

Financing inclusive low-carbon resilient development

Role of Central Bank of Bangladesh and Infrastructure Development Company Limited

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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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How can we deliver climate finance to those who need it most? We examine the choices countries make in financing low-carbon resilient development, focusing on experiences in Bangladesh. Case studies of two financial institutions, Central Bank of Bangladesh and Infrastructure Development Company Ltd. (IDCOL), illustrate how core actors and incentives shape the delivery of climate finance, and how well-designed systems and carefully chosen intermediaries can provide lower-income communities with access to this finance. Our analysis suggests some key principles and strategies for ensuring finance are inclusive and reach the poorest.

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Acronyms

ADB	Asian Development Bank
BCCRF	Bangladesh Climate Change Resilience Fund
BFI	banking financial institutions
CSR	corporate social responsibility
DFID	Department for International Development
FI	financial institutions
GCF	Green Climate Fund
GEF	Global Environmental Facility
GIZ	German government-owned development company
GPOBA	Global Partnership on Output Based Aid
HSD	high-speed diesel
ICS	improved cook stove
IDB	Islamic Development Bank
IDCOL	Infrastructure Development Company Limited
IPP	independent power producer
JICA	Japanese International Co-operation Agency
KfW	German government-owned development bank
LCRD	low-carbon resilient development
LDCs	Least Developed Countries
MFI	micro finance institutions
MRA	Microcredit Regulatory Authority
NBFI	non-banking financial institutions
PO	partner organisations
REDA	Renewable Energy Development Agency
SHS	solar home systems
SIP	solar irrigation pumps
SME	small and medium enterprises
SREDA	Sustainable and Renewable Energy Development Authority
TSC	technical standards committee
USAID	United States Agency for International Development

Summary

Low-carbon resilient development (LCRD) integrates developing countries' responses to the combined challenges of mitigation, adaptation and sustainable development. In Bangladesh, where around two fifths of the population is 'off grid', LCRD is the agenda behind policies aimed at widening access to energy. Government targets include "electricity for all by 2021" and the generation of 10 per cent of electricity from renewables by 2030.

In this report we present case studies of two financial entities that channel funds to implement these policies: Central Bank of Bangladesh and Infrastructure Development Company Ltd (IDCOL). Taking a comparative approach, we examine the choices these two institutions make in harnessing integrated sources, in identifying intermediaries that prioritise getting funds to the poor and deploying instruments and financial systems that can be targeted to the needs of the most vulnerable.

Assessing effectiveness

We also focus on two projects: Solar Home Systems (SHS), one of the largest off-grid electrification initiatives in the world, and Solar Irrigation Pumps (SIPs), a more recent initiative aimed at farmers. Using evidence from stakeholder interviews and discussions with end users, we assess the effectiveness of the two institutions' finance programmes for these projects in terms of:

- Targeting the poor: are funds targeted to those who need them most?
- Leveraging finance for low income population: are public funds able to generate more funds for poor from other sources?
- Generating appropriate finance: do the terms of finance meet the specific needs of poorer people?
- Facilitating co-benefits: does finance translate into LCRD outcomes, for example into community resilience to climate change and better livelihoods?

Case study: Central Bank of Bangladesh

Central Bank of Bangladesh provides credit for investments in LCRD projects primarily through loans to financial institutions (FIs), at concessional or market rates. FIs then lend to end users, either directly or

through further credit linkages with MFIs, NGOs or others. Commercial banks have innovated on this model by introducing composite lending of SIPs loans with crop loans, the latter designed to improve farmers' incomes and so their creditworthiness.

Central Bank's regulatory role has enabled it to gradually change FIs' behaviour, ensuring access for consumers who would otherwise have remained outside 'mainstream' banking; its strategy began with green banking guidelines and concessional loans, progressing to mandatory green lending targets. However, the Bank is limited in its ability to reach the very poorest, since it must seek financial viability and, unlike IDCOL, is unable to offer grants.

Case study: IDCOL

IDCOL was created to translate large-scale donor funding into small-scale finance for renewable technologies. It does this through partner organisations such as micro finance institutions (MFIs).

IDCOL has deployed a 'one stop shop' model combining partial, phased subsidy and refinancing with complementary services supporting market creation. Subsidies for SHS are now being phased out, and it remains to be seen whether this is a step towards market sustainability or whether removing grants just as the technology is becoming affordable for lower-income households is a retrograde step with implications for the viability of IDCOL's chosen model.

Recommendations: key findings and conclusions

Making appropriate choices in developing finance for the poor

- Selection of intermediaries should take into account:
 - Market stage: for example, MFIs are established in poorer communities and so better equipped to deliver finance in early-stage markets, but as markets mature banks can provide cheaper capital to end users.
 - Actors' financial needs and status: for example, individual farmers cannot give the risk guarantees FIs require for SIPs loans, but FIs have made the loans accessible by targeting farmers' co-operatives who can provide group guarantees.

- Financial instruments should include:
 - Grants in the early stages, for market development, that are later phased out to avoid market distortion; grants should continue, however, for the poorest.
 - Concessional loans to provide lower-income groups with appropriate finance; that is, long-term, flexible finance with affordable repayments and limited security requirements.
 - Risk mitigation instruments to ensure channeling finance to the poor is less risky for the financiers.
 - Social protection instruments and safety nets, to include the ultra-poor.
- Appropriate planning systems should include:
 - Integrated and holistic financing model that can create win-win opportunities for all actors in the value stream. Such models can provide a combination of services including market creation, establishing delivery networks, quality assurance, access to capital and training.
 - Clear and phased regulatory policies and signals can be instrumental in engaging diverse actors that remain concentrated in mainstream sectors. In some cases, it may need setting up mandatory requirements.
- Incentivising pro-poor choices
 - Policy incentives: higher-level policies, including government targets and fiscal measures as well as simple political will, incentivise actors at all levels and scales.
 - Economic incentives: all actors need economic incentives, but financial intermediaries in particular need concessional financing, so that entering riskier markets makes commercial sense to them.
 - Knowledge and capacity incentives: non-financial support such as training and technical assistance can encourage local engagement and private sector investment.
 - Reputational incentives: official and public recognition can encourage the involvement of commercial players such as banks.



Solar irrigation pump in Bangladesh © Neha rai.

Introduction

1

If they are to be effective, development efforts could be more climate resilient and have lower carbon emissions. A country pursuing climate resilient development will respond to impacts of climate change that are capable of hindering development performance in the long run (Burton, 2004). In recent years however, developing countries have brought strategies for climate change mitigation and climate change adaptation together as 'low-carbon resilient development' (LCRD), creating a more coherent route towards sustainable development (Fisher, 2013). Some of the Least Developed Countries (LDCs) now use a wide range of approaches to integrate their climate change and development agendas in order to achieve poverty reduction.

Various forms of finance play a role in delivering these LCRD policies and projects; countries are using diverse sources of finance, instruments and intermediaries to mobilise and distribute funds (Rai et al., 2015, Kaur et al., 2014). Levels of 'climate finance' are also rising fast: nearly US\$10 billion has been pledged under the Green Climate Fund (GCF) alone, and countries' own climate-related domestic spending is far greater than this (GCF, 2014, Khan et al., 2012). Experience shows, however, that this spending still falls short of its target of making a real difference to those most vulnerable to climate change; getting funds to the poorest remains a challenge (Sharma et al., 2015, Wilson et al., 2014).

In many countries climate finance is distributed to intermediaries in large sums, meaning that much of it is absorbed at national and institutional levels before it reaches the poorest (Christensen et al., 2012). So for us the key question is not how much but how effective these funds are: it is important that instruments and systems are appropriate and that intermediaries can channel finance to the poor, as it is only when climate finance flows to those who need it most that sustainable development can be achieved. There are opportunities to deliver finance to low income groups, but sources need to be integrated, intermediaries need to prioritise getting funds to poor people and instruments need to be targeted and cost effective.

The implementation of inclusive and 'pro-poor' LCRD is not straightforward: incentives need to be created

and barriers removed. Political and economic factors shape the financial landscape (Rai et al., 2015a) and different knowledge and incentive structures underpin the decisions of policymakers. In this report we examine how LCRD investments can be effective in reaching the poor. In particular we look at how the political economy – actors and their incentives – shapes effective delivery.

Our research programme gathers evidence from Bangladesh, Ethiopia, Nepal and Rwanda on new opportunities and innovations in LCRD. All of these countries are using a wide range of approaches to financing LCRD; some are creating new structures while others are building on existing systems. All four are investing in intermediaries capable of unlocking and disbursing finance appropriate to the needs of poor people.

In this report we focus on Bangladesh and present case studies of two core institutions that have that have been instrumental in channelling finance into decentralised energy projects: Central Bank of Bangladesh, which has recently developed a green credit line to incentivise investment in low-carbon projects, and the Infrastructure Development Company Limited (IDCOL), a government-owned entity that uses public funds to catalyse private investment in LCRD.

Using the climate finance landscape framework for our investigation, we outline the 'design' choices made by these two institutions in financing LCRD – the sources, instruments and intermediaries that they deploy – the effectiveness of these choices in giving the poor access to finance, and the incentive structures by which the institutions' choices are shaped.

We use this analysis to draw out useful learning on how different elements of the financial landscape can be brought together to cater for the poorest, and how incentives can be created to ensure that LCRD finance reaches those who need it most.

Approach and methods

Our analysis makes use of a political economy approach to focus on the dynamics of financing LCRD projects, and the landscape within which these dynamics play out. We define effectiveness in terms of the ability to provide the poor with access to appropriate finance.



2.1 The political economy approach

The underlying political economy can support or constrain the effective delivery of low-carbon resilient development (Rai et al., 2015a, Tanner and Allouche, 2011). It shapes the dynamics of the LCRD 'value stream' – the supply chain through which LCRD projects are delivered – and so affects the choices that are made and how effective they are in providing inclusive finance.

