



# Financing inclusive low-carbon resilient development in the least developed countries

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Dave Steinbach, Nanki Kaur, Neha Rai

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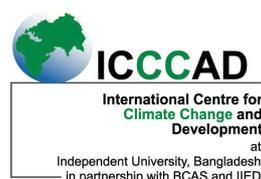
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**Climate change**

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*Keywords:*

Low-carbon resilient development,  
climate finance, political economy,  
Nepal, Ethiopia, Bangladesh, Rwanda



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## Produced by IIED's Climate Change Group

Climate change disproportionately affects the poorest people in the world. The Climate Change Group works with policy and research partners to redress the balance by helping the poor in low and middle-income countries achieve climate resilience and development.

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This Working Paper brings together evidence from four of the least developed countries – Bangladesh, Ethiopia, Nepal and Rwanda – to show how countries can use climate finance to invest in inclusive low-carbon resilient development. It outlines how new public-private investment models are delivering renewable energy investment to communities and households in rural areas, and generates evidence on the different combination and sequencing of financial intermediaries and financial instruments that promote inclusive investment for the poor.

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# Acronyms

|           |   |
|-----------|---|
| ADB       | Asian Development Bank  |
| AEPC      | Alternative Energy Promotion Centre (Nepal)                             |
| BRD       | Development Bank of Rwanda  |
| CREF      | Central Renewable Energy Fund (Nepal)                                   |
| DBE       | Development Bank of Ethiopia  |
| EE        | energy efficiency   |
| FI        | financial intermediary  |
| FONERWA   | Rwanda's Environment and Climate Change Fund                            |
| IDCOL     | Infrastructure Development Company Limited (Bangladesh)                 |
| LDC       | least developed countries   |
| LCRD      | low-carbon resilient development  |
| MDFRE&EEP | Market Development for Renewable Energy and Energy Efficiency Programme |
| MFI       | microfinance institution  |
| NBFI      | non-banking financial institution                                       |
| NDB       | national development bank   |
| NGO       | non-governmental organisation   |
| NRREP     | National Rural Renewable Energy Programme (Nepal)                       |
| RE        | renewable energy  |
| RSP       | regional service providers  |
| SHS       | solar home system   |
| SIP       | solar irrigation pump   |

# Summary

Low-carbon resilient development (LCRD) is a newly emerging policy agenda that brings together the two main policy responses to climate change – mitigation and adaptation – to address the root causes and impacts of climate change within broader development planning. Several least developed countries (LDCs) have launched ambitious LCRD policies, strategies or plans. These are expected to deliver a number of outcomes, including reduced carbon emissions, more resilient households and economies and inclusive, sustainable development.

Climate finance will play an important role in helping countries shift towards a low-carbon, climate-resilient future. Recent estimates suggest that LDCs need at least US\$93.7 billion per year in international support to meet the low-carbon development and adaptation investment needs outlined in their climate change action plans. However, of the US\$40 billion in public finance channelled from developed to developing countries in 2014, only US\$11.8 billion reached the LDCs, and even this finance is not adequately targeted to the poorest and most vulnerable communities.

LDCs will need greater levels of climate finance if they are to meet their LCRD objectives. To ensure that current and future climate finance can be used to promote more inclusive LCRD outcomes, we must identify examples of successful LCRD business models that can be scaled up and out to reach more beneficiaries. This will give donors, governments, project developers and private investors the knowledge and incentives they need to make long-term, inclusive LCRD investments.

Three years of IIED research on LCRD financing in Bangladesh, Ethiopia, Nepal and Rwanda has shown us that the design choices – specifically the financial intermediaries (FIs) and financial instruments – of investment models shape whether or not climate finance promotes inclusive LCRD investment. In this working paper we bring together this research to analyse five case studies that use public-private investment models to deliver LCRD finance to beneficiaries at the local level. Each of our case studies focus on renewable energy (RE) investments that promote low-carbon energy access (predominantly targeted at the rural poor) and development co-benefits that increase the climate resilience of communities and households:

- The Central Bank of Bangladesh provides LCRD finance for investment in solar home systems and solar irrigation.
- Also in Bangladesh, the Infrastructure Development Company Limited (IDCOL) provides LCRD finance for investment in solar home systems, solar irrigation and biogas projects.
- The Development Bank of Ethiopia (DBE) provides finance to private businesses and households for investment in solar lanterns and biogas digesters.
- In Nepal, the Alternative Energy Promotion Centre (AEPCC) established the Central Renewable Energy Fund (CREF) to channel finance for small-scale RE installations in Nepal via commercial banks and microfinance-institutions
- The Development Bank of Rwanda (BRD) uses finance from Rwanda's Environment and Climate Change Fund (FONERWA) for private sector LCRD investment.

Our cross-country analysis of these five case studies aims to understand four key research questions on the role that financial design choices play in shaping inclusive investment:

1. What are the main design features of new public-private financing models in Bangladesh, Ethiopia, Nepal and Rwanda?
2. How does the selection of specific FIs and instruments in these cases impact the delivery of inclusive LCRD investment for the poor?
3. How does the selection of specific FIs and instruments in these cases impact the delivery of long-term, scaled-up finance and development co-benefits?
4. What incentive structures shape the design choices of specific LCRD financing models?

Our main findings below provide valuable insight on the combination of intermediaries and instruments that deliver inclusive investment. They help us identify entry points for policymakers, community organisations and other actors to develop new LCRD investment models or improve existing models to make them more inclusive.

## Trends in new LCRD investment models

- Multiple FIs are used to channel and deliver finance in each of our case studies. The use of multiple FIs with different 'niches' can help cater to different users of finance. For example, institutions with strong regulatory mechanisms like national development banks (NDBs) can effectively engage commercial banks and private companies. These intermediaries can use additional intermediaries such as microfinance institutions (MFIs) and cooperatives to deliver finance to communities and households in rural areas.
- Specific intermediaries are suited for different stage of market development. MFIs and cooperatives can provide finance and risk-sharing facilities to poor borrowers in early-stage of market development. But as these markets mature and new actors gain market access, commercial banks may become better suited to deliver cheaper finance to the rural poor.
- Multiple instruments are used to deliver finance to different actors who have different financing needs. For example, commercial intermediaries and national development banks need concessional finance, while low-income households need better access to financial services, higher amounts of grants and collateral-free or low-interest credit. For LCRD investment models to be effective, they must meet the unique and disparate needs of FIs and household and community end users, while encouraging both of these groups to work for the overall outcome of inclusive LCRD investment.
- Grants are crucial in the initial investment stage to develop new, low-income RE markets – including feasibility research, product development and technical assistance – and to incentivise early technology purchases by subsidising high-interest loans and reducing upfront costs for end users. Grants should be phased out over time to avoid market distortion, but should remain in place to support access for the poor.

## Effectiveness in delivering inclusive LCRD investment for the poor

- In all five case studies, commercial intermediaries and NDBs need, and are receiving, concessional finance to lend on to secondary intermediaries and households so they can make a profit and enter new markets at relatively low risk.
- Low-income households and communities require better access to financial services, higher amounts of grants and collateral-free or low-interest credit. However the intermediaries and instruments that are available to poor households and communities in our case studies are not adequately aligned to their financing needs. Targeted instruments need to be made available to the poorest and most vulnerable to ensure they are not left behind by LCRD initiatives.
- MFIs can make finance more accessible to the rural poor – but mostly through high-interest loans. The lack of commercial banking services in rural areas means that household investors cannot get access to the low-interest credit they require to invest.

## Effectiveness in delivering long-term, scaled-up LCRD finance and development co-benefits

- Efforts to promote the long-term commercial viability of the RE sector by delivering finance through commercial banks, and the selection of NDBs to provide finance to the private sector are both helping encourage long-term investment. Using interest from concessional loans to create cyclical investment through revolving funds has also promote long-term, sustainable investment.
- Scaled-up investment can be achieved by leveraging additional finance from commercial banks and NBFIs. Concessional loans can give commercial actors an economic incentive to co-finance new LCRD projects and enter new markets with new products and services.

- Households and businesses can also co-finance RE purchases if appropriate finance is made accessible to them. At present, households must have the ability to access and repay market or high-interest loans to purchase RE products. Efforts therefore need to be made to improve the accessibility and appropriateness of finance – in the form of concessional credit, grants or guarantees – so that poor households can also invest.
- Household-level RE investments are delivering co-benefits such as employment, improved health, enhanced education opportunities, income-generating activities, an increase in household savings and female empowerment. This highlights the importance of improving efforts to target the poor, so they too can participate in the benefits of LCRD investment.
- In our case studies, policy and economic incentives to promote private sector investment, open new markets and, reduce government and donor expenditure have led to the selection of commercial banks, NBFIs and NDBs that have the mandate, experience and capacity to work with the private sector or that are private entities themselves. They have also led to the selection of instruments (concessional and market rate loans) that incentivise the participation of these intermediaries.
- There were few examples from our case studies of incentives that shaped pro-poor and inclusive LCRD design choices. Across our case studies, we found that the design of new LCRD investment models is beneficial to FIs and large commercial users of finance, but does not adequately meet the needs of poor communities, households and businesses. To improve LCRD outcomes for the poorest and most vulnerable, appropriate incentive structures need to be identified that will encourage policymakers to make design choices aligned to their unique investment needs.

## Incentives shaping LCRD design choices

- The following incentive structures are important in shaping LCRD investment models:
  - High-level policy incentives – policies, targets and fiscal measures – are essential to engage actors along the LCRD value chain, including NDBs, commercial banks, MFIs and end users.
  - Economic incentives – particularly concessional financing – are crucial to encourage FIs and suppliers to invest in markets they would otherwise regard as too risky.
  - Regulatory incentives are important for encouraging private sector participation in rural RE markets.
  - Capacity incentives are important in shaping the selection of appropriate financial intermediaries. Different FIs may have different strengths, for example commercial banks may have strong financial management capacity, private suppliers may have better market knowledge, and MFIs may have better market access.

## 1

# Introduction

Low-carbon resilient development (LCRD) is a newly emerging policy agenda in many of the world's least developed countries (LDCs). LCRD brings together the two main policy responses to climate change – mitigation and adaptation – into an integrated approach that addresses both the root causes and the impacts of climate change within broader development planning.

Several LDCs have launched ambitious LCRD policies, strategies or plans. Climate finance will play an important role in implementing these plans. However, current levels of climate finance flowing to LDCs are significantly below the volume required to meet LCRD investment needs. Further, even where climate finance is being delivered in the LDCs, this finance is not adequately targeted to the poorest and most vulnerable communities who need it the most. Levels of investment need to increase for LCRD plans to be realised, with greater amounts targeted to the poor. Evidence of successful, inclusive LCRD investment models can help address the financing gap and financial inclusion gaps by providing public and private investors with viable business models to scale up and scale out investment.

Over the past three years, IIED has conducted research on LCRD financing in Bangladesh, Ethiopia, Nepal and Rwanda. In this working paper, we bring together research from these four countries to document some of the first LCRD investment models that deliver finance

through public-private partnerships to beneficiaries at the local level. Each of our five case studies focus on renewable energy (RE) investments that promote low-carbon energy access (predominantly targeted at the rural poor) and development co-benefits that increase the climate resilience of communities and households:

- The Central Bank of Bangladesh provides LCRD finance for investment in solar home systems and solar irrigation.
- Also in Bangladesh, the Infrastructure Development Company Limited (IDCOL) provides LCRD finance for investment in solar home systems, solar irrigation and biogas projects.
- The Development Bank of Ethiopia (DBE) provides finance to private businesses and households for investment in solar lanterns and biogas digesters.
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- The Development Bank of Rwanda (BRD) uses finance from Rwanda's Environment and Climate Change Fund (FONERWA) for private sector LCRD investment.

Evidence from our individual country studies shows that the design of different investment models plays an important role in shaping inclusive LCRD investment. In particular, the selection of specific financial intermediaries (FIs) and financial instruments impacts whether LCRD investments are effectively delivered to the poor. In this paper we conduct a cross-country analysis of the five case studies to understand four key research questions on the role that financial design choices play in shaping inclusive investment:

1. What are the main design features of new public-private financing models in Bangladesh, Ethiopia, Nepal and Rwanda?
2. How does the selection of specific FIs and instruments in these cases impact the delivery of inclusive LCRD investment for the poor?
3. How does the selection of specific FIs and instruments in these cases impact the delivery of long-term, scaled-up finance and development co-benefits?
4. What incentive structures shape the design choices of specific LCRD financing models?

The aim of this working paper is to provide evidence to policymakers and investors on how to deliver LCRD investment that is inclusive and equitable for the poor. Evidence from this analysis can be used to: shape the design of new LCRD investment models; improve the design of LCRD investment models to make them more inclusive; and scale-up funding for existing models in the LDCs that are effective in delivering long-term, inclusive LCRD investment to the poor.

## 2

# Financing inclusive LCRD in the LDCs

## 2.1 Climate finance in the LDCs

Climate finance will play an important role in helping countries shift towards a lower-carbon, climate-resilient future. Recent estimates suggest that LDCs need at least US\$93.7 billion per year in international support to meet their low-carbon and adaptation needs (Rai *et al.* 2015). Although the exact volume of total climate-related investment (both public and private) in the LDCs is uncertain, we know that, of the US\$40 billion public finance mobilised by developed countries for developing countries in 2014, only US\$11.8 billion reached the LDCs (Jachnik and Raynaud 2015; OECD 2015; Rai *et al.* 2015).

