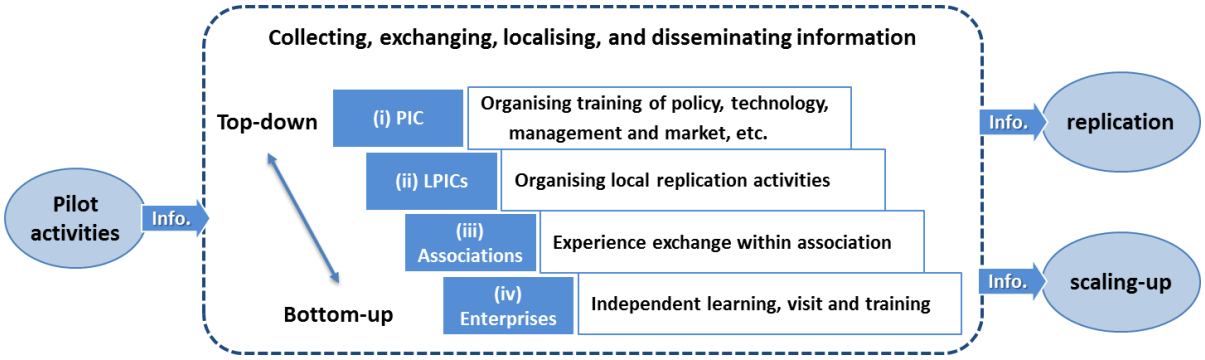
For both mitigation and adaptation, private entities may not want to disseminate some information as they may find it closely related to their competitiveness. Both scaling-up and replication activities may need to obtain and analyse the information related to those barriers and find out how lessons from pilot activities can be better tailored to subsequent activities.

The examples in this paper suggest that useful tools, networks and relevant institutions can help to lower those barriers and disseminate the useful information efficiently for scaling-up and replication. In terms of the tools, the aforementioned Risk and Opportunity Analysis (ROA), developed through AdapCC, carries out seven steps including selection and evaluation of basic data and adaptation of the result to local contexts (AdapCC, 2010). Opportunities to exchange information among different actors (e.g. workshops,

networks, and site-visits) that took place in the middle or at the end of projects or programmes can also useful for efficient scale-up and replication (e.g. the weather index insurance project by ICICI Lombard GIC and BASIX).

The energy efficiency (EE) programme for Township and Village Enterprises (TVEs) in China[23] created and used multiple networks at different levels to disseminate information. The TVE project set up different levels of activities that played catalytic roles in demonstrating information on EE measures and replicating them. These activities have been conducted at; (i) Policy Implementation Committees (PIC), (ii) Local Policy Implementation Committees (LPICs), (iii) industry associations, and (iv) enterprises. Whilst PIC was meant to deal with demonstration activities in a relatively top-down manner, the activities at the enterprise level have been done in a bottom-up approach. (see figure 6) Through those networks at different levels, information on demonstrated EE technologies have been shared and disseminated between pilot TVEs and those who sought replication (Han and Tao, 2009). A number of site visits to pilot TVEs aimed at disseminating lessons learned also took place and as such they were "a prime driver of a large number of independent self-replication" (UNDP and UNIDO, 2007). Assuming that the participants in the site visits had their own unique local contexts and technological backgrounds, the site visit was one of opportunities for the participants to absorb the know-how, bearing the difference with pilot projects in mind and exchanged different views on techniques and operations. LPICs have also been assessed as an effective measure to directly disseminate the demonstrated technologies to the local replicators (ibid.). (For further information, see example 3.1. in the annex)

Figure 6. Dissemination of information through networks at various levels



Source: Based on Han and Tang (2009)

As discussed above, learning from front-runners, or successful pilot projects or programmes, can help to further develop climate finance interventions. However, scaling-up of such interventions may need to take a "step-by-step" approach. For instance, a pilot project which has generated and disseminated useful information may face different kinds of barriers as the project moves onto the next stage. Therefore, it is worth noting the importance of developing and using different financial and policy instruments for different stages of technology dissemination.

[23] The programme was implemented by UNDP and UNIDO with the financial support from GEF. Initially, 8 pilot projects were invested. Once those environmental actions were seen to have positive competitive benefits, private sector began to replicate the energy efficiency activities. More than100 formal replication projects were achieved. In addition, it is also observed that

5. Policies to enhance enabling environments

In addition to well-designed institutional structures of climate funds and demonstration effects, favourable, stable and long-term policy support to enhance enabling environments within countries or regions can also facilitate scaling-up and replication. Such policies can be the basis of countries to access, absorb and channel climate finance. Private investors tend to be reluctant to invest in climate change activities in areas where investors cannot find sufficient institutional or regulatory frameworks. Hence, private entities are prone to invest more in their home countries where the entities are more familiar with the circumstances related to their investment activities (CPI, 2013).

Public interventions could also better help to mobilise further climate finance, if they are used in conjunction with, and reinforce, other environmental policy instruments, such as regulations and economic instruments (Hemraj, 2014). In addition, the larger a mitigation and/or adaptation activity becomes, the more complex and wider range of interventions, including financing instruments, the activity may need. Shifting from project-based to programmatic approaches may help to implement interventions at scale (ibid). Hence, better co-ordination among mitigation or adaptation projects, programmes and policies to enhance enabling environments can further promote scaling up and replicating climate finance interventions. Moreover, inter-governmental collaboration between (e.g.) the ministries of finance, environment and sector departments is also needed on the financing aspects, given the cross cutting nature of climate change impacts across different sectors (ibid).

To facilitate scale-up and replication, enabling environments need to be enhanced to facilitate communication between governments and private sector actors; to properly share financial risks between the private and public sector; and to reduce overall risks and costs related to development and implementation of project/programme (CCXG, 2014; JICA, 2014). This section outlines how policies to enhance enabling environments can increase the private sector's confidence over subsequent scaled-up investment, and then discuss capacity development at various levels needed to facilitate scaling-up and replication. In fact, an evaluation of GEF interventions points out that it may be difficult to identify a clear link between enabling activities (e.g. establishing a map for a country's wind or geothermal resources) and subsequent climate finance interventions (e.g. developing such resources) (GEF, 2013). Nonetheless, it is still worth looking into what kinds of such policies exist behind the scaled up or replicated activities studied in this paper.

5.1 Enabling environments to increase the confidence of private investors

Given that scaling-up and replication often take a long period of time, long-term and predictable policies could effectively increase investors' confidence over the lifespan of their investment plans. As an incentive for investments, the public sector can and needs to (i) set stable, predictable, and coherent policy goals, and (ii) design, implement, and align policy instruments to achieve the goals by enhancing enabling environments (Corfee-Morlot et al., 2012). For instance, governments can increase the predictability and stability of low-carbon and climate-resilient economic development trajectories by establishing roadmaps for developing and disseminating key technologies and services.

In terms of policy instruments, the public sector can level the playing field for private-sector investments in low-carbon and climate-resilient development in several ways. For instance, public policies to change incentives on both supply- and demand-sides of climate friendly technologies and systems can increase the financial attractiveness of mitigation and adaptation activities (e.g. removing subsidies for fossil fuels, and subsidising incremental up-front costs to install EE or RE equipment or premium of weather index insurance). Reforming regulatory frameworks can also improve "the ease of doing business" (Corfee-Morlot et al, 2012), and encourage new entry to the markets, which can also spur scaling-up and replication (e.g. improving access of renewable power plants to national or regional grid).

Bridging information gap, raising awareness of businesses and consumers, and developing capacities of relevant actors are also roles of public policy instruments to pave a way for further scaling-up and replication. Indeed, a number of studies on enabling environments for climate finance have been done and underline the roles of public sector in enhancing enabling environments to mobilise private climate finance in mitigation (e.g. Kaminker et al. 2013; OECD 2013a; Corfee-Morlot et al. 2012) and adaptation (Agrawara 2012: Pauw & Pegels 2013; Ranger 2013). This paper considers the roles of policy instruments to be a key to facilitating scaling-up and replication as well.

Previous studies stress the functions of investment policies such as; investment promotion and facilitation, competition policies, financial markets as well as appropriate financial vehicles (e.g. OECD 2013a). A lack of, or insufficient access to climate finance products is also one of the barriers to scaling-up and replication of climate finance interventions. This issue can be relevant to both providers of finance and borrowers or investees. In order to improve the access to finance, existing case studies suggest that there can be two major approaches. One is to create opportunities or set up mechanisms by which the providers of finance and borrowers or investees can meet and further interact with each other (e.g. The Private Financing Advisory Network by the Climate Technology Initiative, or CTI PFAN). The other is to develop capacities of related actors(e.g. commercial banks and project developers). For instance, financial institutions can benefit from training for assessing the risk and return profiles of mitigation and adaptation activities, while capacity building for skills in designing and presenting projects can increase the project developers' possibility to access climate financing (e.g. The EE project for TVE in China and CHUEE by IFC; and CTI PFAN).