To understand these dynamics, we take a rational choice perspective on political economy, which imply conditions under which actors are willing to make coherent choices when driven by certain incentives or problems (Moe, 2005, Pierson, 2001). Adapting Tanner and Allouche's definition of political economy as processes by which actors, ideas and resources are conceptualised and implemented, we focus on three main elements of the political economy (Tanner and Allouche, 2011) (Figure 1):

- **Actors and their networks** LCRD investments involve a wide range of actors in both policy and implementation. Delivery of investments is shaped by how these various actors work with ideas, power and resources to make and implement design decisions. All stakeholders bring their own beliefs and interests to the table. A climate finance landscape framework (see Section 2.2) helps us to understand who these

actors are, how are they connected, the choices they make and the role they play in channelling LCRD finance.

- **Knowledge and opinions** Our analysis acknowledges that decisions are influenced by actors' knowledge, and understanding. We examine the actors' opinions on effectiveness of LCRD finance.
- **Incentives** Incentives are drivers that motivate people to act in a certain direction (Giger, 1991). They can be categorised as:
 - Policy incentives: a policy, regulation or institutional mandate may support a particular view point or decision
 - Economic incentives: the availability of resources, including funds, influences decisions
 - Knowledge and Capacity incentives: the availability of technical skills, evidence or knowledge and understanding can drive decision-making
 - Reputation incentives: decisions may be made based on the perception that they will enhance the reputation and level of goodwill for the actors or institutions involved
 - Socio-economic incentives: a decision may be expected to lead to particular socio-economic benefits such as improved livelihoods, education benefits, etc.

Figure 1. Elements of the political economy

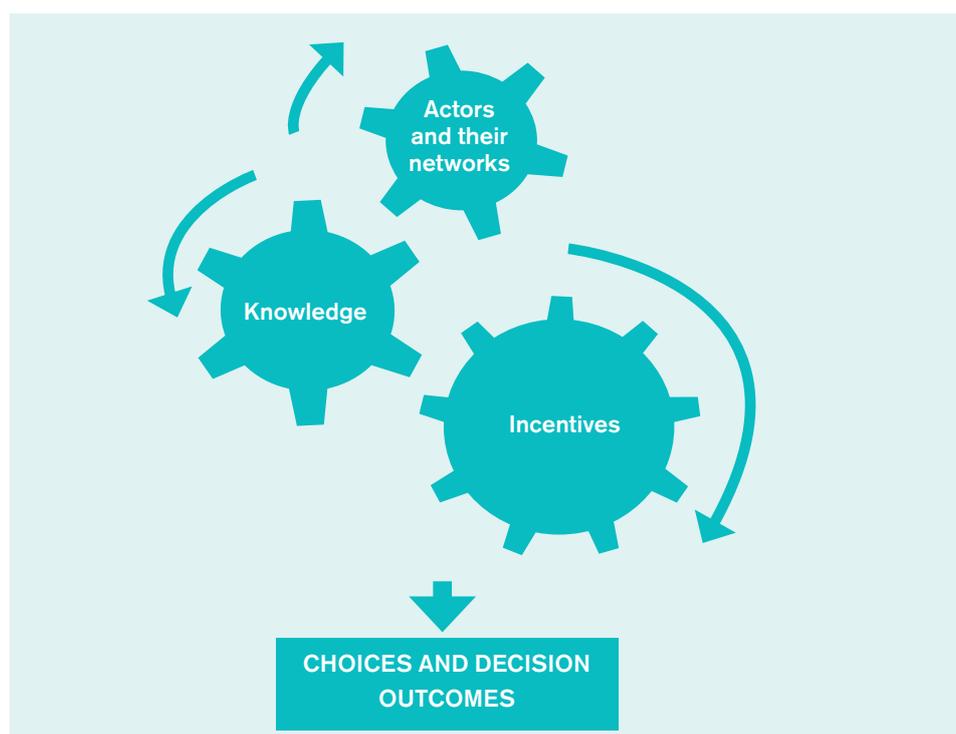
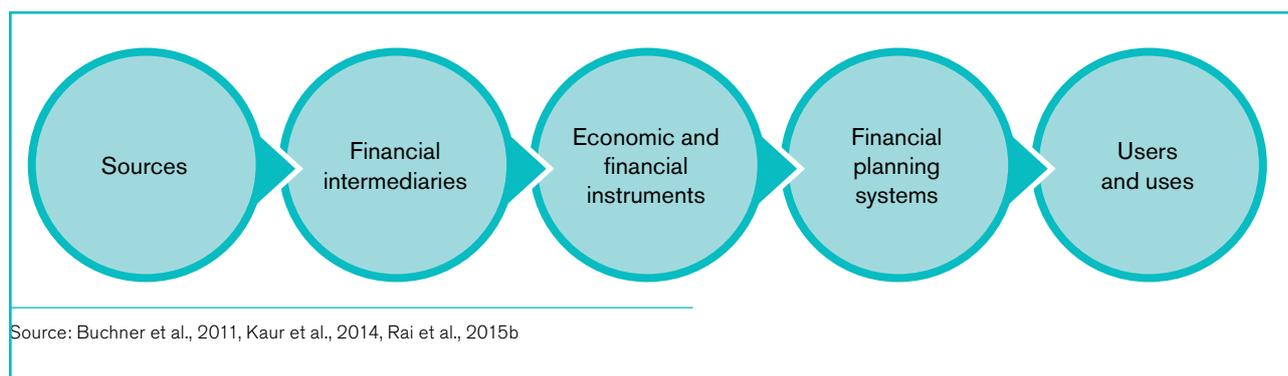


Figure 2. Climate finance landscape framework, adapted from framework developed by Climate Policy Initiative



Using this political economy approach our framework explores three key questions:

1. **Who are the actors and what are the financial instruments and planning systems involved in financing LCRD for the most vulnerable?**
2. **How do incentives enable or constrain LCRD investments and choices?**
3. **How does the political economy shape effective delivery of LCRD investments to the poor?**

Using evidence from semi-structured interviews, we examine the interaction of actors, choices and investments to understand how effectively LCRD investment is targeted at the poorest, whether finance is appropriate to their needs and whether co-benefits of LCRD are realised and additional finance is leveraged.

2.2 Analytical framework

In each country, climate finance may come from a range of sources, and be managed by diverse institutions and used for a variety of adaptation and mitigation activities. Our study uses the climate finance landscape framework (Figure 2) to understand the mechanisms and actors involved in financing climate-related investment, by examining the trends in each of the five 'pillars':

- Sources: the origins and type of climate finance – whether it is domestic or international, short or long term, public or private
- Intermediaries: the institutions that enable finance to flow from its source to end users
- Economic and financial instruments: the mechanisms such as loans, grants, risk guarantees, import tariffs and taxes that motivate or constrain LCRD investments

- Financial planning systems: policies, institutional arrangements, financial planning tools and systems that play a key role in the management and governance of climate finance
- Users and uses: the projects funded through LCRD investment and the people involved in them.

2.3 Methods

2.3.1 Case studies

In order to explore the financing of LCRD in Bangladesh, we conducted case studies of two different institutions: the Central Bank of Bangladesh and the Infrastructure Development Company Limited (IDCOL).

We took a comparative approach to understanding how these two intermediaries are ensuring LCRD investments benefit the poor, focusing on two LCRD projects – Solar Home Systems (SHS) and Solar Irrigation Pumps (SIP) – for which both institutions offer finance products but use different channels and instruments.

2.3.2 Semi-structured interviews

We used a stakeholder mapping exercise to identify key actors along the vertical and horizontal value stream. We interviewed around 50 stakeholders in six categories (Table 1), using semi-structured questions in order to understand the choices actors make, the drivers underlying them and actors' opinions on their effectiveness.

Table 1. Stakeholders interviewed

ACTOR GROUPS	IDCOL CASE STUDY	CENTRAL BANK CASE STUDY
Funding sources	International donors, eg World Bank, DFID, KfW, GIZ, JICA, Danida	Domestic government, ADB
Policymakers	Department of Environment, Planning Commission, Sustainable and Renewable Energy Development Authority, Bangladesh Energy Regulatory Commission, Ministry of Power, Energy and Mineral Resources	
Core financial intermediary	Infrastructure Development Company Limited (IDCOL)	Central Bank of Bangladesh
Other financial intermediaries	Partnering organisations, eg micro finance institutions; NGOs, eg Grameen Shakti; and private companies, eg Rahimafrooz	Participating banking and non-banking institutions, eg Standard Bank, MTBL, Midland Bank, HSBC Bangladesh; micro finance institutions, eg Resource Development Foundation
Suppliers and manufacturers	Small companies, eg MAKS Renewable Energy, Xenergia	Small companies, eg Meghna Solar, Rahimafrooz
Beneficiaries	Farmers using NUSRA solar irrigation pumps in Dhamrai district	Households using solar home systems in Hatibandhah village, Mymensingh district; farmers using solar irrigation pumps in Ratnabiri village, Panchagarh district

2.3.3 Focus group discussions

We conducted focus group discussions with communities – households and farmers co-operatives – that have been using solar home systems and solar irrigation pumps.

2.4 Defining effectiveness of finance for poor

Effectiveness is the “ability to produce a desired result” (Drucker, 2006). For the purpose of this study we defined effectiveness as the ability to:

- **Target the poor** ‘The poor’ here meaning low-income groups, women and children, SMEs and informal markets, and in particular geographical areas
- **Provide appropriate finance** We assess whether finance is appropriate for the poor in terms of:

- Scale of leverage: Is there adequate availability of finance to poor people? Is it affordable?
- Better terms and sustainability of finance: Is there adequate finance to sustain the activity in the longer term? Is there complementary support – O&M support?
- Flexibility: Are the terms of finance suited to the income group, for example is the long-term repayment rate appropriate, is there favourable tenure? Are the instruments used – grants, loans – sufficiently flexible? (See Section 3.2.)
- **Facilitate co-benefits of LCRD** Whether finance is building communities’ resilience, improving health, reducing expenditure, reducing time spent at work, improving education, livelihood diversification and benefits to women

The renewable energy landscape in Bangladesh

The government of Bangladesh has prioritised renewable energy, establishing a national policy along with financial incentives to implement it and a national body to oversee it. The country's central bank has a green energy portfolio, and IDCOL has been set up to catalyse private sector renewable energy finance.