Not only is climate finance insufficient to meet the LDCs' LCRD investment needs, evidence also suggests that within LDCs, climate finance does not promote inclusive LCRD outcomes. We define 'inclusive investment' as adequate, accessible finance targeted to low-income and/or socially marginalised individuals, households or communities for the purpose of delivering LCRD benefits. Within LDCs, climate finance is not reaching the poorest and most vulnerable who need support the most. For example, in the energy sector, less than 3% of approved international public climate finance is targeted at off-grid, decentralised energy projects which reach the rural poor (CFU 2015). Across a range of climate funds, finance is predominantly delivered by multilateral development banks for large-scale RE investment – which suggests that funding priorities are based on scale and bankability of projects, rather than on inclusiveness.

Greater levels of climate finance will be required for LDCs to achieve their LCRD objectives. Equally important is the need to use current and future climate finance to promote more inclusive LCRD outcomes. To overcome the shortfall in inclusive LCRD finance, we must identify examples of successful LCRD business models that can be scaled up and scaled out to reach more beneficiaries. In particular, we must identify the components of these LCRD investment models that enable inclusive investment. This evidence can be used to provide donors, governments, project developers and private investors with the knowledge and incentives they need to make long-term, inclusive LCRD investments.

## 2.2 Designing inclusive LCRD investment models

The design choices behind specific investment models shape whether or not climate finance is used to promote inclusive LCRD investment. Low-income and socially marginalised groups have specific financing needs. They need affordable finance and upfront capital to switch from low-quality energy sources such as kerosene to new RE technologies that deliver LCRD benefits, and they need this finance to be provided on favorable and cost-effective terms appropriate to smaller-scale projects.

Likewise, investors, suppliers, manufacturers and service providers who work within a financial value chain to deliver LCRD finance to low-income and socially marginalised groups have their own needs. Investors look for proven business models, a clear understanding

of risks and returns, and risk management mechanisms that ensure their loans will be covered when investing in low-income, rural areas. They also need adequate returns on small-scale investments with high transaction costs. Clear policy signals can help these actors enter new markets in rural areas (CEM 2015, Wilson *et al.* 2014). Suppliers, manufacturers and service providers who cater to these low-income markets need finance for working capital, to purchase assets, to cover start-up costs until sales become profitable and to make loans to investors in LCRD products (Ashden and Christian Aid 2014).

The choice of financial intermediaries and instruments to deliver climate finance shapes whether these actors are able to work within an investment model that delivers inclusive LCRD finance.

A range of **intermediaries** operate in the climate finance landscape, each with a comparative advantage for resource mobilisation, management and delivery of finance (see Figure 1):

- **National-level line ministries** access and mobilise a large volume of finance for LCRD investment. Their approach to delivering investment often takes a centralised, top-down approach in the form of large national programmes.
- **National climate funds and basket funds** pool finance from a variety of sources – including national governments, donors and the private sector – to ensure adequate resource allocation for mutually agreed priorities. Once established, these funds can efficiently finance LCRD projects. However, they are often established by international agencies, leading to a lack of national ownership and uncertainty on fund replenishment.
- **National development banks (NDBs) and central banks** have a mandate to provide long-term finance for economic development and other national public policy priorities. They can differ in terms of ownership structure, financial objectives, policy objectives, supervisory requirements and the financial instruments they use (Smallridge *et al.* 2012). Their institutional mandates often require the use of credit-based instruments that are inclusive for the poorest, but their development mandates enable them to make investments deemed more risky by commercial actors.
- **Special purpose agencies** are established by governments to oversee the technical and financial management of a specific development objective. They are often cross-sectoral, pooling expertise from a variety of sectors and markets.
- **Commercial banks and non-banking financial institutions (NBFIs)** provide banking services – including loans and credit, risk-pooling, insurance, underwriting and market borrowing – to investors. Unlike commercial banks, NBFIs cannot take deposits from the public.
- **Microfinance institutions (MFIs), non-governmental organisations (NGOs) and cooperatives** provide financial services, including loans. Governments and commercial banks may prefer to channel finance through these microfinance providers because of their experience in rural areas (Steele *et al.* 2015). Since they are embedded in local communities, they can offer services – such as low-collateral loans and risk-sharing – that commercial institutions do not provide. However, high transaction costs mean they tend to offer loans at high-interest rates, even if repayment terms are favourable. Further, MFIs may have limited awareness of LCRD markets or products, which may limit their ability to provide loans for LCRD investment.
- **Sub-national and local climate funds:** Local funds address the collective needs of low-income groups in informal communities and rural areas – often using grants to address specific outcomes.

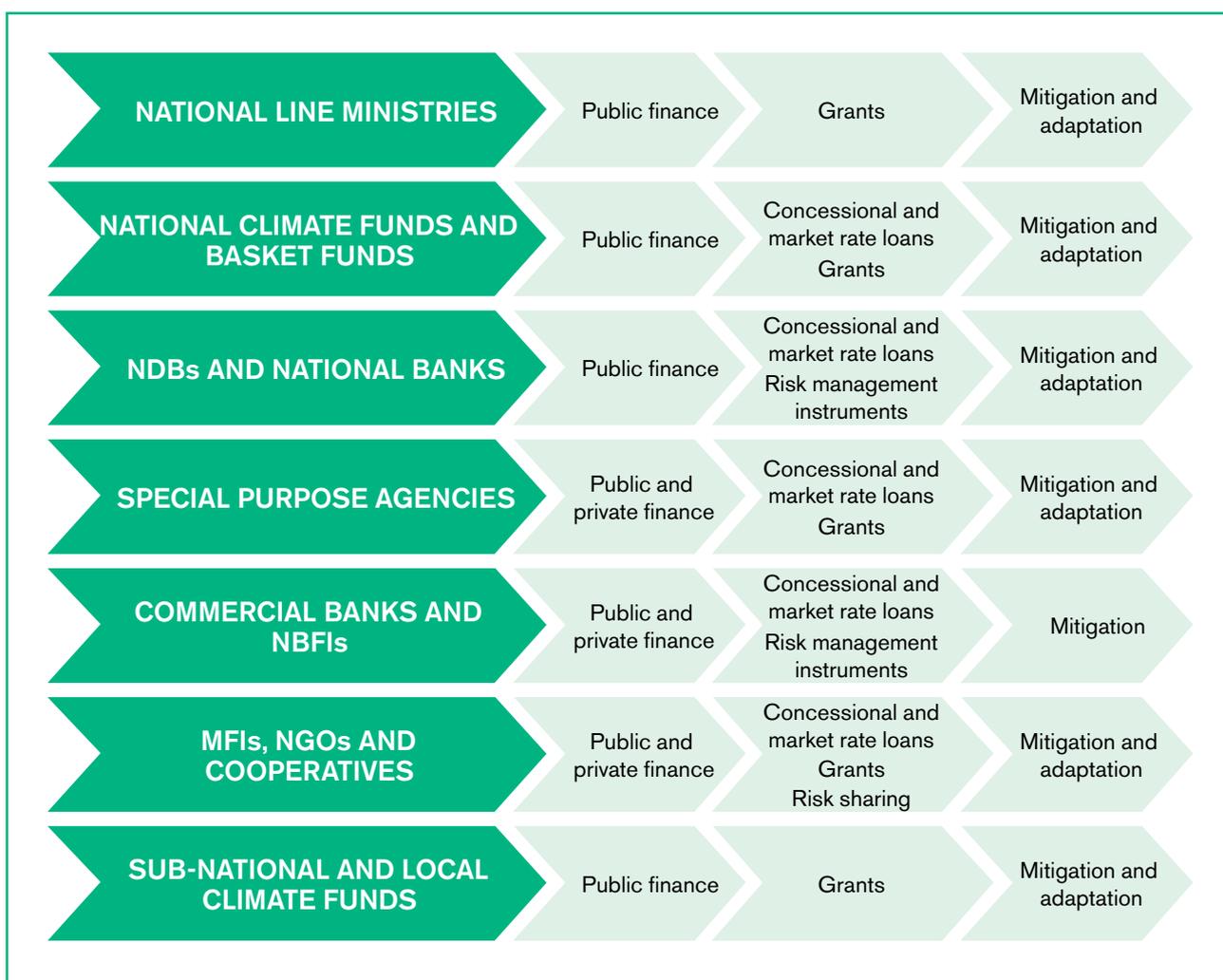
Financial **instruments** also play an important role in delivering LCRD finance, with different instruments targeting different outcomes:

- **Grants** finance activities that do not generate adequate returns or promote the creation of public goods. They are often used to target the poor and to achieve specific policy objectives. They can be deployed in the early stages of a project to cover feasibility research, product development or capacity building – but are often withdrawn after a period of time to avoid market distortion. In the context of climate-related investment, grants are often used to promote adaptation. Grant providers include national climate funds, basket funds, government ministries and special purpose agencies.
- **Concessional and market rate loans** are assets borrowed to make investments, repaid at a specified interest rate. In the context of climate-related investment, concessional loans provide low-interest finance to investors who might not otherwise risk investing in a new and risky market, and are often used for mitigation projects or other infrastructure that generates a return on investment. Loan providers include national climate and basket funds, national development and central banks, special purpose agencies, commercial banks, NBFIs, MFIs and cooperatives.

- Risk management instruments** enable actors to finance high-risk investment projects. Guarantees are risk management tools that cover losses if loans are not paid back. Governments and development finance institutions often use guarantees to unlock finance from commercial and institutional investors. In the context of climate-related investment, they can be used to encourage new investors to enter markets they may deem risky, such as RE installations. NDBs, climate funds, commercial banks and NBFIs can all provide risk mitigation instruments.

When designing LCRD investment models, the selection of different financial intermediaries and instruments shapes whether they will lead to inclusive outcomes. In this working paper, we compare five LCRD investment models in LDCs to build an evidence base on design choices that promote inclusive outcomes. Unpacking these examples and their financing modalities will help us show what combination of intermediaries and instruments promote inclusive investment and how we can incentivise such investments to bring LCRD benefits to poor households and communities.

Figure 1: Intermediaries used to channel public and private climate finance



## 3

# Methodology

Over the past three years, IIED has conducted research on LCRD financing in four countries: Bangladesh, Ethiopia, Nepal and Rwanda. Our research aims to generate evidence on how to design effective investment models that deliver inclusive LCRD benefits to the poorest and most vulnerable in the LDCs. This working paper brings together this research from five case studies in a cross-country analysis to understand how different FIs and financial instruments can enable or constrain effective LCRD investment.

In this section, we outline the approach and methodology of our study. We begin with an overview of the analytical approach and methodology we used during the research for each of the case studies, and then outline the methodology we used for our cross-country analysis.

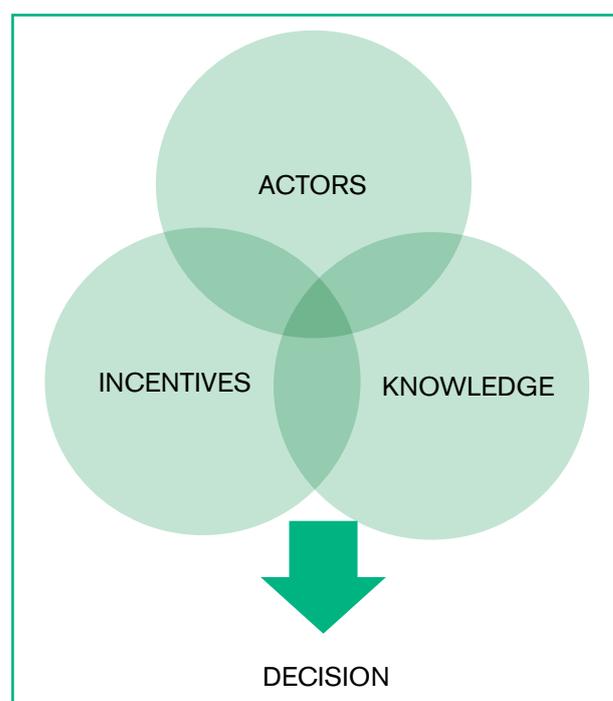
## 3.1 Analytical approach

Two analytical frameworks – political economy analysis and the climate finance landscape framework – guided our case study approach.

### 3.1.1 Political economy analysis

Political economy analysis acknowledges that different actors have different knowledge, and that the decisions of any one actor are influenced and shaped by underlying incentive structures (Rai *et al.* 2015c, Tanner and Allouche 2011). It is the combination of these three political economy factors – actors, knowledge and incentives – that leads to specific decisions (see Figure 1). In each of our case studies, we used a political economy lens to understand the actors involved, the knowledge they use and the incentive structures that drive or constrain inclusive investment in LCRD.

Figure 2: Political economy analysis



**Actors:** Multilateral and bilateral donors, development and commercial financial institutions, public sector agencies, micro-finance institutions and private sector actors are all involved in shaping the climate finance landscape to mobilise, manage and deliver finance for inclusive investment in LCRD. Each actor plays a specific role in shaping the financial landscape. They do this by providing the finance or policy direction for financial investment, managing financial resources to ensure the effective and efficient delivery of finance and/or by accessing finance for investment in LCRD. In each of our case studies, we mapped out the actors in different LCRD investment models (see Table 1).