Japan International Co-operation Agency (JICA)'s support for Indonesian government has covered a wide range of policies for enabling environments for geothermal energy development. They range from supporting to design a national level strategy (e.g. a national roadmap for geothermal development) to proposing individual instruments that would reduce risks and costs (e.g. exploratory drilling and off-taker risk guarantee) or increase revenues and predictability (e.g. obligatory power purchase agreement). These interventions have in turn become policy input to Indonesia's national efforts to develop policy frameworks such as Fast Track Program 2[24], the ceiling price of electricity from geothermal plants and the Geothermal Fund Mechanism (JICA, 2014). These policies are aimed to help private companies to scale up their investment in geothermal power plants by decreasing risks associated with identifying suitable sites and increasing their confidence over the long-term revenues[25]. Public funds for geothermal exploration could help to finance geothermal exploration activities and enhancing feasibility and bankability of geothermal projects by the reliable exploration data (Ampri, 2013). This is because exploratory drilling has been one of the highest risks to promoting geothermal energy (JICA, 2012) and private investment could be further encouraged if such risks are properly shared between private and public entities. The proposal has been realised as the Indonesian government-led Geothermal Fund which is being developed as of March 2014.

The debate on how to create enabling environments for private sector engagement in adaptation activities is still at an early stage, yet many of the abovementioned general roles of public sector can also be applied to adaptation interventions. In particular, assuming that replicable and scalable private-public adaptation actions tend to be autonomous adaptation, major roles of public sector can be to reform regulatory frameworks that may inhibit adaptation and lead to maladaptation (Ranger, 2013). At the same time, policies can stimulate adaptation, for example through the application of building codes and land-use regulations for real estate (Bouwer and Aerts, 2006) and also through more general regulations such as

[24] By Fast Track Program 2, the governmental of Indonesia officially allocated 33 geothermal projects to IPPs and 11 projects to PLN. (PwC, 2011)

[25] For Independent Power Producer (IPP) business, Sumitomo Co. has signed power purchase agreements for Muara rabu (110MW ×2 plants) and Rajabasa (110MW ×2 plants, Marubeni co. has done so for Rantau Dadap (242MW), and Itochu and Kyushu have done for Sarulla (300 MW) as of January 2013.

water temperature limits, water quality standards, price ceilings and security regulations (Agrawala et al., 2011).

The public sector can also encourage scaling-up and replication of private sector adaptation interventions by addressing the information gap. Public sector institutions do not necessarily need to produce this scientific information themselves, but can act as intermediaries to facilitate information exchange between scientific and business communities and to make information more understandable and accessible for non-technical end users (Corfee-Morlot et al., 2011). Additionally, the public sector can assist the private sector's decision-making by providing risk-management guidance and tools.

GIZ has examined existing studies on the roles of public and private actors in mobilising further adaptation finance which include possible public roles in engaging more private finance. Table 2 summarises its work and illustrates possible work to facilitate more autonomous adaptation.

Table 2. Possible roles of public actors in facilitating private adaptation finance

Sectors	Possible roles of public actors
Agriculture	• Providing and investing in reliable research linking climate change to the productivity levels of specific plants, modelling changes and translating them to the business community • Leveraging local knowledge in autonomous adaptation – by creating links between private sector, local populations and local research centres • Supporting research and development into new weather-resistant crops
Finance (including insurance)	• Highlighting the importance of adaptation from a social and environmental perspective in order to attract responsible capital from investors • Subsidising agriculture insurance (in early stages of project development/until economies of scale lead to self-sufficiency/sustainable profitability) • Making educational efforts to spread insurance and financial literacy among local populations • Developing new research methods (modelling etc)
Information Communication Technology (ICT)	• Co-ordinating the existing actors to use available information and put in new formats, increasing accessibility • Working with service providers, banks, NGOs to provide favourable policies • Providing of basic ICT infrastructure where needed
Water	• Providing basic decentralised infrastructure • Subsidising sustainable decentralised technologies (e.g. Water and Energy solutions) • Developing capacities

Source: Based on GIZ (2013)

5.2 Capacity development

Capacity development is essential for various aspects of mobilising climate finance and can also play an important role in replicating and scaling up climate finance interventions as illustrated in the following section. To facilitate scaling-up and replication, efforts for capacity development are needed at various levels. The examples studied in this paper illustrate that capacities of public agencies at a national level, domestic financial institutions, and local project proponents are particularly important.

The capacity of national institutions and their staff to identify, prioritise, design and manage climate finance interventions strongly influences a country's potential to implement, replicate, and scale up pilot projects. Scaling-up and replication therefore builds on capacity building initiatives as an earlier step. An evaluation of GEF interventions highlighted that causal links between a project and its replication were strongest to capacity building activities, particularly when this led to countries adopting national policies or standards in specific areas (GEF, 2013).

Domestic financial institutions in developing countries also need capacity development to better understand investment opportunities in scaling-up and replication of climate finance activities. For both mitigation and adaptation, insufficient capacity of private and public financial institutions is perceived as a major constraint on engaging private sector (IFC, 2010). In particular, public interventions are expected to facilitate capacity development for private financial institutions and fund managers to enhance further private climate finance. Capacities needed include, for instance, methodologies to evaluate climate related programmes and projects, better understanding of designing climate friendly financing instruments, know-how on financing transaction, awareness of accessing public financial sources, and knowledge in specific technologies (e.g. renewable energies and energy efficiency) and industrial sectors. In some low income countries, even development of domestic financial sector itself is quite limited, thus enabling conditions for attracting private investment are weak (ODI, 2012).

Some replicated or scaled up interventions have provided capacity building for local financial institutions. For instance, approximately half of the renewable energy (RE) and energy efficiency (EE) programmes supported by the Climate Technology Fund (CTF) have provided local financial institutions with capacity building on investment assessment on RE and EE plans. Other capacity building activities by CTF include; know-how on targeted financial support, training for bank staff, investment screening tools, and transaction-level support (ICF international, 2013). In China, the aforementioned EE project for Township and Village Enterprises (TVEs) has also established a fund called the Revolving Capital Fund (RCF) to enhance access to climate finance for TVEs. Through operating RCF, the project has provided local banks and TVEs with trainings to utilise non-GEF funding sources. The trainings were available for both pilot and replication projects and considered to be effective in accessing other financial sources than the GEF (UNDP and UNIDO, 2007).

Interventions to enhance project proponents' capacity in designing and presenting bankable projects or programmes can also play an important role in facilitating scaling-up and replication. To attract private finance, project developers need to prepare project proposals and communicate the financial attractiveness to potential international and domestic financiers. A lack of the capacity to present financial viability of projects or programmes can often prevent the developers from accessing suitable climate finance. CTI PFAN mentions that climate finance is not necessarily being constrained by a lack of projects or a lack of funding per se, but by a lack of capability to bridge the gap between investors and project proponents (CTI PFAN, 2013). CTI PFAN, therefore, provides coaching and mentoring for project developers, training for financial institutions, and policy dialogues for governments for scaling-up climate finance. In particular, CTI PFAN strengthens the capacity of the project developers in presenting their projects in a way that investors and financiers can readily understand and find the projects financially attractive. Similarly, the Pilot Program for Climate Resilience (PPCR) in Nepal also stresses the importance of knowledge and capacity development specifically on finance for farmers who suffered from inadequate access to suitable financing. (CPI, 2013b)

6. Initial insights

Public financial resources are scarce, but needs for climate finance are high. Thus, scaling-up and replication of successful climate finance interventions can be an efficient way to increase deployment of technologies and systems that can contribute to low-carbon and climate-resilient development. Mobilising public and private finance sources to scale up and replicate climate finance interventions in developing

countries can also help developed countries to progress towards the USD 100 bn per year by 2020 commitment formalised at COP 16 in Cancun. This paper focuses on the issue of scaling-up and replication in the context of the USD 100 bn per year by 2020 climate finance commitment to developing countries.

Under the ongoing UNFCCC negotiations, the private sector is one of the sources of climate finance and is likely to play an important role in contributing to the mobilisation of the USD 100 bn per year by 2020 commitment. However, private investors tend to avoid investing in new or unfamiliar mitigation and adaptation activities whose risks and returns they cannot confidently estimate or address. Therefore, facilitating scale-up and replication of demonstrated activities can lower the barriers to mobilising private investments, and could highlight the efficient trajectories towards the mobilisation of increased private financing for climate-resilient and low-carbon activities. On the other hand, public support (especially grants and concessional finance) is still needed for unproven technologies. Based on the research on already scaled-up or replicated climate finance interventions, the paper identified four key lessons.