3.1 Government policy

The LDCs are increasingly concerned about energy, particularly in relation to remote rural areas, and need to make the transition to a renewable energy future. As well as reducing their carbon emissions, decentralised renewable energy generation helps to ensure communities are resilient, and by reducing the use of expensive fossil fuels and increasing energy independence it can play a role in lifting them out of poverty.

It is in this context that Bangladesh has developed a diverse set of policies to encourage wider energy access, the most recent of which is the government's vision of "electricity for all by 2021" (GoB, 2011). Currently only 62 per cent of the population has access to electricity and domestic generation figures are among the lowest in the world, at 321 kilowatt hours per person per year (Islam, 2014). Up to 70 per cent of Bangladesh's commercial energy generation comes from natural gas and the remainder from imported oil. Gas is in short supply, however, giving further impetus to the government's renewable energy push. Access to electricity is also a major part of Bangladesh's response to the Millennium Development Goals (Khandker *et al.*, 2014).

A dedicated renewable energy policy has been in place in Bangladesh since 2009 (Box 1; Figure 3). The policy set a target of generating 5 per cent of the country's electricity (800 megawatts per year) from renewable sources by the end of 2015 and 10 per cent by the end of 2030 (GoB, 2008, GoB, 2011). Solar energy is expected to contribute about 500MW towards the 2015 target.

Following their election pledge, on entering government the Bangladesh Awami League prioritised energy policy, setting targets for specific programmes, including SHS and SIPs. In 2011 a Sustainable Energy Development Act was passed which led to the creation in 2012 of the Sustainable and Renewable Energy Development Authority (SREDA), a policy body promoting renewable energy.

Bangladesh's government has created financial incentives for investment in the renewable energy sector, including 20-year tax holidays, reduced levies on importing renewable energy technology and reduced taxes on local manufacture or assembly of renewable energy equipment (Islam, 2014). To encourage the purchase of electricity from renewable sources, feed-in tariffs and other incentives to attract foreign investment in the sector are under consideration, while the private sector has been allowed to generate electricity from renewable sources and sell to chosen customers at preferential rates (Islam, 2014) (Box 2). Concessional finance and capital buy-down grants are also available for renewable energy projects.

BOX 1. OBJECTIVES OF BANGLADESH'S 2009 RENEWABLE ENERGY POLICY

Harness the potential of renewable energy resources and encourage the spread of renewable energy technologies in rural, peri-urban and urban areas

Enable, encourage and facilitate both public and private sector investment in renewable energy projects

Develop sustainable energy supplies to substitute for indigenous non-renewable energy supplies

Scale up the contribution of renewable energy to both electricity generation and heat energy

Promote appropriate, efficient and environmentally friendly use of renewable energy

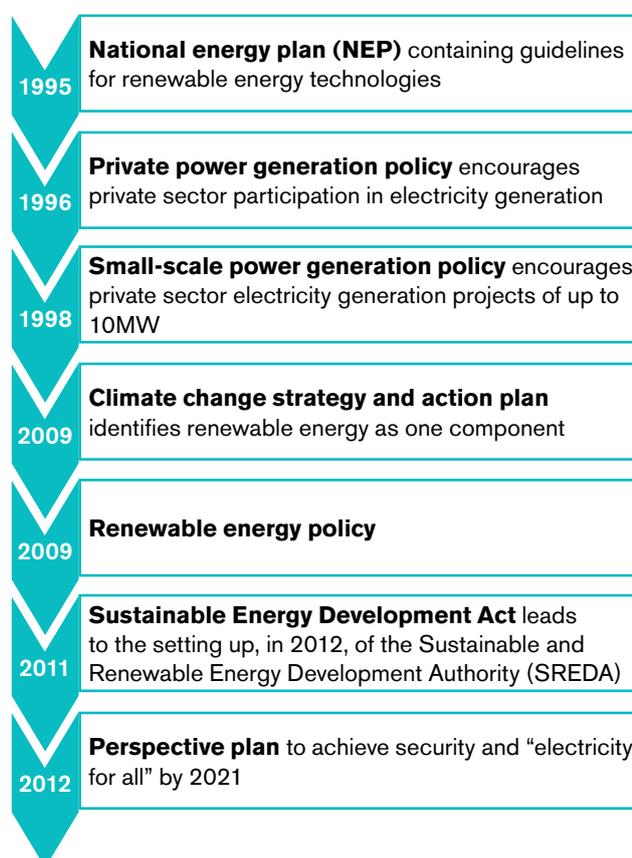
Create an enabling environment and legal support to encourage the use of renewable energy

Promote development of local technology in the field of renewable energy

Promote clean energy in order to contribute to Bangladesh's participation in the Clean Development Mechanism.¹

Source: (GoB, 2008)

Figure 3. Renewable energy policy timeline



BOX 2. THE BANGLADESH GOVERNMENT’S RENEWABLE ENERGY POLICY INTERVENTIONS

- Target of 5% of electricity from renewable energy sources by 2015 and 10% by 2030
- Fiscal incentives for investment in renewable energy sector:
 - 20-year tax holiday
 - Reduced levies on import of renewable energy technologies
 - Reduced taxes on local manufacturing or assembly of renewable energy equipment
- Feed-in tariff under consideration
- Private sector permitted to generate electricity from renewable sources and sell to utilities.

Source: (Islam, 2014)

capacity building and advisory services for public and private stakeholders (Uddin *et al.*, 2006). SREDA also monitors entities that promote and finance energy projects, and supports public–private partnerships in renewable energy projects (PowerDivision, 2013)

Bangladesh’s Ministry of Power, Energy and Mineral Resources is a core policymaker. All activities relating to rural and renewable energy fall within its remit. It supports SREDA by providing administrative oversight.

Similarly, the Ministry of Finance implements renewable energy tax incentives and enables financial institutions to build capacity. It also manages SREDA’s ‘pool fund’, which is supported by international co-operation, ensuring the agency has a sufficient budget.

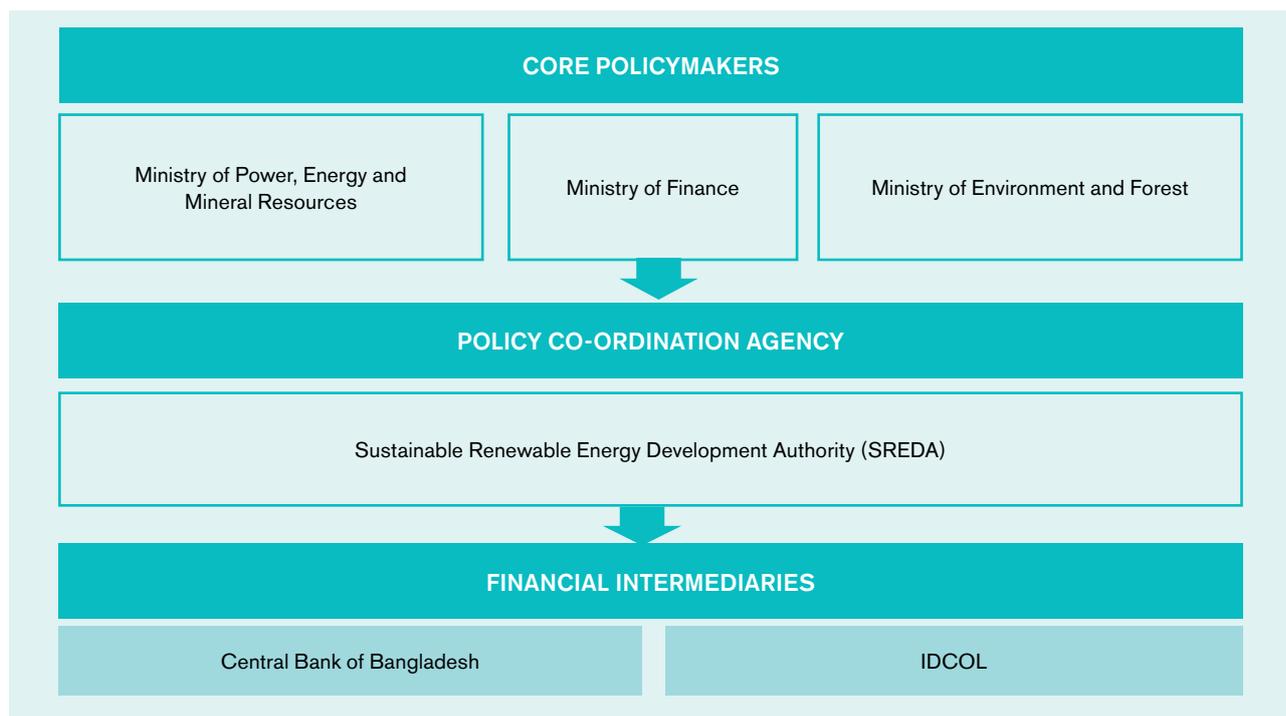
The Central Bank of Bangladesh is a key financial intermediary in the renewable energy landscape. As Bangladesh’s central bank it is the primary regulator of the country’s monetary and credit system, and oversees all banking and non-banking financial institutions. Recently it has also diversified into green lending, providing concessional finance to the financial sector in the form of green credit.

IDCOL, meanwhile, is a non-banking financial institution established to catalyse private sector involvement in Bangladesh’s renewable energy industry. It is hosted by the Ministry of Finance and governed by an independent board of directors from the Ministry of Finance, the Ministry of Information and Communication Technology, and the Ministry of Power, Energy and Mineral Resources.

3.2 Key agencies and actors

As the main agency for policy coordination, the Sustainable and Renewable Energy Development Authority (SREDA) is at the centre of Bangladesh’s renewable energy landscape (Figure 4). Set up in 2012 after a long gestation, SREDA focuses on promoting generation and use of renewable energy through

Figure 4. Actors in Bangladesh’s renewable energy policy landscape



IDCOL has extensive experience – predating government green investment policies by some years – of financing decentralised energy in Bangladesh. It does this using donor funding from both domestic and international sources, and offers a range of measures including grants, subsidies, concessional loans and technical services.

