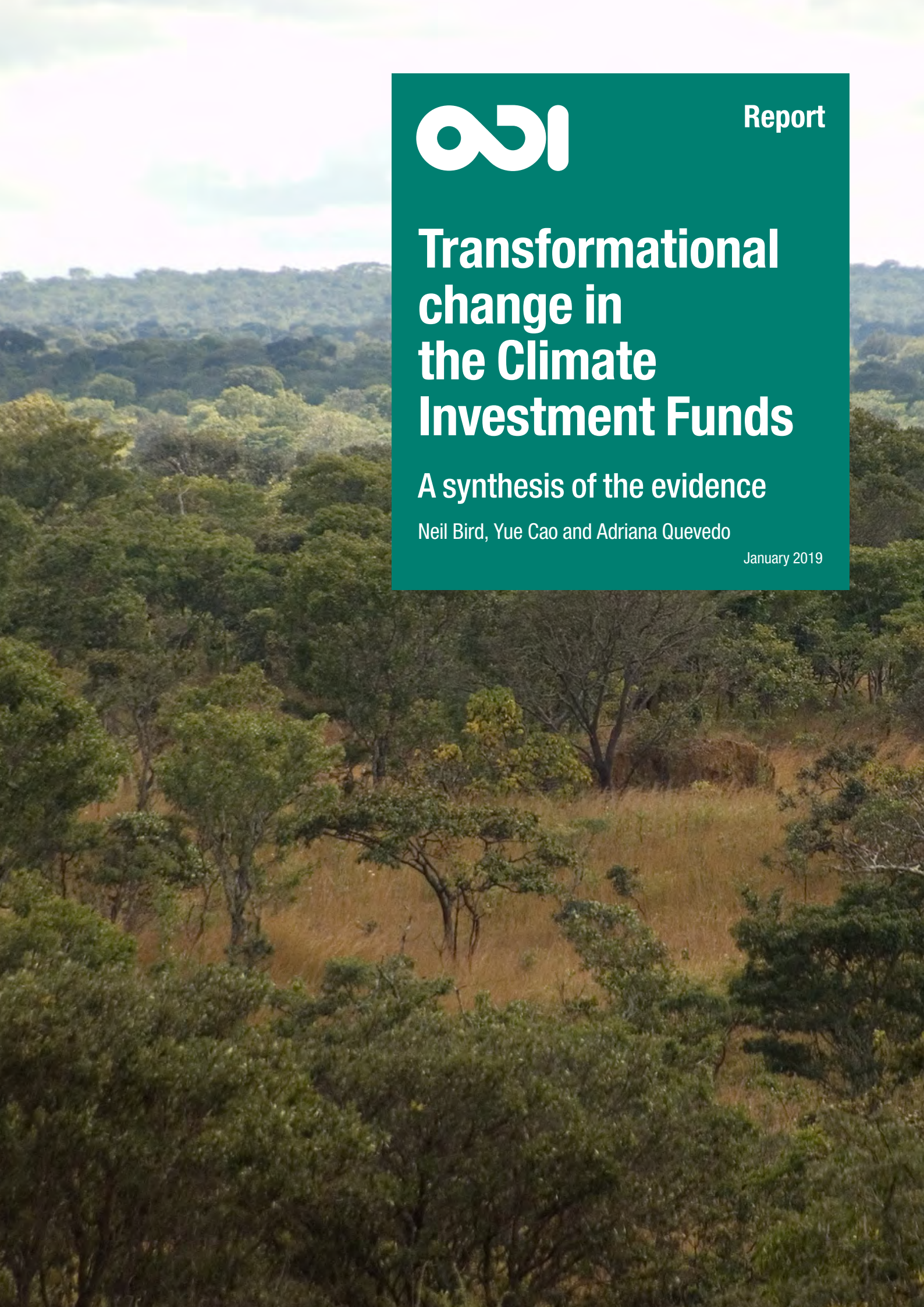

Report

Transformational change in the Climate Investment Funds

A synthesis of the evidence

Neil Bird, Yue Cao and Adriana Quevedo

January 2019

Cover photo: Miombo woodlands, a forest type where the Forest Investment Program invests funds. Credit: Jeff Walker/CIFOR CC BY-NC-ND 2.0.

Acknowledgements

The evidence synthesis team would like to thank Anna Williams, Joseph Dickman, Neha Sharma and Hanna Karima Schweitzer of the Climate Investment Funds Administrative Unit for their support throughout the preparation of this evidence synthesis. The following people kindly provided review comments on earlier drafts of the report: Claudio Alatorre, Rafael Ben, Rob van den Berg, Margherita Calderone, Flavia Frangetto Castanho, Philip Collins, Rocio Sanz Cortes, Joseph Dickman, Mafalda Duarte, Matthew Harris, Andrew Scott, Meerim Shakirova, Neha Sharma, Daisy Streatfeild, Joe Thwaites, Anna Williams and Zhihong Zhang.

The views presented in this publication are those of the authors and do not necessarily represent those of the Overseas Development Institute. In particular, no responsibility for the opinions expressed here should be attributed to the Climate Investment Funds.

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Acronyms

ADB	Asian Development Bank
AfDB	African Development Bank
CIF	Climate Investment Funds
COP	Conference of Parties
CSO	Civil Society Organisation
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
DGM	Dedicated Grant Mechanism
DPSP	Dedicated Private Sector Programs
DRC	Democratic Republic of Congo
E&L	Evaluation and Learning
EBRD	European Bank for Reconstruction and Development
FIP	Forest Investment Program
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IDA	International Development Association
IDB	Inter-American Development Bank
IFI	International Finance Institution
IP	Investment Plan
IPLC	Indigenous Peoples and Local Communities
IRENA	International Renewable Energy Agency
MASEN	Moroccan Agency for Solar Energy
M&E	Monitoring and Evaluation
MDB	Multilateral Development Bank
MidSEFF	Mid-size Sustainable Energy Financing Facility
MSME	Micro, Small and Medium-sized Enterprise
NAP	National Adaptation Plan
NAPA	National Adaptation Programmes for Action
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisation
ODI	Overseas Development Institute
ONEE	Office National de l'Electricité et de l'Eau Potable
PPCR	Pilot Program for Climate Resilience

PPP	Public–Private Partnership
PSSA	Private Sector Set Asides
REIPPPP	Renewable Energy Independent Power Producer Procurement Program
SCF	Strategic Climate Fund
SME	Small and Medium-sized Enterprise
SPCR	Strategic Program for Climate Resilience
SREP	Scaling Up Renewable Energy in Low Income Countries Program
TA	Technical Assistance
TCLP	Transformational Change Learning Partnership
ToC	Theory of Change
TuREEFF	Turkish Residential Energy Efficiency Financing Facility
TurSEFF	Turkey Sustainable Energy Financing Facility
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD+	United Nations Reduced Emissions from Deforestation and Forest Degradation Programme
WBG	World Bank Group

Executive summary

This report is a synthesis of evidence gathered on transformational change within the Climate Investment Funds (CIF). It complements a parallel evaluation on transformational change in the countries where CIF operates. It is distinguished from the evaluation by a focus on the secondary literature, produced both within and outside CIF. The objective of the evidence synthesis is to enhance understanding of how transformational change happens across the CIF portfolio, in a range of country, sector and technology contexts.

CIF was established in 2008 to provide scaled-up climate finance to developing countries to support progress towards low-carbon, climate-resilient development. Channelled through multilateral development banks (MDBs), CIF encompasses two funds: the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF), which includes three targeted programmes – the Forest Investment Program (FIP), the Pilot Program for Climate Resilience (PPCR) and the Program for Scaling Up Renewable Energy in Low Income Countries (SREP). Contributor countries to CIF have pledged more than $8.3 billion to fund preparatory activities and investments in over 70 countries.

Main findings across all CIF programmes

Guiding the learning objectives of the evidence synthesis have been two learning questions, developed as part of the CIF Transformational Change Learning Partnership (TCLP) process:[1]

First, to what extent and how does CIF's approach to planning, designing and implementing its investments work to advance transformational change?

In response to this question, this evidence synthesis has found that two findings hold across all four CIF programmes, in terms of how the CIF approach is advancing transformational change in a number of countries:

- First, there is evidence that the CIF planning approach of extensive consultation has secured the necessary collaboration for multi-sector engagement where it is needed for planning climate change actions that require different sectors and groups of actors to work together.
- Second, national ownership over CIF investments has been strengthened by working through ministries that have the mandate to coordinate action across the government administration.

Second, to what extent, how and under what conditions are CIF-supported investments and activities contributing to transformational change?

The contribution that CIF investments make to transformational change is still emerging, yet two general findings already stand out:

- First, CIF investments have supported enterprises at all scales (from micro, small and medium-sized enterprises (MSME) to large corporates), not only in mitigation strategies, but also for strengthening climate resilience.
- Second, some climate change programmes and technologies in sectors and countries previously supported by CIF are no longer dependent on international concessional climate finance. The likelihood of the sustainability of such actions is therefore increased.

1 The TCLP is described in the introduction of this report.

Findings by programme

The main findings for each of the four CIF programmes will now be documented, recognising their differing contexts and transformational change processes.

Clean Technology Fund (CTF)

Findings on CTF design

CTF was set up with an overall transformation objective of supporting the creation of, or transition to, low-carbon economies by experimenting and learning from large investments in innovative low-carbon technologies. CTF has sought to achieve its objectives by catalysing replication and the scale-up of investments through private sector involvement (as co-financiers, recipients of finance and suppliers of equipment) and ultimately the phase-out of reliance on concessional international climate finance. The reviewed literature points to several features that have enabled CTF to pursue this objective in strategically relevant ways.

- The CTF strategy to invest large sums in a small number of clean energy technology projects has arguably been transformational in itself, as it has enabled CTF to engage lead ministries responsible for strategic planning and financial management in partner countries. This has helped bring climate finance into the mainstream of national economic and development decision-making in countries such as Mexico, Morocco and Turkey.
- The momentum gained through the programmatic planning process, along with the certainty and flexibility of the large CTF resource envelope, has facilitated the design of innovative, sometimes first-of-a-kind projects, as in Mexico and Turkey for energy efficiency.
- CTF has supported countries' enabling environments for transformational change with concessional finance that has complemented and leveraged MDBs and bilateral donors' technical assistance on policy, institutional and regulatory work.

Findings on CTF outcomes

- CTF interventions have been strategically timed to accelerate, scale up and deepen transformational processes and outcomes.
- Several clean energy markets, including wind energy in Mexico and energy efficiency in Turkey, have continued to grow without support of public finance following CTF investments, offering the prospect of sustainable growth.
- Scaling is faster in CTF-supported interventions in increasingly cost-competitive renewable technologies, such as wind or solar photovoltaic (PV) in Mexico and Thailand, when compared to CTF investments in less cost-competitive technologies, such as geothermal in Indonesia.
- CTF investments have supported the deployment of innovative technologies, such as concentrated solar power (CSP), by responding to the enabling environment, particularly where this has been associated with strong political commitment, as in Morocco.

Pilot Program for Climate Resilience (PPCR)

Findings on PPCR design

PPCR's transformative approach, through the design of Strategic Programs for Climate Resilience (SPCRs), has aimed to establish a common, multi-sectoral vision for climate resilience aligned with national development priorities. SPCRs have been designed to address multiple barriers to advance systemic change, spur scalability and increase the likelihood of the sustainability of supported interventions.

- The programmatic approach has changed the way that countries such as Tajikistan and Cambodia approach climate resilience, providing the first opportunities to adopt a multi-sectoral approach, thereby advancing the national enabling environment for climate-resilient investments.
- Establishing a strategic focal unit within government to champion coordination and cooperation of the PPCR, as occurred in Zambia and Bangladesh, has been

instrumental for country ownership, the improvement of institutional processes and the strengthening of policies related to climate resilience.
- Countries with existing climate change adaptation priorities as expressed through National Adaptation Programmes of Action (NAPA), such as Bangladesh and Nepal, have used these to inform the early development of their SPCR strategies. This has brought both opportunities and challenges in terms of increasing speed of action while ensuring national ownership.

Findings on PPCR outcomes

- New planning frameworks, developed as a result of SPCR preparation or embedded in PPCR investments, have increased awareness and understanding of vulnerability to climate change, as evidenced through the review of programmes in Nepal and Mozambique.
- Strategic timing of technical assistance to strengthen knowledge systems on climate resilience has supported the development of national adaptation strategies. There are documented examples of this from Tajikistan, Bangladesh and Nepal.
- CIF reporting on PPCR results has supported systemic change by providing governments with monitoring and evaluation (M&E) tools to measure progress of climate resilience that can be mainstreamed into national systems. This has increased the capacity of governments, notably in Nepal and Zambia.
- The SPCR process in many countries, including Bangladesh, Bolivia, Jamaica and other Caribbean countries, Mozambique, Tajikistan and Zambia, has successfully facilitated co-finance from the MDBs, bilateral donors and private investors for PPCR investments to scale up resources for climate-resilient actions.
- Sub-national engagement at the district level to secure participatory mainstreaming of climate change adaptation, as happened in Tajikistan and Nepal, has helped to secure scaling up of subsequent PPCR investments.

Forest Investment Program (FIP)

Findings on FIP design

The programmatic approach in the FIP includes the preparation of a country investment plan (IP), which aims to align with ongoing initiatives that support the reduction of emissions from deforestation and forest degradation, often in the context of national REDD+ processes.[2] The preparation of IPs has enabled FIP countries to identify major drivers of deforestation and shape investment outcomes towards them, focusing on cross-sectoral linkages in forest-related sectors. FIP has also developed a Dedicated Grant Mechanism (DGM) for Indigenous Peoples and Local Communities (IPLCs), providing a role for IPLC organisations to develop and implement their own actions with the aim of reducing deforestation and forest degradation.

- Efficient coordination and collaboration between MDBs, governments and national stakeholders have established or strengthened the strategic relevance of the country IP preparation by bringing all actors into the planning process, and this in turn has helped to keep activities relevant through IP implementation.
- Adopting a national systems approach where the context, drivers and barriers to forest conservation are identified in the FIP IP has been key to secure action at scale, as documented in Brazil and Burkina Faso.

Findings on FIP outcomes

- New partnerships have been formed to improve forest and agricultural management practices. This institutional cooperation across government agencies has helped to bring together sectors that are impacted by, or that possibly drive, deforestation and land-use change to find cross-sectoral solutions. Such partnerships appear to promote ownership and bring about economic gain at the local level, as demonstrated in Ghana and Mexico.
- FIP capacity-building activities, together with the deployment of financial instruments,

2 Reduced Emissions from Deforestation and Forest Degradation (REDD+).

has helped to shift market perceptions by showcasing the synergies between the agriculture and forest sectors. Documented evidence of this comes from Mexico and Brazil.
- In Brazil, Burkina Faso, Democratic Republic of Congo (DRC), Indonesia and Peru, the DGM is showing it is possible to empower and acknowledge the value of IPLCs, while promoting natural resource management.
- The likelihood of sustainability of FIP investments has been strengthened by governments committing budgetary resources, introducing new fiscal measures and/or making legislative change to develop FIP initiatives deemed to be successful. Documented examples of such action come from Mexico, Brazil, Lao PDR and Burkina Faso.

Scaling Up Renewable Energy in Low Income Countries Program (SREP)

Findings on SREP design

SREP has aimed to create new economic opportunities and increase energy access and supply by investing in renewable energy in low-income countries. These investments were designed to be coupled with policy, regulatory and capacity-building activities to leverage both public- and private-sector strategies to speed up or deepen market maturity of both on-grid and off-grid energy sources.

- SREP has provided the opportunity for countries to adopt a systematic approach to energy sector development by assessing the full range of renewable technology options appropriate to the country context, often for the first time.
- The process of developing the SREP IP, through multi-stakeholder consultation, has facilitated governments' effective engagement with a wide range of stakeholders from the energy sector, as demonstrated in Kenya.
- SREP's support to micro- and mini-grids is expected to increase energy access significantly while bringing about broader socio-economic benefits, as documented in the Maldives and Rwanda.

Findings on SREP outcomes

- SREP has helped strengthen the enabling environment for accelerated renewable energy deployment in low-income countries, as demonstrated in Honduras and Tanzania.
- SREP interventions have activated processes that lower renewable energy deployment risks for both government and private sector, attracting developer and financier interest and follow-on investments. Country examples include Kenya, Ethiopia and Nepal.

Cross-cutting issues

The evidence synthesis provides insights into two cross-cutting issues: the first, on gender, applies across all four CIF programmes; the second highlights private sector transformation within the Strategic Climate Fund (SCF), particularly for the FIP and PPCR programmes. The role of the private sector as an important partner of the CTF and SREP (as private investors, project developers and businesses) is well established. However, for the other two SCF programmes (i.e. the PPCR and FIP) this role has perhaps been less visible.

Building gender considerations into CIF to bring about transformational change

- The importance of gender equality to transformational change has been recognised and incorporated into CTF planning frameworks, contributing to changing some country practices, as evidence from Viet Nam demonstrates.
- There is evidence of mainstreaming gender into the design of a wide range of SCF investments as a potential driver of transformational change in several countries, including Cambodia, Lao PDR and Nepal.

Private sector transformation in the SCF

- Climate risk information that directly caters to private sector needs, together with the provision of loan finance, has created incentives for private sector action, as documented in the energy sector in Tajikistan.
- A mixture of microfinance and risk-sharing mechanisms in countries such as Tajikistan

and Nepal has been key to transferring risks away from individuals and private companies in the agricultural sector, increasing private sector engagement in climate-resilient actions.
- The FIP portfolio emphasises investments that address financial barriers, such as limited financial services, which is leading to a transformation in opportunities for rural enterprises in Mexico.

Suggested ways forward

The evidence synthesis has identified several actions that CIF and the wider global climate finance community could take to foster transformational change.

Recommendations to foster transformational change

1. **CIF programme implementation over the next period should build on the experience and expertise gained during the first 10 years of CIF.** The comparative advantage of CIF has been an ability to work through a few MDBs in a targeted number of countries using concessional resources that can catalyse higher levels of investment to secure large-scale impact. This approach can continue to set it apart from other parts of the international climate finance architecture during programme and project implementation.
2. **Multi-stakeholder consultation, across government, private sector actors and civil society, is a key feature of the CIF programmatic approach and should be maintained throughout the implementation of country programmes and projects in all four CIF programmes.** This approach has changed the way some countries have planned their response to climate change. There is a need now to continue with this type of consultative engagement during programme implementation. The success of working through lead ministries responsible for strategic investment planning and financial management also needs to be maintained to secure this approach.
3. **CIF country programme planners and project implementers should assist in strengthening the planning for, and monitoring of, transformation.** This would entail developing more detailed country theories of change (ToCs) and ensuring that all investment projects are clearly aligned with these. The new national process within which this could be embedded is the Nationally Determined Contributions (NDC) reporting that countries are obliged to submit to the United Nations Framework Convention for Climate Change (UNFCCC).[3] CIF could support this new process by developing tools for programme planners and project implementers based on the concepts of transformational change developed so far (e.g. the four dimensions).
4. **CIF should continue the flexible use of its funds and retain high risk tolerance levels when considering the use of financial instruments to support transformation, especially for emerging or challenging technologies.** The CIF approach has been able to foster innovative country investment plans (IPs), programmes, projects and approaches to engender transformation. CIF should further explore ways in which it can continue to support innovation by providing financial instruments that address project types with higher levels of risk, which are often needed in complex and challenging contexts.

Recommendations on transformational knowledge gaps

The following recommendations address current transformation knowledge gaps, which need to be addressed to increase understanding of how transformational change happens.

5. **CIF should invest in further learning activities that address relevant knowledge gaps in the literature highlighted in the evidence synthesis:**
   a. The evidence base of transformational change in the FIP and SREP programmes remains very limited. From a portfolio perspective, the FIP programme disbursement is significantly ahead of the

3 The relevance of CIF in assisting countries to implement their NDC was raised at the October 2018 TCLP workshop.

SREP programme, but the evidence synthesis found a similar amount of publications that relate to transformational change for both programmes. This suggests that the FIP may be an insufficiently studied programme.

b. More learning studies about CIF outcomes are required, as the overall portfolio implementation nears its mid-point. A significant amount of the transformational change learning that the CIF experience could offer is yet to be captured (acknowledging the ongoing efforts of CIF knowledge activities). Such learning can usefully be grounded in the four dimensions and nine arenas of transformation developed by the Transformational Change Learning Partnership (TLCP).[4]
c. Important areas of the CIF experience currently under-represented in the literature on transformational change include the cross-cutting theme of gender, the Dedicated Private Sector Programs (DPSP) of the CTF and the Private Sector Set Asides (PSSAs) of the SCF.
d. There may be opportunities for across-CIF programme learning in-country. Several countries (e.g. Bangladesh, Cambodia, Honduras, Nepal and Zambia) have multiple CIF programmes, and future research could look to explore what (if any) in-country complementarities exist between the programmes.

6. **CIF should continue to promote a broad understanding of transformational change.** While the TCLP concepts and theory of transformational change were successfully tested in this evidence synthesis, the dimension of sustainability requires further study. In addition, further analysis of the trade-off between opportunities that offer the prospect of securing change quickly, compared to investing with a longer-term view would aid decision-making.
7. **The overall CIF portfolio provides an opportunity for more structured learning on transformational change, building on the existing Evaluation and Learning (E&L) Initiative.** Given that much of the portfolio is now in the project pipeline stage or under implementation, consideration could be given to embedding 'learning partners' – within countries or at the programme level – to play a targeted learning function. This would promote better understanding, more effective application and efficient learning focused on tracking transformational change.

4 See the CIF draft theory of transformational change in the introduction.

1 Introduction

1.1 Climate Investment Funds and transformational change

The purpose of this report is to provide an overview of evidence collated on transformational change in the context of the Climate Investment Funds (CIF). It covers findings from earlier papers of the Transformational Change Learning Partnership (TCLP), findings from the broader CIF Evaluation and Learning (E&L) Initiative, as well as research and analyses relevant to the theme of transformational change.

CIF was established in 2008 to provide scaled-up climate financing to developing countries to support transformational change towards low-carbon, climate-resilient development. Channelled through multilateral development banks (MDBs), CIF encompasses two funds: the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF), which includes three targeted programmes – the Forest Investment Program (FIP), the Pilot Program for Climate Resilience (PPCR) and the Program for Scaling Up Renewable Energy in Low Income Countries (SREP). Contributor countries to CIF have pledged more than $8.3 billion to fund preparatory activities and investments in over 70 countries. Securing the transformational change necessary to move the world to a low-carbon, climate-resilient future has been a central aim of CIF since its inception (World Bank, 2008). The first mention of 'transformation potential' appeared in the 2009 CTF investment criteria:

> In the context of the CTF, the term 'transformation potential' is defined as the extent to which the deployment, diffusion and transfer of technologies and the implementation of policy reforms result in significant reduction in emissions growth against a national, regional or sector baseline (CIF, 2009: 7).

A broader operational definition of transformational change in the context of international climate funds has taken time to evolve, with its systematic adoption considered to be just beginning by 2014 (Mersmann and Wehnert, 2014: 6). The TCLP was launched in April 2017, to foster a more systematic and robust understanding of the concept, both in the context of CIF and more generally (see Box 1). An initial outcome of the TCLP was the following working definition of transformational change:

> Transformational change involves 'strategic changes in targeted markets and other systems with large-scale, sustainable impacts that accelerate or shift the trajectory towards low-carbon

Box 1 The Transformational Change Learning Partnership

CIF's Evaluation and Learning (E&L) Initiative established the Transformational Change Learning Partnership (TCLP) in 2017. The overall purpose of the TCLP is to increase the transformative impact of CIF investments and those of other funds by establishing a more systematic and robust understanding of transformational change in the CIF context. It has done this through multi-stakeholder workshops – including representatives from CIF recipient countries, donors, MDBs, the CIF Administrative Unit and civil society organisation observers, as well as other climate funds, external think tanks and independent experts – to both inform and learn from evidence on transformational change.