It will be difficult to balance mitigation and adaptation finance mobilised by developed countries, at least in the short-term

Considerable and growing experience with public-private climate finance initiatives to date has focused on mitigation activities in developing countries. This translates into significantly more experience in replicating and scaling up mitigation interventions than adaptation interventions. Many mitigation interventions have proven to be revenue-generating, and thus have attractive risk-return profiles for private investors. Research for and case studies examined in this paper highlight that some private sector actors have a significant interest in participating in mitigation interventions in developing countries. This is particularly true for renewable energy and energy efficiency (e.g. the CHUEE energy efficiency programme, Chinese TVE programme, and the Tea sector energy efficiency and renewable energy programme in India).

In contrast, very few adaptation interventions that involve both public and private climate finance have been scaled up or replicated in developing countries (e.g. the climate risk management in agriculture sector in Africa and Latin America). This may also be partly because many adaptation interventions are relatively new, and so there have to date been limited possibilities to evaluate, replicate or scale them up. There is therefore more limited evidence on which to draw lessons from adaptation interventions than mitigation ones. Available examples suggest that adaptation interventions can be financially attractive in some sectors (e.g. agriculture, food industry and insurance) because they reduce future business risks or because new markets opportunities can be explored. Yet the current focus of many adaptation interventions which have used public monies to mobilise private climate finance seems to be on reducing losses from current weather types and resource uses, with adaptation being a side benefit rather than the main reason to invest. Thus, while a substantial share of public climate finance is directed towards adaptation, available information indicates that only a very small share of climate-related private finance targets adaptation interventions.

One promising route for replicating and scaling up adaptation climate finance could be in pursuing interventions which contain both mitigation and adaptation elements. Indeed, one of the few replicated "adaptation" programmes to date (the adaptation project in Peru under AdapCC) is actually a multi-focal project which generates revenues from carbon market credits for mitigation activities (in this case, reforestation), and use this revenue to partly finance adaptation. On the other hand, such multi-focal interventions are likely to be limited to a few sectors, related to (e.g.) agriculture insurance or the production of cash crops. Moreover, care should also be taken that the low or volatile prices on carbon credits may influence the financial sustainability of such multifocal projects financed (partly) by the revenue from the carbon credits, which may hinder provision of private finance.

Multiple instruments and multiple actors are needed to address multiple barriers

There can be several barriers to increased uptake of low-carbon and climate-resilient technologies and systems. These barriers include high up-front or operational costs (such as capital costs and transaction costs), lack of information and awareness by key stakeholders, technological or other risks, difficulty in accessing climate finance, and lack of integration of an individual intervention in the wider country context.

Interventions are therefore most likely to be successful if they identify and address all key barriers. Indeed, using multiple instruments, involving multiple stakeholders, and targeting multiple barriers to increased deployment of climate-friendly goods and services are often common characteristics of climate finance interventions that have been scaled up or replicated. For example, the case studies examined in this report have combined climate finance with (less direct) interventions such as information exchange and capacity development (e.g.Tea sector EE and RE in India, and AdapCC); technical assistance (CHUEE and the geothermal energy development support by JICA); building and enhancing networks between different actors at different levels (e.g. IDCOL, Chinese TVEs' EE, and AdapCC).

Bridging the information gap for scaling-up and replication

Information plays an important role in demonstrating what has worked and what has not in the preceding interventions. As such, information generation and dissemination are essential not only to determine whether to scale up or replicate the interventions, but also how to efficiently scale up or replicate processes. This paper identifies three types of required information. The first is information on the project itself and its environmental performance. The second type of information is information on the financial structure of the intervention, the different instruments used to overcome economic and financial barriers, and the self-sustainability of the intervention. The third type of information needed is on the broader context where the intervention is situated – as this can influence what types of changes are needed in order to ensure that a successful intervention is successfully scaled up or replicated in different areas and/or scales.

Given the complexity of climate finance interventions, information exchange between different actors involved in a given intervention is critical. For example, experience at the fund-level has indicated that it is beneficial to involve both technical and financial experts in decisions on what to fund. Experience at the project- and programme-levels has also indicated that information exchange between project participants improves co-ordination of the intervention, and can also help to feed back into policy lessons or recommendations for the government of the recipient country.

How information on the effective project or programme is disseminated is also important. Thus, different methods and institutions for information exchange are needed for interventions that target rural households than for interventions that target large-scale industry. For example, the site-visits in Chinese TVEs programme, whereby information was exchanged, were "a prime driver" of replication. Moreover, the weather index insurance by ICICI Lombard and BASIX case would not have been so successfully scaled up, if BASIX had not had thousands of employees in hundreds of local offices in several states in India.

Monitoring and evaluation of implementation and impact of climate finance interventions can be a powerful tool to generate useful information for project performance and also for scaling-up and replication – although identifying the wider and longer-term impacts can be far from straightforward. Therefore, building monitoring and evaluation into the design of a climate finance intervention can promote the scaling-up and replication. Further, several sources of climate finance have specifically included a communications component in order to disseminate lessons learned. This is particularly true for sources of climate finance that involve MDBs (whose shareholders are interested in wide dissemination of lessons learned to possible future project proponents and financiers).

However, identifying the longer-term impacts (for example, the strengthening or development of a national mitigation or adaptation policy) of a specific intervention is far from straightforward. As outlined in

previous analyses (Ellis et al., 2013; Lamhauge et al., 2012), this is particularly true for adaptation interventions. Outputs (e.g. the number of farmers trained in the AdapCC project) and outcomes (e.g. the number of the weather index insurance policies purchased in India) can be measured, but the overall contribution to adaptation is hard to measure and changes over time. Indeed, the case studies on adaptation have used very different monitoring and evaluation systems in which the contribution to adaptation was hardly assessed.

Given varying contexts in which interventions are implemented, the design of the intervention may need to be tailored or altered before they are scaled up or replicated. Information generated through monitoring and evaluation of the initial intervention needs to be disseminated and combined with the information specific to the actors and the areas involved in replication and scaling-up. Communication between actors during a project can help to disseminate the information so that it fits the specific needs of subsequent interventions. Given the public-good nature of information, public interventions are often needed to bridge the information gap in order to incentivise scaling-up and replication. The public sector can thus play an important role in developing frameworks, tools and networks to collect, present, and disseminate information to draw on lessons from pilot interventions. Indeed, the climate funds housed at MDBs and the GEF provide a wealth of publicly-available information on the performance of the interventions they finance (both at the level of the intervention, as well as on its wider environmental impact).

Institutional structures and enabling environments have a significant impact on replication and scaling up

Institutional structures can influence the ease with which climate finance can be mobilised, scaled up and replicated. If a particular source of climate finance focuses solely on capacity building activities, any replication or scale-up of the activity could only occur after a time lag (and the link to the initial source of climate finance may not be clear). Alternatively, if the source of climate finance aims at mobilising private sector involvement, interventions will be designed with this aspect specifically in mind. Some climate funds (e.g. CTF) specifically aim to invest in interventions which are likely to be replicable or scalable. The others (e.g. PPCR) focus their effort on a specific set of countries. This may limit scaling-up and replication beyond those countries' borders, unless other funds take lessons from the pilot projects and replicate the projects in other areas. In terms of steps involved in decision-making by financiers, there can be trade-offs between information generation and accruing transaction costs. Whilst a large number of steps in the allocation process of a fund can provide useful checks and balances, it may also increase the time taken to reach funding decisions.

Delays in disbursement of committed funding will thus have a knock-on effect in possible scaling-up and replication of such interventions. Recent initiatives (e.g. ICCF) aim to reduce project implementation delays, which can commonly reach 2 to 3 years for climate funds housed in multi-lateral development banks. Streamlined climate finance approval and disbursement procedures are also essential for the GCF if it is to successfully and efficiently channel large volumes of climate finance, and to undertake adequate intervention-level monitoring and evaluation. This may call for a focus on programme-level interventions (for any direct interventions) as well as on providing direct access to the climate finance it channels.

Indeed, the means of delivering climate finance can affect the ease of scaling-up and replication in different ways. If an individual organisation operates in multiple jurisdictions, it can facilitate replicating such activities in different countries. This was the case for the China CHUEE intervention (supported by i.e. GEF/IFC), where the IFC subsequently launched a similar programme in the Philippines with the support from GEF and CIF. It was also the case for the Cafédirect intervention and GTZ/GIZ which replicated their initial initiative in Uganda, Kenya and other countries, and the ICICI/BASIX insurance programme that rapidly spread over different states within India.