This paper focuses on the two case studies of Central Bank of Bangladesh and IDCOL to understand how a regulator and a non-banking financial institution play an important part in shaping the renewable energy landscape in Bangladesh by catalysing investment in energy access projects. To do so it is necessary to start by looking at the financing needs that these two agencies are trying to meet.

3.3 The financing needs of low income communities and investors

Mainstream, large-scale institutions do not usually provide finance of the level and duration needed by low-income consumers and marginal, remote communities. Various factors are at play here: a perception of high risks and low profit margins, the complexity involved in reaching out to these communities and the influence of national governments prioritising growth over social development. Both IDCOL and the Central Bank of Bangladesh are attempting to bring the financial needs of poorer communities into line with those of investors, in order to give each group access to the other.

3.3.1 The financing needs of low-income consumers

Poor customers require specific types of finance that are appropriate to meet their specific need (UNCDF, 2013, Ugaguchi and Mohammed, 2015) (source: Interviews).

- **Scaled finance:** tailored products that are appropriate to smaller-scale projects and cost effective for low-income customers, which at the same time meet their investment needs
- **Appropriate instruments:** for example, to purchase solar home systems households are likely to need

both low-cost finance and some grants to cover upfront costs

- **Long-term, flexible repayments:** small loans provided through mainstream financial markets tend to be short term, with weekly repayments, whereas poorer consumers require flexible instalment plans tailored to their income, for example farming communities typically require loans that allow them to make payments according to their income cycle
- Lower administrative costs and less rigid requirements for collateral and security (Norris et al., 2015)
- **Complementary services:** in addition to finance, the provision of after-sales, operation and maintenance support and so on is needed to ensure products are sustainable.

3.3.2 The financing needs of investors

- **Affordable concessional finance:** financiers are unable to channel affordable finance to investors as they are cautious of risky low-income markets; as a result there is a need for concessional finance providing assured profit margins
- **Long-term finance:** to ensure availability of sustainable investments, revolving fund through long-term finance can help intermediaries to revolve funds to a large number of users
- **Risk management tools:** low-income customers and off-grid renewable projects are considered to have ‘low bankability’; investors need some assurance that their loans will be repaid with interest within a given time period
- **Mature markets and clear policy signals:** apart from appropriate finance, investors – whether financiers or suppliers – also need complementary support for integrated market development, including capacity-building for different actors in the value stream, the design and testing of different financial and technical products, an exchange of ideas and learning with other mature markets and clear policy signals relating to market development.

Case study: Central Bank of Bangladesh

Central Bank of Bangladesh has developed a worldwide reputation as the first central bank to promote a sustainable development agenda. This case study explores how the bank has deployed a range of intermediaries, instruments and planning systems to address the specific financial needs of LCRD investments.



Central Bank of Bangladesh was established to manage the monetary and credit system of the country. It regulates and licenses all banking and non-banking financial institutions operating in Bangladesh.

It is also the first central bank in the world to take an active part in providing dedicated resources for sustainable development. In 2005 it set up a refinancing scheme advising commercial banks on finance for green energy, including solar and biogas projects. In 2010, partly in response to the Bangladesh government's newly set goals for renewable energy generation, it introduced a US\$26 million refinancing facility for investments in green energy and effluent treatment plants, allowing commercial banks to access capital at lower rates and so increasing the profitability of green lending.

In 2011 the bank set out policy guidelines outlining phased steps for green banking practices in Bangladesh:

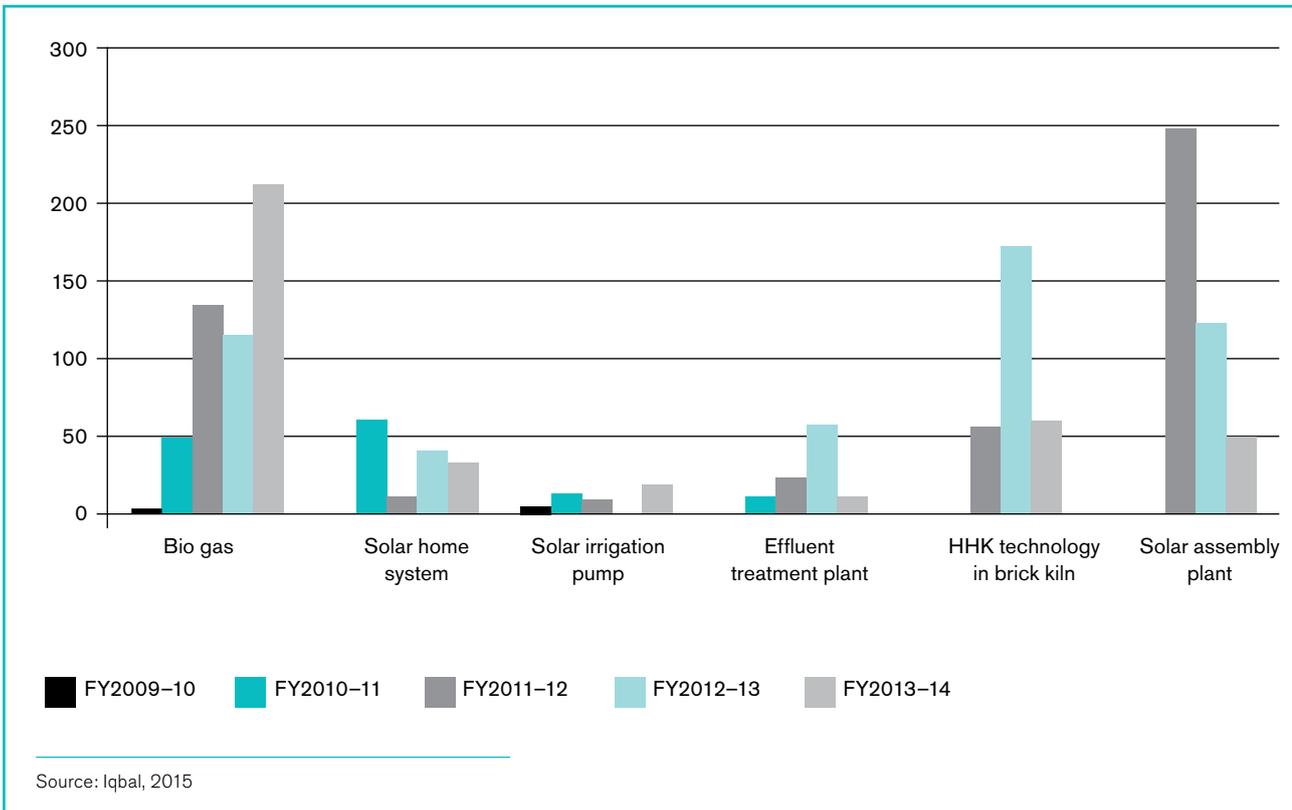
- In phase one, banks allocate a specific budget to green finance. This includes directly financing projects such as renewable energy generation, clean water supply, wastewater treatment plants, solid and hazardous waste disposal plants, biogas plants and bio-fertilizer plants.

- In phase two, banks set (and publicly disclose) achievable green banking targets and strategies and establish a green branch. Compliant banks receive preferential treatment through a refinancing model that provides access to low-cost finance.
- In phase three, banks are expected to undertake independent reporting of their green banking practices.

In a 2014 circular, the bank announced targets for all banks and non-banking financial institutions to ensure the availability of direct finance for environmentally friendly products: banks operating in the market since 2013 are expected to disburse 5 per cent of their lending to green products (which include renewable energy products), while new banks are expected to disburse 3 per cent and non-banking institutions 4 per cent.

As of 2014, more than US\$37 million (original allocation of US\$26 million) under the refinancing facility had been allocated to green projects. Figure 6 shows the funding for the different types of project up to 2014 (Iqbal, 2015). In the third quarter of 2014, investment in renewable energy was nearly 24 per cent of total green lending portfolio.

Figure 5. Use of Central Bank’s refinancing funds for green investments, by category from 2009 to 2014



4.1 Programme overview: Central Bank’s delivery model

Central Bank of Bangladesh funds are allocated to commercial banks based on three mechanisms: refinancing, spontaneous financing and incentive-based financing (Discussed in detail under the IDCOL section) (Masukujjaman and Aktar, 2013).

4.1.1 The refinancing mechanism

Banking financial institutions (BFIs) and non-banking financial institutions (NBFIs) such as IDCOL invest in renewable energy markets with the help of low-cost refinancing facilities provided by the central bank. These funds can be lent through two channels: a ‘direct’ model involving direct credit lending through financial institutions (E.g banks) or an ‘indirect’ model, involving credit wholesale lending through an NGO or MFI.

For direct credit lending (Figure 6), a commercial bank enters into a participatory agreement with Central Bank of Bangladesh. It makes loans to SMEs or direct investors and then applies to the bank for refinancing. The commercial bank can lend directly to a borrower or go through a credit linkage facility by credit wholesaling; the difference will be in the interest rate. Lending directly, it receives a concessional loan of 5 per cent and can lend to the borrower at the rate of 9 per cent, giving it a profit margin of 4 per cent.