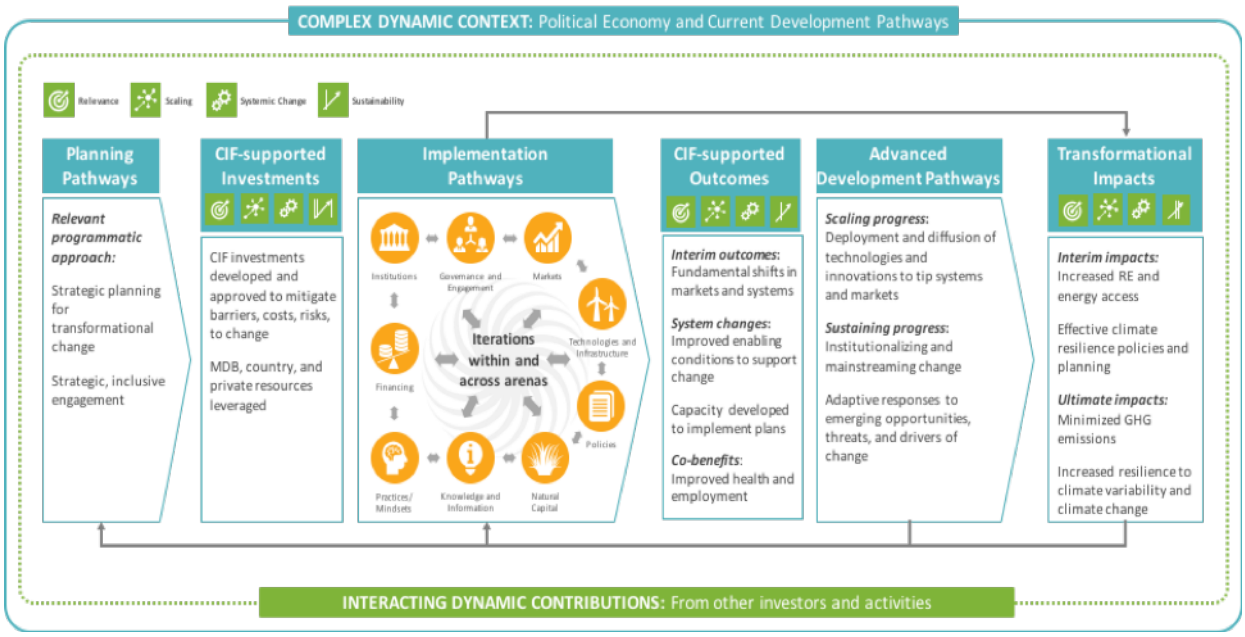
> and climate-resilient development' (Ross Strategic and Community Science, 2018: ii).[5]

The TCLP group developed additional concepts to further understanding, including identifying four dimensions of transformational change (relevance, systemic change, scale and sustainability). These dimensions describe the processes and impacts necessary to achieve transformational change and built on earlier work carried out by the Independent Evaluation Group of the World Bank Group (e.g. IEG, 2016) and the Independent Evaluation Office of the Global Environment Facility (e.g. GEF, 2017). A second conceptual grouping that was developed were arenas of intervention, which represent entry points for action that can enable or catalyse transformational change. Nine such arenas were identified through the TCLP process: financing; governance and engagement; institutions; knowledge and information; markets; natural capital; policies; practices and mindsets; and technologies and infrastructure. These concepts were all brought together in a unifying draft theory of transformational change (Figure 1).

Country context was recognised as being very important and so building on national climate change strategies and MDB country programming was considered key to CIF making an effective contribution towards transformational change.

2018 has seen a new phase of work by the TCLP: to evolve and deepen the understanding of transformational change. This has included an evaluation study of transformational change in CIF (Itad et al., 2018) and a multi-stakeholder facilitated learning process. Complementing these two strands of enquiry is this evidence synthesis that has collated information on transformational change from the TCLP E&L studies, as well as from other sources both within and outside CIF to augment the primary research carried out by the evaluation study. These three strands of work have been developed in a simultaneously reinforcing manner and have benefited from close interaction with the TCLP group. Two TCLP learning workshops were held: the first, in May 2018, included a review of the evidence synthesis methodology; and the second, in October 2018, provided an opportunity to present the results of the evidence synthesis to the

Figure 1 CIF draft theory of transformational change



Source: Transformational Change Learning Partnership.

5 Internal CIF report.

group and receive feedback prior to completion of this report.

1.2 Context within which CIF operates

CIF is part of an international response to the many challenges posed by climate change and operates globally across a wide range of countries, sectors and technologies. It supports actions carried out by an equally wide range of actors, reflecting the ambition of the CIF goal to contribute to the transformational change that will bring about a low-carbon, climate-resilient future.

Decarbonisation is a recognised global challenge facing all countries. Many initiatives involving collective action are now underway, requiring very considerable levels of financing (Meltzer, 2016; Abramskiehn et al., 2017). The need for this finance is driven by the fact that many countries have seen a massive scaling up of policy attention on climate change over the last 10 years (Asian Development Bank, 2017). This has led to a stronger enabling environment of national policies, strategies, regulations and institutions. CIF aims to support and influence these government-led processes and structures.

Climate change-related targets are now included in national policies across a range of sectors. These act as a major driver of reform, particularly in the energy sector. In many less developed countries, securing clean energy access is seen as being as much a development imperative as a climate change challenge; and in some emerging economies, moving away from an economic growth model based on fossil fuels is a significant challenge.

CIF investments operate in highly complex and dynamic contexts. Policy uncertainty raises the level of investment risk (Micale and Oliver, 2015) and political change can have a large impact on implementation programmes (ICF International, 2018). Economic conditions also matter: the post-2008 changes in global financial conditions significantly reduced both public budgets and private investment in many countries, reflecting a more challenging investment climate (Econoler, 2013). Social policies often give emphasis to the needs of vulnerable groups, including women (World Bank et al., 2015; Asian Development Bank, 2016). Hence, climate change actions may include poverty reduction and gender equality objectives, reflecting the inter-connectiveness between climate and development policy (Westholm and Arora-Jonsson, 2015). Environmental policies are often hampered by economic and financial assessments that continue to give less weight to non-markets costs and benefits (IIED and LTS, 2018).

Innovation and technological change can happen rapidly. This has been particularly characteristic of parts of the renewable energy sector over the last decade: including geothermal energy (Barnard and Nakhooda, 2014), off-grid solar power (Westphal and Thwaites, 2016) and concentrated solar power (CSP)(Boyd et al., 2014).

Most countries recognise the important role to be played by the private sector in the national response to climate change. However, the private sector is a broad term that includes enterprises across a wide range of scales – from micro, small and medium-sized enterprises (MSMEs) to major corporations (CIF, n.d.). Many MSMEs are in the informal sector and reaching such enterprises with traditional financial products is difficult (Watson and Patel, 2018). This increases the challenge of developing appropriate investment projects, which often require a range of partners and the deployment of several financial instruments (IIED and LTS, 2018).

The ambition of CIF-implementing MDBs to increase their financing of climate action has also increased significantly over the past decade, through both mitigation and adaptation investments (IED, 2014; Meltzer, 2018). This growing commitment has built on – and benefited from – their country experience with CIF (Nakhooda and Norman, 2014).

Hence, while each country context sets the boundaries for particular CIF investments at any one time, the overall global trajectory over the last 10 years is one of an increasing response to climate change by both the public and private sectors, as well as civil society. The challenge that CIF sets is to ensure that its contribution to such change is transformational.

1.3 Evidence synthesis approach

1.3.1 Analytical approach

Aligning with the TCLP's learning ethos, the objective of this evidence synthesis is to understand to what extent and how CIF is working to advance and contribute to transformational change. Guiding the learning objectives of the evidence synthesis are four learning questions developed as part of the TCLP process:

1. How is transformational change conceptualised in the field of international climate finance?
2. To what extent and how does CIF's approach to planning, designing and implementing its investments work to advance transformational change?
3. To what extent, how and under what conditions are CIF-supported investments and activities contributing to transformational change?
4. How can CIF and others increase their contributions to transformational change?

To answer these learning questions, a theory-based approach using the context-mechanism-outcome lens of inquiry has been used for the evidence synthesis, reflected in the way the evidence was extracted from the source documents (for more details see Annex 3). This approach aims to understand *how* change happens – specifically, how an intervention contributes to certain outcomes within a specific context – and is usually used to investigate complex issues, such as climate change, where linear attribution cannot be discerned. Complementing this approach is the testing of seven evaluation hypotheses, developed as part of the parallel evaluation study, that aim to explore major mechanisms through which CIF has contributed to transformational change (Annex 1 lists a full formulation of the evaluation hypotheses).

1.3.2 Limitations of the evidence synthesis

The evidence synthesis draws on relevant documented information, drawn primarily from 85 source documents (see literature reviewed section). The literature on transformational change in the CIF context is not large, with much of it having been commissioned recently by CIF or CIF implementing partners. There is a larger body of work describing CIF programmes and projects but this does not focus on change processes, nor attempt to explain how change happens. The evidence synthesis draws on published literature in the public domain; it has reviewed neither internal CIF project documentation nor internal MDB papers. Only papers in English are reviewed. With these caveats, the review of the published literature has attempted to be as comprehensive as possible. Annex 3 describes the methodological approach.

This situation, in part, reflects the status of the CIF portfolio. The investment phase of the four programmes is now mostly complete, yet project activity is at varying stages of implementation, with few completed projects (see portfolio summaries at the start of each programme section in Chapter 2). A huge amount of evidence is therefore being generated that will provide further insights into how, when and where transformational change has been supported by CIF. Recent findings of the evaluation report on transformational change in CIF have been incorporated into this evidence synthesis and, while providing supporting evidence, also indicate how much can still be explored.

Many publications focus on where progress has been strongest across CIF programmes and this evidence is fully captured in the evidence synthesis. Experiences of where progress is less clear are not as well documented, and the lack of such studies in this evidence synthesis is a known gap. This gap therefore introduces an uncertain positive bias to the findings and has reduced the opportunity to learn from experiences where progress has not happened as planned.

In reading the programme accounts, it is important to recognise that the amount of evidence available for this synthesis shows considerable variation between programmes (Table 1). In addition, two 'pulses' of publications by year can be discerned: in 2014 and 2018. These pulses appear to reflect funding cycles where analysts have had the opportunity to write about CIF. The CIF Evaluation and Learning Initiative, as well as other CIF knowledge activities, represent a large proportion

of the 2018 studies; the earlier pulse in 2014 was driven, in part, by multilateral and bilateral agency knowledge products.

All these constraints point to the limited evidence base on which conclusions can be drawn. The evidence synthesis findings therefore need to be interpreted in this context.

A theory-based approach to evidence synthesis is highly resource intensive because of the time needed to collect, screen and review information. This meant the synthesis team had to prioritise the extraction of evidence from all potential studies identified and screened. The highest priority information in the evidence synthesis database has been reviewed, with good progress made on lower priority publications, but it remains incomplete.[6] As for any theory-based investigation, the hope is that the evidence accumulated provides insights into how change has happened. This can then be taken up by others to add to the body of evidence and strengthen the findings, or improve on them.

For a relatively new field of investigation, this synthesis therefore represents a significant step in documenting transformational change in CIF.

1.4 Structure of the paper

Following this introduction, Chapter 2 first looks at how common features of CIF design have responded to known barriers to change. Findings across the four CIF programmes (CTF, PPCR, FIP and SREP) are then detailed, by programme design and outcomes. A short section presents evidence on two cross-cutting issues: (1) gender; and (2) private sector transformation in the SCF,[7] together with a brief analysis of the evidence base. Chapter 3 concludes the synthesis and lists recommendations relevant to transformational change in CIF. We list all reviewed papers from which evidence has been extracted and provide annexes including detailed CTF technology case studies and a description of the evidence synthesis methodology.

Table 1 Papers reviewed by programme and year of publication

CIF programme	2018	2017	2016	2015	2014	Earlier	Total
CTF	8	2	1	3	11	4	**29**
PPCR	3	1	3	5	12	3	**27**
FIP	6	2	0	3	4	0	**15**
SREP	5	1	0	2	6	0	**14**
Total	**22**	**6**	**4**	**13**	**33**	**7**	**85**

6 Table A3.1 (Annex 3) documents the number of publications from which evidence has been extracted, compared to the larger number of screened publications.

7 The private sector has been a stronger defining characteristic of the CTF and so features in that programme section of the evidence synthesis.

2 Findings

The evidence base on transformational change in the CIF context is limited. The results summarised in the following sections pick out themes for which there is supporting documented evidence. The key challenge faced in compiling this synthesis is that transformational change takes place within complex systems that extend considerably beyond individual project implementation, which is the focus of much reporting. Being dependent on secondary sources is a major limitation of this study, which should be borne in mind when reviewing these findings. However, the opportunity already mentioned to share and discuss the findings at a TCLP workshop, together with an extensive peer review process, gives us confidence that what follows represents progress being made by CIF towards designing for and contributing to, transformational change.

2.1 Climate Investment Funds design

2.1.1 Barriers to transformational change

Earlier work of the TCLP identified several barriers that all CIF programmes have had to address to advance transformational change (Ross Strategic and Community Science, 2018). Examples of the barriers relating to most of the evidence collated from the literature from across the CIF portfolio are cited below (see Figure 11). How CIF design processes have attempted to respond to these barriers is then described, first in general terms and then expanded on in each of the four programme sections.

Financial barriers

Several financial barriers relate to the underdevelopment of financial markets in many CIF partner countries, which means that businesses requiring debt finance for climate investments incur high interest rates and must accept short debt maturities (Stadelmann et al., 2014). For many domestic development finance institutions, climate-relevant projects often do not 'offer the returns needed for the institutions to consider investing' (Abramskiehn et al., 2017: 18).

The global context has also had an influence. CIF was established during a period of unprecedented economic turmoil, with the 2008 global financial crisis leading to a major turndown in many national economies. Few countries escaped these difficult economic conditions, which impacted CIF development in various ways.

Knowledge barriers

The reliability of climate data, particularly when collected in remote areas, cannot be guaranteed and temporal coverage is often incomplete. The development of downscaled models that could inform investments in climate change risk reduction is severely constrained as a result. In turn, this means that not enough knowledge or analysis of the key socio-economic vulnerabilities in relation to climate change have been generated at the local level (Asian Development Bank, 2017). More broadly, a lack of technical capacity at the national level to make data available to end users remains a challenge (Itad et al., 2018).

Several sources note that knowledge gaps hold back the private sector from investing in climate change action (e.g. IEG, 2016; Vivid Economics, 2016). The most important gaps relate to a lack of awareness of the climate change risks a business may face and lack of understanding of the technological and investment opportunities available (Vivid Economics, 2016; OneWorld and OPM, 2018a).

Regulatory barriers

Scaling up of demonstration projects can be held back in the absence of implementing regulations to support new technologies. Evidence of this comes from several countries, including Egypt and Indonesia (Westphal and Thwaites, 2016;

van den Akker, 2018a). Constraints associated with social policy are also cited in the literature. For example, government subsidies that cap the price of electricity to enable access for vulnerable groups may limit the opportunity for the entrance of new renewable technologies in the energy market (Rakhmadi and Sutiyono, 2015; van den Akker, 2018b).

Regulatory barriers can lead to differentiated outcomes by gender. For example women may be unable to secure formal title to land to act as collateral for credit (World Bank et al., 2015). More broadly, lack of an effective land tenure system is often cited as holding back investments in land-based initiatives (e.g. IIED and LTS, 2018).

Institutional barriers

Low technical and institutional capacity and high staff turnover within governments have affected the development and implementation of CIF country programmes at times. These factors are described as limiting the pace and quality of wider climate change programme development and the expansion of the public sector response to climate change in CIF pilot countries (Asian Development Bank, 2017; Itad et al., 2018). Underlying coordination challenges were reported as a constraint at the beginning of the PPCR (e.g. Seballos and Sonke, 2011; Shankland and Chambote, 2011). Likewise, meaningful inter-ministerial collaboration on FIP was reportedly held back in its early stages by limited information flows between relevant ministries (CIF, n.d.). Such inter-agency coordination challenges appear to continue to hold back change (Itad et al., 2018: 52).

2.1.2 CIF design response

Focusing on the goal of transformational change

Many internationally supported climate change project interventions bring about incremental change: the challenge that CIF set itself was to make a contribution to transformational change. Reviews of programme design highlight that this transformation goal is present in CIF programme documentation, demonstrating this intent. For example, in their 2018 CIF portfolio analysis, Ross Strategic and Community Science note: 'CIF investment plans and project documents generally do an effective job of addressing transformational change concepts, suggesting there is concentrated attention to advancing transformational change' (Ross Strategic and Community Science, 2018: iii).[8]

Securing change at scale is one of the four dimensions of transformational change, with accelerated large-scale change the intended impact. The scale of investment has been a defining feature of CIF programmes and projects from the beginning (Nakhooda and Norman, 2014; Amerasinghe et al., 2017). Also, CIF investment programmes have often been designed to complement MDB development programming in the pilot countries and vice versa, offering scope for scaling and sustainability (Barnard and Nakhooda, 2014; Trujillo et al., 2014).

Promoting inclusive planning

The development of programmatic country investment plans (IPs) lies at the core of the CIF approach and has set it apart from other international climate funds. The programmatic approach aims to ensure that CIF investments respond to nationally determined needs and contribute to locally owned development plans (Rai et al., 2015). By taking a whole-of-economy systems approach across the dimensions of transformational change, the programmatic approach aims to increase the likelihood of transformational change happening. In the 2018 evaluation of the CIF programmatic approach, ICF International define the approach as:

> The CIF programmatic approach encompasses the development and implementation of a country-led IP – supported by MDB collaboration, informed by multi-stakeholder consultation and associated with a predictable and flexible resource envelope – that sets out strategically linked investments, unified by a transformative vision (ICF International, 2018: vii).

8 Internal CIF report.

At the national level, engagement with finance, planning and line ministries, as well as private sector and civil society actors, has been a characteristic of CTF and all three SCF programmes (Asian Development Bank, 2017). Multi-stakeholder national steering committees have supported CIF IPs (ICF International, 2014) and this inclusive governance is reflected at the global level in the CTF and SCF Trust Fund sub-committees (Wood and Martin, 2016). The FIP Dedicated Grant Mechanism (DGM) for Indigenous Peoples and Local Communities represents a CIF strategy that reaches out to sub-national actors to involve them as the direct counterparts in local level climate change actions (Douthwaite et al., 2018).

Monitoring and reporting also follows a collaborative approach (Roehrer and Kouadio, 2015), with some indicators reported as being embedded into national frameworks from an early stage (CIF, 2014e).

Planning for private sector action

Nakhooda and Norman (2014) and the World Bank (2018) both identify the CIF use of concessional lending, together with other financial instruments, as strategic devices to provide financial resources to engage the private sector in climate change action. Meltzer (2018) reports that MDB expertise and experience with the private sector in development activity has been strongly drawn upon to help design CIF engagement with the private sector. CIF has also employed targeted strategies to involve private sector actors in climate change actions from an early stage through the introduction of the Dedicated Private Sector Programs (DPSPs) in the CTF (Trabacchi et al., 2016; ICF International, 2018) and Private Sector Set Asides (PSSA) in the SCF (Vivid Economics, 2016). Several authors (e.g. Trabacchi and Mazza, 2015; IIED and LTS, 2018; OneWorld and OPM, 2018b) identify MDB engagement with national financial intermediaries as a strategy that CIF has adopted to reach MSMEs.

Addressing capacity constraints and knowledge gaps

CTF and the three SCF programmes have invested heavily in capacity-building efforts. For example, all SREP IPs are reported to include funding for capacity building of key stakeholders. FIP self-reporting indicates that 19% of sub-committee approved project spending is directed at capacity building, institutional strengthening and governance reform (CIF, forthcoming).[9] Equally, all PPCR countries have sought funding to strengthen the national climate services in their country IPs (Trujillo et al., 2014; Asian Development Bank, 2017). There are many country examples of CTF and PPCR-supported capacity building (e.g. Trabacchi and Stadelmann, 2016).

2.2 Clean Technology Fund (CTF)

2.2.1 CTF at the global level

CTF is a $5.6 billion fund established in 2008 to provide scaled-up financing to contribute to the demonstration, deployment and transfer of low-carbon technologies with a significant potential for long-term greenhouse gas (GHG) emission savings in developing countries. The programme operates in 15 countries and involves one regional programme – Concentrated Solar Power in the Middle East and North Africa – as well as three dedicated funding windows, the Dedicated Private Sector Programs (DPSP).[10]

By 30 June 2018:[11]

- 15 country IPs and the regional MENA-CSP programme IP have been endorsed by the CTF Sub-Committee.
- $5 billion has been approved by the CTF Sub-Committee for 130 projects and programmes, which are expected to mobilise $46 billion in co-financing from private and public sectors, MDBs and bilateral agencies. Private investors are the largest source of this co-financing, expected to contribute $16 billion.
- 98 projects have been approved by MDBs for a total of $4.6 billion. 80 projects are

9 CIF (forthcoming). FIP semi-annual operational and results report, second semester FY 2018. FIP/SC.21/3.

10 This evidence synthesis has identified a lack of information on transformational change as related to the DPSP.

11 CIF (forthcoming). CTF semi-annual operational report. November 2018. CTF/TFC.22/3.

receiving disbursement, for a cumulative amount of $2.2 billion.
- Eight projects have been completed (fully repaid) to date.[12]

Over the past 10 years, the global low-carbon energy landscape has evolved profoundly. When CTF started in 2008, deployment of utility-scale renewable energy in developing countries was very limited due to high technology costs and investment risks. This global context started transitioning with large-scale investments in renewable technologies, especially in wind and solar PV, which drove down technology costs and spurred investments in emerging markets. This, in turn, activated a virtuous cycle of further cost reductions through learning from economies of scale and further investment in technological development. Between 2004 and 2017, global cumulative investments in the low-carbon sector totalled $2.9 trillion, with investments in new renewable electricity far outstripping new investments in fossil fuel generation capacity in 2017 (Itad et al., 2018).

CTF has operated within this evolving global context, often leveraging these macro-trends and at times contributing to shaping them. The ways in which CTF has engaged with these trends and its partner countries, which are further described in this section, has made a noticeable contribution, notably in relation to innovative technologies such as CSP and geothermal, and to the low-carbon development trajectory of some middle-income countries (see Box 2).

CTF in the literature

The CTF evidence synthesis draws principally on 29 source documents (see Box 3). Several publications date from 2014, with eight new studies in 2018. These sources are supplemented by a small number of interviews with relevant stakeholders engaged in transformational processes within the programme.[13]

CTF features the richest amount of evidence on transformational change among CIF programmes. This may be a function of the initial programme approach to establish projects quickly in participating countries, which has

Box 2 CTF: Key findings

CTF has been designed for, and has contributed to, transformational change through its investments and activities. In terms of the four dimensions of transformational change, the synthesis has found fairly strong signs of scaling processes and outcomes happening in the CTF portfolio, involving reduction of deployment costs for renewables, replication of investments and models by the private sector, large-scale capacity increases, and a shift to non-concessional finance. This scaling evidence is especially strong for deployment of 'conventional' renewable energy technologies, such as wind and solar, and in countries where favourable, pre-existing enabling environments and/or strong political support existed.

Evidence of systemic change and sustainability has also been identified in the literature, although to a lesser extent than scaling. There are instances where strong signals of new market dynamics, business models and supply chains (i.e. market-based approaches) have already become self-sustaining, such as for the wind and solar PV sectors in certain countries. This evidence was, however, less certain for newer renewable technologies, such as CSP and geothermal.

A distinctive attribute of the CTF in-country approach has been the strategic timing of investments and a learning-by-doing attitude which have increased the likelihood of engendering or accelerating transformational change.

12 CIF (2017a) CTF results report. 5 December 2017. CTF/TFC.20/4/Rev.1.

13 Interviews to clarify key ambiguities found in the literature were carried out in November 2018.

llowed for more learning to be generated and recorded in the literature.