Table 1: Summary of actors in the five LCRD case studies

| CATEGORY                 | CENTRAL BANK OF BANGLADESH                                      | IDCOL  | DEVELOPMENT BANK OF ETHIOPIA                                 | NEPAL'S CENTRAL RENEWABLE ENERGY FUND   | DEVELOPMENT BANK OF RWANDA                                   |
|--------------------------|---|--|--|---|--|
| Source funders           | Government of Bangladesh, ADB                                   | World Bank, DFID, KfW, GIZ, JICA, DANIDA, government of Bangladesh | World Bank   | Government of Nepal, DANIDA, NORAD, DFID, KfW, GIZ, SNV, UNDP, SREP           | DFID, Adaptation Fund, KfW, LDCF, UNDP, Government of Rwanda |
| Policymakers             | Government ministries and departments                           | Government ministries and departments                              | World Bank, government ministries, DBE and regulatory bodies | Government ministries and AEPC  | Government of Rwanda   |
| Financial intermediaries | Central Bank, commercial banks, NBFIs, MFIs and NGOs            | IDCOL, MFIs, NGOs and SMEs   | DBE and MFIs   | AEPC, CREF, commercial banks and technology providers                         | FONERWA and BRD  |
| Technical intermediaries |   | Suppliers of RE products   | Ministry of Water, NGOs and private entities                 | DDCs and VDCs, Regional service providers, Technology providers               |  |
| Users of finance         | Households and farmer cooperatives in Mymensingh and Panchagarh | Households and farmers   | Private sector enterprises and households                    | Households, communities and micro-enterprises in Surkhet and Gorkha districts | Private sector companies (e.g. Novel Renewable Energy Ltd)   |

Notes:

- DANIDA Denmark's development cooperation, under the Ministry of Foreign Affairs
- GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit
- JICA Japanese International Cooperation Agency
- KfW German development bank
- LDCF Least Developed Country Fund
- NORAD Norwegian Agency for Development Cooperation
- SREP Scaling Up Renewable Energy Programme
- SNV Netherlands Development Organisation
- UNDP United Nations Development Programme

**Knowledge:** Individual actors' decision-making processes are shaped by the knowledge they acquire and use. For our case study research, we compared the financial and market development needs that each group of actors identified as necessary for LCRD investment.

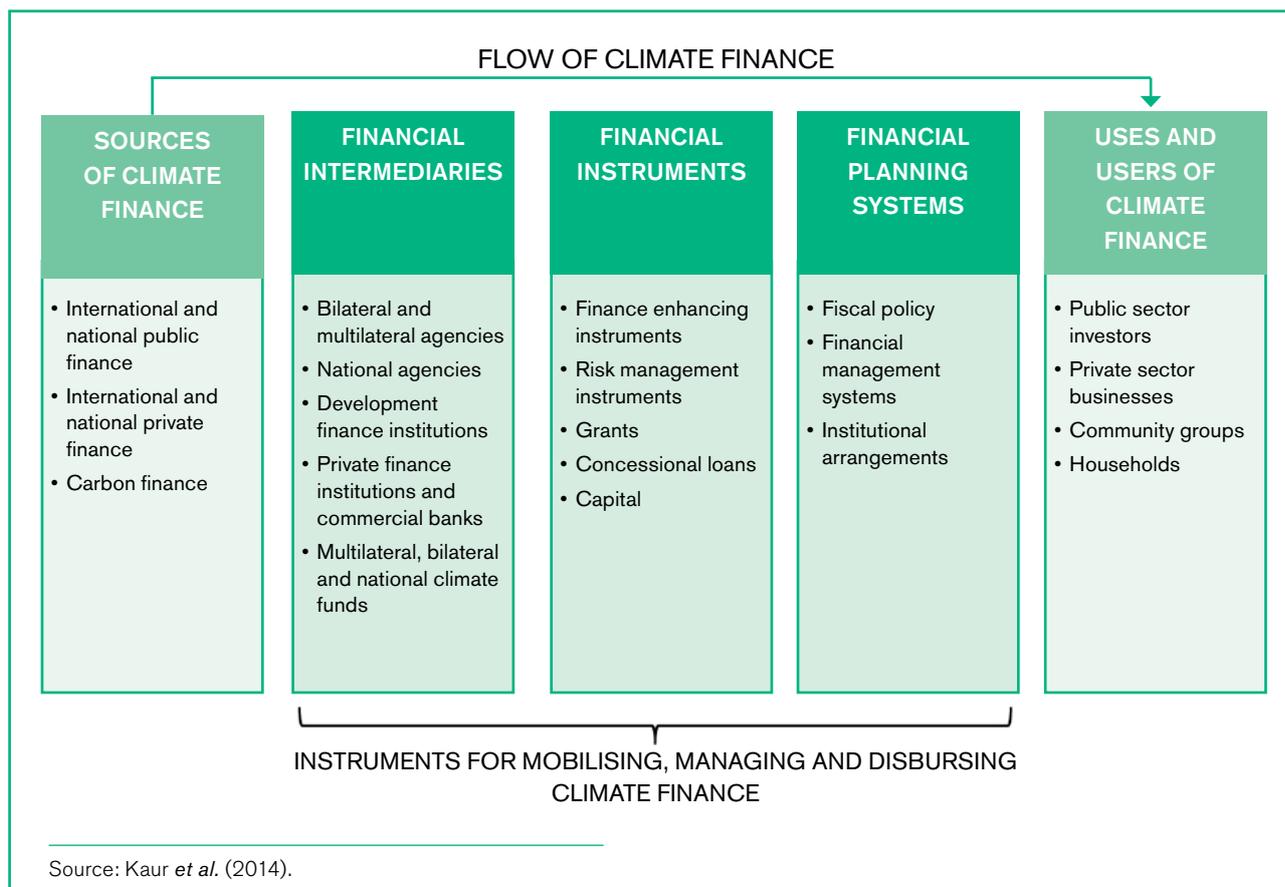
**Incentives:** In each case study, we analysed the underlying incentives that shape investment in LCRD. In particular, we examined how incentives shaped the design of LCRD investment models, how these incentives encourage different actors to invest in LCRD

and whether these incentive structures lead to effective models that promote inclusive LCRD investment.

### 3.1.2 Climate finance landscape analytical framework

The climate finance landscape framework helps map out how climate finance is delivered from its source of origin to the investor at the end of the financial delivery chain. It is a useful tool to understand the different actors, financial instruments and management systems that are used mobilise, channel and deliver climate finance. For

Figure 3: The climate finance landscape framework



each case study, we mapped out the LCRD investment chain, based on the framework's five main pillars:

- 1. Sources of climate finance:** refer to both the origin (international or national) and type (long and/or short term, public, private and/or carbon) of finance.
- 2. Financial intermediaries:** the institutions that enable the flow of climate finance from its source to the end use/users. Intermediaries play a role in mobilising and disbursing climate finance.
- 3. Financial instruments:** provide incentives for climate-relevant investments. A financial instrument is any contract that gives one entity a financial asset and another a financial liability. Different instruments suit different investment needs.
- 4. Financial planning systems:** play a key role in the management and governance of climate finance.
- 5. End users of climate finance:** refer to the type of investors targeted by climate finance.

## 3.2 Case study methodology

Our case study approach was guided by a desire to understand how the design features of different investment models enable or constrain inclusive LCRD outcomes. In particular, our case study analysis focused on how specific financial intermediaries and instruments shape the delivery of LCRD investment, and whether this investment is leading to outcomes that are inclusive and equitable for the poor.

We therefore selected our case studies on the following criteria:

- Countries that had already developed, or were in the process of developing, LCRD policies, plans or strategies.
- Investment models that explicitly targeted both low-carbon (mitigation) and climate-resilient (adaptation) outcomes.

- Investment models included private sector actors, as funders, intermediaries or end users.<sup>1</sup>
- Cross-regional representation from Asia and sub-Saharan Africa.
- Limited to five case studies due to human resource constraints.

Based on this criteria, we selected five LCRD case studies in Bangladesh, Ethiopia, Nepal and Rwanda to analyse in detail (see Section 4). All of these are examples of investment models that provide finance for RE technology with explicit goals to build the climate resilience of households, communities and businesses in rural areas through the delivery of development co-benefits.

For each case study, our research combined a desk-based literature review of key government policies and major LCRD investments, and semi-structured interviews with actors involved at each stage of the LCRD investment chain. We began by conducting background research for each case study. We then

mapped out the main stakeholders in each investment model, using the climate finance landscape to identify interview candidates. Once selected, each interviewee was asked a series of open-ended questions on four main topics to ascertain their main LCRD financing needs; whether the design choices of the investment model were effective in delivering inclusive investment; whether investment achieved three additional LCRD outcomes; and what incentives had shaped the design of LCRD investment models. Box 1 outlines the four dimensions of effectiveness used in this report.

We classified our interviewees into five actor categories – funders, policymakers, FIs, technical intermediaries and end users – to analyse and compare their responses. Table 1 provides a summary of the actors in each group for all five case studies. We aggregated the interview responses for each question by actor category and compared the responses of each group to identify trends in financing needs, the effectiveness of the LCRD investment model and the incentives shaping LCRD investment for each group.

## BOX 1: DIMENSIONS OF EFFECTIVE LCRD OUTCOMES

One of the central questions of our research is whether LCRD investment models are effective in promoting inclusive LCRD investment. We define effectiveness as the “ability to produce a desired result” (Drucker, 2006). We focused on four specific desired outcomes:

- 1. The ability to provide finance that is accessible and appropriate for the poor:** Poor households, communities and businesses often face barriers to investing in LCRD – particularly in access to finance. Here we examine whether financial intermediaries and instruments are tailored to the financing needs of the poor to help them invest in LCRD.
- 2. The ability to provide long-term, sustainable finance:** Long-term, predictable and sustainable finance is important for responding to a long-term, slow-onset challenge like climate change. It is also important in providing investors with the confidence to invest in new areas, such as LCRD. Here we examine whether LCRD investment models promote long-term and sustainable

investment for intermediaries and end-users of finance.

- 3. The ability to provide scaled-up investment by leveraging new sources of finance:** To deliver finance at the scale needed to invest in LCRD, new financing sources need to be identified and provided incentives to invest. Here we examine whether new LCRD investment models leverage additional finance from actors in the investment landscape, for example, co-finance provided by commercial banks or households.
- 4. The ability to deliver development co-benefits:** LCRD investments are expected to deliver multiple benefits, including sustainable economic growth, emission reduction and improved resilience to climate change. Here we examine whether LCRD investment moves beyond low-carbon benefits to improve development indicators – such as health, education, livelihoods opportunities and household income – for end-users of finance.

<sup>1</sup> This criteria was included as a response to the growing discourse on the importance of leveraging climate finance from the private sector. See for example Venugopal, S *et al.* 2012.

### 3.3 Cross-country analysis methodology

Building on our research in the four countries, Section 5 presents a cross-country analysis of our five case studies to understand how their design choices shape the delivery of inclusive LCRD investment. This analysis is split into four sections that correspond with this paper's four main research questions.

#### 1. What are the main design features of new public-private financing models in Bangladesh, Ethiopia, Nepal and Rwanda?

We compare how the investment models from our case studies have been designed to deliver LCRD investment to the local level – focusing on trends across the main sources of finance, the type of FIs involved in channelling and delivering finance, the instruments used to deliver finance and the end users of this finance, who make LCRD investments.

#### 2. How does the selection of specific FIs and instruments in these cases impact the delivery of inclusive LCRD investment for the poor?

To answer this question, we analyse whether our case studies provide examples of investment models that are effective in financing inclusive LCRD. We begin by comparing the main financing needs of the FIs that are channelling and delivering finance and the end users of this finance. We then analyse whether these financing needs align to the intermediaries and instruments that policymakers have selected when designing LCRD investment models.

We focus in particular on whether the financing needs of poor communities, businesses and households are aligned to the intermediaries and instruments that they have at their disposal. We also examine whether FIs have the right instrument-based incentives to promote inclusive LCRD. This analysis builds on the work of Schmitz and Scoones (2015) to ask whether design choices respond to actors with disparate needs and motivations for investing, while also encouraging their participation in an investment chain which has an overall goal of promoting inclusive LCRD investment.

#### 3. How does the selection of specific FIs and instruments in these cases impact the delivery of long-term, scaled-up finance and development co-benefits?

We analyse the different investment models to see if they are effective in delivering three main LCRD outcomes: long-term and sustainable finance, scaled-up finance and development co-benefits. We compare aggregate responses from interviewees across all actor groups in each of our five case studies to understand how design choices impact the effectiveness of LCRD outcomes.

#### 4. What incentive structures shape the design choices of specific LCRD financing models?

We conclude our analysis by comparing the different incentive structures that have shaped the design of new LCRD financing models in Bangladesh, Ethiopia, Nepal and Rwanda. We analyse interview responses from policymakers and donors in each case study to determine the factors that shaped their selection of specific FIs and instruments when designing new LCRD investment models. We then use this information to identify entry points that policymakers, community organisations, civil society, researchers and other actors can use to improve the design of existing LCRD investment models to make them more inclusive and to design new inclusive LCRD investment models in the LDCs.

## 4

## LCRD case studies

Several LDCs have launched innovative LCRD programmes. We examine five case studies from Bangladesh, Ethiopia, Nepal and Rwanda to understand the design choices these ‘first mover’ countries have chosen for delivering LCRD investment to the poor.

In this section, we provide a background on the five LCRD case studies which form the basis of the cross-country analysis in Section 5. We begin with an overview of each case, focusing on the selection of FIs and instruments used to channel and deliver LCRD finance to end users. We then discuss the strengths and limitations of using these cases to make broader recommendations on designing LCRD investment models elsewhere.

## 4.1 Central Bank of Bangladesh

The Central Bank of Bangladesh is the world’s first central bank to provide dedicated resources for sustainable development. In 2005, it set up a refinancing scheme to provide funding to commercial banks and other financial institutions in Bangladesh for investment in a number of different green products such as solar home systems (SHS) and solar irrigation pumps (SIPs). In 2014, the Central Bank announced targets for all banks and NBFIs, requiring them to provide finance for environmentally friendly products. Under this regulation, banks operating in the market since 2013 are expected to disburse 5 per cent of their lending to green products; new banks should disburse 3 per cent and NBFIs 4 per cent. Since its inception, the Central Bank’s refinancing facility has allocated over US\$37 million to green products.

### 4.1.1 Intermediaries

Two different types of FIs access funds from the Central Bank of Bangladesh to provide low-cost refinancing for renewable energy: NBFIs and banks, including private, state-owned and foreign commercial banks and state development banks. There are 52 participatory financial institutions, of which 38 are commercial banks and 14 are NBFIs.