The way of accessing international climate funds can influence scale-up and replication of successful interventions. For instance, "direct access" to international climate finance devolves responsibility for the design, management, implementation and evaluation of interventions to the recipient country. "Enhanced

direct access", which is being considered by the GCF, devolves funding decisions and fund management to the recipient country. Both can streamline decision making processes for financing, and tailor interventions to local contexts, and can therefore lead to enhanced replication of climate finance interventions in some countries. Yet scaling-up and replication of such interventions in other countries might be challenging. Both direct access and enhanced direct access can facilitate timely access to funds, if national institutions meet specified safeguards in place. However, institutional requirement may be a barrier to the participation of some countries. For example, as illustrated by experience in the Adaptation Fund, only a few of the approved "National Implementation Entities" have so far been established in LDCs.

Enhancing enabling environments and capacity development as well as better co-ordination of related policies are also an essential basis for scaling-up and replication. Previous studies on mobilising private climate finance have underscored the importance of enabling environments and capacity development, and the lessons from those studies are also informative for scaling-up and replication contexts. To mobilise more private finance for scaling-up and replication, public finance also needs to be effectively used to build the in-country foundation such as suitable regulatory frameworks, technical capacity, personnel, national and local institutional arrangements, risk mitigation mechanisms. Further, such policies to enhance enabling environments and capacity development need to be properly aligned, and programme and projects need to be situated in those policies. Indeed, the importance of domestic regulatory frameworks and policy instruments, as well as absorptive capacities, is not limited to the climate finance, but also relevant to a wider context of economic development and investment in developing countries.

Way forward

There are a wide range of interventions that can increase mitigation and/or adaptation efforts and impacts in developing countries. Such interventions are of different sizes, involve different actors, and generate economic or environmental benefits to different degrees and on different time-scales. Clearly, there is no "one size fits all" intervention which can be scaled up or replicated in every sector, every country, or every situation. Scaling-up and replication activities will need to adjust intervention types, financing structures and stakeholder involvement to take different project/programme contexts into account.

Scaling up and replicating climate finance interventions to date have focused on only a few types of activities – mainly in the mitigation area, particularly renewable energy and energy efficiency. Scaling up and replicating current interventions are likely to increase this focus on mitigation interventions. Achieving a balance between total mitigation and adaptation climate finance will therefore be difficult - particularly in the short term. Similarly, most of the case studies explored in this paper focus on interventions outside LDCs and SIDS. Such geographical unbalance suggests that private sector is less interested to invest in LDCs and SIDS, since those countries are less likely to have stable and sufficient enabling environments and absorptive capacities to attract private climate finance. Experience from the CDM has also shown that private sector climate finance is neither driven by considerations of geographical or sectoral balance, nor by principles such as equity and fairness. It is therefore not clear if scaling-up and replication of climate finance interventions will meet the provisions for longer-term climate finance committed at COP 16. These provisions outline that climate finance will take into account "the urgent and immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change".

The GCF Board has decided to have windows for adaptation and mitigation, that there will be "balance" in funding between them, and that adaptation finance will be allocated based on the urgent and immediate needs of vulnerable countries. This could ensure that adaptation climate finance, particularly for SIDS and LDCs (eg. African States), accounts for a significant proportion of the USD 100 bn per year climate finance commitment. However, based on current knowledge and experience on private sector participation in adaptation finance, generating sufficient private sector interest in such activities and locations will be difficult. Thus, approaches to scaling-up and replication of mitigation interventions may be different from those needed for adaptation interventions.

Annex: Examples of projects and programmes which have been scaled up or replicated

The annex outlines key mitigation and adaptation projects or programmes that the paper has examined. These examples particularly correspond to section 4 and 5 where lessons are mainly drawn from projects or programmes that have been scaled up or replicated. The description of each example starts with an overview of the activity, followed by actors involved and the outline of replication/scaling-up. It then explores lessons learned from the example for scaling-up and replication. Section 3 does include some programme or project level examples, yet it mainly draws on lessons from various sources of climate finance (e.g. international climate funds) which have been referred in the main texts of the section.

1. Designing and implementing interventions for financially sustainable sustainability (Section 4.1)

Example 1.1. IFC CHUEE in China (scaling-up) and SEF in Philippines (replication) by IFC (mitigation)

Overview of mitigation activities

The International Finance Corporation (IFC)'s China Utility-Based Energy Efficiency Finance Program (CHUEE) illustrates the role that the design of sustainable financial models can play in scaling-up energy efficiency (EE) programmes and mobilising private finance. Since 2006, CHUEE has combined a partial credit guarantee[26] programme for participating Chinese commercial banks with technical assistance and knowledge sharing to finance EE projects in China (IEG, 2010). IFC has provided the former for the local banks to share and reduce some of their financial risks through guarantees for loans for energy efficiency (EE) and renewable energy projects (RE), which is called the risk sharing facility. The latter is training to assist the local banks in assessing the risks and opportunities of such EE and RE projects, and to support their marketing partners.

Actors involved

IFC (provider of the risk guarantee facility), The Global Environment Facility (GEF) (first loss guarantee provider), Finland (technical assistance), Norway (technical assistance), local financial institutions (e.g. Bank of Beijing, Bank of Shanghai, Shanghai Pudong Development Bank, Bank of Jiang Su, and Bank of Nanjing), EE equipment suppliers, energy management service providers and client companies that received loan from the local banks.

Outline of scaling-up and replication

CHUEE I was scaled up to CHUEE II, and subsequently to the latest phase called CHUEE SME. The total funding has increased from USD 60.6 m (CHUEE I) to USD 180.5 (CHUEE II) with the decreased share of the GEF's grant. Through CHUEE SME, $558 m is dedicated to the risk sharing facility specifically for Small and Medium sized enterprises (SMEs).

In addition to scaling up CHUEE within China, IFC looked to replicate this programme in other countries. Drawing on expertise gained from CHUEE, IFC launched the Sustainable Energy Finance (SEF) programme in the Philippines (IEA, 2011).

[26] A partial credit guarantee is a credit enhancement tool that involves a legal commitment that one party will cover the outstanding debt obligations of another. Partial credit guarantees and other credit enhancement mechanisms often allow the guaranteed party to access debt financing at more favorable terms.

Lessons for scaling-up and replication

CHUEE has been designed and successfully managed to financially benefit its marketing partners[27], commercial banks, and energy end-users by energy efficiency activities. Having been evaluated as a financially sustainable programme to save energy and reduce GHG emissions (IEG, 2010), CHUEE I has been scaled-up to CHUEE II. The ways in which CHUEE has reduced the risks and enhanced opportunities to increase revenues of related actors are shown below.

- Establishing and implementing the risk-sharing facility to share and reduce the banks' financial risk through guarantees for loans they make to climate-friendly energy projects. (Financial Institutions in China were traditionally reluctant to lend to energy efficiency projects due to the lack of first-cost financing security.)
- Supporting the commercial banks in assessing the risks and opportunities of the renewable energy and energy efficiency investment.
- Marketing support for suppliers of energy efficiency products and services lacking strong marketing skills or experience
- Demonstrating effectiveness of available EE equipment for end-users who lacked awareness of the economic and technical benefits of energy efficiency equipment

CHUEE also illustrates that the self-sustainability was able to be enhanced over time, by having a strong business model with appropriate public sector risk coverage. This suggests that increased confidence among private investors over profitability of the energy efficiency measures can contribute to leveraging further private financing and thus become more financially self-sustainably. Considering the risk perception associated with the initial programme, USD 8 m of funding from the GEF was used to take a 75% stake in the first loss tranche, with participating private Chinese financial institutions (FIs) assuming the remainder. The second loss tranche was financed 40% by IFC and 60% by Chinese FIs. In CHUEE II, the first loss tranche was reduced to 5% of total financing, only 50% of which was assumed by the GEF. In essence, this enabled GEF to leverage 3.4 times more financing using only 15% more capital.

The lessons from CHUEE also underscore the need for interventions to take a dynamic approach to scaling-up, as the barriers encountered may change substantially as programmes diversify into new sectors and/or seek to engage different market segments. While CHUEE I and II were successful in financing an estimated 14 Mt of CO_2 emissions reductions per year (IEG, 2010), the structure of the programme led to a focus on large industrial EE projects (IEG, 2010; IIP, 2012). In order to further scale up the CHUEE programme for its third financing round of around USD 558 m, IFC had to change some of the previous design elements. Specifically, it had to be modified to reach more small and medium enterprises (SMEs) through partnering directly with medium-sized FIs as opposed to the utilities themselves (IEA, 2011; IFC, 2013; IIP, 2012).