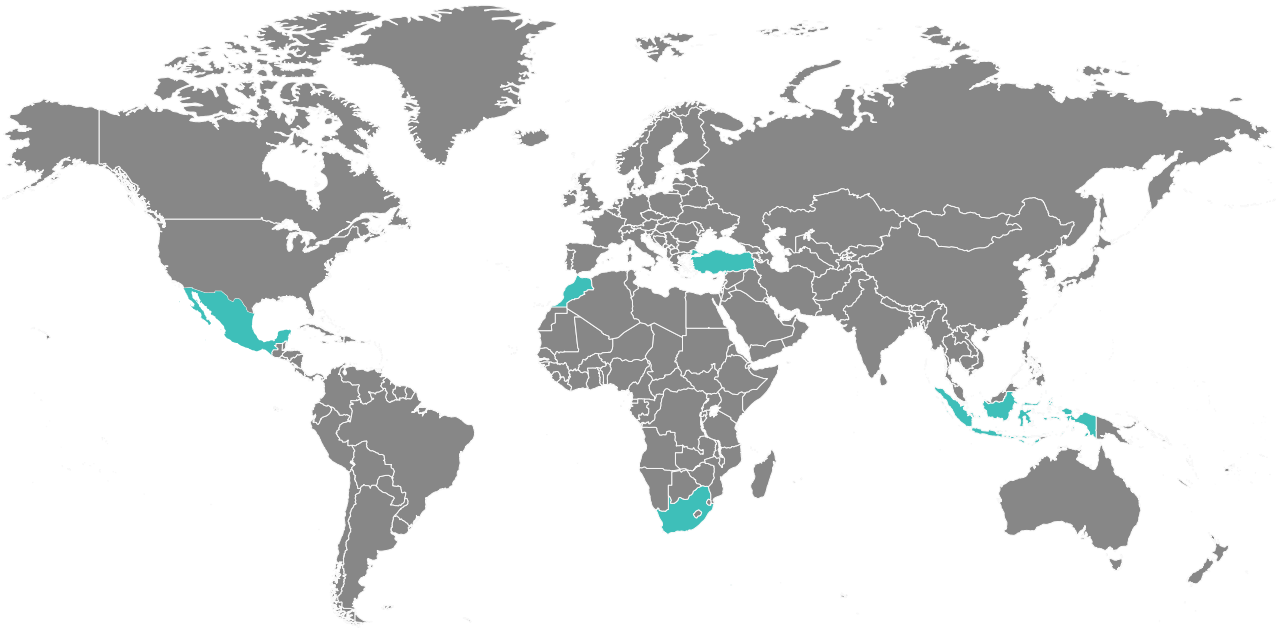
The experiences of Mexico, Turkey and Morocco stand out in this evidence base. These three countries were part of the original group of nine countries whose IPs were endorsed in 2009 and where CTF investments have generated results that have been considered successful by CIF and the broader international climate finance community.

Box 3 CTF: Evidence base

van den Akker (2018a)
van den Akker (2018b)
ICF International (2018)
Meltzer (2018)
Retallack et al. (2018a)
Retallack et al. (2018b)
Ross Strategic and Community Science (2018)
World Bank (2018)
Abramskiehn et al. (2017)
Amerasinghe et al. (2017)
Westphal and Thwaites (2016)
Climate Investment Funds (2015b)
Micale and Oliver (2015)
Rakhmadi and Sutiyono (2015)
Amin et al. (2014)
Boyd et al. (2014)
Climate Investment Funds (2014c)
ICF International (2014)
International Finance Corporation (2014a)
International Finance Corporation (2014b)
International Finance Corporation (2014c)
Nakhooda and Norman (2014)
Office of Evaluation and Oversight (2014)
Stadelmann et al. (2014)
Whitley et al. (2014)
Econoler (2013)
Climate Investment Funds (2013)
Falconer and Frisari (2012)
Climate Investment Funds (2011)

Note: for the full citation of these reports, please refer to the literature reviewed section.

Figure 2 CTF country evidence of transformational change



Note: five countries provide the largest quantity of relevant evidence within the studies analysed: Indonesia, Mexico, Morocco, South Africa and Turkey.
Source: ODI.

2.2.2 Findings on CTF design

CTF was set up with an overall transformation objective of supporting the creation of, or transition to, low-carbon economies by experimenting and learning from large investments in innovative low-carbon technologies. This effort was focused in a small number of countries where there was potential to achieve large-scale GHG emission reductions. The transformation objective was to be achieved by catalysing replication and the scale-up of private investments and ultimately the phase out of reliance on concessional international climate finance.

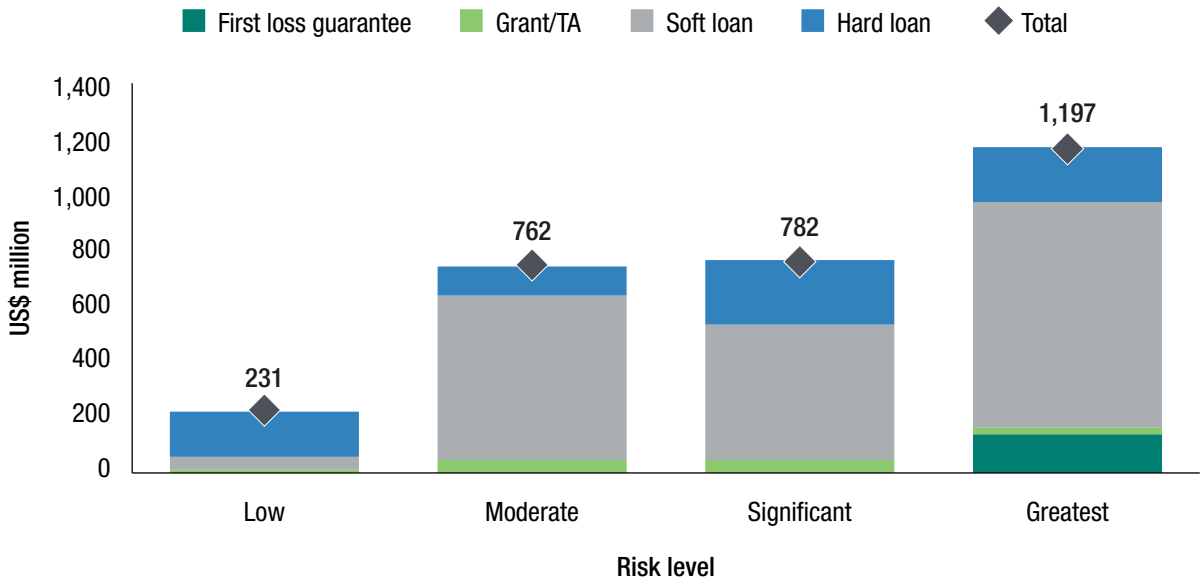
The reviewed literature points at several features that have enabled CTF to pursue this objective. These include: (1) the capacity of investing large sums in innovative renewable energy technologies; (2) the use of a programmatic approach for country investment planning to address transformational change; (3) working in partnership with MDBs and other funders to improve countries' enabling environment for transformation; and (4) strategically leveraging ongoing processes of transformation in certain countries to achieve accelerated and scaled-up progress, especially in those countries with favourable enabling environments and political support.

CTF is achieving its objective of investing large sums in innovative, higher-risk technologies in a small number of countries where strategic opportunities exist. CTF has concentrated its funding in 15 countries instead of spreading it thinly across many recipients. This has allowed CTF to invest hundreds of millions of dollars in single projects, with the average portfolio investment amounting to $49 million, seven times higher than the average project size of other multilateral climate funds (Amerasinghe et al., 2017). Investing larger sums has enabled CTF to support commercially unproven low-carbon technologies, contributing to their de-risking, knowledge generation and cost decrease globally in the case of CSP and to their de-risking and feasibility in Indonesia and Kenya in the case of geothermal (Rakhmadi and Sutiyono, 2015; van den Akker, 2018b).

- In terms of CSP, as of December 2017, the CTF had allocated 22% of its portfolio ($900 million) to CSP projects in middle-income countries (Climate Investment Funds, 2017a). While global deployment had mainly been driven by the US and Spain, more recently Morocco and South Africa, who have received CTF funding for CSP, have emerged as growth markets. This has contributed to decreasing the CSP's levelised cost of energy by 33% since 2010, to a global weighted average of $0.22 per kWh in 2017, with some auctions for plants to be commissioned in 2020 achieving purchasing power agreements ranging between $0.06 and 0.10 per kWh – well within fossil fuel cost range (IRENA, 2018: 15 and 35).
- In terms of geothermal energy, as of December 2017 CTF had plans to invest $810 million to support deployment of this technology (Climate Investment Funds, 2017a). Much of this money is targeting the riskiest stage of early exploration in geothermal deployment, which makes CTF a unique actor in global geothermal energy, as the vast majority (84%) of international financial institutions shy away from early exploration risks to focus on the less risky stages of project development (Micale and Oliver, 2015). MDB and recipient government officials interviewed for the evaluation of transformational change in CIF (Itad et al., 2018) widely recognised the important role that CTF has played in shifting more MDB funding towards the upstream, higher-risk stages of geothermal deployment. In fact, since 2013, multilateral financing for upstream activities grew from 6.7% to 29.2%, with projects in more than 30 countries (Itad et al., 2018). According to World Bank officials interviewed for the evaluation, these projects are expected to mobilise additional funding of $1.5 billion from other sources.

Meltzer (2018) demonstrated that the bulk of CTF investments has gone towards the higher-risk projects in the investment portfolio and vice versa; projects having the lowest risk

Figure 3 CTF public sector project investments by risk level



Source: based on Meltzer (2018).

make up the smallest share in the portfolio (Figure 3).[14]

Meltzer also showed that the concessionality of CTF funding increased as the project risk increased: projects with higher-risk profiles received more CTF soft loans, grants and first loss guarantees, as opposed to low risk projects which received the least.[15] The use of higher concessionality in the riskiest projects was successful in attracting co-financing, both from other public institutions (i.e. recipient governments, MDBs, bilateral donors) and the private sector, with public/private co-financing ratios increasing as project risk increased (Figure 4). Nevertheless, Meltzer cautions against overinterpreting these findings, as there are always information asymmetries about the level of investment risk that the private sector is willing to bear, and thus the level of public support required, which means that private investors may have funded some of those projects anyway.

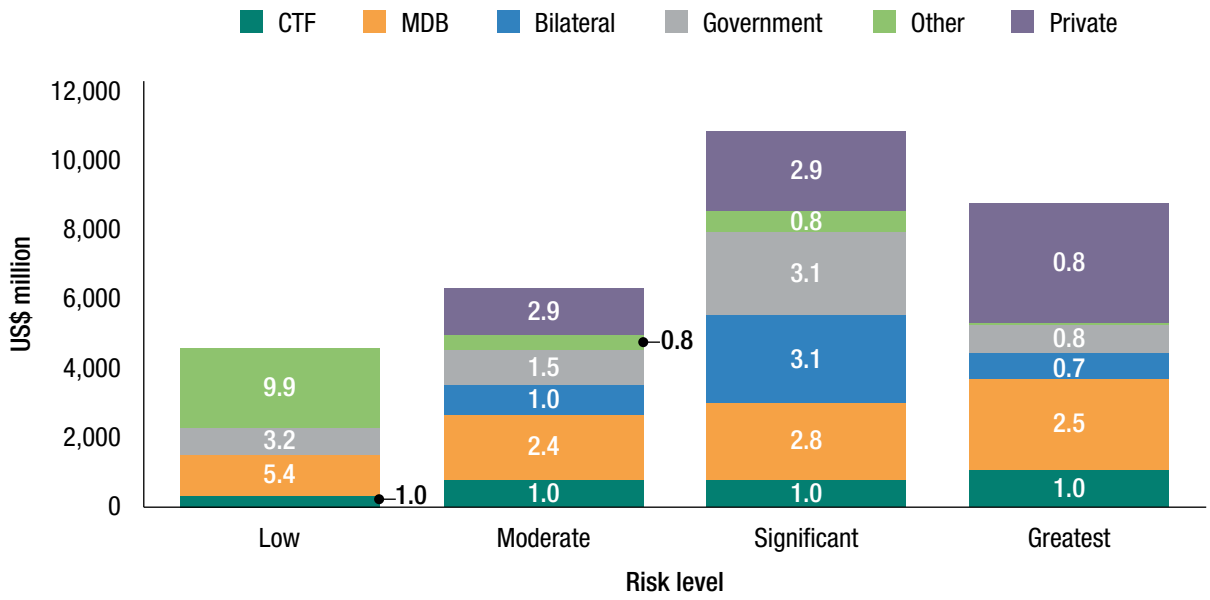
The CTF programmatic approach has engendered increased transformational processes and investments through system changes. CIF was the first climate fund to use a programmatic national investment planning approach as its primary delivery modality. ICF International and Itad et al. report that most stakeholders interviewed for their 2018 evaluations (of the CIF programmatic approach and transformational change in CIF, respectively) agreed that the momentum gained through the programmatic planning process, along with the certainty and flexibility of the large CTF resource envelope, facilitated the design of innovative, sometimes first-of-a-kind, energy efficiency projects, such as in Mexico and Turkey.

At the same time, the programmatic approach has contributed to creating more strategic private/public sector linkages than usually observed in country and MDB programming – around 30% of MDB-approved resources in the CTF are direct private sector investments (ICF International, 2018). This has happened, albeit not extensively, by strengthening the perspective of private investors and project developers in public

14 Allocation of finance and investment risk levels are tentative, as the allocation of a risk level to a given investment takes into account local and project-specific factors that limit the ability to compare risk levels across investments (Meltzer, 2018: 25).

15 The CTF provides highly concessional soft loans for projects with negative rates of return, or below market threshold, whereas hard loans are given to projects with rates of return near normal market threshold but below risk premiums for project type, technology, country, or acceleration in deploying low-carbon technology (Meltzer, 2018: vi).

Figure 4 CTF public sector projects co-financing ratios



CTF:Other public:Private	1:18.5:0	1:5.3:1.8	1:9.8:2.9	1:4:3.3
Public:Private	n/a	1:0.3	1:0.3	1:0.6

Source: Meltzer (2018).

policy-making, which has at times resulted in more conducive enabling environments for low-carbon transformation, such as in Chile, Mexico, Colombia and Thailand (ICF International, 2018).

The 2018 desk analysis of the CIF portfolio found that country IPs and project documents target sectors, sub-sectors and technologies that have potential to advance progress towards large reductions in GHG emissions. Yet, while most documents claim to support deployment of low-carbon technologies beyond the one-off project, the level of detail provided on how to scale up, replicate and ensure the sustainability of changes introduced by investments varies greatly (Ross Strategic and Community Science, 2018). A similar criticism can be found in the earlier 2014 Independent Evaluation of CIF, which argued that many CTF IPs and projects' ToC did not credibly demonstrate pathways to transformation (ICF International, 2014). Part of this can be explained by the fact that ToC relating to transformational change were not developed when CTF began programming.

CTF has supported countries' enabling environments for transformational change with concessional finance that complements and leverages MDBs and bilateral donors' technical assistance on policy, institutional and regulatory work.

Ensuring systemic and sustainable change to low-carbon activities requires the establishment of clear policy and regulatory frameworks and the enhancement of institutional capacity to follow through on implementation (Ross Strategic and Community Science, 2018). CTF was earlier criticised for giving uneven and insufficient attention to policies, regulations and institutional arrangements and capacity, with few IPs directly addressing the regulatory and policy environment and project designs not addressing underlying pricing and subsidy barriers (ICF International, 2014). This was believed to result in investments that faced implementation challenges and substantial delays, affecting the potential for transformation (Nakhooda and Norman, 2014).

However, this criticism is not reflected in the evidence collated during the present synthesis, perhaps reflecting broader experience in the more recent literature. While it is true that CTF's main mode of engagement has been the provision of concessional finance, its investments, through MDB technical assistance and financing of in-country actors, have supported work in arenas of intervention that improve countries' enabling environment for transformational change. Moreover, CTF funding, like the other CIF programmes, is by design delivered through the MDBs. The MDBs have a cascading principle for investment allocation, which favours 'upstream' intervention to improve enabling environments before resorting to providing risk-bearing or risk-sharing instruments (such as guarantees and credit enhancements) or making concessional loans (Meltzer, 2018).

2.2.3 Findings on CTF outcomes

The following analysis is a synthesis of the detailed case studies of transformation provided in Annex 2. Reading these case studies is recommended for a deeper and nuanced understanding of the pathways of transformation that CTF interventions have supported.

CTF interventions have been strategically timed to accelerate, scale up and deepen transformational processes and outcomes, as demonstrated in Mexico and Turkey.

- The Mexican wind power sector was already undergoing a process of transformation before the global financial crisis in 2008. Several regulatory and policy changes were created throughout the 2000s to stimulate renewable energy deployment, including laws that allowed independent power generators to sell electricity to private offtakers, favourable tax rules to lower borrowing costs of projects and ambitious renewable energy targets (IRENA, 2015). This favourable enabling environment brought about a pipeline of wind energy projects reaching financial closure, which, however, saw their debt funding rescinded as the global financial crisis hit.
- In this difficult context, the CTF intervention proved to be strategically timed. As confirmed by the International Renewable Energy Agency's (IRENA) independent analysis (in International Finance Corporation, 2014a), draft findings of Bloomberg New Energy Finance's study on CTF (Bloomberg New Energy Finance, 2018), and the evaluation of transformational change in CIF (Itad et al., 2018), the CTF and MDB's bridging investment was pivotal in restoring the confidence of financial intermediaries to provide debt financing again, thus resuming the deployment of wind power technology.
- This CTF investment also contributed to accelerating and deepening the growth of the wind market by attracting an ever-increasing number of private investors. In 2012, Mexico became the first country in Latin America to attract $298 million debt financing from international pension funds, insurance companies and hedge funds – usually among the most risk-averse investors – to refinance Acciona Energía México's 204 MW Oaxaca II and IV wind farms (International Finance Corporation, 2014a). In 2015, the issuance by Nacional Financiera (NAFIN), the national development bank, of the country's first green bond for wind projects was met by investor demand five times higher than the size of the offering of $500 million, due to high returns. This led NAFIN to issue a second offering in the following year – this time in local currency – worth $100 million (Abramskiehn et al., 2017).
- In Turkey, CTF leveraged existing country strengths and MDB engagement by financing the Turkish Sustainable Energy Financing Facility (TurSEFF) and the Turkey Commercialising Sustainable Energy Finance (CSEF) programme. Both programmes strategically targeted small and medium-sized enterprises (SMEs), a segment of the market with strong demand for intermediated energy efficiency. In the case of TurSEFF, big intermediary banks, with deep branch networks and focused on SMEs as their client base, were selected for the programme, whereas CSEF leveraged the deep networks that leasing companies had established with SMEs since the 1980s (Retallack et al., 2018). Both programmes successfully scaled up deployment of energy efficiency

technologies by attracting follow-on credit lines from participating intermediaries on fully commercial terms (Econoler, 2013; Itad et al., 2018; Retallack et al., 2018). Moreover, the TurSEFF business model has spawned further, more specialised versions of itself: the third iteration of TurSEFF was created without concessional finance, the TuREEFF facility targets the residential sector and the Mid-size Sustainable Energy Financing Facility (MidSEFF) focuses on bigger investments, of between €5 and €50 million (Retallack et al., 2018).

Scaling is faster in CTF-supported interventions in increasingly cost-competitive renewable technologies, such as wind or solar PV in Mexico and Thailand, when compared to CTF investments in less cost-competitive technologies, such as geothermal in Indonesia.

The success of early solar farms supported by CTF finance contributed to the rapid, privately-driven development of the solar PV market in Thailand (IFC, 2014b). The 2018 desk analysis of the CIF portfolio (Ross Strategic and Community Science, 2018) stated that 'Solar PV and wind energy technologies are reported across the CTF portfolio to be closer to cost tipping points than geothermal and CSP technologies, affecting project financing strategies' (p. 26). There are also reports that the solar PV market in Mexico, and the wind power market in both Mexico and Thailand, are functioning solely on commercial terms (Westphal and Thwaites, 2016; Abramskiehn et al., 2017; van den Akker, 2018a), with Thailand's solar PV sector approaching the tipping point where costs for new solar PV plants compare to those for new fossil fuel plants (Itad et al., 2018).

In contrast, scaling pathways of CTF-supported CSP power in Morocco and geothermal energy in Indonesia appear more uncertain. While the CTF has spurred considerable scaling of CSP power in Morocco, public and private stakeholders interviewed for the evaluation of transformational change in CIF have expressed uncertainty whether CSP would form a significant part of Morocco's future added capacity, given the lower cost of wind energy and the potential of future cost-effective energy storage at scale (Itad et al., 2018).

In Indonesia, it is uncertain whether the level of private investment – 20% private debt and 27% private equity (Rakhmadi and Sutiyono, 2015)[16] – can be replicated in future projects, due to the fact that the first developer of Sarulla had already carried out significant exploration work, before the project was re-tendered to the current developer (Rakhmadi and Sutiyono, 2015). No evidence was found that geothermal deployment could be fully private-led in Indonesia, reflecting a global challenge affecting the sector rather than just an Indonesian challenge (Micale and Oliver, 2015).

CTF investments have supported the deployment of innovative technologies, such as CSP, by responding to the enabling environment, particularly where this is associated with strong political commitment. The experience of Morocco shows that when seeking to deploy unproven and technically challenging technologies, strong political support seems to be an important contributor to positive outcomes. This support materialised in Morocco in several measures:

- A highly ambitious national strategy for solar development: the 2009 Moroccan Solar Plan set a target for solar energy of 2 gigawatts (GW) by 2020; more recent targets have set 5 GW by 2030, with overall renewable energy at 52% of total capacity.
- The creation of MASEN, which acts as a project developer, equity owner, debt provider and power purchaser in all public offtake CSP projects. This implies that the state took on high levels of project risks by having MASEN assume such roles.

The World Bank (2018) draft study, *Mobilizing commercial finance for grid connected solar projects. Lessons and experience from 7 countries,* reports that the 'the Moroccan Solar Plan benefited from strong and unwavering political support at the highest levels' (p. 68). Drawing together lessons from CSP deployment in several

16 The share of private actor investment is based on data from 2015, as found in Rakhmadi and Sutiyono (2015: 17).

countries, Stadelmann et al. corroborate this finding, arguing that:

'International public finance should focus on countries with high political willingness to deploy CSP and a need for external support. This means that IFI finance should not necessarily be focused on countries with the highest solar resource potential; indeed, we found situations where solar-rich countries either do not advance their CSP plans (several North African countries) or are anyway able to pay for CSP on their own (United Arab Emirates); in both cases IFI finance would not be effective. IFI finance has most successfully driven CSP deployment where national policy-makers committed financial resources early on, such as in India and Morocco' (Stadelmann et al., 2014: 11).

This compares well with the experience of Indonesia, where it seems that 'a lack of strong leadership inhibited the development of geothermal power in Indonesia for many years' (Westphal and Thwaites, 2016: 25), although more recently regulatory and policy reforms have attempted to encourage faster development.

CTF has supported transformational processes through a learning-by-doing approach, recognising the non-linear and often unpredictable nature of systems transformation, as evidenced by the South African public sector CSP endeavour. This is reflected in the broader experience of CTF IP reallocations, emphasising the importance of flexibility and adaptive programming.

- The CTF-supported Eskom CSP project in Upington, South Africa was the cornerstone of the government plan to demonstrate the feasibility of renewable CSP power in the country and drive the deployment of the technology further (Boyd et al., 2014). The recent cancellation of the project in its original form suggests a missed opportunity.[17] However, a more nuanced interpretation points at the complex and often unpredictable nature of transformational change. Interviews with stakeholders familiar with the project suggested that by supporting both the public Eskom CSP project and the first two privately financed CSP projects in the Renewable Energy Independent Power Producer Procurement Program (REIPPP), CTF was de facto hedging the risks of CSP deployment in South Africa.[18] After the two private sector led projects came online in 2015, other privately financed CSP plants were built in the country, indicating market interest and a certain critical mass behind the technology.

This suggested approach taken by CTF reflects an important, broader principle of CIF – learning-by-doing – which can be observed in other areas of CIF's work. For instance, CIF has had a particularly important influence on MDBs' learning-by-doing on blended finance structures. CIF has helped MDBs develop and test new products and learn lessons by piloting innovative instruments and concepts, which over time have increased the MDBs' sophistication in calibrating concessionality within blended finance (Itad et al., 2018).

Evidence of transformational outcomes has yet to be documented for CTF projects in the transport sector. These projects have generated 1% of the cumulative emissions reductions in the CTF portfolio, while representing 10% of cumulative portfolio investments (CIF, 2017b). This does not mean that evidence of transformation does not exist, but it likely reflects the challenges of providing economical low-carbon transportation (Itad et al., 2018). Available evidence also reflects a bias in the literature that tends to document what have been deemed 'success stories'; the absence of transport examples might indicate that those projects have yet to demonstrate success.