Under the refinancing scheme, banks and NBFIs channel funds for green products to the household and community level in the form of direct or indirect loans.

Many banks feel more comfortable providing credit for LCRD investment through MFIs; with more branches in rural areas, they are better placed to administer small-scale loans for rural, off-grid borrowers. This arrangement is often more accessible to the rural poor, since they do not need the same levels of documentation and collateral. There are concerns, however, around the growing interest rates MFIs are charging. The government is trying to cap the interest MFIs can charge to ensure that green products are accessible for low-income households and individuals.

As banks have become more experienced and established in rural areas, they are increasingly lending directly to end users, which means they can provide more competitive rates. In the case of SIPs, some banks prefer to channel funds through farmers’ cooperatives, which can provide the necessary risk guarantees. Some SHS and SIPs suppliers and manufacturers are also entering into agreements with FIs, acting as intermediaries to provide credit for end users. Suppliers entering to these arrangements have been effective in ensuring cost competence and better after-sales services.

### 4.1.2 Instruments

The Central Bank of Bangladesh provides credit for investments in LCRD projects through concessional and market rate loans. FIs receive concessional loans, which they loan directly or indirectly to SMEs or household investors who wish to purchase green products such as SHS. With direct lending, intermediaries receive a concessional 5 per cent loan from the Central Bank, and lend to the borrower at 8–9 per cent, yielding a 3–4 per cent profit. With indirect lending, also known as the credit linkage model, they lend money at a concessional rate of 8–9 per cent to MFIs, NGOs or private suppliers who provide micro-credit loans to households and communities at higher rates of 10–11 per cent.

Some FIs, who do not receive concessional financing from the Central Bank, offer market rate loans. Charges for direct market rate loans to household investors vary

from 9–15 per cent interest; indirect loans through MFIs and NGOs are charged at 11–18 per cent.

## 4.2 Bangladesh’s Infrastructure Development Company Limited

IDCOL is a government-owned financial institution set up to encourage private investment in infrastructure and renewable energy in Bangladesh (Haque 2012). Its programmes include SHS, domestic biogas, SIPs, solar mini-grids, solar-powered telecoms, a biogas-based electricity project, a biomass gasification project and improved cooking stoves (Islam 2014).

Figure 4: Direct credit lending under the Central Bank’s refinancing mechanism

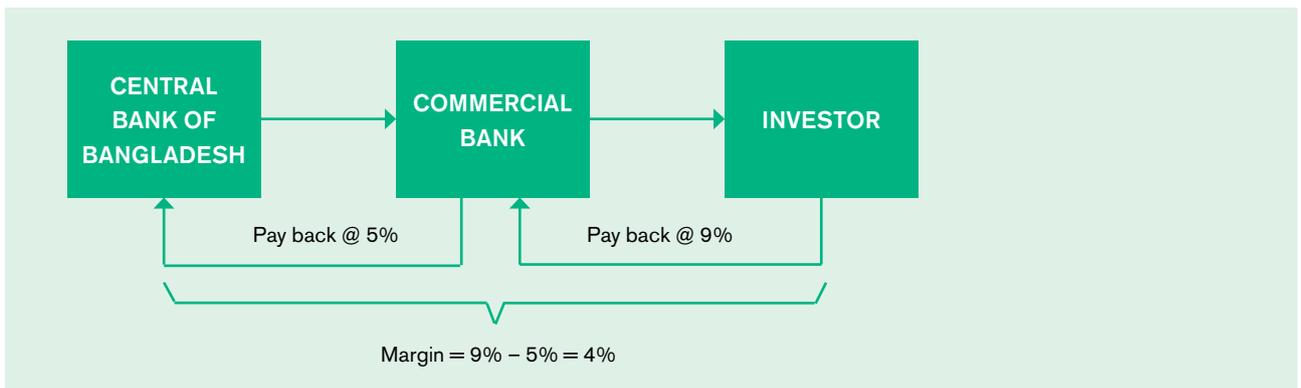
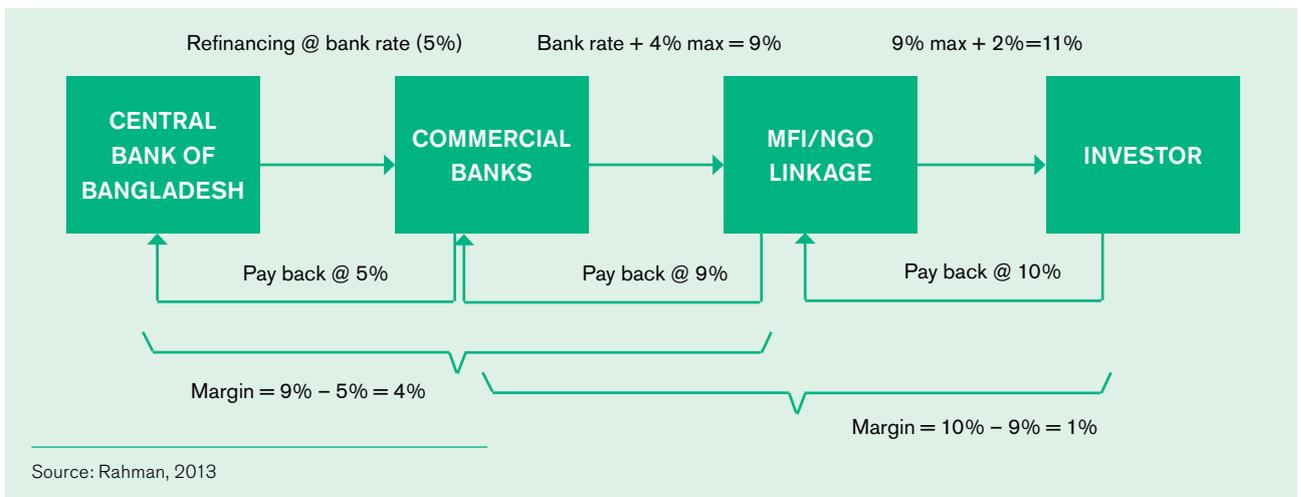


Figure 5: Indirect credit lending under the Central Bank’s refinancing mechanism



Source: Rahman, 2013

Bangladesh's SHS programme has become one of the world's largest off-grid electrification initiatives. Starting in 2003, it quickly exceeded its target of 50,000 units per month and by 2014 had installed more than three million units (Khandker *et al.* 2014). Following the programme's success, the government launched the SIP programme through IDCOL to expand solar-powered irrigation in off-grid areas. The SIP programme is closely linked to government objectives for food security and climate change mitigation, and reflects an acknowledgment that diesel imports are a drain on the country's fiscal resources. The government has set an initial target of installing 1,550 SIPs by 2017. So far, 230 have been approved under IDCOL's SIP programme, and 82 are currently operational.

### 4.2.1 Intermediaries

IDCOL is the main FI delivering SHS and SIPs in Bangladesh. Its main roles are: setting technical specifications, certifying products and components, and selecting intermediaries to deliver finance to individuals and households. IDCOL works with 47 partner organisations to channel finance for household-level investment in SHS and SIPs in rural areas. IDCOL, initially an urban financial institution, lacks a strong rural presence to deliver technology installations. It

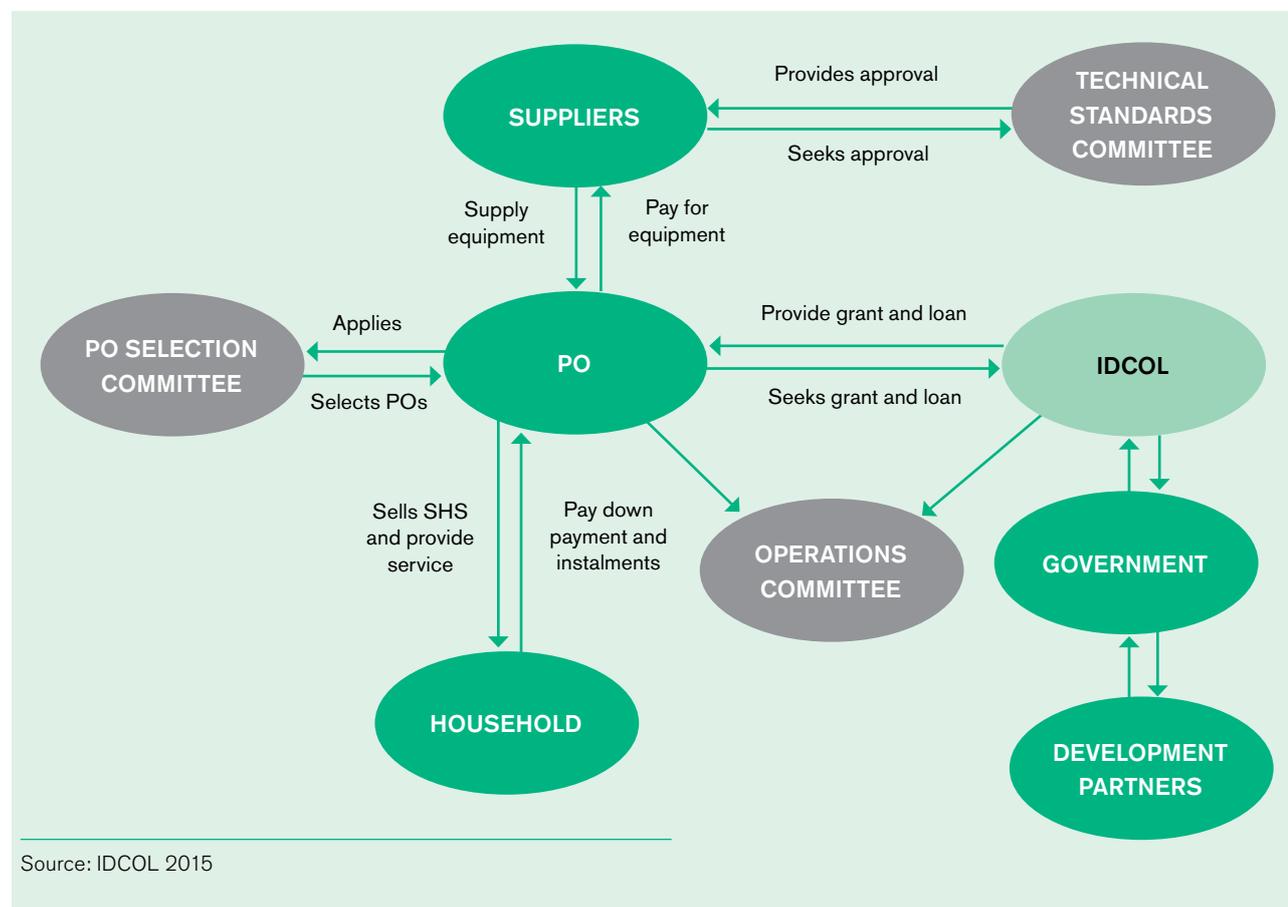
relies instead on local partner organisations – including MFIs, SMEs and NGOs – to perform a number of important functions, such as conducting household energy need assessments, selecting potential SHS and SIPs buyers, installing systems, providing after-sales services and developing a robust market chain (Khandker *et al.* 2014). Partners are subject to stringent screening against eligibility criteria by IDCOL's selection committee.

### 4.2.2 Instruments

IDCOL uses grants and concessional loans to promote investment in SHS and SIPs. Its innovative and partially subsidised SHS and SIPs delivery and financing systems have proven very effective in reaching households across Bangladesh.

IDCOL's main subsidy is a capital buy-down grant on the purchase of new RE systems. It initially provided an upfront grant of US\$70 to local partners for a US\$400 SHS and the buyer paid the remaining US\$330 directly to the partner: a 10–20 per cent down-payment with the balance in instalments over one to five years. As the programme has matured, the capital buy-down grant has been reduced and is now only available for small systems targeted at the poorest households.

Figure 6: Financial delivery of IDCOL's SHS programme



Source: IDCOL 2015

SIP partner organisations receive grants directly, as primary owners of the pumps. An IDCOL grant covers 40 per cent of the total SIP cost. This will rise to 50 per cent to meet the 2017 target of 1,550 installations, before reverting back to 40 per cent and falling to 25 per cent over time. Recent IDCOL estimates show that farmers find SIPs financially viable and more cost effective than diesel pumps, but only with a grant of more than 35–40 per cent (Matin 2015).

IDCOL also provides concessional loans to promote investment in SHSs. It offers local partners loans at 6–9 per cent interest, which they use to buy SHS from technology providers. The partners then offer loans to households at 12–16 per cent interest over one to five years (Rai *et al.* 2015).

## 4.3 Development Bank of Ethiopia

The DBE is currently implementing the World Bank-funded Market Development for Renewable Energy and Energy Efficiency Products (MDFRE&EEP) programme, which aims to promote investment in RE and energy efficiency (EE) products in rural Ethiopia. It builds on previous programmes that have aimed to enhance energy access to off-grid communities, by moving from public to market-led approaches for investment. Specifically, the programme uses new FIs and instruments to deliver credit to private sector enterprises (PSEs) and households in rural areas for investment in technologies such as biogas digesters, improved cookstoves and solar lanterns.

To date, US\$20 million has been allocated to the DBE in the first funding tranche (2012–2017). DBE has so far approved US\$18.8 million and disbursed US\$10.3 million – US\$3.7 million directly to PSEs and US\$6.6 million via MFIs.

### 4.3.1 Intermediaries

The MDFRE&EEP programme is financed by a US\$40 million World Bank concessional loan to the government of Ethiopia: World Bank funds are transferred to the Ministry of Finance and Economic Development, which in turn transfers them to the DBE.

The DBE is a development finance institution with a mandate to promote investment in programmes and projects that are aligned to national development priorities. It uses MDFRE&EEP funding to directly extend credit for RE and EE products to PSEs, or indirectly through MFIs, who lend on to household investors in rural areas.