For credit wholesale lending (Figure 7), the FIs work in collaboration with an MFI or NGO, as well as suppliers. Many banks feel more comfortable providing credit for LCRD investment through MFIs, as they are better at administering small-scale loans for rural, off-grid borrowers. Central Bank of Bangladesh has also allowed participating FIs with a limited rural presence to use NGOs to provide microcredit facilities. With minimum or no documentation, and often no collateral required, microcredits are also easier to access for rural poor. Borrowers do not have to go the bank branches for availing credit, and NGO/MFI staff can

Figure 6. Central Bank’s refinancing mechanism, direct model: direct credit lending

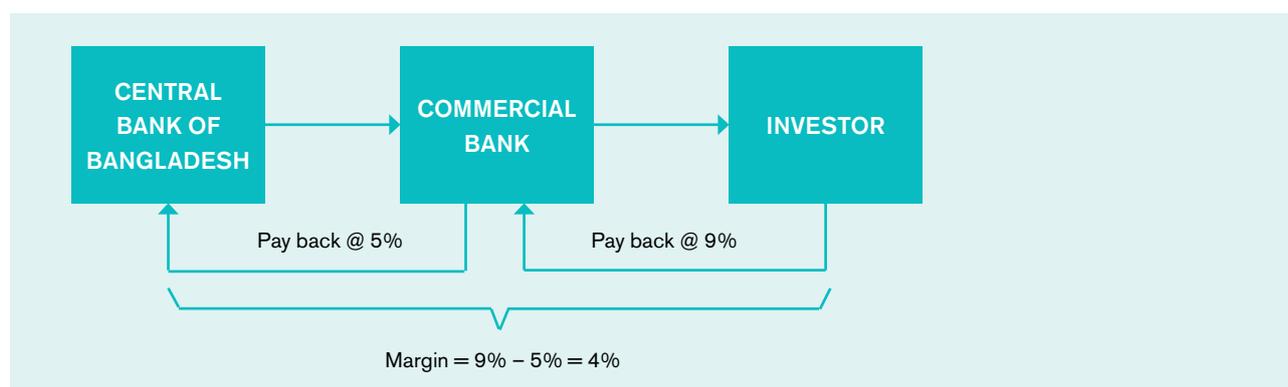
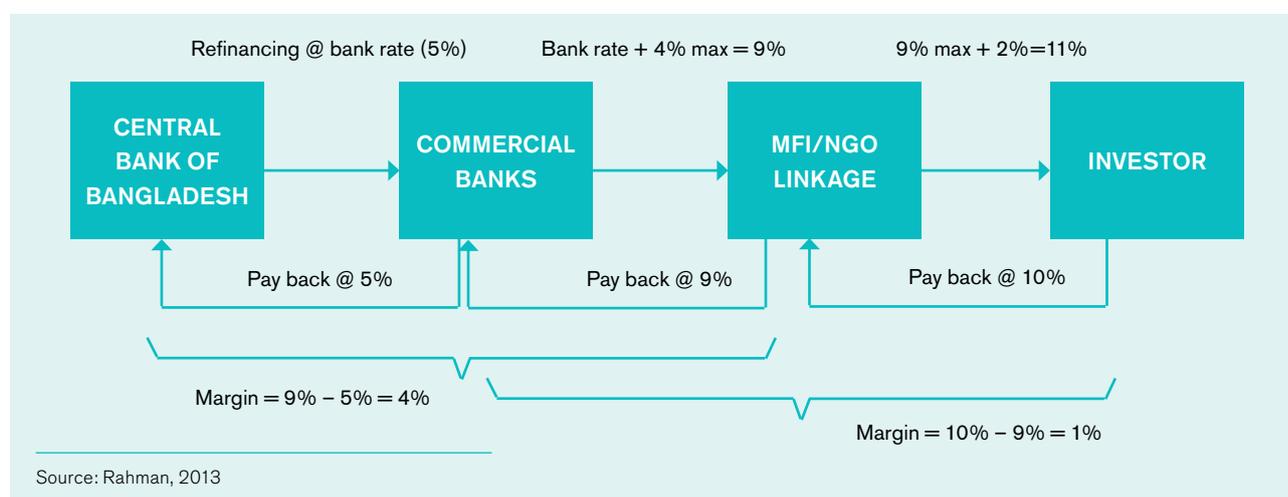


Figure 7. Central Bank’s refinancing mechanism, indirect model: credit wholesale lending through NGO/MFI



Source: Rahman, 2013

visit the prospective borrower's house to provide the loan and collect the small weekly recoveries. There are concerns however around the growing interest rate for microcredit: The government of Bangladesh is now trying to put a cap on how much interest can be

charged for microcredit to ensure it is within reach for low-income populations.

Boxes 2 and 3 describe the operation of the refinancing mechanism for the solar home system and solar irrigation pump programmes.

BOX 2. THE OPERATION OF CENTRAL BANK'S REFINANCING SCHEME FOR SHS

- Credit facility urban area Tk60,000–175,000; rural area Tk10,000–70,000 individual usage or up to Tk175,000 commercial usage
- Debt to equity ratio¹ dependent on bank–customer relationship
- Capacity of solar panel urban area 170–520W; rural area 10–130W individual usage or up to 520W commercial usage
- Eligibility: An Institution or family can obtain a loan jointly or individually
- Interest rate for end user 9% if the borrower is financed directly (bank rate of [currently] 5% + maximum 4%); 11% if the borrower is financed by credit wholesaling through an NGO or MFI (bank rate of [currently] 5% + maximum 7%)
- Repayment period for the investor 4 years from the date of first disbursement, including interest calculated on quarterly basis
- Repayment period for refinancing not more than 3 years from the date of receiving the refinance; principal with interest; payable on a quarterly basis
- Security hypothecation of the solar panel, factory, stock and personal guarantee
- Procedure
 - Borrower applies for SHS finance to bank or NGO/MFI
 - Bank or NGO/MFI assesses the application and, if creditworthy, approves the loan amount and installs the solar home system
 - In the case of direct lending, bank submits refinance claim on a quarterly basis; with an NGO/MFI linkage, bank submits the refinance claim along with the NGO/MFI's statement of the loan and borrower details
 - Central Bank of Bangladesh examines the documents and inspects the project; if satisfactory, it credits the bank's account with the claimed amount.

BOX 3. THE OPERATION OF CENTRAL BANK'S REFINANCING SCHEME FOR SIPS

- Policies
 - Banks are required to finance in green lending through a policy requirement of Central Bank of Bangladesh (ACFID Circular no: 01/2012)
 - Loan limit 35,00,000 taka²
 - Refinance facility offered to banks on a case-by-case basis
 - The refinanced amount is repayable, with interest, within a maximum of 10 years, with a 6-month grace period from the date of first disbursement
- Process
 - Farmers establish a co-operative to manage the SIP station
 - The co-operative makes contact with the MFI/NGO and bank. After a tripartite meeting, a formal SIP proposal is submitted to the bank, either by the MFI/NGO on behalf of the co-operative or directly by the co-operative. The bank assess application and, if creditworthy, approves the loan and installs the SIP through a vendor
 - The bank submits a refinance claim to Central Bank of Bangladesh
 - Central Bank of Bangladesh examines the documents and inspects the project; if satisfactory, it credits the bank's account with the claimed amount
- Loan limit Tk24,00,000: Tk18,27,000 for installation and Tk5,73,000 for developing drainage
- Rate of interest 9% pa
- Validity 10 years from first disbursement. 6-month grace period.

¹ The proportions of equity and debt the company is using to finance its assets.

² 1 USD=77 Taka (Bangladesh's currency)

4.1.2 The spontaneous financing mechanism

Some banks and non-banking FIs may not enter into a refinancing agreement; instead, they may want to invest in renewable energy through their regular credit offering, as 'spontaneous finance'. Initially this type of financing would have been part of FIs' corporate social responsibility (CSR) activities. The FIs themselves calculate the risk and premiums. They do not receive the same concessional finance, and end investors' interest rates range from 9 per cent (as under the refinancing mechanism) to 18 per cent.

4.2 Choices made by Central Bank in the financial landscape

Central Bank of Bangladesh has deployed a range of intermediaries, financial instruments and planning systems to deliver LCRD investments. Figure 8 provides a summary of these choices and the extent to which they address the financing needs of LCRD investments.

4.2.1 Financial intermediaries

The banking FIs participating in Central Bank of Bangladesh's refinancing mechanism comprise private commercial banks, state-owned commercial banks, foreign commercial Banks and state development

banks, while the non-banking FIs include entities such as IDCOL. At present there are 52 of these 'participatory financial institutions', which comprise of 38 commercial banks and 14 other FIs.

In allowing banks to use the indirect, credit wholesale lending route to finance rural renewable energy through microcredit providers (as described in Section 4.1.1), Central Bank of Bangladesh is taking a liberal stand on bank-MFI cooperation, in particular with regard to NGOs. Microcredit, however, is easier for the rural poor to access, since it requires little or no documentation and often no collateral. Also, rather than borrowers having to visit a bank branch – as they would have to if borrowing through a commercial bank – MFI/NGO staff can visit them to arrange loans and collect repayments.

There are concerns, however, about the high effective interest rate for microcredit, as well as the role of the Microcredit Regulatory Authority (MRA), the government body that supervises NGO microfinance operations in Bangladesh. The government of Bangladesh is now trying to introduce a cap to ensure microcredit remains within reach for low-income populations, while Central Bank of Bangladesh is emphasising improved access to bank finance, with its lower interest rates.

As banks become more experienced and established in rural areas, they prefer to lend directly to end users and so offer more competitive, lower rates. In the case of SIPs, some banks also prefer to channel funds through farmers' co-operatives (which, unlike individual farmers, can provide the necessary risk guarantees).