2.3 Pilot Program for Climate Resilience (PPCR)

2.3.1 PPCR at the global level

PPCR is a $1.2 billion programme of SCF, established in 2008 to support developing countries and regions to build their resilience to the impacts of climate change. Since then, it

17 See www.iol.co.za/business-report/energy/eskom-scraps-solar-power-plant-in-northern-cape-16243108.

18 Interviews were carried out because no secondary data explaining the change process behind the project was available.

Box 4 PPCR: Key findings

The SPCR process has led to a step change in national adaptation planning in the pilot countries, with subsequent PPCR investments securing important early implementation experience. As global interest in climate change adaptation builds, the early actions of the PPCR already offer lesson learning opportunities.

In terms of how the PPCR approach to planning, design and implementation is advancing transformational change, three findings stand out:

1. Adopting a programmatic approach has been fundamental to securing multi-sector engagement for planning climate-resilient actions.
2. Working through national leadership structures that have the mandate to coordinate actions across government has built ownership over the national resilience portfolio.
3. Recognition of the sensitivity required to build on existing national processes in an effective way has increased the potential for rapid progress.

PPCR has significantly contributed to achieving transformational change through the scaling of funding available for climate-resilient investments. For every dollar invested by the PPCR an additional two dollars have been raised by the MDBs, national governments and other co-financing partners. This has helped bring about climate-resilient action at scale. Equally, there are visible signs of systemic change in the PPCR portfolio, with strengthened knowledge systems that have raised awareness on both vulnerability to climate change and the actions required to address it, to unprecedented levels compared to a decade ago.

has provided financing to pilot and demonstrate ways to integrate climate risk management and adaptation objectives into core development planning (see Box 4).

Twenty-eight countries and two regions participate in the PPCR. Investment planning is now complete, with the preparation of 30 IPs, termed Strategic Programs for Climate Resilience (SPCRs). The PPCR has therefore entered its implementation phase, with a total pipeline of 64 projects, of which 54 are currently operational and disbursing PPCR funds. Five projects are complete.[19] With projects at various stages of implementation, there is a growing body of evidence on programme and project experience.

When it was established in 2008, the PPCR was a major innovation in the climate adaptation finance landscape (Trujillo et al., 2014). It was the first initiative for climate resilience to bring together multiple sectors in a country to engage in resilience planning at the highest levels of government (CIF, 2015b). Funds pledged to the PPCR have exceeded those pledged to the Adaptation Fund, the Special Climate Change Fund and the Least Developed Countries Fund combined. On average, the size of PPCR-approved investments has been more than three times the size of a Special Climate Change Fund project: $15.8 million versus $4.6 million (Amerasinghe et al., 2017).

The PPCR results framework has advanced global understanding on how climate resilience can be monitored and evaluated. This has influenced other climate funds to mainstream delivery parameters and objectives into their frameworks. There is also a growing emphasis on learning from the practical experiences of the PPCR at individual project and transaction level, including a positive influence on the development of the Green Climate Fund (GCF), which is now a major provider of adaptation finance (ICF International, 2018).

2.3.2 PPCR in the literature

The evidence synthesis draws on 27 source documents for the PPCR (see Box 5). Recent

19 CIF (forthcoming). PPCR operations and results report. December 2018. PPCR/SC.23/3.

publications are scarce for this CIF programme, with many publications reviewed dating from several years ago.

Two countries stand out in terms of number of publications: Nepal and Tajikistan, although the reasons for this are not clear. The evidence base on the PPCR for most of the remaining pilot countries is limited.

2.3.3 Findings on PPCR design

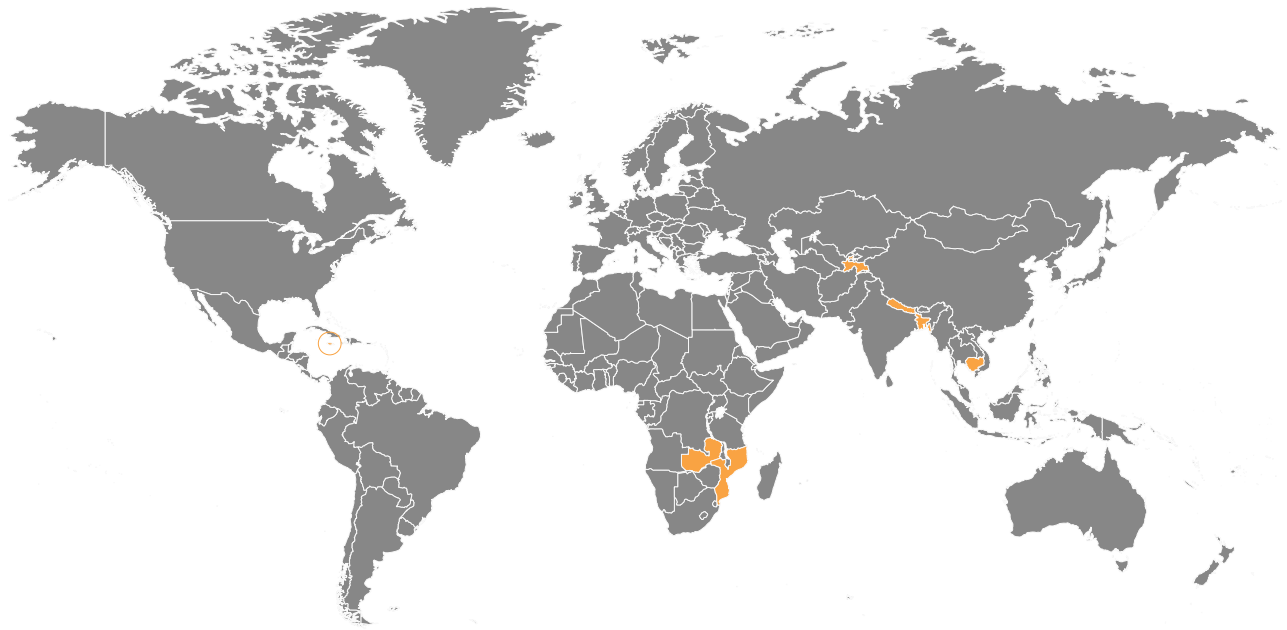
The PPCR's design approach has aimed to establish a common, multi-sectoral vision for

Box 5 PPCR: Evidence base

ICF International (2018)
OneWorld and OPM (2018)
Ross Strategic and Community Science (2018)
Asian Development Bank (2017)
Meltzer (2016)
Trabacchi and Stadelmann (2016)
Vivid Economics (2016)
Climate Investment Funds (2015b)
Climate Investment Funds (2015c)
Rai et al. (2015)
Roehrer and Kouadio (2015)
Trabacchi and Mazza (2015)
Arnold et al. (2014)
Asian Development Bank (2014)
Baral and Chhetri (2014)
Climate Investment Funds (2014a)
ICF International (2014)
Independent Evaluation Department (2014)
Kust et al. (2014)
Nakhooda and Norman (2014)
Office of Evaluation and Oversight (2014)
Trujillo et al. (2014)
Vivid Economics (2014)
Whitley et al. (2014)
Rai and Smith (2013)
Seballos and Kreft (2011)
Shankland and Chambote (2011)

Note: for the full citation of these reports, please refer to the literature reviewed section.

Figure 5 PPCR country evidence of transformational change



Note: seven countries provide the largest quantity of relevant evidence within the studies analysed: Bangladesh, Cambodia, Mozambique, Jamaica, Nepal, Tajikistan and Zambia.
Source: ODI.

climate resilience aligned with the national development priorities of each pilot country. When it started, this type of engagement was new, particularly for those countries where climate change adaptation activities were just beginning.

The programmatic approach has changed the way that countries such as Tajikistan and Cambodia approach climate resilience, providing the first opportunities to adopt a multi-sectoral approach, therefore advancing the national enabling environment for climate-resilient investments.

The PPCR approach of developing Strategic Programs for Climate Resilience (SPCRs) was designed to address multiple barriers to advance systemic change (ICF International, 2018). The grant finance used to develop these country IPs helped establish high-level institutional mechanisms in several countries, with benefits in terms of technical assistance, increased knowledge, new analytical work, awareness raising and capacity development. These benefits were soon recognised as helping to advance the enabling environment for climate-resilience investments (Trujillo et al., 2014).

The PPCR has played a particularly catalytic role in countries whose adaptation planning was nascent, such as Tajikistan, where the PPCR stimulated a new national planning process and supported several initiatives based on an emerging understanding of the country's vulnerabilities and the advantages of building national and local resilience (ICF International, 2014). This was also the case in Cambodia, where most stakeholders, particularly the government, acknowledge that the SPCR preparation and the investment projects have: strengthened government coordination; sustained policy dialogue on climate change; helped develop national and sector strategies; and strengthened assessments of vulnerability and capacity (Asian Development Bank, 2017).

Establishing a strategic focal unit within government to champion coordination and cooperation of PPCR, as occurred in Zambia and Bangladesh, has been instrumental for country ownership, the improvement of institutional processes and the strengthening of policies related to climate resilience.

The 2015 CIF paper on its accomplishments and transformational impact noted: 'All PPCR countries have created some form of coordination unit, either building on existing structures or, establishing new structures, to coordinate PPCR activities and work towards mainstreaming climate resilience into development processes. The mandate for coordination units often extends beyond inter-agency coordination to include coordination between national and sub-national actors and coordination with civil society groups and other stakeholders' (CIF, 2015b: 20). Starting coordination activities as early as possible has allowed effective mechanisms to develop and mature, and the clear link between coordination activities and effective communication strategies has been demonstrated (Asian Development Bank, 2017).

The success of the SPCR in setting up coordination units within the key ministries of finance and planning has been strategic in driving the SPCR forward, due to the convening authority of such ministries across multiple sectors (Rai et al., 2015). This institutional positioning has also secured broader government buy-in, increased local ownership and advanced efforts to scale up facilities across other ministries to manage further incoming funds (Roehrer and Kouadio, 2015). This has increased the prospect for mainstreaming climate resilience into development planning and programmes. For example:

- In Zambia, although supported by PPCR, the Climate Change Secretariat (CCS) was mandated to manage more than just PPCR funds. It oversaw $200 million in development partner climate finance from UN and bilateral agencies. The CCS also coordinated multi-sectoral issue platforms, oversaw the development of new project proposals and explored new sources of climate finance, such as the Green Climate Fund (GCF), to scale up its programmes (ICF International, 2018).
- In Bangladesh, several institutions have operationalised climate finance, including the multi-donor Bangladesh Climate Change Resilience Fund, whose institutional arrangement was harnessed to position PPCR in Bangladesh. However, the PPCR benefits from broad leadership, with both the environment and finance ministries acting as the designated focal authorities for PPCR (Rai et al., 2015).

Countries with existing climate change adaptation priorities as expressed through National Adaptation Programmes for Action (NAPAs), such as Bangladesh and Nepal, have used these to inform the early development of their SPCR strategies. This has brought both opportunities and challenges, in terms of speed of action and developing national ownership.

Rai et al. (2015) document the initial experiences in Bangladesh and Nepal, where both countries had prepared NAPAs. Bangladesh's NAPA was used to move forward the SPCR initial exploratory phase. The government of Nepal also wanted to move directly towards PPCR investments, pointing to the adaptation planning that had taken place as part of the NAPA development. However, Rai et al. report that in Nepal the MDBs required a preparatory assessment to be carried out, considering the NAPA to have a short-term focus compared to the longer-term climate-resilience focus of the PPCR.

These early processes delivered both challenges and opportunities. Affording flexibility to Bangladesh was crucial in ensuring the government's interest in and ownership of the programme. However, this also meant that roles and responsibilities were not clearly defined at the beginning, causing some ambiguity and delays in delivering the SPCR (Rai and Smith, 2013; Rai et al., 2015). In Nepal, the early planning process of Nepal's SPCR began without consensus from all parties (Rai et al., 2015: 17), although relationships between stakeholders evolved and progress was subsequently achieved, facilitated by strong government leadership (Itad et al., 2018).

2.3.4 Findings on PPCR outcomes

New planning frameworks, developed as a result of SPCR preparation or embedded in PPCR investments, have increased awareness and understanding of vulnerability to climate change, as evidenced through review of programmes in Nepal and Mozambique. The preparation of the SPCR and PPCR investments has generated new frameworks that increase the likelihood of sustainability of climate-resilient action. Evidence on how these are being integrated into national administrative processes includes:

- In Nepal, the Department of Irrigation has integrated climate change issues into its environmental impact assessment procedures, developing job descriptions that incorporate climate change and engaging in a dialogue to mainstream climate change into the irrigation master plan. The Department of Urban Development and Building Construction has likewise started to strengthen its environmental screening and to integrate climate change risk assessments into major upcoming projects (Asian Development Bank, 2017).
- In Mozambique, PPCR provided the first support to address climate risks in infrastructure, supporting surveys and inventories of climate risks to road networks in vulnerable areas and the piloting of climate-resilient road designs (CIF, 2015b). PPCR supported the development of climate-resilient national roads standards and the government has since introduced a reform that requires mandatory risk screening of all new road investments. These measures are critical for strengthening Mozambique's resilience to climate-related events, as analysis of the country's vulnerability to disasters has underscored the key role that roads and bridges play in breaking the isolation of rural communities during and after weather-related disasters (Climate Investment Funds, 2015c).

Strategic timing of technical assistance to strengthen knowledge systems on climate resilience has supported the development of national adaptation strategies. Documented examples of this happening come from Tajikistan, Bangladesh and Nepal. Technical assistance (TA) has commonly addressed the following knowledge barriers on climate resilience: lack of expertise, lack of information and limited awareness on adaptation options. Various mechanisms have been used to build capacity and disseminate lessons on adaptation planning (Asian Development Bank, 2017).

- In Tajikistan, PPCR was the first fully funded programme for climate change adaptation and the country's first opportunity to adopt a multi-sectoral strategic approach. This involved conducting comprehensive risk

and vulnerability analyses, consultative prioritisation and planning and detailed stocktaking of climate change adaptation activities in the country. The SPCR TA Building Capacity for Climate Resilience project built on this experience, initiating a multi-stakeholder process to develop a national adaptation strategy (Asian Development Bank, 2017).

- In Bangladesh, the post-Cyclone Sidr vulnerability assessments provided strong knowledge products to support change in the infrastructure sector. The combination of this additional information, the existing technical partnerships between MDBs and implementing line departments and available co-finance for coastal infrastructure, helped build consensus and cooperation, making the PPCR investment attractive. In addition, this was aligned with Bangladesh's climate change strategy and the NAPA, thus gaining policy support (Rai et al., 2015).
- In Nepal, evidence shows that the 'decision to invest in climate information systems arose from a view that long-term sustainability goals are important and that greater capacity for climate adaptation will lead to transformation. Decisions were also incentivised by two high-level strategic plans, the NAPA and Nepal's sectoral framework for adaptation in agriculture' (Rai et al., 2015: 39).

CIF reporting on PPCR results has supported systemic change by providing governments with M&E tools to measure progress of climate resilience that can be mainstreamed into national systems. This has increased the capacity of governments, notably in Nepal and Zambia. The PPCR monitoring and reporting framework broke new ground on how to measure climate resilience and was one of the first aggregated monitoring and reporting systems to be implemented for adaptation globally (Roehrer and Kouadio, 2015). The framework incorporates the aim of maintaining an inclusive and programmatic approach in the implementation of the IPs. Some countries use the five core PPCR indicators to track progress of their entire national climate-resilience portfolio, a significant early reported impact (CIF, 2015b). However, a common institutional barrier is the continuing need for institutional strengthening on M&E within line agencies to ensure that the PPCR monitoring and reporting mechanisms are effective and sustainable (Asian Development Bank, 2017).

The development of a coherent framework for monitoring and reporting has been an important catalyst for deepening coordination across government agencies and for providing lessons on broader coordination efforts of climate change initiatives beyond PPCR.

- The Asian Development Bank (2017) reports that the Nepal PPCR was an early mover in developing a results management framework and, in a significant innovation, it developed a framework for monitoring the contributions of all climate change projects, while also satisfying the requirements for the CIF PPCR core indicators. Baselines were set for the core indicators through an extensive consultation process, and the expected results and contribution of all projects to the country's nine NAPA priorities were agreed on. This work has built capacity of government officials and has also benefited the wider development community working on M&E of climate change interventions in Nepal and beyond.
- In Zambia, the reporting of PPCR efforts to mainstream climate resilience into national development planning helped to bring about a shift in government budget allocations, leveraging allocations towards further climate-resilience programmes (Ross Strategic and Community Science, 2018).

The SPCR process in many countries, including Bangladesh, Bolivia, Mozambique, Tajikistan, Zambia, Jamaica and other Caribbean countries, has successfully facilitated co-finance from MDBs, bilateral donors and private investors for PPCR investments to scale up resources for climate-resilient actions. Also, increasing capacity has enabled governments to leverage other climate funds for additional climate-resilience investments.

The SPCR process has been critical in several countries to ensuring investment quality, complementarity with other country initiatives and the leveraging of co-financing for adaptation

from MDBs, as well as from the public and private sectors. Through concessional loans and public-private partnerships, the PPCR has reduced entry costs, compensated for relatively poor economies of scale and has contributed to underwriting investment risk for the private sector (Trujillo et al., 2014). This has led to an overall deepening of efforts to build climate resilience (Asian Development Bank, 2017).

The 2015 CIF report, *Key Lessons from the PPCR* states that for 16 blended projects, each dollar of PPCR investment leveraged $3.20 in co-financing from International Development Association (IDA), government and other sources.[20] The most recent PPCR operations and results report of December 2018 highlights that for the entire PPCR portfolio a co-financing ratio of 1:2 is expected, with the MDBs, recipient governments, bilateral/other donors and the private sector being co-financing partners (in order of magnitude).

There is also evidence that the SPCR and PPCR investments have increased government capacity, knowledge and procurement systems to help acquire further international climate funds, including from the GCF. For example:

- In Cambodia, the PPCR team assisted the Ministry of Environment in costing and prioritising climate change objectives in national and sector development strategies. They then supported the conduct of feasibility studies to secure GCF resources to meet these objectives (Asian Development Bank, 2017).
- In Zambia, the piloting of PPCR participatory adaptation investments led to a proposal by the government to the GCF to scale up the successful approach taken in mainstreaming climate resilience in local development plans (ICF International, 2018).

Sub-national engagement at district level to secure participatory mainstreaming of climate change adaptation, as happened in Tajikistan and Nepal, has helped to secure scaling up of subsequent PPCR investments. Understanding of climate resilience at the national level can differ from that at the local level, and this is reflected in the common barrier of lack of cooperation and alignment of policies between different levels of government. The SPCR process has contributed to, or enhanced dialogue on, climate change adaptation to bridge the gap between the national and sub-national levels and to understand the complementary roles of formal and informal institutions (Arnold et al., 2014; Asian Development Bank, 2017). This has stimulated discussions, understanding and raised awareness of how sub-national governments, communities and other stakeholders can build climate resilience.

- In Tajikistan, various representatives from government, civil society and the private sector, as well as individuals, were involved in designing the original SPCR. However, sub-national stakeholders were weakly engaged in its preparation. Implementation of the early PPCR investments, including the conduct of vulnerability assessments, feasibility studies and project-related consultations, helped to engage sub-national actors, strengthening their engagement and awareness. In addition, it paved the way for more concrete actions to mainstream adaptation at the sub-national level (Asian Development Bank, 2017).
- In Nepal, the SPCR TA Mainstreaming Climate Change Risk Management in Development project has contributed to readiness for climate finance, particularly at the sectoral and sub-national levels. At the local level, the training of district planners across 31 districts was aimed at increasing understanding of the cost of adaptation initiatives and generating a commitment to allocate public funding. This message has also been imparted to district-level stakeholders, political parties and social activists. Overall, this raised awareness of climate finance and government policy, especially at sub-national level (Asian Development Bank, 2017).

20 Countries – Bangladesh, Bolivia, Dominica, Grenada, Haiti, Mozambique, Pacific Regional Program, Saint Lucia, Saint Vincent and the Grenadines, Samoa and Tajikistan.

Box 6 FIP: Key findings

Across the FIP portfolio, evidence points to increased prospects for transformation in sectors working across the rural landscape that have long been undercapitalised. The FIP has also provided a vehicle for MDB engagement in the forest sector where institutional interest has been flagging, often as a result of the fragmented and small-scale nature of investments in the sector.

Concerning how FIP design has worked to advance transformational change, evidence is strong in two areas: (1) the inclusive and collaborative nature of preparing the FIP IP; and (2) the systems approach taken in such planning that has gone beyond the traditional confines of the forest sector to identify both drivers and agents of change.

FIP remains a developing portfolio of investments, with many projects in the FIP pipeline. So, the contribution of FIP to transformational change is still emerging. Yet, several areas are worth emphasising at this stage: (1) new partnerships across the value chain have emerged in several countries; (2) market perceptions of the financial viability of forest enterprises has shifted in some countries; (3) the prospect of sustained action has been enhanced through national spending, fiscal reform and legislative change, building on where initial FIP investments have been successful.

2.4 Forest Investment Program (FIP)

2.4.1 FIP at the global level

FIP is a $750 million programme of the SCF, established in 2008 to provide scaled-up financing to help countries address the drivers of deforestation and forest degradation. It began working in eight countries, expanding in 2015 with an additional six countries, each with an indicative resource envelope, and a further nine countries with an uncertain resource envelope.

As of 30 June 2018:[21]

- 21 countries have had their FIP IPs endorsed by the FIP Sub-Committee.
- 30 MDB-approved projects are ongoing and disbursing FIP funds.
- 23 projects are under development.
- Investment planning within the FIP has matured; programme and project implementation is now building.

FIP complements two other international forest-related climate change initiatives: the Forest Carbon Partnership Facility and the United Nations Reduced Emissions from Deforestation and Forest Degradation Programme (UN-REDD+). To date, these two other programmes have targeted capacity building for REDD+ readiness in developing countries. Prior to an international payment system for forest carbon sequestration becoming operational, there was a gap in international funding to support country efforts. The FIP has contributed to addressing this gap, thereby helping to maintain the momentum of the international REDD+ process (see Box 6).

2.4.2 FIP in the literature

The FIP evidence synthesis draws primarily on 15 source documents (see Box 7), a smaller body of work compared to the CTF and PPCR. It also represents a very recent literature, with six of the documents written in 2018.

Burkina Faso and Mexico stand out in this documentation. Both countries were part of the first phase of FIP-supported countries, therefore reflecting where most experience has been gained. Burkina Faso is not a traditional high-profile country in the global forest literature, so this represents a significant result in itself. It highlights the contribution of Savanna forest biomes to national climate change strategies and rural development goals. FIP support for investments

21 CIF (forthcoming). FIP semi-annual operational and results report, second semester FY 2018. FIP/SC.21/3.

in the Cerrado biome in Brazil is equally notable, since most previous international forest attention had focused on the Amazon region of Brazil.

2.4.3 Findings on FIP design

The programmatic approach in the FIP includes the preparation of a country IP, which aims to align with ongoing initiatives that support the reduction of emissions from deforestation and forest degradation, often in the context of national REDD+ processes (ICF International, 2018; Little, 2018). The preparation of IPs has enabled FIP countries to identify major drivers of deforestation and shape investment outcomes towards them,

Box 7 FIP: Evidence base

ICF International (2018)
OneWorld and OPM (2018)
Ross Strategic and Community Science (2018)
Asian Development Bank (2017)
Meltzer (2016)
Trabacchi and Stadelmann (2016)
Vivid Economics (2016)
Climate Investment Funds (2015b)
Climate Investment Funds (2015c)
Rai et al. (2015)
Roehrer and Kouadio (2015)
Trabacchi and Mazza (2015)
Arnold et al. (2014)
Asian Development Bank (2014)
Baral and Chhetri (2014)
Climate Investment Funds (2014d)
ICF International (2014)
Independent Evaluation Department (2014)
Kust et al. (2014)
Nakhooda and Norman (2014)
Office of Evaluation and Oversight (2014)
Trujillo et al. (2014)
Vivid Economics (2014)
Whitley et al. (2014)
Rai and Smith (2013)
Seballos and Kreft (2011)
Shankland and Chambote (2011)

Note: for the full citation of these reports, please refer to the literature reviewed section.