Several technical intermediaries support the delivery of RE and EE investment under the MDFRE&EEP. Technical service providers play a number of roles, including identifying credit-worthy households and supporting their applications for credit, developing market linkages – for example, linking MFIs to technology providers – and providing technical assistance for the distribution, installation and maintenance of RE and EE products. The Ministry of Water, Irrigation and Energy provides technical assistance to the DBE and private companies accessing credit from the DBE, while the Oromia Bureau of Water, Mines and Energy provides similar assistance to MFIs.

### 4.3.3 Instruments

The two main financial instruments used to finance investment in RE and EE products are concessional and market rate loans.

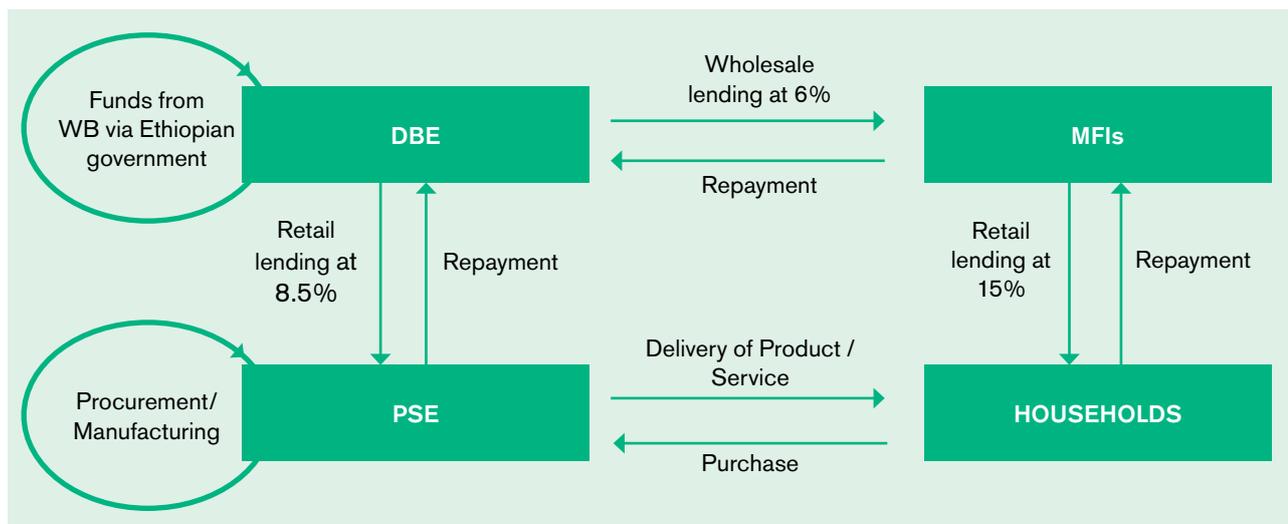
The DBE provides concessional loans to PSEs to promote investment in RE and EE products. The DBE provides 70 per cent working capital loans at an interest rate of 8.5 per cent with a five-year repayment period. PSEs need to provide 30 per cent of the total product cost in the form of equity contributions.

The DBE also provides concessional loans to MFIs for on-lending to households. These are provided at 6 per cent interest with a 10-year repayment period. MFIs do not need to provide collateral, and the DBE bears the full risk of these loans. MFIs use these funds to provide market rate loans for households to invest in RE and EE products. MFIs set their own lending rates and repayment periods based on market conditions and are not bound by interest rate caps.

For biogas investments, MFIs provide a maximum of US\$500 per household at 15 per cent interest, repayable over two years. Households do not need to provide collateral, but make an equity contribution either as part payment or labour when the biogas digesters are installed.

For solar lantern investments, MFIs provide credit to households at 18 per cent interest, with a one-year repayment period. Households make an equity contribution in the form of partial payment and provide group collateral.

Figure 7: Financial delivery model of MDFRE&EEP programme



## 4.4 Nepal’s Central Renewable Energy Fund

Nepal has a number of programmes and initiatives that provide financial support to promote LCRD outcomes. This case study focuses on the Alternative Energy Promotion Centre (AEPC)’s work promoting RE technology to off-grid communities and households in rural Nepal through the CREF.

AEPC has a specific mandate to deliver all RE technologies in Nepal with a generating capacity under 10 megawatts. It acts as a technical intermediary between the government and donors, who provide policy direction and finance for RE in Nepal, and the FIs – banks, MFIs, private technology providers and NGOs – that channel finance for RE investment to beneficiaries.

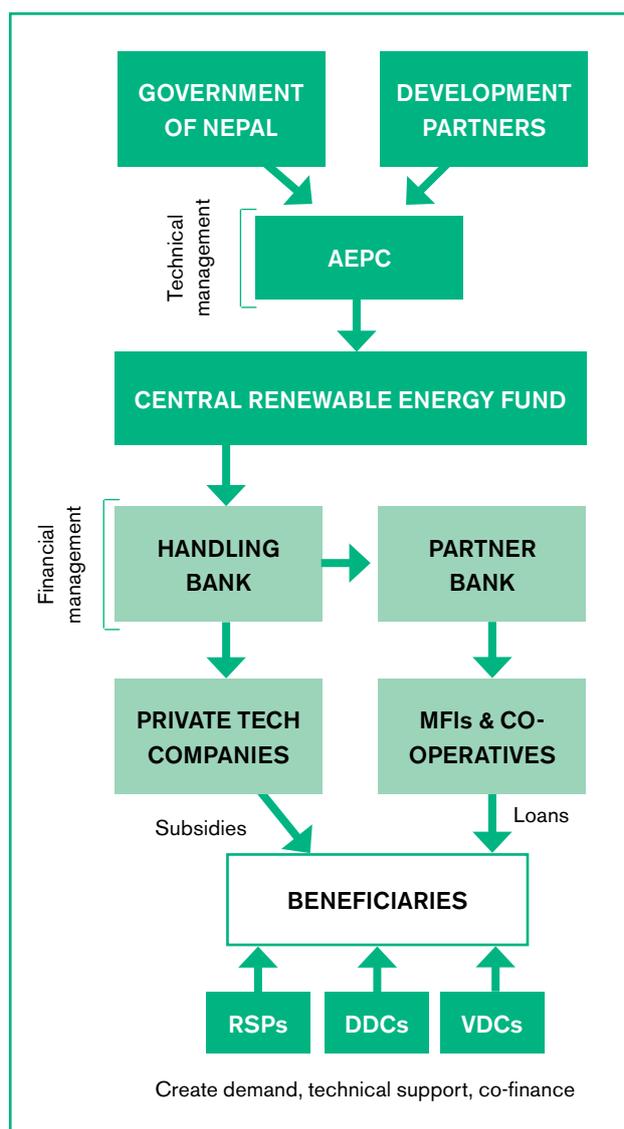
In 2012, AEPC launched the US\$170 million National Rural Renewable Energy Programme (NRREP), which brought all RE projects together under a single programme modality. Jointly funded by the government of Nepal and bilateral and multilateral development partners, it will run until 2017, funding the installation of RE technologies such as micro/mini hydropower, SHSs, institutional solar power systems, improved cook stoves

and biogas plants. Expected co-benefits of the NRREP include new income-generating activities for the rural poor, greater rural employment, reduced dependencies on traditional energy sources and improvements in socioeconomic indicators such as health and education.

### 4.4.1 Intermediaries

For the first time in Nepal, the NRREP uses commercial banks as the main FI to manage and channel finance for investment in RE technology at community and household levels (Steinbach *et al.* 2015). CREF – a basket fund that is housed within Global IME Bank – collects the NRREP funding from donors and the government of Nepal. Global IME Bank acts as handling bank for all NRREP funding. It is responsible for disbursing all grant-based finance under AEPC’s subsidy policy to private companies installing technology at the household level. It also acts as a lender to seven partner banks selected by AEPC to deliver credit-based finance for investment in off-grid RE technologies. These seven banks have signed memorandums of understanding with AEPC to deliver concessional finance under the NRREP. They receive concessional loans from Global IME Bank and provide concessional loans to district and village-level cooperatives and MFIs.

Figure 8: Financial delivery model of the NRREP through CREF



MFIs and cooperatives use the money loaned by the NRREP's partner banks to provide market rate loans to their members to invest in RE technologies such as SHSs or micro-hydro installations. Regional service providers (RSPs) – a group of 10 NGOs spread across Nepal's different regions – support the implementation of the NRREP by raising awareness and encouraging communities and households to invest in RE technologies. District and village development committees (DDCs and VDCs) are responsible for documenting RE installations so they can report on progress in meeting NRREP targets to the AEPC.

#### 4.4.2 Instruments

The NRREP funds RE technology at household and community levels through a mixture of grants and credit. Investment in household RE installations are split as follows: 40 per cent grants and 40 per cent loans from the NRREP and 20 per cent co-finance leveraged by households, DDCs or VDCs (Government of Nepal 2013).<sup>2</sup>

Grants are delivered via the Global IME Bank, which transfers funds to private technology providers whose agents promote RE technologies in rural areas. When an individual or household wants to invest in a specific technology, they buy the product directly from the provider at a cost below the market rate, in accordance with AEPC's subsidy guidelines. Depending on the context, 30–50 per cent of the cost is covered by grants.

For households that are not eligible for grant-based support, RE technologies are financed through concessional and market rate loans. The seven partner banks provide concessional loans to MFIs and cooperatives in rural areas at a maximum interest spread of 5 per cent. MFIs then lend to households at an interest spread of 10–11 per cent. As a result, households can pay as much as 16 per cent interest (market rate) on their RE investment.

#### 4.5 Development Bank of Rwanda

In 2013, Rwanda established the Environment and Climate Change Fund (FONERWA) as a national basket fund to mobilise, channel, disburse and monitor climate and environment-related finance. FONERWA is funded by a number of bilateral partners, UN agencies and the government of Rwanda. DFID is the largest single contributor, having provided 46.5 per cent of FONERWA's initial funds. FONERWA disburses finance to both the public and private sectors under four thematic financing windows that align with the objectives listed under the National Strategy on Climate Change and Low Carbon Development and the Second Economic Development and Poverty Reduction Strategy.

The Rwandan case study examines the role that the BRD plays in delivering LCRD finance from FONERWA's basket fund to private sector companies investing in RE.

<sup>2</sup>In practice, most of the finance delivered to date has been through subsidies, since memorandums of understanding between AEPC and the banks were not finalised until March 2015. It is anticipated that investments during the remaining two years of the NRREP will mostly be made through concessional loans.

### 4.5.1 Intermediaries

FONERWA operates as a basket fund to access and disburse finance for LCRD investment, pooling international and national sources of finance and playing a technical intermediary role in selecting appropriate projects for investment with these funds.

The Development Bank of Rwanda is FONERWA's main FI for delivering private sector climate finance. To date, BRD has only financed two projects under FONERWA's private sector window. Both of these projects provide concessional finance to private sector companies installing medium and large-scale RE installations in Rwanda, and are being implemented by Novel Renewable Energy Ltd. (Rwirahira and Fisher, 2015).

### 4.5.2 Instruments

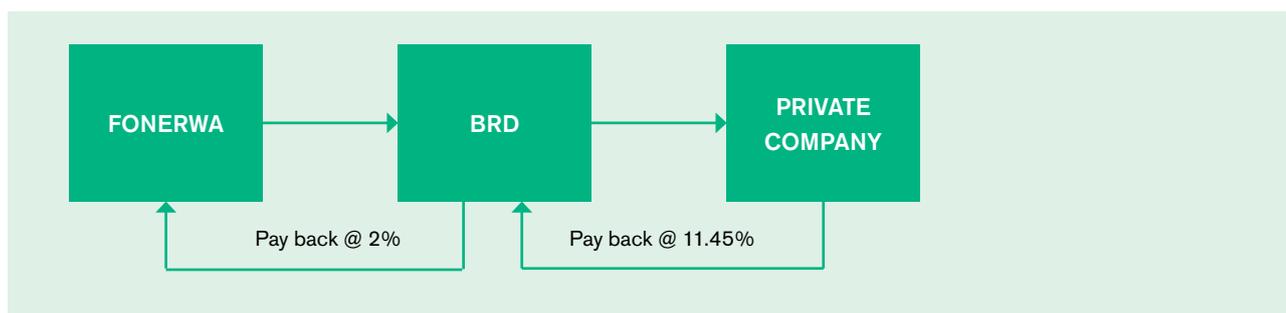
BRD uses long-term concessional loans to deliver LCRD finance to private sector investors for investment in RE technologies. FONERWA's joint basket fund provides a concessional loan to BRD with a 2 per cent interest rate, which BRD loans on Novel Renewable Energy Ltd at a fixed rate of 11.45 per cent. In comparison, where FONERWA is not the BRD's main source of funding, the bank lends to private actors at 15 per cent, only slightly below prevailing market rates of 18–19 per cent.

## 4.6 Strengths and limitations of the case studies

All five of our case studies provide evidence of domestic and international climate finance being used to deliver LCRD finance to businesses, communities and households in rural areas. We can see from these cases that LDCs have already made significant achievements in scaling up LCRD investment to meet national policy objectives.

For example, Bangladesh's SHS programme is one of the world's most successful RE investment programmes, having exceeded its targets to deliver SHS to three million households – 10 per cent of its population. Both cases from Bangladesh show how scaled-up domestic and international investment can be used to deliver RE technologies to huge segments of the population previously deemed to be unbankable. In Ethiopia and Rwanda, strong national-level policy leadership has been used to guide the creation of ambitious LCRD strategies and national funding models to invest in LCRD. Ethiopia's Climate Resilient Green Economy Facility is currently outlining its financing strategy and looking at the DBE's MDFRE&EEP programme as a possible investment model, while FONERWA has already begun financing projects through its public and private sector investment streams. In Nepal, we can also see how RE investment is scaled up in rural areas under the NRREP. The Nepal case

Figure 9: Direct credit lending under the Development Bank of Rwanda's refinancing mechanism



study provides evidence on how policy objectives to commercialise the off-grid RE sector is bringing in new commercial financial actors to the RE sector who are committed to scaling up the volume of RE investment in the years ahead.