Adjustment was also needed when IFC replicated CHUEE to launch a similar programme in the Philippines (i.e. SEF). Started in 2008, the SEF programme has facilitated financing for 87 of 300 pipeline projects by the advisory services and partial credit guarantee developed through CHUEE as well as a credit line facility. It has generated 843 000 MWh of RE per year and reducing CO_2 emissions by roughly 1 Mt per year (IFC, 2013)[28]. However, in transferring the success of CHUEE in China to SEF in the Philippines, IFC found a need to adapt certain aspects of the programme to the local financial and regulatory context. For instance, while FIs in the Philippines and China shared some of the same barriers in terms of limited

[27] Marketing partners are companies that manufacture, sell and deliver energy efficiency products. They benefit from increased sales of their products through CHUEE.

[28] SEF has also supported regulatory improvements for energy efficiency and renewable investments and built partnerships with technology suppliers, auditors, vendors, Energy Service Companies (ESCO) networks

risk tolerance, experience, and technical knowledge necessary for financing energy efficiency projects, some Philippine financial institutions also had less readily investable capital available. To address this additional barrier, the IFC coupled the advisory services and partial credit guarantee aspects of CHUEE with a credit line facility for partnering FIs in the Philippines (CIF, 2010)

Example1.2. Adaptation example: Rainfall index insurance in India (Scaling-up) by ICICI Lombard GIC, BASIX, and Commodity Risk Management Group of the World Bank (adaptation)

Overview of adaptation activities

In 2003, ICICI Lombard General Insurance Company Ltd [29] (ICICI Lombard GIC) formed a partnership with BASIX to pilot the sale of rainfall index insurance contracts to small farmers in Andrha Pradesh, India. The Commodity Risk Management Group of the World Bank (CRMG) provided technical support. The project became the first weather insurance initiative in India and also the first farmer-level weather-indexed insurance offered in the developing world (Withey et al., 2009). Farmers in the area have purchased the insurance to insure themselves from the economic loss caused by high temperatures, increased drought, and flooding which can lead to large-scale crop failure, as well as to slower productivity losses due to soil degradation.

Actors involved

ICICI Lombard GIC, BASIX, CRMG, and, at a later stage, the federal government of India.

Outline of Scaling-up

The initial launch of the scheme was very small-scale, with 230 participants and a focus on crop-specific risks only. By 2005, the scheme had gradually evolved and considered risk exposure of an entire district to climate variations (IFC, 2010). During the 2005 monsoon, BASIX sold over 7,600 policies to almost 7,000 customers in 36 locations in six states.

The success in scaling-up in the organisation has sparked much broader interest in weather-indexed insurance in India, leading to a host of new players entering the market during 2004–05 (Manuamorn, 2007). These new players include IFFCO-Tokio, Monsanto and the Agriculture Insurance Company of India Limited and others. In 2007 weather insurance was further boosted after the federal government of India started subsidising the index-based weather insurance (Hess, 2014). As of March 2014, approximately 12 m farmers have weather insurance in India, and replication is ongoing in, amongst others, Malawi, Kenya, Mexico, Tanzania, Uganda and Morocco, albeit with mixed success (Hess, 2014).

Lessons for scaling-up

This project exemplifies that commercial viability of the project has ensured self-sustainability and led to scaling up the sales of insurance products. Withey et al. (2009) claim that traditional crop insurance products had not been commercially viable in most Indian rural settings, and thus had rarely helped Indian farmers overcome weather risks. This is mainly because contracts were expensive largely due to the costs of assessing crop damage for a large number of small farmers. ICICI Lombard GIC and BASIX tackled this barrier by initiating insurance based on a weather-risk index, taking into account a correlation between crop yields and rainfall. In its design, insurance payments are triggered by rainfall amounts: if the rain stays below a threshold over a certain period of time, compensation payments are made. Since no field inspections are required, this type of insurance drastically reduces transaction costs, and claims can be paid

[29] This is a joint venture between ICICI Bank and Lombard, Canada.

promptly (Pierro & Desai, 2011)30.This insurance design enhances the financial benefit for the actors involved. Significant investment in research and start-up phase are however necessary to develop such index-based weather insurance, and international reinsurance companies may be reluctant in covering these costs (Pierro and Desai, 2011). ICICI Lombard GIC however sees a strong profitability potential for weather insurance and expects a 'recoup' within 2–3 years from the 'growing Indian weather risk market' (Manuamom, 2007).

Successful scaling-up was also supported by strong delivery channels, strategic planning, effective and transparent communications with farmers and a complementary partnership with local organisations. The project has increased ICICI Lombard GIC's penetration into the rural economy and expanded its customers. Moreover, it has also enhanced the company's weather risk related knowledge. ICICI Lombard GIC now uses weather data and analysis in designing broader natural disaster and catastrophic risk covers and products. Public supports, such as technical assistance by CRMG and subsidy by the federal government of India, have contributed to scaling-up (Hess 2014; ICICIC Lombard GIC 2005). CRMG contributed to the initial research to develop the crop loan insurance and risk management product, and to the gradual scaling-up by supporting promotion activities (Hess, 2003).

Apart from ICICI Lombard GIC and BASIX, other stakeholders have also gained substantial benefits from this project. First, poor farmers have access to cash in the event of a low rainfall and low crop yield thereby reducing their vulnerability. Being insured also helps farmers to think in terms of risks, which helps them to safeguard production in the future (Hess, personal communication). Second, the government can reduce the amount of public expenditure for establishing a safety net for its vulnerable populations. Third, microfinance institutions and banks have a lower risk of loan defaults by farmers. Finally, international development agencies can focus on providing fast relief to victims of catastrophic disaster events (Withey et al., 2009).

The subsidies by the federal government of India for premium of the insurance have made the insurance more affordable for farmers. After the hike in the number of policies sold from 425 in 2004 to 11 716 in 2007, ICICI and BASIX had difficulties in scaling up its sales. The government subsidies that were introduced in 2007 reinvigorated the growth of the weather index insurance significantly in terms of the area covered by the insurance from 2008 onwards (see the table below) (Agricultural Finance Corporation, 2011). It should be noted that government subsidies are often provided for rainfall insurance in many cases in both developing and developed countries.(Cole et al. 2009)

Table 3. Weather Insurance Coverage of ICICI Lombard GIC and BASIX

Marketing year	Weather Insurance Coverage (Acres)
2003-04	1 054
2004-05	5 736
2005-06	107 586
2006-07	125 185
2007-08	87 002
2008-09	458 960
2009-10	2 002 477

Source: Adapted from Agricultural Finance Corporation (2011)

[30] After a delayed onset of the rainy season in 2005, farmers' claims were serviced within 15 days of the end of the policy period. This sharply contrasts with the 12–18 months for India's national crop insurance scheme with its conventional loss inspection and settling (Mechler et al., 2006).

2. Generating information through monitoring and evaluation (Section 4.2.)

Example 2.1. Energy efficiency and renewable energy project in tea industry in India (replication) by Government of India, UNDP, and GEF (mitigation)

Overview of mitigation activities

This programme was designed and implemented to reduce GHG emissions and energy consumption for tea manufacturers in parts of Kerala state during the period between 2008 and 2012. A total budget is USD 2.05 m, of which 46% is grant funded by GEF and 54% comes from co-financing (e.g. tea factory promoters, Tea Board, and commercial banks) (Ocampo and Maithel, 2012). 63% of the budget was spent on adoption of EE and RE equipment, and the rest was provided for awareness raising (14%), financial barriers (8%), and project management cost (8%).

Actors involved

This project was managed by the Executive Director of Tea Board, Coonoor, and is supported by the UNDP and GEF. Technology Informatics Design Endeavour (TIDE, a technology promoting organisation) implemented it. Commercial financial institutions such as Union Bank of India, IREDA and Central Bank of India have also been engaged in the programme.

Outline of replication

India's Ministry of Commerce examined lessons learned from the pilot project, and subsequently decided to replicate the project in Assam state under India's current Five Year Plan (2012-2017) for national development (TIDE, 2013, and GEF, 2012). The replication process is being developed as of March 2014.

Lessons for replication

This EE and RE programme exemplifies ways in which information from the ex-post and regular and mid-term monitoring and evaluation can be important inputs to the decision making on replication by Indian government. Such information has helped the government to officially decide replication of the project in Assam. The obtained information had turned into the explicit knowledge such as an evaluation report and a variety of useful tutorials and a web-based knowledge-sharing platform (i.e. EnConTea). Since the government has decided to replicate the project under the national development plan, this example also suggests that experiences at a project level have been shared at a national level, and used for planning replication elsewhere in the country.

With regard to the ex-post evaluation, GEF and UNDP require projects supported by them to undergo a "Terminal Evaluation (TE)". TE includes information on the project's replicability/scalability and lessons learned as well as recommendations for a way forward. In addition to the significant cost reduction achieved, the outcomes of the project, such as awareness creation about relevant technologies, learning, knowledge sharing, and replicability have also been evaluated and ranked as "highly satisfactory".