Figure 6 FIP country evidence of transformational change

Note: six countries provide the largest quantity of relevant evidence within the studies analysed: Brazil, Burkina Faso, Ghana, Lao PDR, Mexico and Peru.
Source: ODI.

focusing on cross-sectoral linkages in forest-related sectors (IIED and LTS, 2018). These drivers are heavily linked to livestock activities, agricultural expansion and the overharvesting of timber, firewood and non-timber forest products.

Deforestation and forest degradation are often linked to local drivers related to poverty, hence some commentators point to the need for forest carbon projects to reconcile local development and carbon sequestration (e.g. Westholm and Arora-Jonnson, 2015). An innovative part of the FIP to secure such synergy is the DGM for Indigenous Peoples and Local Communities (IPLC), which provides a role for IPLCs to develop and implement their own response to climate change. The DGM is managed by one of the CIF implementing partners, the World Bank. The DGM provides potentially transformational resources to forest-dependent peoples and communities to enable their strengthened participation in the FIP and other REDD+ processes (Douthwaite et al., 2018).

Efficient coordination and collaboration between MDBs, governments and national stakeholders have established or strengthened the strategic relevance of the country IP preparation by bringing all actors into the planning process and this, in turn, has helped to keep activities relevant through IP implementation.

The potential for transformational impact of FIP is influenced by many factors, given the underlying complexities of forest conservation, coupled with the traditional scarce funding of the sector. The guiding documents for the preparation of IPs included a criterion to guide transformation in programme activities under such circumstances, calling for the establishment of multi-stakeholder, national-level steering committees, with representation from local authorities and communities, indigenous peoples and the private sector (ICF International, 2018).

The planning phase of FIP, developing the IP, has been instrumental in establishing coordination mechanisms that serve as a bridging function to implementation of FIP investments. IPs in Brazil and Mexico have been developed through consultations with development partners, international and national non-governmental organisations (NGOs), local communities and civil society organisations (CSOs), indigenous peoples' groups or traditional authorities, research institutes, academia and the private sector. This broad participation has helped to ensure that FIP IPs, programmes and projects are aligned with national policies and priorities. In turn, this has contributed to the participatory processes supporting national REDD+ efforts through the building of effective consultation mechanisms (ICF International, 2018). Overall, this has created the foundation needed to identify and establish relevant FIP investments in support of national policy and institutional reform, with strengthened forest sector coordination and governance. For example:

- In Brazil, the IP led to a FIP coordination project to ensure continuous collaboration between the three ministries that are implementing the IP and their MDB partners. This project is aligned with ongoing government plans and policies (CIF, 2015b).
- In Mexico, the IP builds on 20 years of World Bank support to forestry and related sectors and draws on the Inter-American Development Bank's (IDB) knowledge of and operations in, Mexico's financial sectors and its established relationships with local financial institutions (Cooper and Huff, 2017).

Adopting a national systems approach, where the context, drivers and barriers to forest conservation are identified in the FIP IP, has been key to bringing about action at scale, as documented in Brazil and Burkina Faso.

Common barriers holding back forest conservation initiatives involve insecure tenure; lack of technical capacity; lack of business know-how and organisation; and barriers to asset investment, including the overly high risk to return ratios and transaction costs (IIED and LTS, 2018). By addressing these barriers, IPs can capture the local context to bring about action at scale, placing a strong emphasis on strengthening institutional capacity, particularly for the improvement of the policy and regulatory frameworks for sustainable land-use and private sector investment. Documented evidence of success with systems planning include the following:

- The Brazil IP was strategically focused on making agriculture and ranching practices more sustainable to achieve transformational change. The National Plan on Climate Change states that Brazil's goal is to achieve a 40% reduction in deforestation in the Cerrado biome by 2020 (from a baseline average 1999–2008). However, the rapid increase in Brazilian soybean and cattle production, and its expansion into the Cerrado, act as drivers of economic growth that hinder effective climate change actions (Little, 2018). The IP strategically chose to make investments in the Cerrado biome, operating at a geographic scale larger than the landscape or ecosystem level. This has supported national efforts to formulate a set of policies that can be applied at this scale, thereby increasing the potential for generating transformational impact (Little, 2018).
- In Burkina Faso, where 35% of the nation's gross domestic product (GDP) comes from agriculture, forestry and related sectors, the IP includes efforts to test REDD+ mechanisms that address the drivers of deforestation in protected forests and the areas bordering these forests. The IP identified the need for: (1) mainstreaming REDD+ and climate change into sectoral frameworks; (2) developing the necessary legal and institutional framework to implement REDD+ activities effectively; and (3) strengthening capacity to deliver the national REDD+ strategy at the national and local levels (CIF, 2015b).

2.4.4 Findings on FIP outcomes

New partnerships have been formed to improve forest and agricultural management practices. This institutional cooperation across government agencies has helped to bring together sectors that are impacted by, or possibly drive, deforestation and land-use change to find cross-sectoral solutions. Such partnerships appear to promote ownership and bring about economic gain at the local level, as demonstrated in Ghana and Mexico.

- In Ghana, under the Ministry of Land and Natural Resources (MLNR), FIP helped support a major shift in the relationship between two key actors in natural resource management: the Ghana Cocoa Board (COCOBOD) and the Forestry Commission. These two key government actors have changed their perception of local farmers and this has spurred further collaboration. COCOBOD now provides incentives in the form of inputs, fertiliser and technical assistance to farmers to promote the new climate-smart cocoa standards, while the Forestry Commission provides trees for planting on farms. The FIP investment has also helped build ownership of the local population for sustainable forest management at the decentralised level (Lafontaine, 2018).
- One strategic focus of FIP is to support smallholder farmers and enterprises. The 2018 IIED and LTS FIP learning study on forest-related enterprises identifies that upscaling towards transformational change appears more rapid and pronounced in projects working around value chains with various scales of enterprise. Capacity-related barriers for smallholder enterprises manifest themselves in a lack of technical expertise, weak organisation and lack of business skills, knowledge and access to finance. FIP-supported actions in Mexico have begun to address these barriers through business incubation services around value chains that not only generate revenue for enterprises but also support additional employment opportunities (Cooper and Huff, 2017).

FIP capacity-building activities, together with the deployment of financial instruments, has helped to shift market perceptions by showcasing the synergies between the agriculture and forest sectors. Documented evidence of this comes from Mexico and Brazil.

FIP investments have addressed the barrier of lack of access to finance for smallholder enterprises through capacity-building training and financial support. On the latter, there is convergence around three different types of asset investment provided to three scales of forest-related enterprise: (1) provision of microfinance to households for alternative livelihoods (through village funds and other microcredit arrangements);

(2) tailored financial products with appropriate grace periods for SMEs involved in forest plantations; and (3) concessional credit and guarantees for larger enterprises, to reduce the cost of piloting more sustainable practices and increasing access to finance for traditionally 'high risk' investment activities (IIED and LTS, 2018).

Engagement with, and participation of, rural landowners has expanded the scope of stakeholder involvement well beyond the traditional forest sector to include both small and large private sector agricultural producers, transforming them into potential agents of change (Little, 2018).

- In Mexico, the FIP investment project 'Support for Forest Related Micro, Small and Medium-sized Enterprises in Ejidos and Communities', provided concessional loans and grants to marginal and emerging enterprises and leveraged a 'demonstration' effect to show that Community Forest Enterprises projects are financially viable and can offer environmental benefits. This enabled local banks to work with communities directly to improve the social, environmental and economic conditions of forest-based communities (Cooper and Huff, 2017).
- In Brazil, the goal is not to halt land-use conversion completely, but rather to do it in a planned, legal manner with an eye on long-term environmental impacts, providing a more complete approach to climate change mitigation (Little, 2018).

In Brazil, Burkina Faso, DRC, Indonesia and Peru, the DGM is showing that it is possible to empower and acknowledge the value of Indigenous Peoples and Local Communities, while promoting natural resource management.

CIF consider the DGM for IPLCs to be 'an innovative and unique mechanism to empower indigenous peoples and local communities in REDD+ decision-making and a truly transformational initiative' (CIF, 2014c: 7). With approved funding for eight countries and a global component, the DGM is proving that IPLC organisations can work as direct counterparts with multilateral development organisations, proposing and implementing their own projects. Douthwaite et al. (2018), in the first major learning review of the DGM, describe the range of capacity-building activities that could have a transformational impact: (1) enhancing IPLC participation in forest and land management processes related to REDD+; (2) increasing community and community-based organisations' participation in integrated landscape management; and (3) strengthening capacity for community-based natural resource management.

IPLCs have developed a strong sense of ownership over the DGM mechanism through working together, which in turn has built respect, trust and relationships that have helped to keep the process running. The aspiration to continue after the end of FIP support is evident in most DGM countries, including Brazil, Burkina Faso, DRC, Indonesia and Peru. For its part, the World Bank has built experience in working with indigenous peoples' leaders. This has helped to change perceptions and working engagements with indigenous peoples, where they are seen 'as counterparts and not only beneficiaries' (Douthwaite et al., 2018: 38).

- In Brazil, the IPLC's strong indigenous knowledge base has been recognised as being of value, especially in natural resource management. They have gained a forum for collaboration and interaction with each other, where training for land rights has helped settle land conflicts (Little, 2018). National recognition of the DGM's success was reflected in central government's push for an upscaling of funds to sustain the DGM process (Douthwaite et al., 2018).
- In Peru, the government saw the DGM as an opportunity to showcase to donors that funds can be spent and accounted for by indigenous peoples' groups, while meeting their needs, with considerable potential for scaling up of resources (Douthwaite et al., 2018).

The likelihood of sustainability of FIP investments has been strengthened by governments committing budgetary resources, introducing new fiscal measures and/or making legislative change, to continue developing FIP initiatives deemed to be successful. Documented examples of such action come from Mexico, Brazil, Lao PDR and Burkina Faso.

- In Mexico, FIP financed the Forest and Climate Change project with $42 million, whereas the Mexican government financed $333 million and the International Bank for Reconstruction and Development contributed $350 million. The government's own funding demonstrates national long-term commitment and shows that FIP is contributing to activities that will generate results into the future.
- In Brazil, the National Rural Learning Service (SENAR) and the Ministry of Agriculture, Livestock and Food Supply (MAPA) have budget allocations to continue funding FIP programmes deemed to be successful (Parker et al., 2015).
- Lao PDR has proposed the introduction of a payment for environmental services scheme to support the sustainability of FIP investments. This will be funded through a 1% levy on the hydro sector (Parker et al., 2015).
- Burkina Faso has created a Fund for Environmental Investments (FIE) as a component of its Environmental Protection Law. The FIE is funded through a new tax mechanism, with a contribution of $10 million from the FIP. The FIE has funded approximately 200 projects through two calls for proposals (Forest Carbon Partnership Facility, 2017).

2.5 Scaling Up Renewable Energy in Low Income Countries Program (SREP)

2.5.1 SREP at the global level

SREP is a $750 million programme of the SCF, launched in 2010 to expand energy access and scale up the deployment of renewable energy solutions in the world's poorest countries. Its creation filled a perceived financing gap for renewable energy financing in low-income countries (ICF International, 2014). Six countries were initially selected as pilots for the programme, this was then increased to 13 and 27 after two additional rounds of selection.

As of 30 June 2018:[22]

- 21 country IPs have been endorsed by the SREP Sub-Committee.
- $585 million has been approved by the SREP Sub-Committee for 46 projects and programmes, which is expected to leverage $2.95 billion in co-financing.
- 33 projects have been approved by MDBs for a total of $394 million, with 24 projects currently receiving disbursement, for a cumulative amount of $82 million.

The average SREP funding per project is $9 million, which is significantly larger than most other funds that focus on distributed clean energy (Amerasinghe

Box 8 SREP: Key findings

There is less documented evidence of transformation as a result of SREP actions in the literature to date compared to other CIF programmes. This does not mean that transformational change is not happening in countries. What the synthesis has been able to document is that SREP is contributing to putting in place foundational systems and capabilities on which future transformation can build and scale quickly once certain tipping points are reached.

In terms of outcomes, evidence that SREP investments and activities are lowering renewable energy risks and attracting private sector investment is strong in Kenya within the geothermal programme, with weaker signs of this happening in Honduras, Ethiopia, Armenia and Nepal. A potentially game-changing feature of SREP is the support for micro-grid solutions to provide electricity access to off-grid communities. SREP is one of the biggest global funders of mini-grids, with over $200 million for projects in 14 countries (Climate Investment Funds, 2017b). Implementation of such projects in Mali, the Maldives and Rwanda is ongoing.

22 CIF (forthcoming). SREP operational and results report. November 2018. SREP/SC.20/3.

et al., 2017). The capacity to provide larger funding envelopes, similar to the other CIF programmes, has enabled the SREP to pursue innovative technologies, such as micro- and mini-grids, to tackle problems of energy access. In addition, responding to the challenging country contexts where it operates, the SREP has focused on building foundational systems and capacities to provide the enabling environment for future accelerated deployment of renewable energy (see Box 8).

2.5.2 SREP in the literature

The SREP evidence synthesis draws primarily on 14 source documents (see Box 9) and is complemented by recent SREP operational reports. It is the CIF programme in which the least amount of evidence related to transformational change progress has been identified. This can be explained by the fact that it was the last CIF programme to be established, along with the status of its portfolio: with only 17% of MDB-approved funds disbursed, compared to 51% in CTF, 38% in PPCR and 36% in FIP (Climate Investment Funds, 2018a; 2018b; 2018c; 2018d).

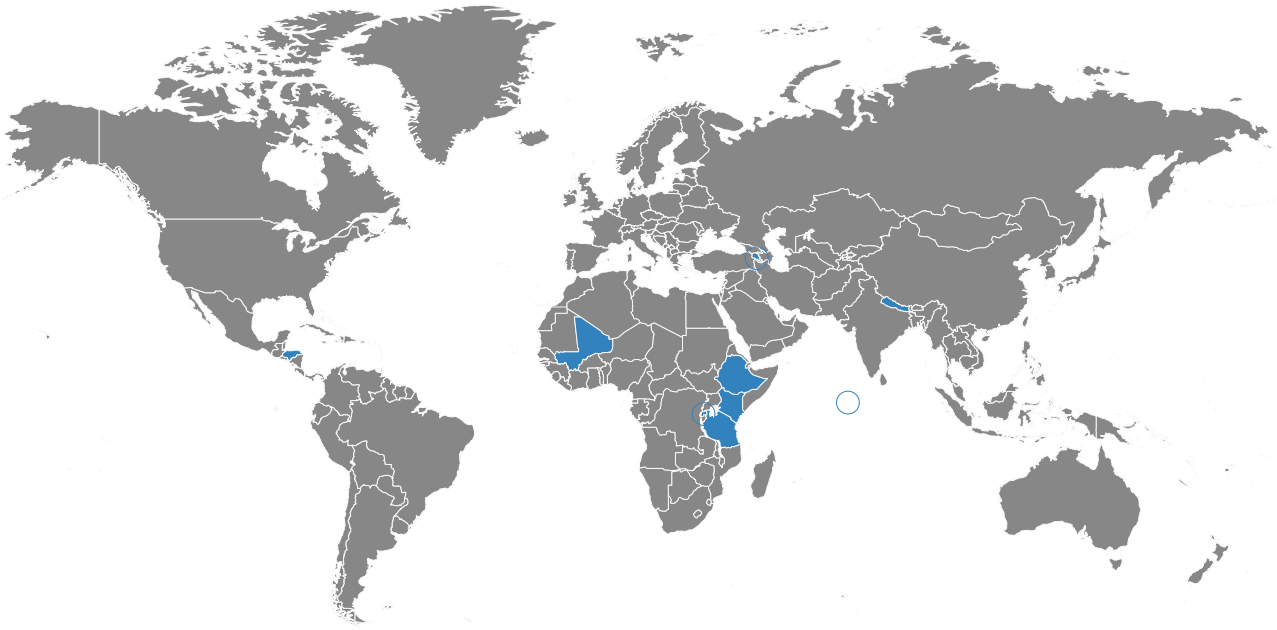
A few countries stand out in the documentation, all from the first selection of SREP – Nepal, Kenya, Honduras, Ethiopia and

Box 9 SREP: Evidence base

van den Akker (2018b)
de Baets (2018)
ICF International (2018)
Ross Strategic and Community Science (2018)
World Bank (2018)
Amerasinghe et al. (2017)
Climate Investment Funds (2015b)
Rai et al. (2015)
Barnard and Nakhooda (2014)
Climate Investment Funds (2014b)
ICF International (2014)
Nakhooda and Norman (2014)
Vivid Economics (2014)
Whitley et al. (2014)

Note: for the full citation of these reports, please refer to the literature reviewed section.

Figure 7 SREP country evidence of transformational change



Note: nine countries provide the largest quantity of relevant evidence within the studies analysed: Armenia, Ethiopia, Honduras, Kenya, Mali, the Maldives, Nepal, Rwanda and Tanzania.
Source: ODI.

the Maldives – where innovative projects with the potential to engender transformational change are at various stages of implementation.

2.5.3 Findings on SREP design

SREP aims to create new economic opportunities and increase energy access and supply by investing in renewable energy in low-income countries. These investments are coupled with policy, regulatory and capacity-building activities to leverage both public and private sector strategies to speed up or deepen the deployment of on-grid and off-grid energy sources (ICF International, 2018). The SREP approach is notable for a strong focus on: (1) activities across a range of arenas key to overcoming barriers that hold back systemic change with potential to enable scaling of renewable energy deployment; and (2) innovative pilots that are attracting the interest of the private sector and have potential to lead to accelerated, scaled-up and deepened transformation, as already recognised by the 2018 desk analysis of the CIF portfolio (Ross Strategic and Community Science, 2018: 56).

SREP has provided the opportunity for countries to adopt a systematic approach to energy sector development by assessing the full range of renewable technology options appropriate for the country context, often for the first time, as well as identifying the investments needed to capitalise them (Barnard and Nakhooda, 2014; ICF International, 2018). This has generated strategic leverage points through which SREP has sought to induce or accelerate transformation.

- In Nepal, evidence shows there was strong programmatic coordination during the preparation of the IP. Nepal's IP preparatory grant was used to support analysis and policy review, concept note preparation and consultation events. This inclusive, informative and constructive process resulted in a robust IP that was country-led and aligned to ongoing initiatives (ICF International, 2018). The SREP IP coincided with the country's move to create a National Rural and Renewable Energy Program (NRREP), with the goal of streamlining funding for alternative energy in rural communities through one focal mechanism. The SREP IP therefore scaled up efforts to help implement the NRREP and other ongoing developments in the sector (Barnard and Nakhooda, 2014).

The process of developing the SREP IP, through multi-stakeholder consultation, has facilitated governments to engage effectively with a wide range of stakeholders from the energy sector, and in some cases gain better insights that have subsequently been reflected in country IPs.

The SREP planning process, with support from MDBs, has built and strengthened dialogue in the pilot countries by bringing a wide range of stakeholders from the energy sector together. These include agencies responsible for energy and finance, economy and planning, informed by consultations with development partners, international and national NGOs, local communities and CSOs and the private sector (ICF International, 2018). Indeed, Barnard and Nakhooda (2014) argue that the participatory nature of the SREP IP drafting exercise has contributed to better insights into the factors holding back investments in targeted sectors. For example, the preparation of the Kenyan IP provided an opportunity for the private sector to signal that the low feed-in tariff for geothermal energy was preventing investment, which resulted in a recommendation for revision that was subsequently carried out (Barnard and Nakhooda, 2014).

While generally positive, the IP process has, however, met with some challenges. In countries where there was good alignment between the government and the MDBs, quick decisions on IP were made, such as in Kenya with geothermal funding. In Ethiopia, on the other hand, a lack of consensus between stakeholders after the IP joint mission resulted in a request to reformulate the funding proposal, leading to delays in implementation (Barnard and Nakhooda, 2014).

SREP's support to micro- and mini-grids is expected to increase energy access significantly while bringing about broader socio-economic benefits, as documented in the Maldives and in Rwanda.

The SREP programme has faced significant implementation barriers in the countries where it operates, which in many instances has led to project delays and resulted in slow

implementation of the overall SREP portfolio. This is a function of the challenges posed by providing renewable energy access in the complex contextual environments of low-income countries. Regulatory and policy barriers are the most prominent type of barriers mentioned in the literature, but financial and technological challenges are also considerable, especially in relation to providing off-grid energy access to populations in rural areas. Because of the complex environments and these significant challenges, the countries where SREP operates in also have a high potential for deep, accelerated and scaled-up transformation once such barriers are addressed and transformational processes are unlocked:

- In the Maldives, while electricity access is universal, the costs incurred to guarantee this are exceptionally high. Until recently, the country's entire power generation was diesel based, with almost half of the capacity located in resort islands. This required costly fuel imports, resulting in the Maldives having the highest cost of electricity generation in South Asia. The SREP support to install 20 MW of PV systems is estimated to benefit more than 10% of the overall population, leading to estimated fuel savings of around $47 million to 137 million over a 20-year period (World Bank, 2014).
- Similarly, in Rwanda, SREP support in increasing electricity access through off-grid technology and facilitating private sector participation by reducing access to finance constraints, is estimated to benefit more than 10% of the population (World Bank, 2017)

In addition, SREP is also supporting knowledge exchange for micro-, mini- and off-grid market solutions at the global level. It has so far convened three action learning events in 2016 and 2017, where SREP and non-SREP country participants, MDBs and other experts have had the opportunity to share successes and lessons learned.

2.5.4 Findings on SREP outcomes

SREP has helped strengthen the enabling environment for accelerated renewable energy deployment, as demonstrated in Honduras and Tanzania. This approach responds to the challenging enabling environments for renewable energy in low-income countries (Itad et al., 2018).

- In Honduras, SREP support has helped to steer the growth of the clean cookstove market away from a donor-driven model by improving the enabling environment for the private sector to drive future development (de Baets, 2018).
- In Tanzania, SREP has assisted a new Transaction Advisory Services Facility to improve the technical and business skills of local entrepreneurs and provide market and regulatory knowledge to international companies seeking to establish on- and off-grid systems in rural areas (Barnard and Nakhooda, 2014).

SREP interventions have activated transformational processes that lower renewable energy deployment risks, for both the government and the private sector, attracting developer and financier interest and follow-on investments. Country examples include Kenya, Ethiopia, Armenia and Nepal.

SREP has focused on shifting cost structures that inhibit low-carbon technology deployment, by lowering capital costs (through economies of scale), technology and financing risks (through de-risking activities) or both (Ross Strategic and Community Science, 2018).

- In Kenya, SREP supported the country's newly created Geothermal Development Corporation to de-risk the development of the Menengai Geothermal Field through a grant of $17.5 million and a concessional loan of $7.5 million, channelled through the African Development Bank (AfDB), with the AfDB providing a loan equivalent of $120 million (van den Akker, 2018b). This model generated considerable interest from both investors and project developers and there are some signs of interest in the region as to its wider implementation (Micale et al., 2015).

Evidence of financial de-risking and/or attraction of private sector funding brought about by SREP interventions is observed in other countries (Itad et al., 2018):

- In Ethiopia, there are signs of substantial private sector interest in investing in geothermal development, as shown by the recent 25-year power purchase agreement for two $2 billion geothermal plants between the government and Reykjavik Geothermal.
- In Armenia, several stakeholders have noted increased private sector interest in investing in future utility-scale renewable energy projects, following the release of the country's first reverse-auction tender for a 55 MW solar park in Masrik, Eastern Armenia, in April 2017.
- In Nepal, where significant private project developer interest has arisen for a tender issue for utility-scale solar in which SREP will cover the price gap between production cost and the power purchase agreement price.

2.6 Cross-cutting findings

Two cross-cutting issues across the CIF programmes are briefly expanded on here, making use of the evidence synthesis database to draw on examples across the CIF portfolio. The first, on gender issues, applies across all four CIF programmes. The second highlights private sector transformation within the SCF, particularly for the FIP and PPCR programmes. The role of the private sector in a variety of capacities as an important partner of the CTF and SREP programmes is well established and is referenced in the previous programme sections. However, for the other two SCF programmes – PPCR and FIP – this role has perhaps been less visible and is therefore worthy of some analysis.

2.6.1 Building gender considerations into CIF to bring about transformational change

The literature on how gender considerations influence transformational change is very limited and where it does appear it mostly refers to programme and project design and awareness raising. Only six gender-specific publications considered relevant to transformational change have been identified from CIF literature. Further evidence has been found in other source documents, supplemented by CIF programme operational reports.