Despite the fact that these cases provide us with strong examples of LCRD investments in the LDCs, we must be careful to acknowledge the limitations in our ability to apply their lessons more broadly to other countries.

- We cannot say that a specific model from one country can be replicated elsewhere. Different LCRD investment models are appropriate for different countries, depending on their unique national context: including their policy context, structure of the economy, climate and geographic features, energy infrastructure and socioeconomic factors.
- These case studies are not a representative sample of all LCRD investment models. We have only documented RE case studies, but LCRD investment is equally important for other sectors, such as forestry, agriculture and infrastructure. Different types of investment, FIs and financial instruments may be more appropriate for other sectors.
- Our case study selection criteria aimed to select examples of public-private LCRD investment models. So the majority of our case studies use development banks, commercial FIs and loan-based instruments to finance LCRD. Although these can be useful in showing whether commercial LCRD financing models are working to deliver finance to the poor, they provide less evidence on the effectiveness of public FIs or grant-based funding models in promoting inclusive investment.

- These case studies only provide evidence on investment models that use grants and loans to finance LCRD. Although other risk mitigation instruments have been proposed – for example, in Ethiopia – these are not yet operational in any of our case studies, so we cannot document their effectiveness.
- We have not always provided a complete picture of each country's portfolio of LCRD investment strategies. FONERWA, for example, only provides 20 per cent of finance through its private sector window; grant-based financing makes up the majority of its early investments. We have focused on FONERWA's private sector window, but a broader picture shows that a portfolio of interventions to target different actors and users may be a more important investment strategy than developing a single financing model.

Despite the limitations discussed above, a comparative analysis of these LCRD case studies can provide important evidence on the design features that have enabled or constrained inclusive investment in specific locations. While we need to be cautious in projecting these findings, we believe these lessons can provide useful guidance to designers of LCRD investment models in other contexts.

## 5

# Cross-country analysis

Bangladesh, Ethiopia, Nepal and Rwanda have all designed programmes to channel and deliver finance for LCRD investment at the sub-national level. In this section, we present the findings from a cross-country analysis of the five LCRD investment models we outlined in Section 4. This cross-country analysis explores our four key research questions:

1. What are the main design features of new public-private financing models in Bangladesh, Ethiopia, Nepal and Rwanda?
2. How does the selection of specific FIs and instruments in these cases impact the delivery of inclusive LCRD investment for the poor?
3. How does the selection of specific FIs and instruments in these cases impact the delivery of long-term, scaled-up finance and development co-benefits?
4. What incentive structures shape the design choices of specific LCRD financing models?

Our findings help us identify valuable lessons on the combination of intermediaries and instruments that deliver inclusive investment. They also help us identify entry points for policymakers, community organisations, civil society, researchers and other actors to develop new LCRD investment models or improve existing models to make them more inclusive.

## 5.1 Trends in the design features of LCRD financing models

The first part of our analysis compares the design features of the five LCRD case studies to identify trends in the main sources of finance, users of finance, FIs and instruments that are used to deliver LCRD finance. In Sections 5.2 and 5.3, we go on to use these trends as a basis for our analysis of the effectiveness of design choices in delivering inclusive investment with important LCRD outcomes.

Table 2 below provides a summary of the LCRD investment chain in our case studies, using a modified version of the climate finance landscape framework, which omits financial planning systems.

Table 2: Summary of LCRD financing models in the five case studies

| CASE STUDY                            | SOURCES OF FINANCE  | FINANCIAL INTERMEDIARIES  | FINANCIAL INSTRUMENTS  | USERS OF FINANCE                               |
|---------------------------------------|---|---|--|--|
| Central Bank of Bangladesh            | Government of Bangladesh (80%)<br>Multilateral development bank (20%)   | Central Bank<br>Commercial banks and NBFIs<br>MFIs, NGOs providing microfinance<br>Technology suppliers                 | Concessional loans to commercial banks and NBFIs (5% interest rate).<br>Concessional loans with refinancing: (9% directly to users, 10–11% through MFIs or NGOs).<br>Market rate loans without refinancing: to households and suppliers (9–15% directly, 11–18% indirectly). | Households<br>Farmer cooperatives              |
| IDCOL                                 | Co-finance from households, partner organisations and IDCOL (48%)<br>Multilateral development banks (37.5%)<br>Government of Bangladesh (7.1%)<br>Bilateral development partners (e.g. 6.6%) <sup>3</sup> | Non-banking financial institution (IDCOL)<br>MFIs, NGOs, SMEs providing microfinance                                    | Subsidies: Currently 10% for small SHS <sup>4</sup> ; 40–50% for SIPs<br>Concessional loans: for SHS, 6–9% interest rates to partner organisations, who lend at 12–16% to buyers. Remaining cost of SIPs also covered by concessional loans                                  | Households<br>Farmers                          |
| Development Bank of Ethiopia          | Multilateral development bank (100%)  | National development bank (DBE)<br>MFIs   | Concessional loans: to project developers at 8.5% interest over five years; to MFIs at 6% interest over 10 years for on-lending to households.<br>Market rate loans: from MFIs to households at 15–18% interest.   | Private sector enterprises<br>Households       |
| Nepal's Central Renewable Energy Fund | Government of Nepal (40%)<br>Bilateral development partners (45%)<br>Multilateral funds (15%)   | Special purpose agency (AEPC)<br>Basket fund (CREF)<br>Commercial banks (e.g. Global IME Bank)<br>MFIs and cooperatives | Subsidies: 30–50% of technology cost.<br>Concessional loans: to commercial banks with 0–3% interest rate; to MFIs at 5% interest rate spread.<br>Market rate loans from MFIs to users up to 16%.   | Households<br>Communities<br>Micro-enterprises |
| Development Bank of Rwanda            | Bilateral development partners (58.8%)<br>Multilateral funds/MDBs (29.1%)<br>Co-finance (7.5%)<br>Government of Rwanda (4.6%)   | Basket fund (FONERWA)<br>National development bank (BRD)  | Long-term concessional loans to the private sector (11.45%).   | Private sector RE companies                    |

<sup>3</sup> This financial breakdown is an indicative amount only, based on Component A of the Rural Electrification and Renewable Energy Development II project (World Bank 2012) for SHS. Bilateral and multilateral development partners have made other financial contributions to support IDCOL's renewable energy programming in Bangladesh. However, since this project has been operational since 2003 using revolving funds, it is difficult to precisely account for contributions from different sources of finance.

<sup>4</sup> Previous subsidies for SHS have been phased out as markets have matured, but in the past were 17.5 per cent.

### 5.1.1 Sources of finance

There are five main sources of finance across our case studies: LDC governments, multilateral development banks, bilateral donors, private sector companies or households providing co-finance for LCRD investment.

Our case studies in Bangladesh and Nepal, get significant finance from domestic sources – either directly from government budgets or as co-finance from households and businesses. In the Rwandan and Ethiopian cases, there is the potential for co-financing from businesses and PSEs, but this has yet to materialise substantially. In the Rwandan case, this is due to the limited number of projects implemented under FONERWA's private finance stream.

Multilateral funding institutions and bilateral donors also play an important role in providing the initial capital to launch new LCRD investment programmes. The World Bank is the sole source of finance for Ethiopia's MDFRE&EEP and a significant contributor to IDCOL's SHS programme. Other multilateral institutions – such as the ADB and UNDP – are important financiers for LCRD investment in our Bangladesh, Nepal and Rwanda case studies. In the Nepal and Rwanda cases, bilateral donors – such as DFID, DANIDA, NORAD, KfW and GIZ – are the largest contributors to new LCRD programmes.

### 5.1.2 Financial intermediaries

Two trends emerge from an analysis of the FIs that have been selected to channel and deliver LCRD finance in our five case studies. First, all case studies use multiple intermediaries to access, channel and deliver LCRD finance. These can be categorised into a number of different types of intermediary, including basket funds, special purpose agencies, NDBs, central banks, commercial banks, NBFIs, MFIs, NGOs, SMEs and technology providers. Second, in all the case studies where finance is delivered to the household level – in other words, in all but the Rwanda case – LCRD finance is being channelled through MFIs or other non-commercial, community-level organisations to reach poor rural households and communities.

These observations highlight that different intermediaries are needed to target different users of finance based on their unique needs. In the Rwandan case, for example, the BRD's mandate and capacity to invest in large-scale projects that respond to pressing national development concerns, has led to its selection as the main FI for large-scale RE investment. In the Bangladesh, Ethiopia and Nepal cases, however, the commercial banking sector's lack of market penetration into rural areas means that MFIs, cooperatives and NGOs are better placed to deliver finance to household-level investors.

The advantages of different intermediaries varies from context to context. Even within one investment model, they will likely change over time. Different intermediaries are suited for different stages of market development. For example, MFIs and cooperatives can provide finance and risk-sharing facilities to poor borrowers in the early stages of market development, but as these markets mature and new actors gain access to it, commercial banks may become better suited to deliver cheaper finance to the rural poor.

### 5.1.3 Financial instruments

Across all five case studies, multiple instruments – grants, concessional loans and market rate loans – are being used in each investment model to provide economic incentives for different actors to invest.

Grants are often used in the early stages of market development for RE technologies, but are then phased out as technologies become more affordable in order to avoid market distortion. Grants are also used more broadly to target poor and socially marginalised groups, but they are not used as safety nets in all of our case studies.

Concessional loans are primarily delivered to commercial FIs – banks, partner organisations and private investors – to incentivise them to lend on at further concessional or market rates to end users and households. Private sector actors are often the recipients of lower interest concessional finance, while households receive higher-rate concessional finance or market rate loans.

Guarantees and other de-risking instruments are not being used in any of the cases, but the DBE is considering their use in Ethiopia.

### 5.1.4 End users

The users of LCRD finance can be broken into two main groups across our five case studies. In the Bangladesh, Ethiopia and Nepal cases, the end users of finance are mostly households, farmers or businesses who invest in technologies such as biogas, SHS, solar lanterns and SIPs. Some finance is also channelled to community groups, who invest in micro-hydro systems that help power households and village enterprises. The other users of LCRD finance are larger businesses, which invest in big RE installations that increase national energy generation capacity.

## 5.2 Effectiveness in delivering inclusive LCRD investment for the poor

Having identified the main design features of new LCRD investments models in our case studies, in this section we analyse whether these design features are tailored to the financing needs of investors at different stages of the LCRD investment chain. In particular, we questions how the choice of specific intermediaries and instruments in our case studies affects the delivery of inclusive LCRD investment for the poor.

Different groups of actors in the LCRD investment chain have different financing needs. We asked respondents in each of the five case studies to identify the main financing requirements that would enable them to invest in LCRD. Table 3 outlines the financing needs of FIs and end users of finance. We can see an important difference between the two: the former needs long-term, concessional finance, whereas the latter (particularly households) need accessible, subsidised finance in the form of either grants or collateral-free credit.

As long as the appropriate design choices align to meet the individual needs of different actors while also working towards a broader goal, then the fact they have different needs should is not a problem (Schmitz and Scoones 2015). In other words, the design choices of LCRD investment models must address the different financing needs of commercial banks, NDBs, MFIs, businesses and poor households and communities, while also promoting inclusive LCRD investment. To test whether this is happening, we compare the financing needs highlighted in Table 3 against the design choices of the intermediaries and instruments that are being used to deliver finance in the five case studies. We present this comparison data in Table 4, which can be analysed by whether:

1. The financing needs of the intermediaries in each country are aligned to the instruments that policymakers have selected to deliver LCRD investment; and
2. The choice of intermediaries and instruments are aligned to the financing needs of end users.