In addition to the TE, the project had continuously obtained and showcased lessons on technologies from its implementation (EnConTea, n.d.). The measures to communicate the lessons include tutorials on energy efficiency such as the website called "encontea.org", a compendium named "Consolidation of Detailed Energy Audit", and the Energy Score Card which is a framework for factories to self-assess their performance regarding baseline energy use. Those materials are expected to serve as references for future efforts to replicate this project.

Example 2.2. Concentrated Solar Power (CSP) projects in Morocco (scaling-up and replication) by AfDB, CTF, IBRD, AFD, KfW, and EIB (mitigation)

Overview of mitigation activities

Concentrated Solar Power (CSP) focuses sunlight to heat a thermal fluid and can be used for power and thermal applications. Integrated Solar Combined Cycle (ISCC) aims to generate electricity generation by the combination of a conventional gas fired combined cycle plant and CSP. CSP and ISCC contribute to reducing GHG emissions that would have occurred by combusting fossil fuels.

Actors involved

The ISCC plant in Ain Beni Mathar; Moroccan Office National de l'Electricité (ONE) has been operating ISCC plant since 2006. African Development Bank (AfDB) co-financed it with the support from World Bank (World Bank, 2011). The ISCC plant combines Concentrated Solar Power (CSP) and thermal power plants.

- Financing information
  - African Development Bank (AfDB): EUR 136.45 m
  - Global Environment Facility (GEF): USD 43.2 m
  - Instituto de Credito Oficial (ICO, Spain): EUR 43 m
  - (Office Nationale de l'Electricite (ONE, Morocco): EUR 151.40 m (loan from AfDB))
- Project development and implementation
  - Project developer: Abener
  - Operation & Management: Abengoa Solar, Office Nationale de l'Electricit (ONE)

Noor I in Ouarzazate, Morocco: Moroccan government launched the first phase of the CSP project, (160MW of CSP) with the financing by AfDB, Clean Technology Fund (CTF), IBRD, AFD, KfW, and EIB as well as Private Public Partnership including Moroccan Agency for Solar Energy (MASEN).

- Financing information
  - African Development Bank (AfDB): EUR 168 m
  - CTF/ADB: EUR 70.12 m
  - World Bank: EUR 140.25 m
  - CTF/World Bank: EUR 68.02 m
  - EIB: EUR 100 m
  - AFD: EUR 100 m
  - KfW: EUR 100 m
  - NIF: EUR 30.15 m
  - MASEN/FDE/SPC: EUR 265.78 m
  - (Office Nationale de l'Electricite (ONE, Morocco) - EUR151.40 m (loan from AfDB))
- Project development and implementation
  - Project developer: ACWA Power International

Outline of scaling-up and replication

Ouarzazate I CSP project (160MW) was launched, drawing on lessons from the ISCC project in Ain Beni Mathar (20MW). Ouarzazate I is also being scaled up to Ouarzazate II (additional 100MW)

Lessons for scaling-up and replication

Concentrated Solar Power (CSP) projects in Morocco gives an example of how lessons obtained through mid-term or ex-post monitoring and evaluation of a pilot project could be useful for informing relevant actors of lessons learned to replication/scaling-up. Morocco is considered to be one of the most advanced

countries in using solar thermal power generation. Subsequently, This project is now being implemented and has been decided to be scaled-up to the second phase, or Noor II. The second phase has secured several financial sources such as KfW and EIB and screens private tenders to install 500MW of CSP, as of October 2013 (Reuters, 2013).

Documents relating to monitoring and evaluation of the CSP programmes (e.g. World Bank 2011; World Bank 2013) suggest that the information from the ISCC in Ain Beni Mathar has been an important factor in deciding to launch similar CSP projects in Ouarzazate. For instance, World Bank (2011) stressed in a project appraisal on Ouarzazate I that lessons learned about CSP during the project preparation and construction of the IISC plant have increased the confidence of a relevant government agency in the technology and led to launching the ambitious Moroccan Solar Plan and Ouarzazate I project in 2009. Another CTF document, Revised CTF Investment Plan for MENA CSP, also considers that the Morocco's experience in the ISCC project has made this country one of the best places to pursue CSP projects among MENA region. (CIF, 2013) Further, ONE staff was also informed when they chose contractors, engineers and equipment based on the experience from the ISCC project, using the same terms and contract. Moreover, a number of site visits took place to share knowledge with other national and international professionals.. (World Bank, 2013)

The ISCC project also provided a range of information on challenges it faced. Examples are construction delays, management difficulties, and inflexible financing that resulted in scaled-down projects (CPI, 2012b). The research by CPI stresses that the actors involved appeared to have leaned numerous lessons. For instance, the CTF decided to support a small number of projects at significant scale. In addition, the national government and local institutions became willing to work with donors and the private sector to develop a public-private partnership that addressed cost and policy risks as well as management risks (CPI, 2012b).

Example 2.3. AdapCC in agriculture industry in Latin American and South Africa (replication) by Cafédirect and GTZ (adaptation)

Overview of adaptation activities

The AdapCC project supported coffee and tea farmers in Latin America and Kenya in developing strategies to cope with the risks and impacts of climate change. GTZ planned and implemented the project, while Cafédirect facilitated access to their producers and supported in communication activities.

Prior to the programme, Cafédirect and GTZ had interviewed farmers in the areas. The interviews found that the farmers had experienced climatic changes in the preceding 20 years, such as modifications in rainfall patterns, heavy rainfall causing landslides and increase in temperatures.

The Risk and Opportunity Analysis (ROA) tool was developed for establishing adaptation strategies for each of the pilot groups after the preliminary research. ROA allows for an identification of climate risks for small-scale production systems in a specific region and to understand the root causes of being affected by climate variability or extreme weather events. The strategies are meant to be implemented by the affected producers themselves. The strategies include, for instance, diversifying farmers' income and food production; increasing the efficient use of natural resources such as forests, water and land; selecting more resilient crop varieties; and building capacity among farmer (GTZ and Cafédirect, 2010).

Actors involved

A British fair-trade company for hot beverages, Cafédirect[31], and the German Gesellschaft für Technische Zusammenarbeit (GTZ)[32]. Cafédirect and GTZ formed a PPP to implement the pilot initiative called

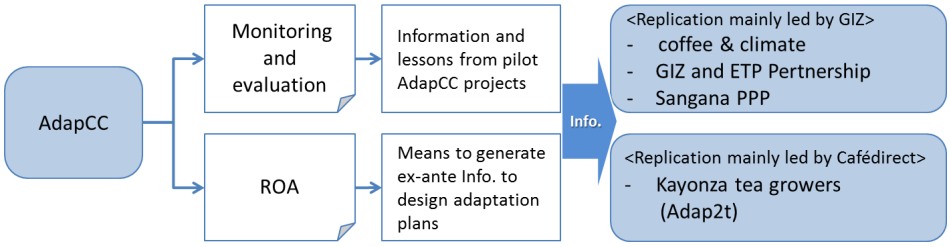
[31] The Cafédirect network consists of 40 small-scale coffee, cocoa and tea producer organisation in Latin America, Africa and Asia, representing more than 280.000 small-scale farmers. ·

'Adaptation for Smallholders to Climate Change' (AdapCC) in Kenya, Peru, Mexico and Nicaragua from 2004 to 2007. The pilot initiative was financed by Cafédirect (52%) and the PPP programme (48%) of the German Federal Ministry for Economic Cooperation and Development (BMZ) (Cafédirect, 2014). As part of the project, GTZ commissioned the International Centre for Tropical Agriculture (CIAT) to analyse the future suitability of current coffee growing areas.

Outline of replication

Some of the pilot projects under the AdapCC have subsequently been replicated. GTZ replicated lessons learnt and results of AdapCC through further development partnerships in the tea and the coffee sector, including Sangana PPP (Kenya), Coffee & Climate (Brazil, Tanzania), Trifinio (Guatemala, Honduras, El Salvador and Vietnam), and ETP tea project (Kenya). (Linne, 2014). Kayonza Growers Tea Factory has also replicated the projects in Uganda with the financial support from Comic Relief[33] (GTZ was not involved in this project).

Figure 7. Procedure used to replicate the AdapCC projects



Lessons for replication

Adaptation for Smallholders to Climate Change (AdapCC) shows the importance of tools (i.e. the ROA) and networks for scaling-up, and how useful information could be generated through monitoring and evaluating the adaptation activities for further replication and scaling-up.

GTZ and Cafédirect jointly published a final report of AdapCC based on the GTZ's evaluation formats. The report explicitly proposed options for scaling up the pilot initiative of AdapCC. One example is a concept called 'multiplying institutions' which is formed in the small-scale coffee and tea sector both within the Cafédirect producer partner network and within the wider coffee and tea sector in particular in Latin America and East Africa[34]. The concept of the multiplying institutions explicitly mentions how the potential project developers and other relevant actors could scale up and replicate the initiatives at different levels. Measures recommended in the report include information exchange, marketing activities through the Cafédirect brand, further use of ROA, and new PPP proposals to design a capacity building programme for the tea sectors in developing countries.