The importance of gender equality to transformational change has been recognised and incorporated into CTF planning frameworks, contributing to changing country practices, as evidence from Viet Nam demonstrates.

Advances have been made in incorporating gender inclusivity into CIF programme design that may spur transformational change by reducing gender gaps (Itad et al., 2018). However, equitable access within national climate change mitigation strategies remains a challenge for women, partly because of the technical nature of mitigation projects in sectors where the opportunities for women have traditionally been limited. CTF was the first CIF programme to be made operational, with most CTF IPs first endorsed in the period from 2009 to 2010. At that time, there was no mention of gender in the guidelines for the initial IPs, nor in the guidelines for the preparation of grants for public and private sector projects seeking CTF support. However, since then explicit gender considerations have started to appear in CTF investment programming. For example:

- In Viet Nam, the CTF-supported Sustainable Urban Transport for Ho Chi Minh City Mass Rapid Transit Line Project includes a range of gender-responsive design features to increase women's access to transport services and, importantly, to employment in the transport sector, with targets of 20% of project construction jobs and 30% of station jobs for women. Metro stations also feature a range of gender-specific design features (Asian Development Bank, 2016).

There is evidence of mainstreaming gender into the design of a wide range of SCF investments as a potential driver of transformational change. This includes Cambodia, Lao PDR and Nepal.

SCF programme-level guidance has been more inclusive than CTF guidance on expectations for stakeholder groups that should be consulted during IP/SPCR preparation. PPCR, SREP and FIP identify IPLCs and PPCR and FIP explicitly name women or women's groups. Examples from across the SCF portfolio where gender issues have been mainstreamed into programme and project design include:

- In Cambodia, the PPCR Greater Mekong Sub-region Southern Economic Corridor Towns Development Project recognised that women could benefit through employment measures, increased participation in decision-making and gender-specific training and capacity building (Asian Development Bank, 2016).
- In Lao PDR, under the FIP, women's organisations including the Lao Women's Union were included in stakeholder consultations throughout the FIP process, with three out of the four indicators in the subsequent FIP results framework monitoring participation by women, with data disaggregated by gender (Climate Investment Funds, 2015c).
- In Nepal, the SREP South Asia Sub-regional Economic Cooperation Power System Expansion Project recognised during project design that women in the area of the investment continue to suffer disproportionately because of minimal access to education, health and electricity supply, as well as low participation in decision-making processes. Investment design therefore included a range of gender sensitive elements (Asian Development Bank, 2016).

2.6.2 Private sector transformation in the SCF

The private sector has been a stronger defining characteristic feature of the CTF compared to the SCF. In early SCF investment planning processes there was a perceived tendency to prioritise the public sector, with the 2011 CIF report on early lesson learning on private sector actors noting: 'a viewpoint has often been expressed that CIF fund allocation is a sort of "zero sum game", whereby use of funds for private sector projects amounts to a loss by the public sector' (CIF, 2011: 13). As a response, CIF created the PSSA in 2012, as a dedicated mechanism to attract private sector investments in the SCFs. An early study by Vivid Economics (2014) indicated some success with high-quality and innovative investments, yet structural constraints were reported to hold back this particular mechanism from reaching its hoped-for potential. Further evidence on the experience of the PSSAs is lacking.

A mixture of microfinance and risk sharing mechanisms in countries such as Nepal and Tajikistan, has been key to transfer risks away from individuals and private companies in the agricultural sector, increasing private sector engagement in climate-resilient actions. One of the sectors that the PPCR targets is agriculture, which is often ranked among the riskiest sectors for the provision of affordable lending opportunities from commercial banks. This is because of uncertainties of investments due to high levels of climate vulnerability and low levels of collateral from farmers (Trabacchi and Standelmann, 2016; Vivid Economics, 2016).

- In Nepal, the PPCR investment of Promoting Climate-Resilient Agriculture, supported a risk sharing facility for commercial banks that has reduced the risk faced by banks in extending credit to small-scale farmers (Trabacchi and Standelmann, 2016).
- In Tajikistan, microfinance for climate resilience has become a specific focus of Tajikistan's PPCR to promote private companies' resilience to the effects of climate change. CLIMADAPT is an intermediated finance facility that started with on-lending to local banks through creating concessional finance facilities and conditions for loans to beneficiaries. CLIMADAPT has a total funding of $10 million to provide financing to small businesses, farmers and households through local partner financial institutions. CLIMADAPT has demonstrated that, if local finance institutions are properly capacitated, they can act as agents of change, to rapidly and sustainably increase market penetration and accessibility of technologies for building climate resilience (OneWorld and Oxford Policy Management, 2018b).

The FIP portfolio emphasises enabling investments that address financial barriers, such as limited financial services, which is leading to a transformation in opportunities for rural enterprises in countries such as Mexico.

- Reluctance of the financial sector in Mexico to provide credit and market opportunities to communal forestry operations has historically limited financial services available to most forest owners. This significant barrier was

captured in the preparation of the Mexican IP and addressed in subsequent FIP investments, leading to a transformation in opportunities for small-scale forest enterprises (Cooper and Huff, 2017).

- IIED and LTS, in their 2018 study, noted the limited number of private sector-led projects suggested an unrealistic assumption of the level of attractiveness, accessibility and demand for the FIP offering among private project developers (IIED and LTS, 2018: 14). But they also note that FIP has a comparative advantage in providing public sector grant funds, channelled through national government, or as part of public–private partnerships, to improve the enabling environment for the private sector (IIED and LTS, 2018: 21).

Climate risk information that directly caters to private sector needs, together with the provision of loan finance, has created incentives for private sector action, as documented in Tajikistan.

Engaging and incentivising the private sector for climate-resilience investments is challenging due to many barriers (Trabacchi and Mazza, 2015; Asian Development Bank, 2017). The ability of the PPCR to offer grants and concessional loans to develop pilot projects, supply technical assistance and provide access to finance at longer and more affordable terms, are key attributes. These attributes have been instrumental in encouraging private investment in climate-resilient projects, which can be capital intensive, have long payback periods, or carry first-mover risks (Trabacchi and Mazza, 2015). The strong engagement and technical backstopping from MDBs in building an understanding for such investments has been an important complementary strategy (Asian Development Bank, 2017).

- In Tajikistan, a European Bank for Reconstruction and Development (EBRD) project's modelling of future hydrology under a range of climate change scenarios enabled the scaling up of finance for investment in two hydropower plants through a $10 million loan from the PPCR and a $50 million loan from the EBRD (Vivid Economics, 2016).

2.7 The evidence base and identified gaps

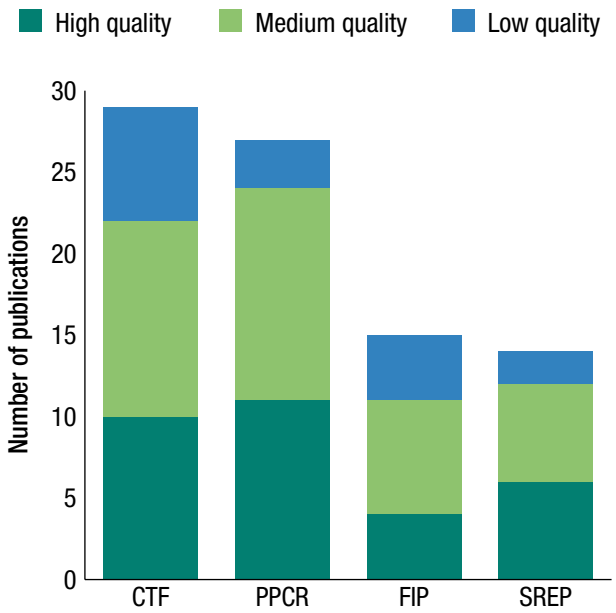
Following the documentation of findings of the evidence synthesis in previous sections, this section provides a quantitative overview of the extracted evidence with metadata generated through the evidence synthesis database. The intent is to provide an insight into the depth and breadth of the evidence base, to assist with the interpretation of the findings and to further the transparency of the evidence synthesis. However, it is important to note that the following charts do not illustrate the direction of evidence, e.g. positive or negative, or the extent of transformation. They simply show the number of publications documented by different categories of relevant information.

The extracted evidence reveals interesting, but not unexpected, trends. In terms of CIF programmes, the CTF and PPCR provide the largest amount of evidence, with overall good quality (less than 25% of publications related to both programmes were considered to be of low quality).[23] Less evidence has been collated for FIP and SREP. The FIP has the lowest number of high-quality publications (Figure 8). In part this reflects the prominence of and interest in the CTF and PPCR, reflected in the size of their respective portfolios. Forest-related strategies have tended to be of less central interest in the international climate change discourse.

Evidence on transformational change in CIF is spread across 54 of the 72 CIF partners countries. However, the number of studies per country is limited, with only one relevant report for 18 (one-third) of these countries. The evidence base is concentrated in a small number of countries, with Mexico being the most mentioned country in the literature, followed by Kenya, Burkina Faso, Nepal, Tajikistan and Turkey. (Note this is not a trend on the extent of transformational change in these countries,

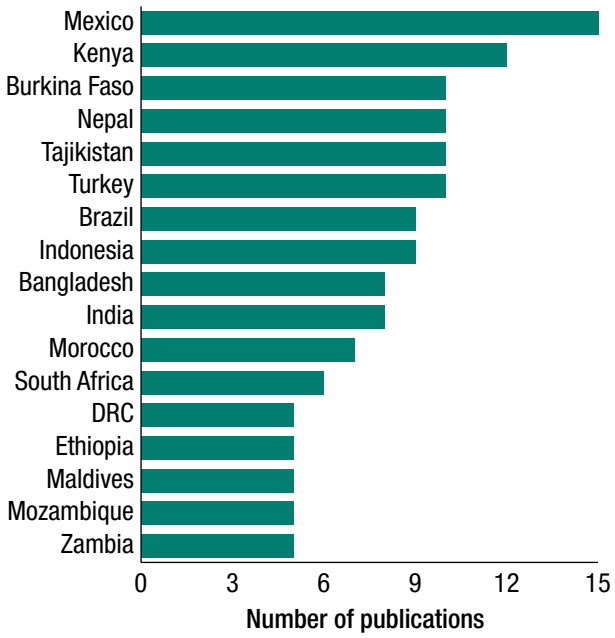
23 See Annex 3 for a description of the quality criteria used.

Figure 8 Number of papers reviewed containing relevant evidence by CIF programme and assessed quality of source



Source: ODI.

Figure 9 Number of papers reviewed containing relevant evidence by country



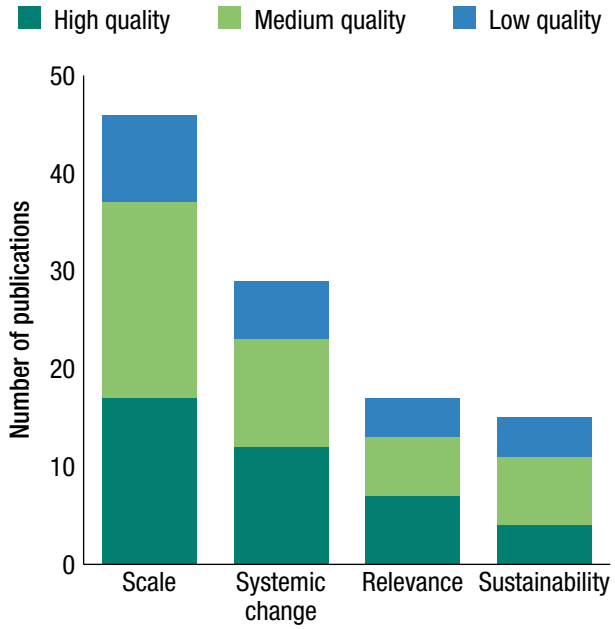
Note: graph shows only countries that appear in five or more publications. This country coverage does not imply any trend concerning advanced/less advanced progress towards transformational change.
Source: ODI.

only the number of papers that contain relevant evidence.) Figure 9 lists those countries that are referenced in five or more publications. Country coverage is determined by many factors: it may be because there are multiple CIF programmes in the country, as in Mexico and Nepal; for other countries, the novel nature of the programme may have attracted interest, e.g. geothermal power in Kenya and forestry in Burkina Faso.

Evidence on transformational processes and outcomes (both positive and negative) is concentrated around the scale and systemic change dimensions and to a lesser extent around relevance and sustainability (Figure 10). This trend is driven by CTF, which has the largest share of scaling outcomes in the overall tally, whereas PPCR evidence has been related more to systemic change. There is least amount of evidence on the sustainability of change, which is to be expected, being indicative of the time lag required to see and document lasting changes from CIF investments.

CIF programmes have had had to contend with several barriers to transformational

Figure 10 Number of papers reviewed containing relevant evidence by transformational change dimensions and assessed quality of source



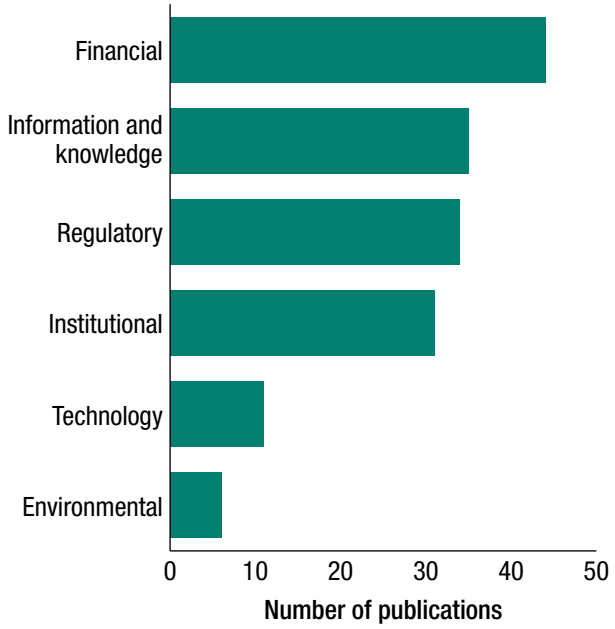
Source: ODI.

change, as described in section 2.1 (Figure 11). Technology and environmental barriers have not been mentioned often as issues that CIF-supported interventions have had to face. This is possibly a reflection of the type of literature reviewed, which is prevalently made up of analytical studies directed towards a policy and financing audience and therefore focusing less on technology issues. Environmental barriers, such as deforestation processes and a lack of water, feature in a very limited part of our evidence.

To overcome these barriers, CIF has operated across the nine TCLP arenas of intervention, generating diverse mechanisms by which they have sought to support transformational change. As expected, the two basic inputs of CIF – concessional financing and TA – focus pre-eminently in the evidence (Figure 12). Least evidence is available for the natural capital arena, suggesting that the analytical usefulness of this conceptual category may have been less than hoped, or that this is an arena that is under-researched.

In terms of evidence that can inform the four learning questions (section 1.3), our evidence base is strongest for CIF design considerations (learning question 2) and less so for how CIF implementation has contributed to transformational change (learning question 3) (Figure 13). This reflects the implementation status of the

Figure 11 Number of papers reviewed containing relevant evidence by barriers to transformational change

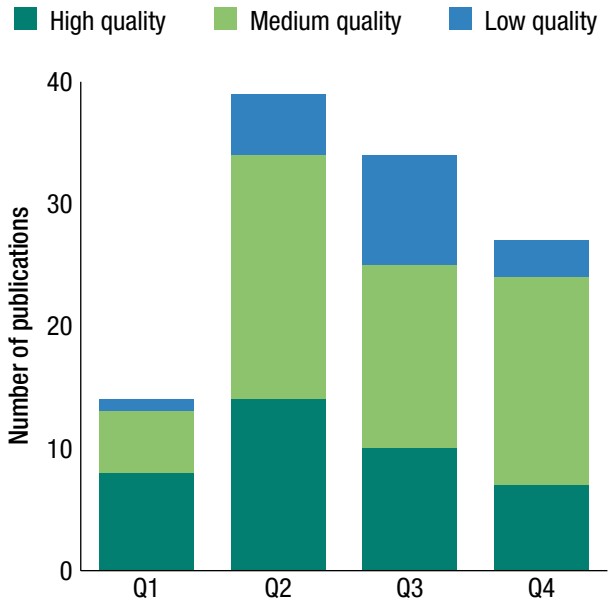


Source: ODI.

Figure 12 Number of papers reviewed containing relevant evidence by arenas of intervention

Source: ODI.

Figure 13 Number of papers reviewed containing relevant evidence by learning question



Source: ODI.

CIF portfolio, as previously described. Little information on transformational change conceptualisation (learning question 1) has been captured in the literature, perhaps reflecting the novelty of the CIF approach, i.e. seeking to operationalise the concept of transformation within the global climate change analytical space.

3 Conclusions and recommendations

3.1 Conclusions

This evidence synthesis has collated information from a wide range of documents, guided by the CIF transformational change definition and ToC. It has been conducted to advance understanding on transformational change in the CIF context and responds to the four learning questions established by the TCLP. The synthesis has concentrated on addressing the following two questions:

- To what extent and how does CIF's approach to planning, designing and implementing its investment work to advance transformation change?
- To what extent, how and under what conditions are CIF-supported investments and activities contributing to transformational change?

The following sections draw out the main learning insights gained from across all four CIF programmes, recognising that the limited evidence base severely constrains any broad generalisations. What follows is based on evidence previously cited.

3.1.1 How CIF approaches can advance transformational change

In terms of how the CIF approach to planning, design and implementation is advancing transformational change, two general findings appear to hold across all four CIF programmes. Both design features have helped to advance transformational change in several countries, as reported in the programme sections.

1. There is evidence that the CIF planning approach of extensive consultation has secured the necessary collaboration for multi-sector engagement where it is required for planning climate change actions that requires different sectors and groups of actors to work together.
2. National ownership over CIF investments has been strengthened by working through ministries that have the mandate to coordinate action across government. The large amount of investment finance that CIF has been able to bring to help address climate change challenges has helped to focus attention on strategic investments.

Inclusive planning

Low technical and institutional capacity and, at times, high staff turnover within government administrations have affected the development and implementation of CIF country programmes. One strategy that governments have used to reduce this risk is to increase the number of players involved through inclusive planning, drawing upon expertise among non-state actors to support project implementation.

The CIF programmatic approach – observable across the CTF, PPCR, FIP and SREP programmes – has led to the inclusive development of country IPs. Evidence has been cited that such plans have brought about a public and private sector response and have facilitated the design of innovative, sometimes first-of-a-kind projects. By strengthening the private sector's perspective in public policy-making, the approach has contributed to creating strategic public/private sector linkages. Partnerships with bilateral and multilateral donors

– to support countries' enabling environment for transformational change – have also played a significant role. The MDBs have brought their collective experience and expertise to bear on developing innovative solutions across a broad range of contexts, as the programme sections demonstrate. Sub-national engagement to secure broad-based participation has also helped to secure scaling up of CIF investments.

Strengthening country ownership through large-scale investments
The CIF design strategy of investing large sums has enabled it to engage lead national ministries responsible for strategic planning and financial management in partner countries. This has contributed to bringing climate finance into the mainstream of national economic and development decision-making in some countries. Establishing strategic focal units within key government ministries to champion coordination and cooperation appears to engender country ownership, leading to improved institutional processes and the strengthening of some national policies related to climate change.

3.1.2 How CIF contributes to transformational change

CIF remains a developing portfolio of investments, with a very large number of projects under implementation. So, the contribution that CIF investments make to transformational change is still emerging. However, several outcomes under each programme can already be discerned and illustrative examples include:

- CTF has achieved its transformational objective of supporting the commercialisation of innovative, low-carbon technologies in a targeted number of countries where strategic opportunities exist.
- The SPCR process has led to a step change in national adaptation planning in some pilot countries, with subsequent PPCR investments helping to secure transformation through the scaling up of climate-resilience actions.
- Across the FIP portfolio, evidence points to increased prospects for transformation in sectors across the rural landscape that have long been undercapitalised.
- There is some early evidence that SREP interventions have activated transformational processes that lower renewable energy deployment risks for both governments and the private sector.

Two general learning findings on the CIF contribution to transformational change stand out:

1. CIF investments have supported enterprises at all scales (from MSMEs to large corporates), not only in mitigation strategies, but also for strengthening climate resilience.
2. Some climate change programmes and technologies in sectors and countries previously supported by CIF are no longer dependent on international concessional climate finance. The likelihood of the sustainability of such actions is therefore increased.

Private sector action
CIF programmes have addressed a significant number of financial barriers related to the underdevelopment of financial markets in many partner countries, often benefiting from the financial expertise of CIF MDB implementing partners. Across the CIF portfolio there are examples of investments that are addressing these barriers in the enabling environment, helping to unlock the potential of the private sector at all scales of activity. One area of emerging evidence is in the mixture of microfinance and risk sharing mechanisms that have been developed to transfer risk away from small-scale private enterprises. All these actions have supported increased private sector engagement in climate change-related activity.

Sustainability
Across a range of countries, the likelihood of sustainability of CIF investments as part of a national low-carbon climate-resilient strategy has been strengthened by governments committing new budgetary resources for public sector action and introducing fiscal measures as an incentive for private sector action. Both strategies have been underpinned by legislative change in some countries. Elsewhere, the commercial market for climate-related technologies has matured sufficiently to allow for further development on

commercial terms. An early demonstration of success has often been key, as it then strengthens confidence for both the public and private sectors to make further climate investments.

3.2 Recommendations

The evidence synthesis has identified several actions that CIF and the wider global climate finance community could take to foster transformational change.

3.2.1 Recommendations to foster transformational change

1. **CIF programme implementation over the next period should build on the experience and expertise gained during the first 10 years of CIF.** The comparative advantage of CIF has been an ability to work through a small number of MDBs in a targeted number of countries using concessional resources that can catalyse higher levels of investment to secure large-scale impact. This approach can continue to set it apart from other parts of the international climate finance architecture during programme and project implementation.
2. **Multi-stakeholder consultation, across government, private sector actors and civil society, is a key feature of the CIF programmatic approach and should be maintained throughout the implementation of country programmes and projects, in all four CIF programmes.** This approach has changed the way some countries have planned their response to climate change; there is a need now to continue with this type of consultative engagement during programme implementation. The success of working through lead ministries responsible for strategic investment planning and financial management needs to be maintained to secure this approach.
3. **CIF country programme planners and project implementers should assist in strengthening the planning for and monitoring of, transformation.** This would entail developing more detailed country ToC and ensuring that all investment projects were clearly aligned with these ToC. The new national process within which this could be embedded is the Nationally Determined Contributions (NDC) reporting that countries are obliged to submit to the UNFCCC.[24] CIF could support this new process by developing tools for programme planners and project implementers based on the concepts of transformational change developed so far (e.g. the four dimensions).
4. **CIF should continue the flexible use of its funds and retain high risk tolerance levels when considering the use of financial instruments to support transformation, especially for emerging or challenging technologies.** The CIF approach has been able to foster innovative country IPs, programmes, projects and approaches to engender transformation. CIF should further explore ways in which it can continue to support innovation by providing financial instruments that cover the higher levels of project risk, which are often needed in complex and challenging contexts.

3.2.2 Recommendations on transformational knowledge gaps

The following recommendations address current transformation knowledge gaps, which need to be addressed to increase our understanding of how transformational change happens.

5. **CIF should invest in further learning activities that address relevant knowledge gaps in the literature highlighted in the evidence synthesis:**
   a. The evidence base of transformational change in the FIP and SREP programmes remains very limited. From a portfolio perspective, the FIP programme disbursement is significantly ahead of the SREP programme, but the evidence synthesis found a similar amount of publications that relate to transformational change for both programmes. This suggests that the FIP may be an insufficiently studied programme.

24 The relevance of CIF in assisting countries to implement their NDC was raised at the October 2018 TCLP workshop.

b. More learning studies about CIF outcomes are required, as the overall portfolio implementation nears its mid-point. A significant amount of the transformational change learning that the CIF experience could offer is yet to be captured (acknowledging the ongoing efforts of the CIF knowledge activities). Such learning can usefully be grounded in the four dimensions and nine arenas of transformation developed by the TCLP.
c. Important areas of the CIF experience currently under-represented in the literature on transformational change include the cross-cutting theme of gender, the Dedicated Private Sector Programs (DPSP) of CTF and the PSSAs of SCF.
d. There may be opportunities for across-CIF programme learning in-country. Several countries (e.g. Bangladesh, Cambodia, Honduras, Nepal and Zambia) have multiple CIF programmes and future research could look to explore what (if any) in-country complementarities exist between the programmes.