Table 3: The different financing needs of intermediaries and end users of finance

| CASE STUDY                            | FINANCIAL INTERMEDIARIES  | END USERS   |
|---------------------------------------|---|---|
| Central Bank of Bangladesh<br>IDCOL   | Affordable concessional finance<br>Long-term finance<br>Risk management tools<br>Market development and capacity building | Accessible finance (i.e. appropriate products and instruments for the poor, such as low-cost products, grants, better collateral provisions)<br>Long-term loans with flexible repayment<br>Complementary services (after-sales support, operational support and maintenance of RE products) |
| Development Bank of Ethiopia          | Long-term finance<br>Concessional finance   | PSEs: access to foreign currency, low-collateral credit<br>Households: access to more concessional credit, collateral-free (guaranteed) credit  |
| Nepal's Central Renewable Energy Fund | Access to new markets and capacity building to enter RE sector<br>Concessional finance                                    | Access to finance: rural banking services and collateral<br>Higher amounts of grants  |
| Development Bank of Rwanda            | Sustainable finance (revolving fund)<br>Concessional finance  | Concessional loans with low interest rates (5–8%)<br>Grants   |

Table 4: Comparing financing needs and design choices in the five case studies

| CASE STUDY                            | FINANCING NEEDS   | CHOICE OF INTERMEDIARIES   | CHOICE OF INSTRUMENT  |
|---------------------------------------|---|--|---|
| Central Bank of Bangladesh            | <p><b>Intermediaries:</b> Affordable concessional finance; long-term finance; risk management tools; market development and capacity building</p> <p><b>Users:</b> Appropriate products and instruments for the poor (low-cost, some grants, better collateral provisions; long-term loans with flexible repayment; services (after-sales support, operational support and maintenance of RE products))</p> | <p>Central Bank</p> <p>Commercial banks and NBFIs</p> <p>MFIs, NGOs providing microfinance</p> <p>Technology suppliers</p>                 | <p>Concessional loans to commercial banks and NBFIs</p> <p>Concessional loans with refinancing: to users directly or through MFIs</p> <p>Market rate loans without refinancing to users and suppliers</p> |
| IDCOL                                 |   | <p>Non-banking financial institution (IDCOL)</p> <p>MFIs, NGOs, SMEs providing microfinance</p>  | <p>Subsidies: for small SHS and SIPs</p> <p>Concessional loans: to partner organisations who lend at higher concessional rates to buyers of SHS and SIPs</p>  |
| Development Bank of Ethiopia          | <p><b>Intermediaries:</b> Long-term, concessional finance</p> <p><b>Users:</b> Access to foreign currency, low-collateral credit (PSEs); access to more concessional credit, collateral-free (guaranteed) credit (households).</p>  | <p>National development bank (DBE)</p> <p>MFIs</p>   | <p>Concessional loans: to project developers and MFIs</p> <p>Market rate loans: from MFIs to households</p>   |
| Nepal's Central Renewable Energy Fund | <p><b>Intermediaries:</b> Access to new markets; concessional finance</p> <p><b>Users:</b> Access to finance (banking services, collateral); higher levels of grants</p>  | <p>Special purpose agency (AEPC)</p> <p>Basket fund (CREF)</p> <p>Commercial banks (e.g. Global IME Bank)</p> <p>MFIs and cooperatives</p> | <p>Concessional loans: to commercial banks and MFIs.</p> <p>Market rate loans: from MFIs to users.</p> <p>Grants to end users.</p>  |
| Development Bank of Rwanda            | <p><b>Intermediaries:</b> Sustainable finance (revolving fund); concessional finance</p> <p><b>Users:</b> Concessional loans with low interest rates (5–8%); grants.</p>  | <p>Basket fund (FONERWA)</p> <p>National development bank (BRD)</p>  | <p>Long-term concessional loans to the private sector (11.45%).</p>   |

Based on the evidence in Table 4, we find that design choices are closely aligned to the needs of intermediaries and private investors, but less so to the needs of poor household and community end users.

In all five case studies, commercial intermediaries and NDBs need concessional finance to lend on to secondary intermediaries and households so they can make a profit and enter new markets at relatively low risk. These intermediaries receive concessional loans in all five cases; in other words, there is a close alignment between their financing needs and design choices.

There is a strong demand from poor households and communities for better access to financial services, higher amounts of grants and collateral-free or low-interest credit. However, the design choices that are available to these end users are significantly less aligned to their financing needs than to the needs of the intermediaries.

There is mixed evidence about the alignment between the needs of the poor and the intermediaries available to them. On one hand, the selection of MFIs to channel a significant amount of LCRD finance to the community and household levels improves the accessibility of finance in many of the case studies. However, this design choice does little to help overcome the lack of commercial banking services in rural areas. Commercial banks may expand into rural areas over time, but in the meantime, rural households cannot access the financial services they need to invest in LCRD.

This lack of appropriate financial services is coupled with the limited availability of financial instruments that the rural poor require to invest in LCRD. Most end users highlight the need for grants, collateral-free credit and financial guarantees. But household investors have to take market rate loans from MFIs because they cannot access the concessional credit that might be available through commercial banks. As a result many of the poorest and most vulnerable households and communities may be unable to access LCRD finance. For example, although Nepal's CREF model provides

grants, the subsidy amount is not enough to enable many poor households to purchase RE technologies. Similarly, in Ethiopia there is household-level demand for concessional credit and guarantees, yet households can only access market rate loans from MFIs.

In sum, this analysis shows that the design choices of our case study investment models are not adequately aligned to the financing needs of the poorest and most vulnerable, and are therefore not effectively delivering inclusive LCRD investment.<sup>5,6</sup> Low-income consumers require tailored business models, intermediaries and instruments to meet their specific LCRD financial needs for more accessible and subsidised finance. Greater efforts must be made to ensure these models provide financial services that are tailored to the needs of the poor, so they too can benefit from LCRD financing initiatives.

### 5.3 Effectiveness in delivering long-term, scaled-up LCRD finance and development co-benefits

In this section, we expand our focus on the effectiveness of new LCRD investment models, to analyse how design choices shape the delivery of three key LCRD outcomes in addition to inclusive investment: long-term and sustainable finance; incentives for actors to scale up their funding or leverage new sources of finance; and development co-benefits.

In each of our case studies, we asked stakeholders from across the LCRD investment chain whether they believed that the LCRD investment model was effective in delivering these three outcomes, and why these outcomes have or have not been achieved. Table 5 presents the aggregated responses of these interviewees.

<sup>5</sup> Only in our Rwanda case study is there alignment between the financing needs of end users and the instruments available to them. But since end users are large companies and not households, this does not alter the overall finding from our case studies that the financing needs of the poor are not being adequately addressed.

<sup>6</sup> There may be many other factors that shape the inclusiveness of LCRD investments – the broader policy context for pro-poor targeting, ineffective programme delivery, variations in contextual factors in different communities, etc. It would be beneficial to systematically examine these factors, but here our main aim is to provide evidence on the financial delivery models themselves.

Table 5: Effectiveness of design choices in delivering long-term, scaled-up finance and co-benefits

| CASE STUDY                            | LONG-TERM, SUSTAINABLE FINANCE   | LEVERAGED FUNDS   | CO-BENEFITS   |
|---------------------------------------|--|---|---|
| Central Bank of Bangladesh            | Green Banking Policy requires 5% of lending will be for green purposes – guaranteeing long-term investment in RE.  | Refinancing leverages bank and NBFIs funds<br>Households and businesses invest own finance              | Reduced diesel imports, health, education, income-generation, job creation, female empowerment, skills training                                   |
| IDCOL                                 | Long-term tenor payment allows MFIs and private financiers to revolve funds twice during the tenure period, which increases profit margins by reinvesting. | New donor co-finance<br>Household investment through upfront capital                                    | Health, education, reduced fuel costs, improved energy access, communications, mobile phone access, increased production, diversified livelihoods |
| Development Bank of Ethiopia          | Revolving funds ensure long-term sustainability of investment model by scaling out to more households  | Households and PSEs co-finance purchase of biogas digesters and solar lanterns                          | Health, education, energy access, communications, improved savings, business opportunities  |
| Nepal's Central Renewable Energy Fund | Credit reduces burden on government and donors from providing subsidies<br>Bank participation will commercialise RE sector                                 | Additional co-finance from partner banks<br>Districts and households will co-invest in LCRD             | Energy access, education, health, income generation, enterprise development, female empowerment, internet access                                  |
| Development Bank of Rwanda            | Loan repayments are re-invested in new projects (revolving funds) which promotes financial sustainability  | Private companies could co-finance RE projects in addition to BRD loans, but so far evidence is limited | Electricity access, job creation, education and health  |

Evidence from Table 5 suggests a number of important findings on how design choices lead to effective LCRD outcomes in our case studies.

According to stakeholders in all five of our case studies, these new models are effective in providing sustainable, long-term finance for investment in LCRD initiatives. The selection of specific FIs in new public-private investment models has helped to promote sustainable, long-term finance. For example, efforts to promote the long-term commercial viability of the RE sector in Nepal by delivering finance through commercial banks are expected to improve the sustainability of RE investment. Similarly, some NDBs provide long-term repayment tenor (up to 10 years) for loans to the private sector, which enables investors new to the RE market on opportunity to sustain their investments over a longer time horizon. The selection of specific financial instruments – such as concessional loans to deliver finance coupled with revolving funds that

create cyclical investments – also promote long-term, sustainable investment.

Our data also shows that the majority of the investment models examined in our case study research are effective in scaling up investment by leveraging additional finance from commercial entities and households. In the Nepal and Bangladesh case studies, we see that private banks and NBFIs are beginning to invest their own capital in LCRD projects beyond the concessional loans they receive from government and donors. In these cases, the selection of concessional loans as the main financial instrument is providing commercial actors with the economic incentive, through return on their investment, to co-finance new LCRD projects as they gain confidence operating in new markets with new products and services. Private companies are expected to provide co-financing in Rwanda, but only two projects have received BRD loans to date, making it too early to assess progress.

Similarly, we can see from the Bangladesh, Ethiopia and Nepal case studies that households and businesses are providing upfront capital to invest in new RE installations. Since most households only receive market-rate or high-interest concessional loans, existing household-level co-finance may be coming from relatively wealthy households in rural areas who have the ability to repay loans. But these finding suggests that if appropriate finance is made accessible to communities and households they will provide their own co-finance for LCRD investments. Efforts therefore need to be made to improve the accessibility and appropriateness of finance – in the form of concessional credit, grants or guarantees – so that poor households can also invest.

Finally, there is broad agreement across all five case studies that these new models are effective in delivering development co-benefits. Respondents consistently highlighted that LCRD investment brought benefits in terms of employment opportunities for implementing LCRD projects, improved health through reduced kerosene usage, enhanced education opportunities, income-generating activities, business opportunities, increased household savings and female empowerment.

Based on these findings, we can see that the LCRD case studies we explore in this paper are effective in delivering long-term, scaled-up LCRD finance and development co-benefits. While evidence from the previous section suggests their design features are less appropriate to meet the needs of the poorest, our findings here suggest that the models are bringing significant, lasting LCRD benefits to rural areas in Bangladesh, Ethiopia, Nepal and Rwanda. This highlights the importance of improving efforts to target the poor, so they too can participate in the benefits of LCRD investment.

## 5.4 Incentives shaping the design of new LCRD models

From our previous analysis, we can see that design features play an important role in determining the effectiveness of LCRD investment models.<sup>7</sup> Examining the incentives that shape these features can help us identify how the outcomes are influenced at the design stage. We can learn from the examples where incentives shape inclusive investment and effective LCRD outcomes, and attempt to replicate these incentive structures elsewhere. Conversely, we can use the examples where incentives are shaping sub-optimal

outcomes to identify and promote incentives that lead to inclusive and effective LCRD outcomes.

In this section, we analyse the incentives that have shaped the selection of different FIs and instruments in our five case studies. In Tables 6 and 7 we present the findings from our interviews with policymakers and donors on the incentives that shaped their selection of intermediaries and instruments. After each table, we outline how incentives are shaping the selection of specific design features in our case studies. We conclude with an analysis of how incentives shape the overall design of these LCRD investment models.

### 5.4.1 Choice of financial intermediaries

We can see from Table 6 that the choice of FIs in our LCRD case studies was shaped by both policy and capacity incentives.

Policy incentives shape the selection of intermediaries in two ways. First, national development policy mandates influence the selection of certain types of intermediary for LCRD investment. For example, because Nepal has a strong policy mandate to deliver finance through the private sector as part of an effort to commercialise the RE sector, policymakers chose commercial banks as the main intermediaries responsible for channelling and delivering LCRD finance. Similarly, FONERWA's investment plan to provide 20 per cent of its climate finance through the private sector influenced the decisions to channel finance through the BRD, which has strong experience in providing loans to private investors as the main users of finance. Second, the mandates of certain FIs – for example, the Central Bank of Bangladesh, DBE and BRD – to provide investment for national development priorities has led to their selection in the LCRD investment models analysed in this report.

Capacity incentives also play an important role in shaping the design of LCRD investment models. In the Rwanda and Ethiopia cases, the selection of NDBs was shaped by their strong financial management capacity, experience in private sector investment and experience promoting rural development. Similarly, the Nepal case study uses commercial banks as the main intermediaries for managing and delivering LCRD finance due to their strong financial management capacity. MFIs are the preferred intermediaries to deliver LCRD finance to rural areas in our Bangladesh, Ethiopia and Nepal case studies because they have better coverage, expertise and acceptance among local communities.

<sup>7</sup> Here we only focus on incentives that have shaped the technical design of the various investment models. A broader analysis of the policy drivers which have led to the establishment of different investment programmes – and which, in turn, may affect the design of the investment models themselves – would be useful, but is beyond the scope of this report.