With financial support from Comic Relief, Kayonza Growers Tea Factory in Uganda (one part of the project called Adap2t) also replicated the project under AdapCC using the Risk and Opportunity Analysis (ROA) tool (Linne, 2014). The replicated project aims to 1) sensibilise and train 5 609 farmers of Kayonza Tea Factory, and 2) implement climate change adaptation measures along four areas, namely: management of pest and diseases, food security, family planning, and nature conservation (Cafédirect 2012). Smallholder farmers in Western Uganda have perceived climatic shifts such as declining food and crops

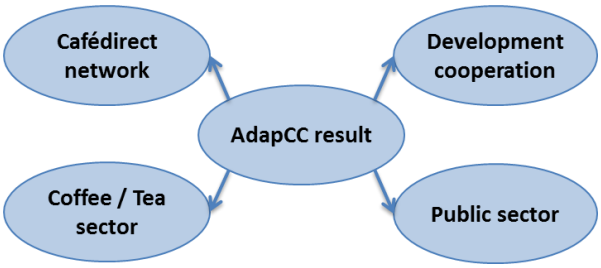
[32] GTZ has been merged with the Deutscher Entwicklungsdienst (DED) and Internationale Weiterbildung und Entwicklung (InWEnt) into Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) since 2011.

[33] Comic Relief is a UK based charity, see http://www.comicrelief.com/about-us

[34] Some potential partners were already identified, e.g. through GIZ's cooperation in the Sangana PPP

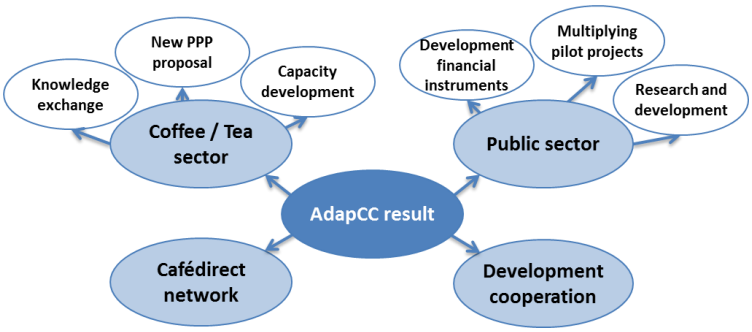
harvests and prolonged droughts over the years. The final report by GTZ and Cafédirect mentions that those climate shifts have resulted in low tea production, food scarcity and decline in household income. Cafédirect continues to be active in climate change adaptation, collaborating with the Kayonza tea growers. In the annual review of 2012, the chairman of Cafédirect particularly highlights further progress in tackling climate change with its growers (Cafédirect, 2013).

Figure 8. Scaling up AdapCC through different 'multiplying institutions



Source: Adapted from GTZ & Cafédirect, (2010)

Figure 9. Example of the use of multiplying institutions



Source: Adapted from GTZ & Cafédirect, (2010)

3. Disseminating information (Section 4.3)

Example 3.1. EE programme for Township and Village Enterprises in China (replication) by UNDP, UNIDO, and GEF (mitigation)

Overview of mitigation activities

Having implemented from 1998 to 1999 (phase I) and from 2003 onward (Phase II), Township and Village Enterprises (TVEs) in the brick, cement, metal casting and coking sectors in China have increased the utilisation of energy efficient technologies and products. At the time of its Final Independent Evaluation (FIE) conducted by GEF in 2007, nearly USD 47 m of co-funding was invested in 8 pilots and more than 100 replication projects at TVEs.

Actors involved

- UNDP was an implementing Agency, and Ministry of Agriculture (China) and UNIDO were executive agencies.
- Chinese Township and Village Enterprises (TVEs) were end-users of electricity, generated and disseminated information, and led replication.

- GEF has provided grants of USD 7.992 m. USD 47 m of co-financing was also mobilised, consisting of USD 6.3 m from Government of China, USD 17.46 m from Agricultural Bank of China (ABC), and USD 23 m from beneficiary enterprises (pilot TVEs)
- Hongyuan Company is a private company which provides energy saving service
- Local governments have worked with TVEs to bridge information gap about EE technologies and know-how.

Outline of replication

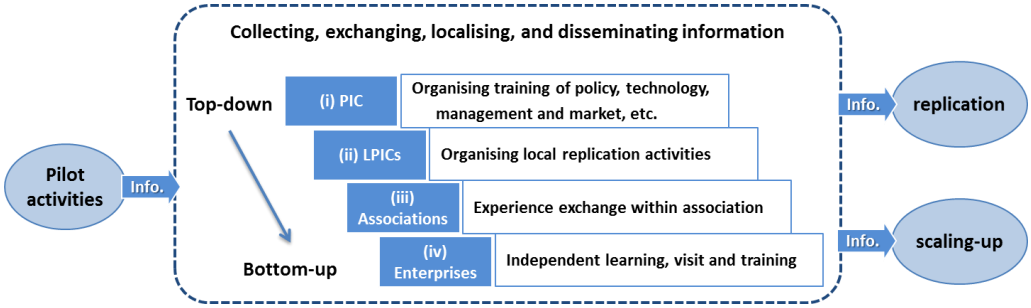
Once those environmental actions were seen to have positive competitive benefits, private sector began to replicate the energy efficiency activities. Beyond the eight pilot TVEs, replication was formally intended at 118 other enterprises, among which 111 formal replication projects were achieved or underway.

Lessons for replication

The Energy Conservation and GHG Emissions Reduction in TVEs, supported by UNDP, UNIDO and GEF, can provide insights into how the lessons learned from pilot projects can be tailored and transferred throughout replication processes. The following analysis suggests that tailoring and transferring lessons, among other factors, contributed to successful replication of this EE project. The measures taken by the project include forming various networks and institutions at different levels, understanding the local contexts, adjustment of demonstrated and selected technologies, capacity development, and dissemination of technologies to the locals.

To tailor and disseminate lessons, this project set up different levels of activities that played catalytic roles in demonstrating EE measures and replicating them. These activities have been conducted at; (i) Policy Implementation Committees (PIC), (ii) Local Policy Implementation Committees (LPICs), (iii) industry associations, and (iv) enterprises. Whilst PIC was meant to deal with demonstration activities in a relatively top-down manner, the activities at an enterprise level have been done in a bottom-up approach.

Figure 10. Dissemination of information through networks at various levels



Source: Based on Han and Tang (2009)

PIC facilitated demonstration by designing the institutional arrangement of LPICs, helping the industrial sector to form industry associations, and organising dissemination and workshops. During the programme implementation, it organised 13 nationwide information dissemination activities and more than 1 200 people participated in the events. (Han and Tao, 2009)

Local governments have worked with other actors through LPICs and played an effective role in adjusting lessons from pilot projects at the central government level to specific needs and contexts at a local level (UNDP and UNIDO, 2007). Local governments incorporated the demonstration activities into their daily

work by which local TVEs gained valuable project level information[35] (Han and Tao, 2009). LPICs have also been assessed as an effective measure to directly disseminate the demonstrated technologies to the local replicators (UNDP and UNIDO, 2007).

Demonstration activities at an industrial association level formed useful networks among TVEs, research institutes, and EE technology suppliers, and fostered knowledge sharing and technology transfer. Through those networks, the association level activities disseminated and enlarged the result of the pilot projects, which were highly appreciated and welcome by TVEs that sought replication (Han and Tao, 2009).

At an enterprise level, a number of the site visits have been organised to invite those who were interested in replication to the pilot project sites. The site visits aimed at providing opportunities for information exchange and capacity development. FIE has reported that such site visits were "a prime driver of a large number of independent self-replication" (UNDP and UNIDO, 2007). Assuming that the participants in the site visits have had their own unique local contexts and technological backgrounds, they seem to have absorbed the know-how, bearing the difference with pilot projects in mind and exchanged different views on techniques and operations.

Moreover, this project suggests that both public and private entities can be useful vehicles for information transfer. A newly established private entity called Hongyuan Company has acted as a co-operative energy management service provider. This company successfully functioned as a vehicle to transfer information and know-how related to energy management on a commercial basis.

The evaluation also mentions some other important factors for the replication of this EE project such as a suitable electricity market, an accessible and sustainable financial instrument called Revolving Capital Fund (RCF), and national and local energy saving regulations. However, this energy efficiency project has given useful insight into how lessons learned from pilot interventions have been handled and adjusted to be transferred to the replication activities.