6. **CIF should continue to promote a broad understanding of transformational change.** While the TCLP concepts and theory of transformational change were successfully tested in this evidence synthesis, there are certain considerations that emerged at the TCLP October 2018 workshop:[25]
   a. The dimension of sustainability requires further study. Sustainability captures the temporal expression of change, yet its present framing lacks precision. Greater emphasis on 'timeliness of supported action', that responds to country ownership and capacity, may be worth considering for future development. This reflects the continuing need to secure transformational change at the earliest opportunity to safeguard society under the future climate. Such an approach could be set within a broader framing to explore how sustainability might be measured in the context of transformational change.
   b. Further explorations of transformational change also need to consider the trade-off between opportunities to achieve change quickly compared to investing with a longer-term view. The former aims at existing or identifiable tipping points, such as when renewable energy becomes cost-competitive with alternatives, in countries where tipping points are deemed to exist. The latter gives attention to riskier technologies and in country contexts whose pathways to transformation are much less clear and non-linear. CIF and other major climate funds need to find a balanced strategy that addresses both views.
7. **The overall CIF portfolio provides an opportunity for more structured learning on transformational change, building on the existing E&L Initiative.** Given that much of the portfolio is now in the project pipeline stage or under implementation, consideration could be given to embed 'learning partners' within countries or at the programme level to play a targeted learning function[26]. This would promote better understanding, more effective application and efficient learning using the transformational change lens.

25 23–24 October 2018, Washington DC.

26 This approach is already used in large research and project consortia.

Literature reviewed

The listed publications below are those that have been screened for their relevance to transformational change and subsequently reviewed according to the methodology described in Annex 3. Evidence extracted from these publications has been uploaded and stored in the evidence synthesis database, and subsequently drawn upon for the preparation of this synthesis report.

During the drafting of the evidence synthesis report, a small number of additional references were found that add to the evidence base. These publications, which are listed following the main reference list, have yet to be uploaded and stored in the evidence synthesis database.

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Annex 1 Evaluation hypotheses

H1 The provision of long-term concessional finance at scale can be a crucial factor in changing perceptions of risk among investors, particularly in the context of infrastructure projects with high capital costs, complex supply chains or innovative technology profiles.

H2 Combining climate mainstreaming with investment programming creates incentives for policy-makers to engage with the climate agenda, while also providing learning opportunities to inform the better development of relevant policies, planning and institutional frameworks across sectors.

H3 Coordinated, multi-level efforts that strengthen policy, institutional, social and market capacities are needed to address fundamental market and policy failures to value natural capital and wider environmental externalities.

H4 It is possible to create market tipping points for (near) cost-competitive low-carbon technologies by combining policy reform with support for market development, incentive frameworks and other innovative approaches to mitigate investor and developer risk.

H5 Working through intermediaries and supporting value chain development is an effective way to deliver transformation in the context of smaller-scale investments in climate goods and services.

H6 Working through the MDBs has enabled the CIF to influence the climate orientation of much larger development finance institutions and funding flows.

H7 Gender equality efforts in institutional, policy and investment processes help the CIF support transformational change.

Annex 2 Clean Technology Fund technology case studies

The following case studies are grouped by technology and country experience. Most studies draw evidence from the literature published in 2017–2018; these include CSP in Morocco and South Africa, wind in Mexico and energy efficiency in Turkey and Mexico. The Indonesian geothermal energy case study draws evidence from earlier literature published in 2015 and 2016.

Concentrated solar power

There is a moderate amount of evidence that CTF-supported investments have contributed to expanding and diffusing the development and deployment of CSP technologies. The evidence of transformational outcomes is stronger for Morocco than for South Africa.

Morocco

As with other countries in the CTF portfolio, Morocco is motivated by the energy trilemma, the three parallel objectives of energy policy in pursuing low-carbon growth: to achieve (1) clean, (2) affordable and (3) secure energy services to grow its economy and realise a prosperous society.

In Morocco, the context within which the country has pursued an ambitious CSP strategy saw energy demand grow by 4.2% per year over 2002–2012 (World Bank, 2018) and 5.1% per year in 2010–2016 (Bloomberg New Energy Finance, 2018). Most of the country's energy supply is reliant on fossil fuel imports, with coal accounting for 47% of total electricity generated and oil and gas making up 24% (World Bank, 2018). In addition, electricity supply is heavily subsidised through a compensation system operated directly through the state utility. Between 2009–2011, estimates of subsidies on the government budget ranged between $1 billion to $4.3 billion, or around 1% to 4.3% of the country's GDP (Falconer and Frisari, 2012). Hence, the combination of energy security and affordability concerns, coupled with the vision of reaping first-mover advantages and becoming a regional technological leader in CSP, prompted the government to launch the Morocco Solar Plan to install 2 GW of CSP and an energy strategy to achieve 42% of power generation through renewables by 2020 (Falconer and Frisari, 2012; Stadelmann et al., 2014).

CTF mechanisms addressing barriers to transformational change

When Morocco embarked on its CSP programme, the main barrier holding back CSP projects was the high cost of capital caused by the lack of a track record and the immature technology in the country. Unlike other renewable technologies, CSP cannot be developed piecemeal, segment by segment, and requires a major financial commitment from the very start. The high fossil fuel subsidies also raised the cost of renewable energy compared to conventional generation. Estimates by Falconer and Frisari (2012) show that even the lowest bid for the first CSP project in the country, Ouarzazate Noor I, was

far from grid parity in the absence of the international concessional lending it received from CTF and other multilateral lenders.

To kickstart the CSP market in Morocco, CTF supported the Noor I plant with a concessional package of $475 million, which was matched by $190 million of private equity and $980 million of MDB co-funding. CIF has reported that this blending of finance allowed the levelised cost of electricity for the project to be 25% lower compared to financing from commercial banks (Climate Investment Funds, 2014: 12).

In addition, the loan package supported a new business model: one where the country's public agency responsible for solar development, MASEN, is an equity partner, project developer and debt provider at the same time through a public-private partnership. The lending also spurred the African Development Bank (AfDB) and the World Bank to work closely with MASEN to design the successful tender that attracted private developers for the 75% equity stake in the project (Falconer and Frisari, 2012; Climate Investment Funds, 2013).

Transformational outcomes

Findings from independent studies (some of them still in draft form) provide evidence of transformative processes and outcomes of CTF-supported CSP investments in Morocco (Falconer and Frisari, 2012; Bloomberg New Energy Finance, 2018; Itad et al., 2018; World Bank, 2018).

Noor I was designed at a scale large enough to demonstrate the feasibility of the storage component to meet evening electricity peak demand and the associated cost reduction, with the objective of building a portfolio of projects over time to further drive down technology costs. Private investors were drawn into Noor I as equity partners thanks to the innovative public–private partnership (PPP) model, which caused the investors to state publicly that the model had significantly lowered their perception of policy and political risks and prompted them to reduce their required rate of return by 2 percentage points (Falconer and Frisari, 2012).

The success of the PPP then led MASEN to replicate it in three additional projects: two new CSP plants, Noor II and III and a hybrid CSP-PV plant, Noor Midelt. All of them received CTF concessional loan support and attracted MDB and developer funding (Bloomberg New Energy Finance, 2018). Out of these projects, 510 MW of generation capacity will be online by the end of 2018, with a further 150–190 MW of capacity at the bidding stage (World Bank, 2018). The rapid scaling of CSP in the last decade makes the World Bank (2018) believe that 'Morocco will become a CSP pioneer not only on the African continent, but with its pipeline of CSP projects; it will rival the largest CSP markets in the US and Spain in the next few years' (World Bank, 2018: 18).

There are also signs of a wider regional interest in replicating the MASEN model. MENA countries originally targeted by the CTF regional CSP programme, but prevented from engaging for different reasons, are reconsidering the potential of CSP in their energy mix. The Moroccan government is currently looking to expand its support for renewable energy deployment in 10 other countries (Itad et al., 2018). In addition, there is evidence of global learning, with Shanghai Electric, whose engineers have undertaken several field visits to Morocco to learn about CSP, participating in the recent Dubai CSP tender alongside the main CSP developer in Morocco, ACWA Power (Itad et al., 2018).

The rapid development of the Moroccan CSP sector over the last decade hints at considerable systemic changes in the country's energy sector. MASEN required a local content valued at 30% of capital costs for the Noor I plant. This was part of the overall government strategy to create a leading CSP industry in the country over the subsequent phases of CSP development in Ouarzazate, including Noor II, III and Midelt. In itself, Noor I had little impact on local industry development, yet estimations at the time put the overall strategy's creation of jobs at 11,000 full-time posts in construction, manufacturing and maintenance by 2020; savings of $64 million in fossil fuel subsidies over the lifetime of the plants; and energy import reduction of 42% with the full Morocco Solar Plan implemented (World Bank in Falconer and Frisari, 2012: 12).

Recent signals of deepening systemic change have come in the wake of the 2015 Paris Agreement and the COP22 meeting held in Marrakech in 2016. The Moroccan government announced a new target of 52% of renewable energy capacity by 2030, of which 5 GW would be supplied by solar. The role of MASEN was also strengthened in renewable energy procurement, by receiving responsibility for all renewable electricity including the wind projects previously managed by the state utility Office National de l'Electricité et de l'Eau Potable (ONEE). In this regard, CTF's capacity-building support was pivotal in shaping MASEN into the highly effective financing and project management organisation, with in-depth knowledge of CSP contracting, that is now (Itad et al., 2018). MASEN's new role is likely to reinforce private partners' confidence in the political backing that MASEN enjoys (Bloomberg New Energy Finance, 2018; World Bank, 2018).

Nonetheless, the continued cost reduction effects of the MASEN model on CSP technology remains to be seen – a strong indication will come from the unveiling of the Noor Midelt bids. There are also signals that the business model itself may not be profitable in the long run. While the private sector continues investing as an equity partner in Noor II, III, Midelt and the Noor PV I (which groups three solar PV plants) most funding is still public. Overall, the private sector contributes 24% to the country's $3.3 billion cumulative investment in CSP (World Bank, 2018). Falconer and Frisari (2012) have argued that replicating this model 'will not be sufficient in and of itself to support the development of a large-scale portfolio of CSP projects. To reach the scale desired by the Moroccan and Mediterranean Plans, significant sums of additional capital will be needed. Given the scarcity of public and international support, more commercially-oriented financing models will need to emerge' (Falconer and Frisari, 2012: 26).

Continued high reliance on public finance can seemingly be explained by the fact that the private offtake market has not developed as quickly as public offtake projects in Morocco (Bloomberg New Energy Finance, 2018). Regulatory and institutional coordination problems in the private offtake market, such as the absence of an operational regulator requiring wheeling charges to be negotiated on a case-by-case basis and private developers struggling to select suitable sites for lack of grid expansion information from the state-owned utility and local distribution operators, have been mentioned as obstacles to rapid development (World Bank, 2018).

That said, MASEN and its partners are aware that other modalities to involve more private participation are necessary to achieve the government's ambitious solar energy targets. In fact, they have already taken steps to adapt the current PPP model and have reached an agreement with the national Attijariwafa Bank to mobilise more private finance (World Bank, 2018).

South Africa

South Africa experienced load shedding episodes in 2007–2008 and again in 2014–2015, owing to inadequate operations and maintenance of ageing power plants (World Bank, 2018). This saw the reserve margin falling from 25% in 1994 to 8% in 2008 – significantly below the international standard of 15% to 25% (Boyd et al., 2014). The country has also one of the biggest coal power generation fleets in the world, accounting for 85% of total electricity generation. Thus, energy insecurity, as well as the commitment to reduce emissions, as pledged by then president Jakob Zuma at the 2009 COP15 meeting in Copenhagen to achieve 34% emission reduction by 2020, prompted the country to seek diversification out of its energy mix, with a strong focus on solar (World Bank, 2018).

CTF mechanisms addressing barriers to transformational change

The main barriers to transformation in the renewable energy sector in South Africa have been regulatory, macroeconomic and technological. By law, Eskom, the country's vertically integrated power company, is obliged to subsidise consumers. In 2013, Eskom in South Africa could charge customers an average of $0.08/kWh, whereas the LCOE for CSP and hydro was between $0.28 to $0.33/kWh and $0.06 to $0.13/kWh (Boyd et al., 2014). In addition, the national regulator (NERSA)

has consistently approved tariff increases that were lower than Eskom requested, increasing feasibility issues for new solar projects (World Bank, 2018).

Macroeconomic shocks have also dented South Africa's foray into CSP, when the global financial crisis in 2008 led the South African government to stop the development of the Eskom CSP project in Upington and redirect resources towards conventional technologies to mitigate a power generation gap (Boyd et al., 2014; World Bank, 2018).

Before embarking on its CSP projects, Eskom did not have any non-hydro renewable energy project in its portfolio, which raised the risk of its ability to deliver (Boyd et al., 2014).

The CTF support to South Africa came at an important juncture, by providing concessional loans to the first two Independent Power Producer (IPP) CSP projects, Abengoa KaXu and Abengoa Khi, to demonstrate that private sector participation in the renewable electricity sector can be successful (Boyd et al., 2014; International Finance Corporation, 2014b). The CTF also provided concessional finance to what at the time was the most ambitious and technically challenging CSP project outside the US, the Eskom CSP plant in Upington (which has recently been cancelled).[1] The overall loan package provided amounted to $1 billion, including other international finance institutions' money (Boyd et al., 2014).

Transformational outcomes

There is limited and mixed evidence on whether the CTF investments in South Africa have spurred the wider deployment of CSP technology. The CTF contribution was important, because it came at a strategically relevant time. While currently having a supportive policy and regulatory framework for renewable energy and a strong auction market, South Africa struggled for a long time to form a coherent renewable energy policy (Westphal and Thwaites, 2016). Throughout the 2000s, a series of uncoordinated manoeuvres sent mixed signals to markets, such as the abrupt shift from a feed-in-tariff regime for renewable energy to an auction system with the creation of the new Department of Energy in 2009 and the first iteration of the Integrated Resource Plan which focused on commissioning coal generation plants to solve the generation deficits during 2008–2009, neglecting falling renewable energy costs (Westphal and Thwaites, 2016).

CTF funding for the first two CSP projects, Kaxu and Khi, under the new renewable energy private sector auction regime – the REIPPPP – started in 2010 with the establishment of the Independent Power Producer office, and supported the credibility of this new system (Itad et al., 2018). Further private CSP projects developed afterwards – current generation capacity in the country stands at 500 MW – providing some evidence that the success of Kaxu and Khi established a track record that facilitated the mobilisation of further private funding (Climate Investment Funds, 2015).

The extent to which CTF's support to the Eskom public CSP project in Upington has contributed to transformational progress in South Africa's energy system is uncertain. Interviews with stakeholders familiar with the project suggested that, by supporting both the public Eskom CSP project and the first two private CSP projects in the REIPPP, the CTF was de facto hedging the risks of CSP deployment in South Africa and that contributing to the cancellation of the Eskom project was the fact that the REIPPPP had been able to procure CSP and renewable energy more widely, on purely commercial terms. This meant that the Eskom's initial transformational objective of demonstrating the feasibility of CSP technology through the project had already been met. And it explains why the investment has now been turned into a pure energy storage project, perhaps as an attempt to enable other transformational processes of the country's energy system.

With regard to the wider benefits of CTF support to Eskom, Nakhooda and Norman (2014) have also questioned the extent to which the CTF project helped to shift mentalities and change Eskom's approach to energy investment internally, as it is not clear whether the CTF programme was prioritised in the organisation.

1 For more information, see www.iol.co.za/business-report/energy/eskom-scraps-solar-power-plant-in-northern-cape-16243108

Wind

Mexico

In the early 2000s, Mexico initiated a process to transform its energy system by assembling a 3.8 GW pipeline of wind energy projects. Wind energy was at the time a nascent and largely unproven industry, which is why, when the global financial crisis hit, commercial lenders rescinded debt funding, even to projects with completed financial plans. With a halt to lending, projects could continue only with 100% equity funding, which would have reduced profits and burdened company balance sheets. As a consequence, only 85 MW of capacity was installed by the end of 2008.

CTF mechanisms addressing barriers to transformational change

Under these circumstances, CTF funding proved to be fundamental in resuming the transformational journey. CTF provided $45 million of subordinated debt, blended with IDB and International Finance Corporation funds, to support two wind farms – the 250 MW Eurus and 67 MW La Ventosa projects – in Oaxaca state. These interventions restored confidence in the Mexican wind market through two important mechanisms:

- CTF concessional funding brought down the cost of capital in line with the expectations under which these projects had originally been developed (International Finance Corporation, 2014a);
- The MDBs provided technical assistance to help build the capacity of NAFIN, the national development bank, to blend concessional finance, and evaluate and fund large-scale wind power projects (ICF International, 2014; Bloomberg New Energy Finance, 2018).

Transformational outcomes

Independent analysis by the International Renewable Energy Agency (IRENA) (in International Finance Corporation, 2014a), draft findings of Bloomberg New Energy Finance's study on the CTF (Bloomberg New Energy Finance, 2018), and the evaluation of transformational change in the CIF (Itad et al., 2018) confirm that the CTF and MDBs' bridging investment was pivotal in catalysing debt financing and resuming wind market development in Mexico. After the global financial crisis, the Mexican wind power market rapidly scaled up, attracting a multitude of private investments owing to favourable returns. In 2012, Mexico became the first country in Latin America to attract debt financing from international pension funds, insurance companies and hedge funds, with Acciona Energía México's $298 million bond offering to refinance its 204 MW Oaxaca II and IV wind farms. This was evidence that the sector had developed a sufficient track record to make this type of investor – generally among the most risk averse – comfortable enough to invest (International Finance Corporation, 2014a).

Since 2013, the commercial market in Mexico has matured enough to finance wind development fully on commercial terms (Bloomberg New Energy Finance, 2018; Itad et al., 2018). In fact, IFC and the government decided to reallocate CTF resources earmarked for wind projects for this reason in the same year (International Finance Corporation, 2014a). In 2015, Mexico's national development bank NAFIN issued the country's first green bond of $500 million for wind energy generation projects in the international market. Owing to better returns than the five-year Dollar Mexican Government bond and even the five-year US Treasury Bond, investor demand turned out to be five times higher than the size of the offering. This led NAFIN to issue a second offering – this time in local currency – worth $100 million with a seven-year maturity the following year (Abramskiehn et al., 2017).

By the end of 2016, 3.8 GW of capacity had been installed with projections pointing at 12 GW by 2024. A strong manufacturing sector had developed, including over 45 developers, equipment manufacturers and service providers (International Finance Corporation, 2014a).

The rapid transformation of the wind energy sector was made possible by an existing favourable regulatory and policy environment for renewable energy (ICF International, 2014; Bloomberg New Energy Finance, 2018):

- The 1992 Public Electricity Service Law, which was reinforced by the 2008 Law for the Development of Renewable Energy and Energy Transition Financing, allowed private investment in the sector while complying with the traditional constitutional limitation on the sale of electricity. Independent power generators have been able to sell electricity to private offtakers (e.g. energy intensive industries) on the condition that the latter hold a share in the generation assets. This then qualifies the project as 'self-supply' because no 'sale' happens. This self-supply regime provides price certainty through a power purchasing agreement and subsidised costs for renewable energy access to the grid, which makes the transmission charges largely independent of the actual distance between generation and consumption centres (IRENA, 2015).
- A 2004 decree, maintained in the 2013 Income Tax Law, introduced accelerated depreciation on renewable energy assets, which allowed tax savings and lower borrowing for wind project developers. The law permits 100% depreciation on renewable equipment in one fiscal period if it has been functional for five consecutive years.
- More recent policies include a renewables target set in 2012, which aims for 35% electricity from clean energy sources by 2024, 40% by 2035 and 50% by 2050. The 2014 Electricity Law liberalising the power generation and supply markets is expected to further stimulate market dynamism (IRENA, 2015).

The timely CTF interventions during the global financial crisis leveraged this favourable enabling environment, which ultimately led to a sustained transformation of the sector that weaned itself off both international and domestic concessional finance. Nevertheless, while there is solid evidence of scaled-up and sustained change, when considering the transformational impacts it is important to recognise that the wind energy sector still only accounts for 3% of the country's overall power generation (Bloomberg New Energy Finance, 2018).

Energy efficiency

Turkey

From 2000 to 2010, Turkey's economy tripled in size and the population grew by 14%, raising energy demand by 7% per year between 2005 and 2013. The reduction of tariff subsidies at the same time, coupled with the government desire to reduce fuel imports and increase energy security, focused policy attention on energy efficiency. In addition, the Turkish economy is strongly export oriented, driven by SMEs, which make up 10% of its exports and generate 25% of the country's GDP. The government saw in this a strategic opportunity to improve its economy's competitiveness through energy savings (Retallack et al., 2018).

CTF mechanisms addressing barriers to transformational change

Several barriers prevented the development of an energy efficiency market in Turkey before the intervention of CTF. Financiers were unfamiliar with a business model based on future cost savings, leading to higher pricing and misjudgement of risk. SMEs were unable to take on extra debt given their limited balance sheets and/or poor credit histories. In general, there was poor interest among all parties about energy efficiency owing to its perceived high transaction costs. This meant that financial intermediaries able to identify, assess the risk of and structure financing for potential projects did not exist and the credit on offer for projects often mismatched the payback period of the energy efficiency investments (Econoler, 2013; Retallack et al., 2018).

Within this context, CTF adopted an intermediated approach by supporting two projects: TurSEFF and the Turkey Commercialising Sustainable Energy Finance (CSEF). In TurSEFF, the blended

CTF-EBRD funding provided credit lines to local banks for on-lending with longer maturities and lower interest rates than would have been possible with EBRD money alone – CTF provided longer tenors of 15 years versus five years of EBRD and longer grace periods of seven years versus two years of EBRD. The programme also adopted a very flexible approach by keeping the eligibility criteria of projects wide and being technology agnostic, to allow the participating banks to freely expand into new markets, and gain a deeper understanding of the market for future initiatives (Econoler, 2013; Retallack et al., 2018).

Another important feature of the programme was the provision of free technical assistance to build the capacity of participating banks. This involved providing regular coaching sessions in over 100 bank branches to evaluate renewable energy and energy efficiency projects, as well as carrying out technical workshops and training for over 1,400 engineers, business owners, suppliers and participants from industry associations (Econoler, 2013). In addition, EBRD worked with the Turkish government to create the first national Energy Efficiency Strategy Plan, which set an overall energy intensity reduction target of 20% by 2023 on a 2008 baseline (Retallack et al., 2018).

In CSEF, CTF supported a highly innovative project design by working through leasing companies. CTF money was blended with IFC funding to provide credit lines to three leasing firms, which had various levels of energy efficiency exposure. They also received free TA to build their capacity to identify investments and market to potential SME clients and to help them define opportunities before buying the required technology with the CTF-IFC blended money. Similar to TurSEFF, CSEF also adopted a technology agnostic approach (Retallack et al., 2018).

Transformational outcomes

In terms of scale of energy efficiency deployment, both projects were successful. Specifically, TurSEFF financed around 240 projects, through seven national banks that cover 60% of all banking assets in Turkey, resulting in very low non-performance levels (Retallack et al., 2018). Both projects attracted follow-on credit lines from participating banks and leasing companies on fully commercial terms: Akbank within TurSEFF was the first bank to disburse all the funding and obtained an additional $25 million to finance its remaining pipeline; Yapi Kredi Leasing sought an additional $96 million loan (Econoler, 2013; Retallack et al., 2018). In TurSEFF, participating banks also blended their own money together with IFI loans. Overall, TurSEFF has seen significant co-financing with a ratio of 1:35, where $50 million from the CTF and $7.5 million from the EU helped catalyse up to $2 billion (Retallack et al., 2018).

Moreover, the experience of TurSEFF has spawned further, more specialised versions of the facility. The third iteration of TurSEFF was created without any concessional finance, but with a small package of CTF-financed technical assistance. The TuREEFF facility targets the residential sector and the MidSEFF focuses on bigger investments, between €5 million and €50 million (Retallack et al., 2018).

The two projects' strategic relevance to the national context helps explain why they have been successful. Both projects have targeted an area or segment of the economy where there was latent demand for energy efficiency services – SMEs – and were designed to leverage this. As already mentioned, SMEs make up an important share of the Turkish economy and have historically struggled to access finance. This meant they represented the perfect channel through which to help grow the economy while reducing GHGs.