Figure 8. Summary of Central Bank of Bangladesh's choices in the financial landscape

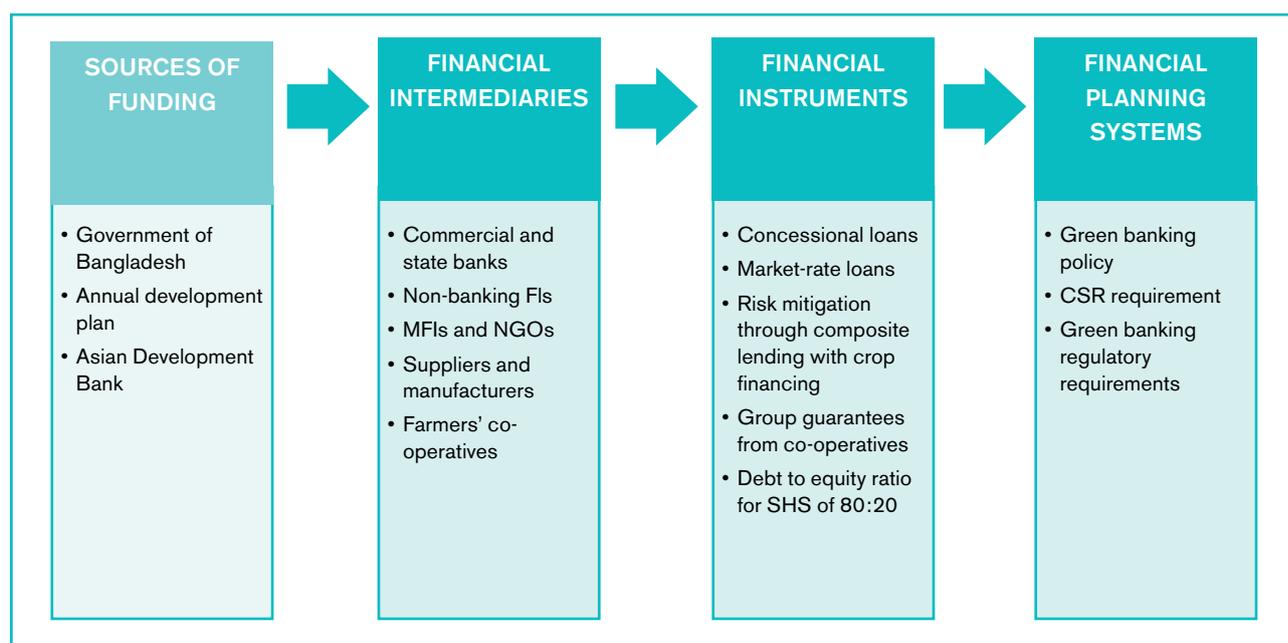
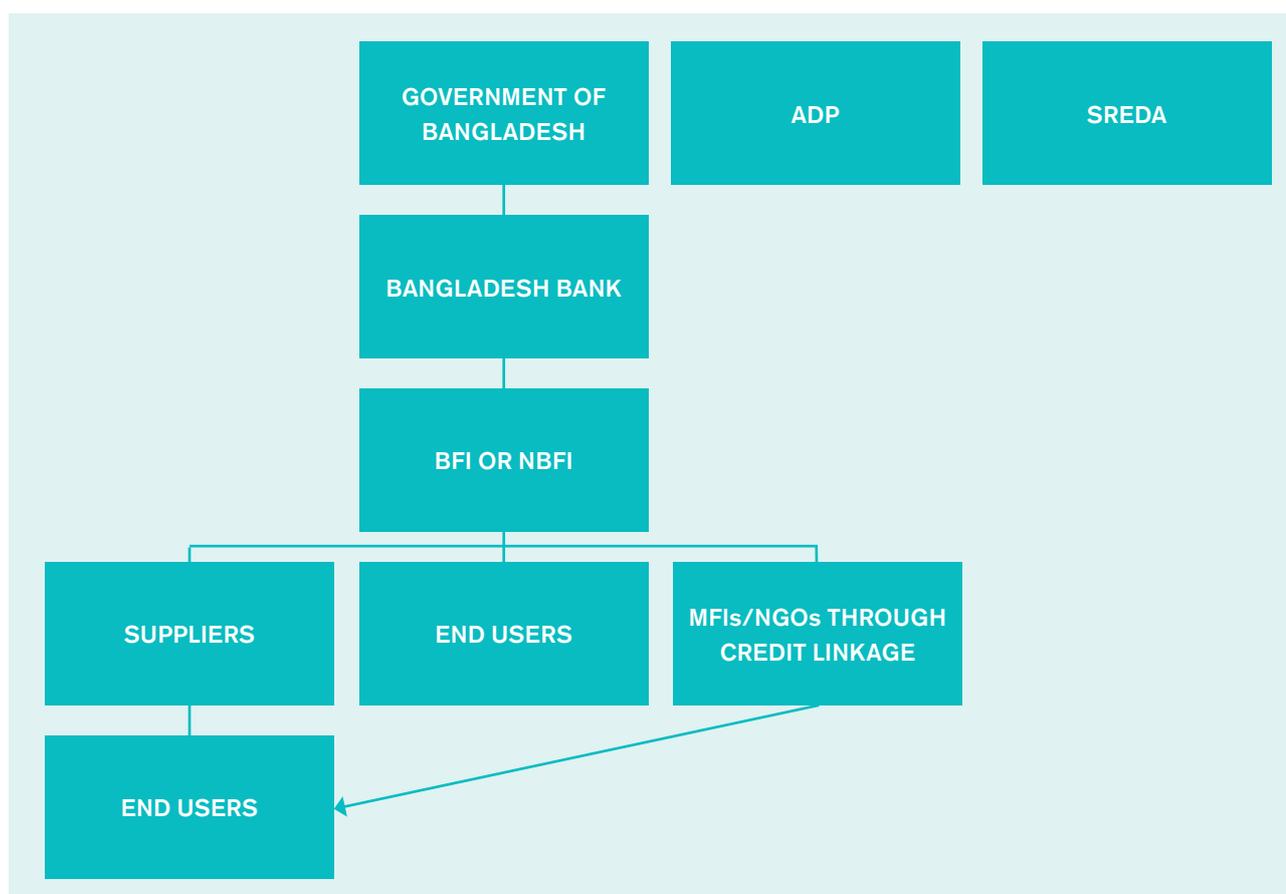


Figure 9. Actors in Central Bank’s value stream



Channelling finance through farmer's cooperatives as seen in the case of SIPs has also been effective in ensuring risk management. To access finance for solar pumps, farmers form cooperatives to submit their loan proposal to banks. Purchasing SIPs can be expensive for individual farmers who may not have the repayment capacity. Cooperatives also provide risk guarantees to banks, which make them more preferable borrowers in comparison to individual farmers. Financing directly through cooperatives also reduces the intermediary cost and as a result reduces the final interest rate to the end-user. For example, MTBL, a commercial bank, funds 16 SIP projects. Previously these were financed through a credit linkage, resulting in an interest rate to end users of more than 11 per cent. As MTBL has established more rural branches, it has begun financing co-operatives, reducing the rate to 8–9 per cent.

Rather than simply providing equipment for local MFIs or NGOs, some SHS and SIPs suppliers and manufacturers are also now entering into agreements with FIs, acting as their intermediaries to provide credit for end users. Suppliers entering to these arrangements have been effective in ensuring cost competence and better after-sales services.

4.2.2 Financial instruments

Central Bank of Bangladesh provides credit for investments in LCRD projects primarily through concessional and market-rate loans, and also through composite lending. Which of these financial instruments is used may depend on the type of investment being made – for example whether it is in SHS or SIPs.

- **Concessional loans** FIs receive concessional 'green credit' under the bank's refinancing facility, at an interest rate of 5 per cent. End users pay interest at a rate of 8–9 per cent to borrow directly from an FI, or 11–12 per cent to borrow through the credit linkage model.
- **Market-rate loans** FIs use loans at the market rate to deliver finance to households and suppliers. End users pay interest of 9–15 per cent on direct loans, or 11–18 per cent on the 'indirect' model.
- **Composite lending** Composite lending is available from FIs in the case of SIPs, where solar irrigation pump and crop financing are combined.

Table 2 summarises the combined effect of the financial instrument and the financing model on the interest rates charged to end users. Clearly, concessional loans combined with the direct model is cheapest for the end user, but deploying the refinancing facility with credit

Table 2. Effect of Central Bank's financial instrument and end-user financing model on end user interest rates

CENTRAL BANK'S FINANCIAL INSTRUMENT	INTEREST RATES ON LOANS TO END USERS	
	DIRECT MODEL	INDIRECT MODEL
Concessional loans (with refinancing facility)	8–9%	11–12%
Market-rate loans (without refinancing facility)	9–15%	11–18%

linkage may also result in lower rates than when market-rate loans are used; they are also lower than IDCOL's rates for end users. (Note that the terms offered to end users may differ in other important ways, for example SHS loans are repayable within 5 years and SIPs loans within 10 years.)

End users have highlighted the need for grants and for instruments that transfer the risk of investment from the end user to the financier. At present FIs are unable to provide loans to extremely poor households because they are unable to cover upfront costs and they are unable to provide security for loans.

To finance a SIP project, a farmers' co-operative must provide collateral to cover 100 per cent of the loan, the pumps, the registered mortgage for the project land, crops and agricultural equipment are all pledged, and members also provide both a personal guarantee and a third-party personal guarantee as landowners and as members of the co-operative. In the case of SHS, households must provide the solar home system as collateral and in some instances a personal guarantee, as well as a 20 per cent equity contribution.

Requirements such as these discourage and exclude many below a certain income level from entering the financing stream, for example sharecroppers who do not have land to offer as security. Combining loans with other financial instruments such as grants and risk guarantees will help to remove these barriers, enabling ultra-poor populations which fall into financial institutions' high-risk bracket to access finance.

Commercial banks are now innovating with new financial instruments, for example composite financing of crops and SIPs helps to reduce recovery risks, since farmers can, for instance, diversify their crops or purchase fertilisers and increase income, so improving their repayment capacity.

4.2.3 Financial planning systems

Central Bank of Bangladesh is making use of its policy frameworks and institutional arrangements to govern the flow of LCRD finance. It employed a sequential strategy in creating policies to incentivise green lending among financial institutions. This began with a CSR guideline in 2005, followed in 2008 by the bank's introduction of its refinancing facility and in 2011 by its phased green banking guidelines, which requested that banks allocate a budget to green finance before moving on to set targets and report on their green banking practices.

More recently, in 2014, the bank has followed this by introducing regulatory measures that oblige BFIs and NBFIs to disburse up to 5 per cent of their total lending to green finance.

4.3 Incentives driving choices

A wide range of incentives can underpin decisions to invest. These incentives, which may relate to policy, economic, capacity, reputational or socio-economic factors (see Section 2.1), provide the motive to invest. In this section we explore the incentives that drive investment in low-carbon development projects, as well as how they influence the use of specific instruments and modalities (Interviews and (Ahmad et al., 2013).

4.3.1 Incentives for LCRD investments

Table 3 summarises the main drivers for investment in renewable energy access in Bangladesh, based on discourses and opinions of different stakeholders.