Table 6: Incentives shaping the choice of financial intermediaries

| COUNTRY                               | CHOICE OF INTERMEDIARIES  | INCENTIVES   |
|---------------------------------------|---|--|
| Central Bank of Bangladesh            | Central Bank<br>Commercial banks and NBFIs<br>MFIs, NGOs providing microfinance<br>Technology suppliers                 | <b>Policy:</b> The Central Bank has developed a Green Banking Policy. Its institutional mandate to catalyse private sector finance has driven choice to channel funds through commercial banks and NBFIs.<br><b>Capacity:</b> MFIs and NGOs selected for indirect financing since they have better access to rural areas, higher levels of acceptance in target communities and experience delivering microcredit.<br><b>Capacity:</b> Technology suppliers selected for indirect financing since they are cost-competitive and have better after-sales services.  |
| IDCOL                                 | Non-banking financial institution<br>MFIs, NGOs, SMEs providing microfinance  | <b>Capacity:</b> Selection of MFIs and NGOs as partner organisations due to their established presence in target communities and experience delivering microcredit.<br><b>Capacity:</b> Selection of SMEs as partner organisations due to their marketing skills and technical product knowledge.  |
| Development Bank of Ethiopia          | National development bank<br>MFIs   | <b>Policy:</b> Government policy goal to enhance energy access and incentivise private sector to invest in energy sector (CRGE Strategy, National Energy Policy, Growth and Transformation Plan)<br><b>Policy:</b> Development finance institutions (e.g. DBE) have mandate from government to deliver finance for investment in key sectors.<br><b>Capacity:</b> World Bank works with DBE since it has the mandate and capacity to deliver finance to PSEs in rural areas<br><b>Capacity:</b> DBE works through MFIs since they have capacity to deliver finance to rural households.  |
| Nepal's Central Renewable Energy Fund | Special purpose agency (AEPC)<br>Basket fund (CREF)<br>Commercial banks (e.g. Global IME Bank)<br>MFIs and cooperatives | <b>Policy:</b> Single programme modality funded by CREF through private banks selected to increase efficiency, avoid project duplication, and promote long-term sustainability of Nepal's RE sector through commercialisation.<br><b>Capacity:</b> Banks were selected under CREF due to better financial management capacity, regulatory frameworks and auditing capabilities than AEPC.<br><b>Capacity:</b> MFIs and cooperatives have the most capacity to provide banking services in rural areas.<br><b>Economic:</b> Anticipation that banks will leverage their own finance.<br><b>Knowledge:</b> of similar best practice examples (e.g. Sri Lanka). |
| Development Bank of Rwanda            | Basket fund (FONERWA)<br>National development bank (BRD)  | <b>Policy:</b> Objective under EDPRS to incentivise the private sector to take the lead in delivering green growth and innovation by 2020. FONERWA has commitment to deliver 20% of funds through the private sector.<br><b>Capacity:</b> BRD has the financial management capacity and experience of working with the private sector in Rwanda.   |

Table 7: Incentives shaping the choice of financial instruments

| COUNTRY                               | CHOICE OF INSTRUMENTS  | INCENTIVES  |
|---------------------------------------|--|---|
| Central Bank of Bangladesh            | <p>Concessional loans to commercial banks and NBFIs</p> <p>Concessional loans to end users from banks and NBFIs directly or via MFIs</p> <p>Market rate loans without refinancing to users and suppliers</p> | <p><b>Policy:</b> Central Bank has an institutional mandate to provide commercially viable loans.</p> <p><b>Economic:</b> Concessional loans encourage banks and NBFIs to lend on at a profit to MFIs or directly to users.</p> <p><b>Economic:</b> Concessional or market rate loans to end users and suppliers encourage investment in RE technologies where these actors have low access to financial services.</p>  |
| IDCOL                                 | <p>Subsidies for small SHS and SIPs</p> <p>Concessional loans to partner organisations who lend at higher concessional rates to buyers of SHS and SIPs</p>   | <p><b>Policy:</b> Grants provided to help develop RE markets, enabling access to capital and making products affordable. Grants for SHS have declined since markets have matured. Grants for SIPS remain, in an effort to reach national targets.</p> <p><b>Economic:</b> Loans ensure commercial viability, enabling revolving funds for re-investment.</p> <p><b>Economic:</b> Concessional rates and long-term repayment encourages MFIs and SMEs to invest.</p>   |
| Development Bank of Ethiopia          | <p>Concessional loans to PSEs and MFIs</p> <p>Market rate loans from MFIs to households</p>  | <p><b>Policy:</b> Political mandate to deliver inclusive growth encourages DBE to provide concessional finance.</p> <p><b>Economic:</b> Revolving funds from loan repayments ensure long-term, sustainable finance for more households investing in RE and EE.</p> <p><b>Economic:</b> DBE uses concessional loans to leverage private sector investment by providing 70% loans to PSEs, which in turn unlocks 30% equity contributions from PSEs.</p> <p><b>Economic:</b> MFIs are allowed to set their own lending and opt for high returns on investments through market rate loans.</p>                     |
| Nepal's Central Renewable Energy Fund | <p>Concessional loans to commercial banks and MFIs.</p> <p>Market rate loans from MFIs to end users.</p> <p>Subsidies to households and communities</p>  | <p><b>Policy:</b> Concessional loans to ensure long-term sustainability of RE sector, and reduce reliance on government/donor funding through commercialisation.</p> <p><b>Policy:</b> Targeted subsidies to poor communities and households will help government/donors meet development objectives.</p> <p><b>Economic:</b> Concessional loans to banks selected will incentivise the private sector to enter RE market, provide co-finance and lead to commercialisation of the RE sector.</p> <p><b>Economic:</b> Market rate loans from MFIs to users provide financial incentives for MFIs to invest.</p> |
| Development Bank of Rwanda            | <p>Long-term concessional loans to the private sector.</p>   | <p><b>Policy:</b> FONERWA has committed to deliver 20% of funds through the private sector, and medium and long-term targets to use concessional loans and equity to finance climate-related investment.</p> <p><b>Economic:</b> Concessional loans from BRD are best available interest rates, which encourages private companies to invest.</p> <p><b>Economic:</b> Loans are repaid into a basket fund, which can be reinvested in new projects, ensuring sustainability of the programme.</p>   |

## 5.4.2 Choice of financial instruments

Based on this analysis, policy and economic incentives are both important in driving the choice of financial instruments for our LCRD investment models case studies.

Policy incentives have shaped the choices of financial instruments in four ways:

1. National policy direction to promote private sector investment in Nepal, Ethiopia and Rwanda has led governments to select concessional loans as the main financial instrument to deliver finance LCRD. For example, in our Nepal case study, the desire to reduce government expenditure and dependence on donor financing has led to a shift in RE programming from a subsidy-based to a mixed financial model where concessional loans will gradually replace subsidies as the main financial instrument over time. However this focus on financial sustainability may lead to less targeted finance for the poorest households.
2. The policy mandate of specific financial instruments has also led to the selection of concessional loans. In our case study of the Central Bank of Bangladesh, the bank's mandate to provide commercially viable loans has led to a model based on the provision of concessional loans.
3. Bangladesh's policy objective of opening up markets to new goods and services has led to subsidy-driven models, where IDCOL has provided grants to introduce new RE technologies such as SHS and SIPs. These models are flexible to demand: as technology suppliers and buyers enter the market, subsidies are gradually reduced over time in favour of concessional credit. However targeting the poor remains a challenge as the economically weakest sections of society struggle to afford the upfront technology costs of SHS and SIPs.
4. Poverty reduction mandates in Nepal have led to the continued use of subsidies for delivering LCRD finance to community and household levels in our CREF case study. CREF subsidies target the poor and aim to promote rural energy access and income-generating activities for those who cannot afford the installation cost of RE technologies or do not have access to collateral to take out a loan.

Economic incentives are also important in shaping financial instruments design choices, playing both a direct and indirect role in shaping the choice of instruments for delivering LCRD finance to end users:

1. In all our case studies, policymakers and donors have tried to design investment models that can provide long-term, sustainable LCRD finance. In the DBE, BRD and IDCOL cases, the underlying driver to promote economic sustainability has led to investment models with commercial loans and revolving funds. These revolving funds reinvest the principle and interest repaid by borrowers in another round of LCRD investments, thereby ensuring the long-term sustainability of the business model. Nepal's basket fund managed by CREF operates in the same way, but respondents in Nepal did not explicitly identify this economic incentive as one that shaped the design of the AEPC investment model.
2. Economic incentives also play an indirect role. For example in the Central Bank, IDCOL, CREF, and BRD cases, policymakers use economic incentives – low interest rates that enable banks, NBFIs, and NDBs to make a profit – to encourage FIs to lend on to other MFIs or directly to end users for LCRD investment.

## 5.4.3 Incentive structures that shape LCRD investment

Across our five LCRD case studies, we found strong incentive structures that prioritise engaging with new FIs and providing them with economic incentives to invest in LCRD. Policy and economic incentives that emphasise working with the private sector, opening new markets to commercial activity, reducing government and donor expenditure and promoting the long-term sustainability of LCRD investment models have led to the selection of intermediaries with the mandates, experience and capacity to work with the private sector, or which are private entities themselves. They have also led to the selection of instruments that incentivise the participation of these FIs: mostly concessional and market rate loans.

There are few examples from our interview responses, however, of incentives that shape design choices that target the poorest and most vulnerable. Nepal's CREF case study was the only case where interviewees highlighted poverty reduction and the provision of safety

nets for the poor as key policy drivers that shaped the design of their LCRD investment model. These incentives have led to continued subsidy support for poor and vulnerable households, even as CREF moves towards the commercialisation of Nepal's rural RE supply. However this is more likely to be an error of omission by our interviewee respondents rather than an absence of appropriate policy incentives, since each of the four case study countries have strong national-level policies for poverty reduction and low-carbon resilient development.

Finally, across the cases, we found that the design of new LCRD investment models is beneficial to FIs and commercial users of finance, but does not adequately meet the needs of poor communities and households. While LCRD investment is having significant positive impacts in all our case studies, improving the alignment between design choices and the needs of end users would make it more inclusive and more effective. To improve this alignment, we need to identify incentive structures that will encourage policymakers to make design choices that support inclusive, pro-poor LCRD investment.

## 6

# Conclusion

LCRD is an important new public policy discourse that has emerged in development and climate change planning over the past decade. Many of the world's least developed countries have outlined LCRD policies, plans and strategies, but international and domestic funds to implement these plans are insufficient to meet the LCRD investment needs of the LDCs.

This working paper has presented a cross-country analysis of five LCRD case studies that use new public-private financing models to deliver LCRD investment. Our research aims to generate evidence on how to design investment models that deliver inclusive LCRD benefits to the poorest and most vulnerable in the LDCs, in an effort to provide donors and policymakers with options for scaling up LCRD investment in the future.

Evidence from this cross-country analysis can be used by a number of different actors. At the international level, it can help guide the design of new climate finance investment models – e.g. to deliver finance from the Green Climate Fund or to deliver multilateral and bilateral donor funding to the LDCs. At the national level, policymakers – including those in Bangladesh, Ethiopia, Nepal and Rwanda – can use it to improve existing LCRD investment models, ensuring they deliver inclusive investment, or to shape the design of new investment models under their long-term development strategies. Finally, at the sub-national and local level, it can be used to substantiate the demands of poor communities and households for increased access to financial services that are targeted to their unique needs, ensuring that they, too, can benefit from LCRD investment.

Our comparative analysis highlights trends in the design of our case studies' LCRD investment models; how their design choices affect the delivery of inclusive investment for the poor; how their design choices shape the delivery of long-term, sustainable finance and development co-benefits; and the incentive structures that influence the selection of specific design choices. We outline the findings from each of these analyses below.

## Trends in new LCRD investment models

- While international donors are the largest provider of finance for RE investment, domestic sources of finance within LDCs are playing an increasingly important role in financing LCRD.
- Different intermediaries are needed to target different users of finance, based on their unique needs. The use of multiple FIs with different 'niches' in the value chain can help cater to different users of finance, and specific intermediaries can be used for different stages of market development.
- Different instruments are also needed to target specific actors in the LCRD finance landscape, based on their unique financing needs. For example, providing concessional loans to commercial FIs – banks, NBFIs and private investors – can incentivise them to lend on to MFIs and end users, while grants combined with collateral-free credit can meet the investment needs of the ultra-poor.

## Effectiveness in delivering inclusive LCRD investment for the poor

- For LCRD investment models to be effective, they must meet the unique and disparate needs of FIs and household and community end users, while encouraging both of these groups to work towards the overall outcome of inclusive LCRD investment.
- In all five case studies, commercial intermediaries and NDBs need, and are receiving, concessional finance to lend on to secondary intermediaries and households so they can make a profit and enter new markets at relatively low risk.
- Low-income households and communities require better access to financial services, higher amounts of grants and collateral-free or low-interest credit. However the intermediaries and instruments that are available to poor households and communities in our case studies are not adequately aligned to their financing needs. Targeted instruments need to be made available to the poorest and most vulnerable to ensure they are not left behind by LCRD initiatives.
- MFIs can make finance more accessible to the rural poor – but mostly through high-interest loans. The lack of commercial banking services in rural areas means that household investors cannot get access to the low-interest credit they require to invest.

## Effectiveness in delivering long-term, scaled-up LCRD finance and development co-benefits

- Efforts to promote the long-term commercial viability of the RE sector by delivering finance through commercial banks, and the selection of NDBs to provide finance to the private sector are both helping encourage long-term investment. Using interest from concessional loans to create cyclical investment through revolving funds has also promote long-term, sustainable investment.
- Scaled-up investment can be achieved by leveraging additional finance from commercial banks and NDBs. Concessional loans can give commercial actors an economic incentive to co-finance new LCRD projects and enter new markets with new products and services.

- Households and businesses can also co-finance RE purchases if appropriate finance is made accessible to them. At present, households must have the ability to access and repay market or high-interest loans to purchase RE products. Efforts therefore need to be made to improve the accessibility and appropriateness of finance – in the form of concessional credit, grants or guarantees – so that poor households can also invest.
- Household-level RE investments are delivering co-benefits such as employment, improved health, enhanced education opportunities, income-generating activities, an increase in household savings and female empowerment. This highlights the importance of improving efforts to target the poor, so they too can participate in the benefits of LCRD investment.

## Incentives shaping LCRD design choices

- Policy and economic incentives to promote private sector investment, open new markets and, reduce government and donor expenditure have led to the selection of commercial banks, NBFIs and NDBs that have the mandate, experience and capacity to work with the private sector or that are private entities themselves. They have also led to the selection of instruments (concessional and market rate loans) that incentivise the participation of these intermediaries.
- There were few examples from our case studies of policy, economic or capacity incentives that emphasised pro-poor and inclusive LCRD outcomes. The CREF case study was the only one where respondents outlined poverty reduction and safety nets for the poor as key policy drivers, which led to ongoing subsidy support for poor and vulnerable households, even as CREF moves towards commercialising Nepal's rural RE sector.
- Across our case studies, we found that the design of new LCRD investment models is beneficial to FIs and large commercial users of finance, but does not adequately meet the needs of poor communities, households and businesses. To improve LCRD outcomes for the poorest and most vulnerable, appropriate incentive structures need to be identified that will encourage policymakers to make design choices aligned to their unique investment needs.

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This Working Paper brings together evidence from four of the least developed countries – Bangladesh, Ethiopia, Nepal and Rwanda – to show how countries can use climate finance to invest in inclusive low-carbon resilient development. It outlines how new public-private investment models are delivering renewable energy investment to communities and households in rural areas, and generates evidence on the different combination and sequencing of financial intermediaries and financial instruments that promote inclusive investment for the poor.

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