TurSEFF selected the intermediary banks, favouring those bigger in size, with deep branch networks and focused on SMEs as their client base. Similarly, by partnering with leasing companies, CSEF leveraged their existing broad and deep networks with SMEs. In addition, CSEF's activities came at a time when leasing companies were seeking to expand into new markets, as the 2008 VAT increase from 1% to 18% for leasing meant that their traditional client base was shrinking (Retallack et al., 2018).

The projects have also had systemic effects that seem likely to be sustained. Specifically, the TurSEFF TA has established lasting capacity at the banks' branch level to identify and lend to energy efficiency projects. EBRD reported that over time the budget for TA reduced and more responsibilities were being shifted to local experts and people within the banks, as opposed to the beginning when

international EBRD-employed consultants led the training. Now, the TA is almost entirely carried out by local experts, apart from the project manager (Econoler, 2013; Retallack et al., 2018).

Overall, there is evidence that the CTF contribution helped the Turkish market to achieve the current state of functioning on solely commercial terms (Climate Investment Funds, 2015b).

Mexico

Between 2000 and 2012, the Mexican population grew by an average of 1.6 million people per year, which required construction of half a million extra homes each year. This contributed to increasing the construction sector's energy demand, which currently stands at 17% of the country's energy use. On the other hand, the widespread use of inefficient equipment is the principal reason for the substantial energy use in the SME food processing sector. The government saw this as an opportunity to increase productivity and competitiveness through deployment of energy efficiency technologies (Retallack et al., 2018). These trends together with the government's mitigation ambitions at the time, as set out in the Special Climate Change Program (2009–2012), frame the context within which CTF supported energy efficiency investments in Mexico.

CTF mechanisms addressing barriers to transformational change

An endemic distrust of energy efficiency was common among end users because in the past energy service companies had failed to deliver promised savings and struggled to finance multiple projects. Financial intermediaries perceived high risk due to unfamiliarity with energy efficiency and because of poor credit histories or lack of collateral of some SMEs. This translated into their low capacity to understand the market and identify opportunities (Retallack et al., 2018). There is also a general lack of capacity of national development banks to track climate finance investments and to know in which sector they have been made (Abramskiehn et al., 2017).

In the residential sector, cultural factors lead people to spend their budget on larger or better equipped homes instead of more energy efficiency. This is also exacerbated by energy subsidies and the fact that most consumers may move out of their houses and miss out on the full financial reward. Absence of financial incentives also pervades the construction industry, which does not see the benefit of building costlier energy efficient housing owing to low demand. Aggravating this problem is the fact that new constructions often do not adhere to efficiency standards despite being obliged by regulation (Retallack et al., 2018).

Two distinct CTF projects have sought to address these barriers: the Energy Saving Insurance (ESI) pilot and ECOCASA.

ESI is a programme channelled through the national development bank FIRA, where an IDB loan and a CTF grant are used to provide capital through FIRA to local banks for on-lending to SMEs (Retallack et al., 2018). At the same time, the project also provides an accreditation service for technology suppliers; has developed standardised energy performance contracts; and supports validation of project performance by third-party verification agents using standardised methodologies. These measures are designed to drastically reduce risk perception.

Because of the immature market, ESI also had a strict focus on the target market – specific technologies to be used by food processing SMEs. This design feature made it easier to identify a limited number of organisations that could meet the requirements and thus reduce likelihood of non-performance. These features were decided together with FIRA when designing the project, based on a prioritisation and a market study (Retallack et al., 2018).

ECOCASA was also managed by a national development bank, Sociedad Hipotecaria Federal, where CTF, IDB and Kreditanstalt für Wiederaufbau (KfW) blended finance provided the credit line to be on-lent to housing developers directly or through local banks. The blending of CTF money provided loans to developers at a rate of 2.55 percentage points below the market rate. The properties developed could also access a green mortgage programme, Infonavit. This double incentive on the supply and demand side was designed to drive up demand quickly (Retallack et al., 2018). TA,

funded by CTF, was also a fundamental component of the project. This involved hands-on training of over 1,000 developers and 20 banks on assessment of and recommendation for cost-effective energy efficient technologies. Expert networking and knowledge-sharing events with companies from Germany and Spain were also organised, as well as promotional events and awareness-raising campaigns targeting consumers and the industry (Retallack et al., 2018).

Transformational outcomes

Both ESI and ECOCASA are still under implementation, therefore there is limited evidence available on their transformational outcomes to date. By design, the ESI model was to be piloted additionally in Colombia, El Salvador, Brazil and Peru (supported by CTF funding in the first country). The fact that it is going ahead after Mexico could be evidence of the project achieving scale effects (Abramskiehn et al., 2017). Yet, as pointed out by Retallack et al. (2018), its long-term success will depend on how well the model can be adapted to other sectors. A similar comment can be applied to ECOCASA, where uncertainty remains as whether the programme has created enough skills transfer and confidence in the energy-efficient housing market, especially once the financial incentives of both ECOCASA and Infonavit conclude (Retallack et al., 2018). In fact, one of Retallack et al.'s overall conclusions on the CTF energy efficiency portfolio is that future CTF programmes should have clear exit strategies on how to wean recipients off finite concessional finance.

Geothermal

Indonesia

Indonesia will experience energy consumption growth averaging 8.7% per year over the next 7–8 years, while aiming to increase electricity access to 100% by 2024, from 84% in 2014 (Rakhmadi and Sutiyono, 2015). Increasingly, this will put pressure on public finances if the country continues to rely on oil imports for power production and subsidising energy tariffs. The government has the ambition to increase the share of renewable energy in the overall mix from 5% to 23% by 2023 (Rakhmadi and Sutiyono, 2015). On the back of this context, CTF provided funding to a sector that had been developing since 2003 – albeit at a slow pace – but was still facing all the challenges common to geothermal energy.

CTF mechanisms addressing barriers to transformational change

The main barrier to geothermal development in Indonesia, as well as globally, is the high upfront capital investment required. Globally, developers usually spend around 40% of the project's overall cost for the exploration phase to establish feasibility, with success rates in the range of 50% to 59%. Further uncertainty occurs during the field development stage, with success rates estimated at 74% (Micale and Oliver, 2015). All this creates large risks which are priced into the cost of capital by investors. Indonesia also suffers from short maturity of loans available in the market – generally below 10 years, which is not enough for geothermal projects (Rakhmadi and Sutiyono, 2015).

Another barrier for electricity projects to access project finance in Indonesia is the financial health of PLN – the country's main offtaker for most electricity generation. This is caused by the legal obligation that PLN has to apply government-determined electricity tariffs in exchange for regular subsidies of its operation. Thus, in case of distress to either the government or PLN, the latter would risk not meeting its offtake obligations (Rakhmadi and Sutiyono, 2015).

Furthermore, institutional coordination problems have been behind the slow development of the sector. In 2012, the Ministry of Finance, supported by international funding institutions, established a Geothermal Fund Facility, with $200 million in funding. After three years of operation, no disbursements were made, owing to the differing objectives of the Ministry of Energy and Mineral Resources, which implements the Geothermal Law and sets tariffs, and the Treasury, which manages

the fund but is reported to be more focused on minimising the fiscal impact of subsidies to geothermal than its actual development (Westphal and Thwaites, 2016).

To address these issues, CTF supported the development of the 330 MW Sarulla Geothermal, which is the world's biggest single contract geothermal power plant, with a concessional mezzanine loan of $100 million. The CTF loan was blended with other IFI funding, as well as a syndicate of private lenders who provided $328 million, for a total of $1.2 billion. The CTF funding proved crucial to achieve financial closure. Additionally, the project benefited from a 20-year Business Viability Guarantee Letter from the government, which supports the financial performance of PLN.

Transformational outcomes

There is no documented evidence that Sarulla has spurred deployment of geothermal beyond the project itself.[2] Westphal and Thwaites (2016) consider the Indonesian geothermal experience to be a case of 'missed opportunity or early stage development' of transformation. This could be explained by the fact that the project itself encountered obstacles, taking over eight years to achieve financial closure from the award of the tender in 2006, caused by delays in negotiating the power purchase agreement tariff and government guarantees (Rakhmadi and Sutiyono, 2015).

In terms of decreasing the cost of deployment and attracting private investments, a comparison of Sarulla with other existing geothermal plants in Indonesia carried out by Bloomberg New Energy Finance (in Rakhmadi and Sutiyono, 2015: 17) shows that it performed very well, attracting 20% of private debt and 27% of private equity. This suggests that there is private sector appetite to invest in the sector. Yet, the substantial level of private co-financing was made possible because the previous developer had already carried out significant exploration work before Sarulla was re-tendered.

Overall, there appears to be no evidence that geothermal deployment could be fully private-led in Indonesia in the foreseeable future. This, however, seems to be a global problem and not just local to Indonesia, as exploration risks remain a significant barrier to the development of the sector (Micale and Oliver, 2015).

2 Peer-review comments have highlighted that Sarulla has provided the financing template for other projects, e.g. Muara Laboh (2017) and Rantau Dedap (2018).

Annex 3 ODI evidence synthesis methodology

Summary

There are 136 relevant publications are stored in an evidence synthesis database developed by the synthesis team. Evidence has been extracted from 85 of these publications (Table A3.1). These 85 publications have informed the findings of the evidence synthesis and are listed in the literature reviewed section.

The evidence synthesis draws on published literature in the public domain; it has reviewed neither internal CIF project documentation nor internal MDB papers. The reviewed papers are also in the English language only. With these caveats, the review of the published literature has attempted to be as comprehensive as possible.

Many publications focus on where progress has been strongest across the CIF programmes, and this evidence is fully captured in the evidence synthesis. Experiences of where progress is less clear are not as well documented and the lack of such studies in this evidence synthesis is a known gap. This gap therefore introduces an uncertain positive bias to the findings and has reduced the opportunity to learn from experiences where progress has not happened as planned.

The amount of evidence available for this synthesis shows considerable variation between programmes. In addition, two 'pulses' of publications by year can be discerned, in 2014 and 2018.

All of these constraints point to the overall limited evidence base upon which conclusions can be drawn. The findings of the evidence synthesis therefore need to be interpreted in this context.

Table A3.1 Publications screened and reviewed by relevance and quality ratings

Screened publications in EPPI-Reviewer*				
	High quality	Medium quality	Low quality	Total
High relevance	14	32	27	73
Medium relevance	20	19	24	63
Total	34	51	51	**136**
Extracted evidence				
	High quality	Medium quality	Low quality	Total
High relevance	14	32	8	54
Medium relevance	20	8	3	31
Total	34	40	11	**85**

**https://eppi.ioe.ac.uk/CMS/Default.aspx?alias=eppi.ioe.ac.uk/cms/er4&*

Data sampling

The data units in the evidence synthesis are documents containing information related to transformational change in the context of the CIF. Purposeful sampling of data was carried out, focusing on the following six source types: peer-reviewed journal, peer-reviewed research institute publication, independent evaluation study, CIF-commissioned third-party study, CIF knowledge product and MDB knowledge product.

These documents were identified through a number of internet searches, including the Scopus and Web of Knowledge academic databases; the Google search engine; Google Scholar; major environmental think tank websites; as well as the MDB and CIF websites. This was augmented by CIF-commissioned E&L studies that are part of the CIF E&L Initiative. These searches were complemented by several rounds of interaction with TCLP members, CIF Administrative Unit staff and MDB officials, to ensure that other relevant sources were identified.

Table A3.2 Publications screened and reviewed by source type

Source type	Number of publications
Peer-reviewed journal	10
Peer-reviewed research institute publication	33
Independent evaluation study	6
CIF-commissioned third-party study	12
CIF knowledge product	13
MDB knowledge product	11
Total	**85**

An initial list of 82 potential papers was compiled. Inputs were then received from TCLP members at the May 2018 workshop in Washington DC, where TCLP members recommended additional relevant studies, in addition to validating the importance of some of those already identified. Several studies were discarded at this stage, as being of low relevance.

Academic database searches

A broad range of climate change and CIF goal-related keywords (e.g. renewable energy, forest conservation, resilience) were used to run searches in two academic databases – Scopus and Web of Knowledge. This produced results in the range of 10,000 hits, which was clearly unmanageable and hence it was not possible to establish an immediate relationship to the CIF. The CIF programme names were then used to run searches, as per the search string below, which resulted in 25 academic papers being identified. Screening of these papers identified five papers that met the quality and relevance criteria for transformational change.

> Search string: *"climate investment funds" OR "clean technology fund" OR "strategic climate fund" OR "scaling up renewable energy program" OR "forest investment program" OR "pilot program for climate resilience"*

Google Scholar searches

Owing to the limited academic search results, Google Scholar was used to capture both academic and grey literature due to its capacity to identify search keywords within the body of documents, unlike academic databases. An English-only search, using the same search string, from 2010 onwards produced 3,370 hits. However, as a search engine, Google automatically limits search results to the first 1,000. A total of 683 results was then gathered and uploaded into EPPI-Reviewer, after accounting for duplicates and eliminating documents unrelated to climate change or the CIF. A pre-screening exercise then identified 59 documents as having potential relevance to transformational change in the CIF. This identified content was then subject to the screening process for quality and relevance prior to evidence extraction using the team's coding schema.

Google searches

To capture the latest relevant material, separate Google searches were made using the CIF programme names. Each search was limited to a review of the first five pages of results (excluding advertised content) within the time period 1 January 2014–1 August 2018. These searches produced a small number of additional sources for each search keyword (Table A3.3).

Table A3.3 Google search results

Search keyword	Number of new sources of evidence	Screened for evidence extraction
Climate Investment Funds	4	4
Clean Technology Fund	11	4
Scaling Up Renewable Energy Program	6	3
Forest Investment Program	9	4
Pilot Program for Climate Resilience	11	0
Total	**41**	**15**

Think tank searches

The 2017 Global Go To Think Tank Index report was used to identify further potential sources of relevant material from leading environmental think tanks.[3] Using the same search strings as were applied in Google and Google Scholar, a Google advanced search (to display only PDF content) was completed for the following think tanks to gather potential sources of evidence over the time period 1 January 2014–1 August 2018 (Table A3.4).

Table A3.4 Think tank search results

Think tank	Number of papers	Screened for evidence extraction
Potsdam Institute for Climate Impact Research (PIK) (Germany)	3	1
Stockholm Environment Institute (SEI) (Sweden)	5	0
World Resources Institute (WRI) (US)	7	4
E3G – Third Generation Environmentalism (UK)	5	3
Worldwatch Institute (US)	3	2
Ecologic Institute (Germany)	0	0
Resources for the Future (RFF) (US)	0	0
Wuppertal Institute for Climate, Environment and Energy (Germany)	0	0
Brookings Institution (US)	3	3
Heinrich Böll Stiftung (US)	1	1
Chatham House (UK)	4	1
International Institute for Environment and Development (IIED) (UK)	2	1
Global Green Growth Institute (GGGI) (Republic of Korea)	3	1
Institute du Développement Durable et Relations Internationales (IDDRI) (France)	0	0
Energy and Resources Institute (TERI) (India)	2	0
Total	**38**	**17**

3 McGann, J.G. (2018) *2017 Global Go To Think Tank Index Report*. TTCSP Global Go To Think Tank Index Reports 13. Philadelphia PA: University of Philadelphia (https://repository.upenn.edu/think_tanks/13)

As with the Google searches, this identified content was subjected to the screening process for quality and relevance prior to evidence extraction using the coding schema.

MDB website searches

Additional Google searches were made of the implementing MDB websites to capture any MDB material not copied to the CIF website. The working assumption was that this would be a small number of studies. Using the same search strings as applied in the above Google searches, a Google advanced search (to display only PDF content) was completed for the following MDBs to gather potential sources of evidence over the time period 1 January 2014–1 August 2018 (Table A3.5).

Table A3.5 MDB website search results

MDB	Website	Number of papers	Screened for evidence extraction
World Bank Group (WBG)	www.worldbank.org/en/research	2	1
Asian Development Bank (ADB)	www.adb.org/publications www.adb.org/site/evaluation/resources	5	4
Inter-American Development Bank (IDB)	https://publications.iadb.org/facet-view?field=type_view&locale-attribute=en	1	1
African Development Bank (AfDB)	www.afdb.org/en/documents/publications/ www.afdb.org/en/documents/evaluation-reports/	1	1
European Bank for Reconstruction and Development (EBRD)	www.ebrd.com/home www.ebrd.com/what-we-do/evaluation-reports.html	1	1
Total		**10**	**8**

CIF evaluation and learning material

An important source of recent and relevant documentation was drawn from the CIF evaluation and learning studies, which are led by MDBs, countries and Observer CSOs, based on the E&L Initiative Calls for Proposals. Where draft reports have been accessed this is noted in the literature list (recognising that much of this work was in progress during the evidence synthesis).

Publication screening

Once collected, studies were screened for their quality and relevance to transformational change in the context of the CIF, using a rubric developed by the synthesis team and informed by discussions at the TCLP learning workshop in May (Table A3.6). This was done in recognition of the fact that not all evidence should be considered of equal weight in the synthesis and to prioritise those publications with the highest quality and relevance for evidence extraction to inform the synthesis.

Box A3.1 'Evidence' definition

We consider the term 'evidence' to mean 'information that supports a finding'. In this evidence synthesis, the quality of evidence is proxied by the quality of the publication, as judged by the synthesis team.

Table A3.6 Quality and relevance screening criteria

Quality	Screening criteria for quality of evidence
High	• Appropriate methodology is described and shows signs of having been executed consistently. • Evidence has been subjected to a robust peer-review process. • Evidence comes from an author other than the project implementer.
Medium	• Appropriate methodology is described and shows signs of having been executed consistently. • Evidence has been subjected to some peer-review. • Evidence provided solely by the project implementer.
Low	• Methodology is not described; and/or • No reference is made to a peer-review process.
Relevance	**Screening criteria for relevance of evidence**
High	• Findings, conclusions or recommendations relate to one of the seven evaluation hypotheses of the TCLP. • Findings, conclusions or recommendations relate directly to transformational change in the CIF.
Medium	• Findings, conclusions or recommendations relate to key goals or intended outcomes (explicit and implicit) of the CIF.
Low	• Findings, conclusions or recommendations have limited applicability for gauging achievement of transformational change in the CIF.

The synthesis team then adopted the prioritisation order below, to increase the likelihood of extracting the best evidence first (Table A3.7).

Table A3.7 Priority ranking for evidence extraction by relevance and quality categories

Priority	Relevance	Quality
1	High	High
2	High	Medium
3	Medium	High
4	High	Low
5	Medium	Medium

Evidence extraction

Extraction of evidence was performed with the help of the non-profit, proprietary EPPI-Reviewer software,[4] which allows line by line coding of written documentation. Each screened publication was reviewed and coded by a member of the synthesis team using a common coding schema (Table A3.8). The coding schema was programmed into EPPI-Reviewer to aid generation of evidence metadata, which have been used to support the synthesis. Categories of information included those that provided evidence on programme design, the transformational change dimensions and evaluation hypotheses. Other categories were structured to aid a theory-based context-mechanism-outcome lens of inquiry, using categories of context, barriers, arenas of intervention and outcomes.

To address variation in coding judgement between team members, an initial coding calibration exercise involving seven priority publications was conducted by each team member separately. A review

4 https://eppi.ioe.ac.uk/CMS/Default.aspx?alias=eppi.ioe.ac.uk/cms/er4&

meeting was then held to discuss differences in evidence extraction, where a common approach was agreed for the remaining studies. After each document extraction, a review of the assigned screening criteria (i.e. quality and evidence) was performed to increase the accuracy of the initial screening.

As mentioned in Box A3.1, the synthesis team used the quality of a publication to proxy the quality of evidence contained within. Recognising that evidence in a document can differ in quality, the synthesis team adopted a protocol to extract the 'best' evidence in each document. An illustrative example of what this means is provided below:

- **Too general:** Some countries find it difficult to attract investment to the geothermal sector due to financial and technology risks.
- **Fair**: The risks associated with the exploration and drilling necessary to prove that geothermal resources can feasibly provide electricity are a major barrier to investment.
- **Best**: Identifying and confirming geothermal resources suitable for electricity production is risky as global success ratios of wells drilled during the exploration phase are estimated at 50% to 59%. Developers typically need to spend up to 40% of a project's overall costs before establishing its feasibility, which means that attracting investment for geothermal has often proved difficult to secure.

All the extracted evidence was uploaded in a cloud-based database powering EPPI-Reviewer. There is potential for the evidence synthesis database to become an open source resource on completion of the evidence synthesis. This would enable: (1) full transparency of the evidence synthesis and allow traceability of the analysis performed for replication; and (2) provide an infrastructure on which to build further enquiry of transformational change within global climate mitigation and adaptation.

Finally, during the drafting of the evidence synthesis report, a small number of additional references were found that helped to fill information gaps in the evidence base. In addition, CIF operational and results reports were reviewed to cite the most up-to date portfolio information. All these publications are listed following the main reference list (see literature reviewed section). They have yet to be uploaded and stored in the evidence synthesis database.

Table A3.8 ODI evidence synthesis coding structure

Q1

Definition [line by line coding]

Q4

- CIF evidence-based [checkbox]
- Non-CIF evidence-based [checkbox]

Q2 and Q3

Q2

- CIF evidence-based [checkbox]
- Non-CIF evidence-based [checkbox]

Q3

- CIF evidence-based [checkbox]
- Non-CIF evidence-based [checkbox]

TC dimensions

- Relevance [checkbox, line by line coding]
- Scale [checkbox, line by line]
- Systemic change [checkbox, line by line]
- Sustainability [checkbox, line by line]

Hypotheses

- 1 [checkbox]
- 2 [checkbox]
- 3 [checkbox]
- 4 [checkbox]
- 5 [checkbox]
- 6 [checkbox]
- 7 [checkbox]

Design

- Design [line by line]

Context

- Context [line by line coding]

Barriers

- Financial [checkbox, line by line]
- Technology [checkbox, line by line]
- Knowledge and information [checkbox, line by line]
- Regulatory [checkbox, line by line]
- Institutional [checkbox, line by line]
- Environmental [checkbox, line by line]

Arena of intervention

- Financing [checkbox, line by line]
- Governance and engagement [checkbox, line by line]
- Institutions [checkbox, line by line]
- Knowledge and information [checkbox, line by line]
- Markets [checkbox, line by line]
- Natural capital [checkbox, line by line]
- Policies [checkbox, line by line]
- Practices and mindsets [checkbox, line by line]
- Technologies and infrastructure/networks [checkbox, line by line]

TC outcome

- TC Outcome [line by line coding]

Impact

- Impact [line by line coding]

Intervention type

- Size [line by line coding]
- CTF [checkbox]
  - Geothermal [checkbox]
  - Solar [checkbox]
  - Wind [checkbox]
  - Renewable energy (mixed) [checkbox]
  - Energy efficiency [checkbox]
  - Transit [checkbox]
  - Vehicle technologies [checkbox]
- FIP [checkbox]
  - Agriculture and landscape management [checkbox]
  - Capacity building [checkbox]
  - Forest monitoring [checkbox]
  - Indigenous people and community [checkbox]
  - Landscape approaches [checkbox]
  - Sustainable forest management [checkbox]
  - Private sector [checkbox]
- PPCR [checkbox]
  - Agriculture and landscape management [checkbox]
  - Coastal zone management [checkbox]
  - Enabling environment [checkbox]
  - Information systems and risk management [checkbox]
  - Infrastructure [checkbox]
  - Urban development [checkbox]
  - Water resources management [checkbox]
- SREP [checkbox]
  - Geothermal [checkbox]
  - Hydropower [checkbox]
  - Solar [checkbox]
  - Renewable energy (mixed) [checkbox]

Sustainable development co-benefits

- Social [line by line]
- Environmental [line by line]
- Financial [line by line]

Country

- Kenya [checkbox]
- Turkey [checkbox]
- Indonesia [checkbox]
- Niger [checkbox]
- Zambia [checkbox]
- Burkina Faso [checkbox]
- Democratic Republic of Congo [checkbox]
- Peru [checkbox]
- Etc.

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Ideas.
Change.

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ODI
203 Blackfriars Road
London SE1 8NJ

+44 (0)20 7922 0300
info@odi.org

odi.org
odi.org/facebook
odi.org/twitter