Table 3. Incentives to investment in decentralised energy in Bangladesh, by stakeholder category

STAKEHOLDER	INCENTIVES TO INVESTMENT IN ENERGY ACCESS PROJECTS	
	TYPE	DESCRIPTION
Core intermediary: Central Bank of Bangladesh	Policy	<ul style="list-style-type: none"> Government policy goal of electricity for all by 2021
	Economic	<ul style="list-style-type: none"> Reduced burden on foreign exchange reserves caused by diesel imports and expensive 'quick rental' power plants
	Capacity and Knowledge	<ul style="list-style-type: none"> Knowledge of electricity demand in the market
	Reputational	<ul style="list-style-type: none"> The bank governor's political will and ambition for greening development
Policymakers: government of Bangladesh, DOE, Planning Commission, SREDA	Policy	<ul style="list-style-type: none"> Policy goal of electricity for all by 2021 Targets of 5% of electricity generated from renewable sources by 2015 and 10% by 2030
	Economic	<ul style="list-style-type: none"> Reduced diesel imports and agricultural subsidies Support for the industrial sector Financial viability of renewables in remote areas
	Capacity and Knowledge	<ul style="list-style-type: none"> Lack of government resources and capacity for connection of rural and remote areas to electricity grid Solar is easy to install and portable, appropriate for use in remote rural areas
	Reputational	<ul style="list-style-type: none"> Enhancement of standing in the international community by addressing carbon emissions
Financial intermediaries: banks and non-banking financial institutions	Policy	<ul style="list-style-type: none"> Green finance regulation (requiring up to 5% of lending for green investments) and green banking policy
	Economic	<ul style="list-style-type: none"> Access to low-cost funds Portfolio diversification
	Reputational	<ul style="list-style-type: none"> Inclusion in 'top ten green banks'
	Capacity and Knowledge	<ul style="list-style-type: none"> Government agenda Market demand
	Capacity	<ul style="list-style-type: none"> Disincentives: few branches in rural areas, less accepted by end user (eg due to requirements for documentation), high operational costs
Credit linkage group: MFIs, NGOs, suppliers	Economic	<ul style="list-style-type: none"> Access to low-cost loans for MFIs and NGOs Tax incentives for suppliers
	Capacity	<ul style="list-style-type: none"> Experience and track record of working in rural and remote areas: acceptance among end users, established branch networks
Beneficiaries: households and farmers	Socio economic	<ul style="list-style-type: none"> Health and educational benefits
	Economic	<ul style="list-style-type: none"> Reduced cost of electricity Reduced farm cultivation costs and higher productivity Better payment terms compared to diesel

Core intermediary: Central Bank of Bangladesh

The primary drivers behind Central Bank of Bangladesh's decision to start investing in low-carbon and green energy were economic and developmental, with political will driving its move to incentivise green investments through central financial channels: it sought to contribute toward achieving the government's goal of "electricity for all by 2021" and to meet the country's growing demand for energy.

The respondents from the Central Bank were also of the view that Bangladesh experiences a major electricity deficit in the period from March to May, when the need for irrigation for paddy cultivation is at a peak. The grid cannot supply the electricity needed, triggering expensive diesel imports or electricity generation in 'quick rental' power plants. Attention has turned to renewable energy, and it makes economic sense for the bank to invest to cater for this demand in a cost-effective manner.

Financing is still unaffordable for the renewables industry in Bangladesh, but the bank saw a clear role for itself in leveraging private sector finance to meet the capital deficit. Through the efforts of its governor, in particular, it has developed a worldwide reputation for promoting a sustainable development agenda.

Polymakers: government of Bangladesh, Department of Energy, Planning Commission, SREDA

The primary objective of governmental policymakers interviewed for the Bangladesh Bank case study was to cater for the country's unmet demand for electricity. Government policies and priorities, including the target of "electricity for all by 2021" and the issue of energy access (recognised in the country's sixth 5-year plan), acted as drivers for government investment. The financial viability of renewable energy in remote villages, compared to grid-based solutions, was an important factor.

Financial intermediaries: banks and non-banking financial institutions

Central Bank of Bangladesh incentivises a range of banking and non-banking financial institutions to invest in green lending, principally by giving them access to low-interest capital. Previously FIs would have been hesitant to invest in such projects because of perceptions of high risk and a lack of experience with this segment of the market; however the potential for profit on offer through the bank's refinancing facility presents them with a clear economic incentive.

FIs have also been encouraged to act because of the regulatory requirement to invest up to 5 per cent of their lending in green projects. There are reputational incentives at play too, for example each year Central Bank identifies the 'top ten green banks' (these also receive preferential benefits under the green refinancing scheme).

Credit linkage group: MFIs, NGOs, suppliers

MFIs, NGOs and suppliers involved through credit linkage are keen to engage in the renewable energy market due to a wide range of incentives. The clearly targeted scheme offers a low interest rate, enabling MFIs and NGOs to lend on to customers at a profit (1 to 2 per cent). Their experience in the market means these actors are also comfortable in managing finance arrangements tailored to the low income end users. Suppliers, meanwhile, benefit from policy and fiscal incentives such as tax holidays, and they also qualify for the refinancing scheme, helping them to access the renewable energy market.

Beneficiaries: households and farmers

Co-benefits and reduced costs are the primary incentives for households and farmers' co-operatives to invest in SHS and SIPs. Households with solar heating systems avoid some of the cost and many of the hassles that come with using diesel and kerosene, and gain health and educational benefits from better lighting.

In the case of SIPs, having electricity at the right time in the season means farmers' cultivation costs are reduced, since less labour and less fertiliser are needed to prepare the land. The pumps also increase productivity, enabling triple cropping, and free farmers to spend less time on irrigation and more on other tasks.

The terms of payment for SIPs are also more attractive than those for the use of diesel pumps. For example, farmers must pay in advance of the harvest for the use of diesel pumps but under the SIP arrangement they can pay after, and whereas SIP instalments are fixed for the entire loan tenure, diesel costs may vary by area or with the amount used.

4.3.2 Incentives for choices made by Central Bank of Bangladesh in the financial landscape

Incentives also influence the Bank’s decisions about intermediaries, implementation channels, funding instruments and delivery models. These are summarised in Table 4.

Intermediaries

Central Bank of Bangladesh channels low-cost finance through diverse intermediaries, using its direct and indirect (credit linkage) models:

- **Direct model: Banking financial institutions**
Central Bank’s institutional mandate means that it seeks to catalyse private sector finance in renewable energy investments, driving it to channel its funds through commercial banking institutions. Direct bank lending also means that end users pay lower interest rates, in the absence of intermediaries.
- **Indirect model: credit linkage through MFIs, NGOs or Suppliers** Central Bank and its banks may prefer to channel funds through MFIs or NGOs, however, because they have better levels of

community acceptance and access in remote rural areas: they may have experience doing business in specific geographical locations, and tend to employ community members as local representatives. Because MFIs usually charge a service fee and also offer higher interest rate, the cost of finance to end users may increase.

Financing instruments

The institutional mandates of Central Bank of Bangladesh require it to use credit-based instruments. Ultimately it seeks to ensure the efficiency, viability and bankability of its investments, and credit-based instruments are better able to ensure some level of return. The bank therefore prefers providing concessional loans over grant-based support.

Loans from the bank for investments in renewable energy are available either at lower rates through its refinancing facility or at market rates. (See Table 2)

Commercial banks have also introduced innovative instruments such as composite loans for solar pumps and crops. The primary driver is economic, as banks’ main aim is to improve the repayment capacity of borrowers.

Table 4. Examples of Central Bank’s incentives for selecting intermediaries and financing instruments

CHOICE	INCENTIVES	
	TYPE	DESCRIPTION
Intermediaries: credit linkage through MFIs, NGOs and suppliers	Knowledge, capacity, economic	<ul style="list-style-type: none"> • MFIs and NGOs have good access and community acceptance in target populations, and are also experienced in managing microcredit programmes • Suppliers have cost competence and better after-sales service
Financing instruments: Central Bank’s single loan-based instruments	Economic, capacity	<ul style="list-style-type: none"> • The bank’s institutional mandate is to provide loans • Loans are more commercially viable, able to generate returns
Financing instruments: commercial banks’ composite lending	Economic	<ul style="list-style-type: none"> • Composite lending Improves borrowers repayment capacity/bankability so helps to ensure returns

4.4 Effectiveness of finance for poor

The choices made in the financial landscape help to determine the effectiveness of LCRD investment. This section explores the extent to which public investments in energy access made through Central Bank have been effective in terms of targeting the poor, generating appropriate finance, reaching out to the poor and facilitating co-benefits.

4.4.1 Targeting the poor

Our study examined the extent to which Central Bank's funding programme and instruments have been successful in targeting low-income groups, women and children, SMEs and informal markets, and particular geographical areas, in order to reach the poorest populations.

Bank's green banking policy does not explicitly target particular income groups, but since it is aimed at off-grid areas bank officials believe that it targets the poor by default. The bank's refinancing facility gives banks and NBFIs a favourable interest rate for channelling finance to rural areas, but it does not tailor rates for different income groups. Although low interest rates and flexible tenure do represent incentives for end users, customising terms according to income may provide better scope for reaching the ultra-poor.

4.4.2 Leveraging finance

Central Bank of Bangladesh deployed a systematic three-pronged strategy for incentivising banks to invest in LCRD: first, they motivate bankers to invest through its CSR guidelines; second, its refinancing facility offering low-interest credit; and third and most recent, its requirement that all FIs allocate up to 5 per cent of their portfolio to green lending. As a result, banks and NBFIs have increased their involvement to the extent that some investments in renewables projects are being made without the help of the refinancing facility. In this way, the bank has leveraged institutions' own credit funds as well as their CSR funds for investment in the sector.

Complementary government policies, such as tax incentives and low-cost finance, also motivate many manufacturers and suppliers to enter the off-grid market, using their own capital to start businesses. Households contribute to SHS by providing upfront capital; some households— particularly those belonging to small entrepreneurs and shop owners – are using their own funds to purchase the system, since it offers more reliable electricity than the grid.