4. Policies to enhance enabling environments (Section 5.1)

Example 4.1. Geothermal energy in Indonesia (scaling-up) by JICA (mitigation)

Overview of mitigation activities

Promoting geothermal energy to renewable energy share in the national energy mix (The government of Indonesia has announced the Geothermal Development Plan (2011 – 2020) which has set a target to introduce geothermal power plants by more than 6 000MW by 2020.)

Actors involved

Japan International Cooperation Agency (JICA), private project developers (e.g. Supreme Energy, GDF Suez, Sumitomo Corporation, Mitsubishi Corporation and Marubeni Corporation), Geological Agency of the government of Indonesia

Outline of replication

Development of a master plan for geothermal power policy at a national level and policy advice on Feed in Tariff and a public fund for exploratory drilling contributed to scaling up investment in geothermal power plants by decreasing risks associated with identifying suitable sites. For Independent Power Producer (IPP) business, examples include the following actors (Sato 2014).

[35] According to the survey research on the effectiveness of government advocacy by Han and Tao (2009), 51 % of enterprises got information from central or local government advocacy activities, 19% got it from workshops and 18% got it from training.

- Muara rabu (110MW ×2 plants) : Supreme Energy, GDF Suez, Sumitomo Co.
- Rajabasa (110MW ×2 plants) : Supreme Energy, GDF Suez, Marubeni Co.
- Rantau Dadap (242MW) : Supreme Energy, GDF Suez, Marubeni Co.
- Sarulla (300 MW) : Medco, Itochu, Ormat Technologies, Kyushu Electric Power Co., Itochu Co.

Lessons for replication

JICA has played an important role in scaling up private climate finance for geothermal power plants in Indonesia by supporting Indonesian government to establish enabling environments. JICA has conducted the Geothermal Master-plan Study (2006-2007) that prioritised promising sites and established a road map for geothermal development, and policy analyses of fiscal and non-fiscal incentives to accelerate private sector geothermal energy development in 2009 and 2011. As a result, the government has introduced obligation for PLN[36] to sign Power Purchase Agreement (PPA) if winning bid is lower than 9.7 cents/kwh. In addition, the guarantee for off-taker risk was decided to be provided for certain types of projects.

Having co-operated with the Indonesian government, JICA proposed establishing Exploratory Fund and a Feed in Tariff scheme for renewable energies in Indonesia (JICA, 2012). The former aims at financing for geothermal exploration activities and enhancing feasibility and bankability of geothermal projects by the reliable exploration data (Ampri, 2013), since exploratory drilling has been one of the highest risks related to developing geothermal energy (JICA, 2012). The proposal has been realised as the Indonesian government-led Geothermal Fund.

JICA has also implemented capacity development to enhance the basis for enabling environments. It provided training for local staff working at the Center for Geological Resources (CGR), under Geological Agency, through the programme called Capacity Building for Enhancement of the Geothermal Exploration Technology in Indonesia (JICA 2013). The programme was conducted from 2010 to 2013, aiming to (i) install a GIS database relating to geothermal resource to CGR, and (ii) enhance capabilities of engineers at CGR in geothermal resource exploration and modelling exercise as well as assessment of potential amount of resource at individual sites (Sato, 2014). Enhanced capacity of local staff in geothermal energy development is an essential part of establishing enabling environments and thus JICA's support seems to have played an important role in promoting scale-up and replication of geothermal projects in the country.

Example 4.2, Prosol Residential Programme Tunisia (mitigation)

Overview of mitigation activities

Under Prosol Residential Programme in Tunisia, Solar Water Heating systems (SWHs) have been installed to replace water heating systems run by fossil fuels thereby reducing GHG emissions and improve energy independence. SWHs also contribute to reducing government expenditure on fossil fuel subsidy and creating further opportunities for economic growth (e.g. technological development and employment creation for manufacturing, selling and installing SWHs)

Actors involved

- Tunisian Ministry of Industry, Energy and Small and Middle Size Enterprises; the National Agency for Energy Conservation of Tunisia (ANME); National Fund for Energy Conservation (FNME);
- The United Nations Environment Programme
- A state-owned utility company called Société Tunisienne d'Électricité et du Gaz (STEG)

[36] Perusahaan Listrik Negara ('State Electricity Company') which is an Indonesian government-owned energy distribution corporation

- International financial support backing from the Italian-led Mediterranean Renewable Energy Program and Italian Ministry for the Environment and Protection of Land and Sea (MATTM)
- Commercial banks such as; Attijari bank, UBCI, and Amen bank
- Certified manufacturers, importers, and installers

Outline of scaling-up and replication

Over the programme periods for phase I and II as well as Prosol Residential (2005-2010), the programmes have been gradually scaling up, and more than 119 000 SWH systems to households in Tunisia were installed in Tunisia, with a fivefold increase in annual deployment. The similar financial scheme is being replicated for other Prosol programmes for service sector and hotels, industrial sectors (e.g. textile, chemical, and food industry), and households needing smaller SWH systems. This shows that Prosol's financial architecture can have certain transferability whereas those subsequent programmes are still under development.

Lessons for scaling-up and replication

The Prosol example provides insights into how a public policies can level the playing field between low carbon technologies and heavily subsidised fossil fuel based alternatives in order to scaling-up of the cleaner technologies (CPI, 2012a). Tunisian governmental agencies, including ANME, FNME, and STEG, are mandated by law an investment subsidy to lower the upfront cost of installing SWHs. Barriers which Prosol had to address were relatively high initial investment required for SWHs, competiveness against traditional fossil fuel heaters due to subsidies on fossil fuels, and limited access to finance, as well as lenders' and borrowers' low understanding of the new technology. The subsidy for the incremental costs and loan repayment scheme by STEG through electricity bills managed to increase financial attractiveness. Subsidies on the interest rate which are funded by MATTM have also contributed to scaling up Prosol residential programme.

Tunisian government (USD 21.8 m) and Italian government (USD 1 m) funded 20% of the capital cost of SWHs to bring consumers' up-front costs down. MATTM spent USD 1 m to provide a temporary interest rate subsidy to lower the cost of credit. As a result, Prosol has successfully scaled up the number of households having installed SWHs by 119 000 from 2005 to 2010 and will reduce GHG emissions by 715 000 t-CO_2 over the life time of SWHs installed (CPI, 2012a). Prosol suggests that the design, implementation and diffusion of 'improved subsidy' mechanisms may be a good model to replicate in other countries where energy subsidies are built into popular political expectations (CPI, 2012b).

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Glossary

ADB	Asian Development Bank
AF	Adaptation Fund
AFD	Agence Française de Développement (French Development Bank)
AfDB	African Development Bank
CB	Capacity building
CCXG	Climate Change Expert Group (of the OECD + IEA)
CDM	Clean Development Mechanism
CHUEE	China Utility based Energy Efficiency financing programme (of the IFC)
CIF	Climate Investment Funds
COP	Conference of the Parties (of the UNFCCC)
CPI	Climate Policy Initiative
CTF	Clean Technology Fund (of the CIF)
CTI PFAN	The Private Financing Advisory Network by the Climate Technology Initiative
DFI	Development finance institution
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIB	European Investment Bank
EUR	Euro
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GIZ	Gesellschaft für Internationale Zusammenarbeit (German development agency)
GTZ	Gesellschaft für Technische Zusammenarbeit (German technical assistance agency, merged with other agencies to GIZ)
GW(h)	Gigawatt (hours)
IBRD	International Bank for Reconstruction and Development
ICCTF	Indonesian Climate Change Trust Fund
ICF	International Climate Fund (of the U.K.)
IDA	International Development Association (of World Bank)
IDB	Inter-American Development Bank
IEA	International Energy Agency
IEG	Independent Evaluation Group (of the World Bank Group)
IFC	International Finance Corporation
IFI	International financial institution
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau (German development bank)
LDC	Least Developed Countries
LDCF	Least Developed Country Fund

MDB	Multilateral development bank
MEM	Ministerio de Energía y Minas, Peru
MRV	Measurement, reporting, and verification
MW(h)	Megawatt (hours)
NDB	National development bank
NIE	National implementing entity
ODA	Official Development Assistance
ODI	Oversees Development Institute
OECD	Organisation for Economic Co-operation and Development
PPCR	Pilot Program for Climate Resilience (of the CIF)
RBF	Results-based finance
RDB	Regional Development Bank
SCF	Strategic Climate Fund (of the CIF)
SCF	Standing Committee on Finance
SEI	Sustainable Energy Initiative (of the EBRD)
SIDS	Small Island Developing States
SPRCC	Support Programme to Respond to Climate Change (of Vietnam)
STAR	System for the Transparent Allocation of Resources (of the GEF)
TA	Technical assistance
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WB	World Bank

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