Central Bank of Bangladesh has therefore incentivised several groups to invest in a nascent market, but we lack evidence on whether its policy has leveraged the ultra-poor populations to spend.

4.4.3 Generating appropriate finance for the poor

Whether Central Bank policy and instruments have succeeded in creating finance channels accessible to small-scale low income end users is considered here in terms of ease of access and the availability of adequate, affordable, long-term finance on terms appropriate to the lowest income groups.

Affordable capital for intermediaries

Although Central Bank's low-cost fund has been effective in prompting banks and MFIs to reach out to rural markets, the poorest sections of the population are not entirely catered for. End users who are unable to meet requirements for upfront capital or (in the case of SIPs) collateral cannot obtain loans, even if they are offered at below-market rates. However, some efforts are made to ensure affordability in case of SHS. Central Bank of Bangladesh encourages local solar panel producers to reduce the system price through its refinancing facility. The monthly SHS instalment is also kept below the equivalent cost of using kerosene, diesel and dry cells.

Flexibility of solar irrigation finance in comparison to the cost of diesel pumps

As described previously (Section 4.3.1), the terms of payment for SIPs are more attractive to farmers than those for diesel pumps. Lower overall costs and more predictable payments that better fit farmers' income cycle means that, in general, farmers prefer SIPs to diesel pumps, because of the lower costs and better terms of available finance.

No measures to enable the extreme poor to access finance

To receive SHS or SIP finance, end users are required to have the financial capacity to cover upfront costs, provide collateral and repay their loans; repayment tenure and interest rates are the same for all; and (in the case of SIPs) the debt-to-equity ratio depends on the relationship between bank and customer. While the low-income population may be able to fulfil these requirements, meet the terms of finance and establish relationships with the banks, the extreme poor cannot. At present, no specific measures targeting this group are in place.

MFIs and NGOs offer access to finance but not always cost-effective finance

Central Bank of Bangladesh has engaged MFIs and NGOs through its credit linkage channel. Given their local market knowledge and their understanding of the barriers and risks particular to remote, rural markets, these institutions play a critical role in helping to translate large-scale finance into products that meet the small-scale needs of low-income populations. However, although they help to make finance accessible to these populations, they do not always help to make it affordable. The credit linkage mechanism and their high transaction fees increase the cost to the end user, compared to the credit that would be provided direct by commercial banks. One option would be for Central Bank to channel low-cost finance to MFIs and NGOs using a direct model, similar to the way it funds banks.

Use of single loan-based financial instruments

Central Bank's use of loans is effective in terms of financial viability, but often newer areas of investment require grants to support complementary activities that nurture and grow markets. To achieve sustainable LCRD, Central Bank and its participating FIs will require the resources to establish and monitor quality standards for renewable energy equipment, for example, and to train financial institutions, provide grants to make upfront capital available to the poor, and so on.

Short-term repayment tenure

A repayment tenure of 5 years means that MFIs, suppliers and banking institutions are able to revolve the fund only once.

4.4.4 Co-benefits

Actors derive a wide range of co-benefits from LCRD projects:

- Reduced fiscal burden from the import of diesel for irrigation was identified as a primary co-benefit by government policymakers.
- Socio-economic benefits including improved living standards, better health, increased school enrolment and increased community awareness about access to energy were perceived as primary co-benefits by nearly all respondents – beneficiaries, MFIs and financial intermediaries as well as core policymakers.
- Opportunities for increasing income, particularly among women, are cited as a primary co-benefit by direct beneficiaries, banking institutions, and suppliers and manufacturers. The ready availability of electricity allows women the flexibility to engage more in income-generating activities, for example by working at night. They are also able to access low-cost funds to support these activities.
- Training provided by suppliers in after-sales services has enhanced employment capacities, again particularly among women. Renewables manufacturing and assembly also creates factory jobs for skilled and semi-skilled workers.
- Similarly, the economic benefits to farmers of using solar irrigation pumps (as described in Section 4.3.1) were identified as a primary co-benefit by banking institutions and by farmers themselves.
- Reduced carbon emissions were identified as a co-benefit only by MFI and NGO respondents.

4.4.5 Actors' views and discourses on effectiveness

Table 5 summarises actors' perceptions of the effectiveness of Central Bank's programmes.

Table 5. Actors' views on the effectiveness of the public sector in enabling energy access for the poor in Bangladesh

ACTORS	TARGETING THE POOR	LEVERAGING FINANCE	APPROPRIATE FINANCE	CO-BENEFITS
<p>Policymakers and core financial intermediary: government and Central Bank of Bangladesh</p>	<p>No specific targeting by income group.</p> <p>Interest rate is flat for both urban and rural areas under the refinancing facility.</p> <p>There is oral encouragement to cover rural poor people.</p> <p>BFIs and NBFIs get higher limit for investing in rural areas.</p>	<p>Refinancing facility leveraging banks' and NBFIs' own credit and CSR funds.</p>	<p>Ability to repay required.</p> <p>Repayment tenure and interest rate are 'flat' for all.</p> <p>The debt-to-equity ratio depends on the banker–customer relationship.</p> <p>There is no specific guideline/instruction to cover poor.</p> <p>To reduce SHS system price BB refinancing facility available to local solar panel producers.</p>	<p>Reduced diesel imports.</p> <p>Better living standards, health, education and communication.</p>
<p>Other financial intermediaries: banks and non-banking financial institutions</p>	<p>No specific internal policy to cover ultra-poor.</p> <p>Loan tenure not more than 5 years.</p> <p>For SIPs, land mortgage is required, so not accessible to sharecroppers.</p>	<p>Households contribute through upfront capital.</p> <p>Suppliers and manufacturers are starting businesses using own capital.</p>	<p>Instalments set by assessing repayment ability and comparing fuel costs.</p> <p>In practice SHS hasn't reached the most marginalised or ultra-poor.</p> <p>Most often disaster-vulnerable areas are excluded to prevent environment risk.</p> <p>No policies specific to women or ultra-poor.</p> <p>Mostly banks and NBFIs wholesale the credit to MFIs and NGOs, which increases the interest rate to the poor.</p>	<p>Diversifying credit portfolio.</p> <p>Alternative income generation helps increase numbers of 'good' borrowers.</p> <p>With SIPs, agri-loans for crop production are increasing.</p> <p>Composite lending is effective in increasing repayment capacity</p> <p>With SHS, women are involved in income-generating activity. For FIs this opens up opportunities for SME loans to women.</p>

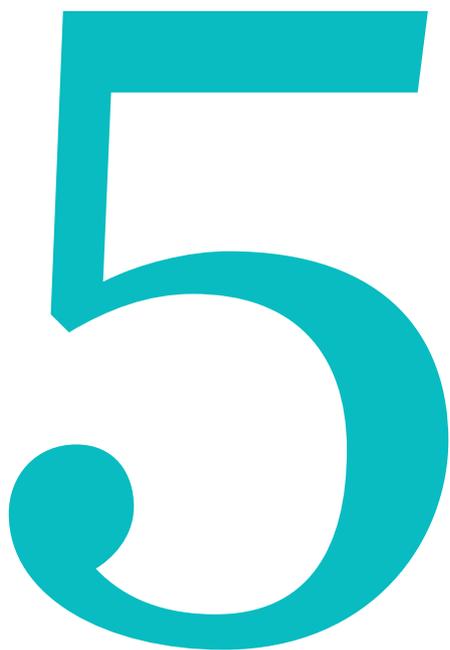
(continues)

Table 5. Actors' views on the effectiveness of the public sector in enabling energy access for the poor in Bangladesh (cont.)

ACTORS	TARGETING THE POOR	LEVERAGING FINANCE	APPROPRIATE FINANCE	CO-BENEFITS
Credit linkage group: MFIs, NGOs	<p>Mainly MFIs and NGOs working in off-grid rural communities to provide SHS and SIPs.</p> <p>Have good networks at the community level so they can provide finance to end users at low operational cost.</p> <p>They may not include the poorest due to the absence of a customised loan product in the market.</p>	<p>End users are now contributing to the purchase of renewable energy products. Equity sharing is increasing.</p>	<p>MFIs and NGOs have low operational costs, but if they are not the suppliers then price of the technology increases a little.</p> <p>On the other hand they have community acceptance and can better assess end users' needs and can therefore provide customised products. However they can't customise loans in terms of interest rate and tenure.</p>	<p>Reduced carbon emissions.</p> <p>Improving health.</p> <p>Increasing school enrolment.</p> <p>Job creation.</p> <p>Increased community awareness about energy access.</p>
Suppliers and manufacturers	<p>Manufacturers now producing solar panels locally, which reduces system cost.</p> <p>No policies specific to poor people.</p> <p>Initial cost of SIP very high as customised SIPs for small areas of land are not available; farmers without land cannot purchase SIP.</p>	<p>Suppliers and manufacturers now getting financial help from different donor agencies.</p>	<p>For both SHS and SIP, end user needs financial capacity; so programmes do not cover poor people.</p>	<p>Technological know-how increasing to meet market demand.</p> <p>Job creation: skilled and semi-skilled factory workers.</p> <p>Training in after-sales service, particularly women; enhances women's empowerment in rural society.</p>
Beneficiaries: households and farmers	<p>No policy to cover poor, women, disabled.</p>	<p>Some households now using own funds for SHS.</p> <p>Some business centres, shops, etc leveraging their own finance.</p> <p>Some people with grid connection are buying SHS for its greater reliability.</p>	<p>Not appropriate for all. Low-cost fund cannot include ultra-poor.</p> <p>With SIP, sharecroppers not getting ownership but can work on solar irrigated land; they are indirectly included.</p>	<p>SHS: empowerment of women, job creation, health benefits, educational benefits, improved communication through use of mobile phones, enhanced knowledge due to access to TV.</p> <p>SIP: increasing productivity, alternative income generation, increasing time for family, improved health.</p>

Case study: IDCOL

This case study explores how IDCOL's Solar Home Systems and Solar Irrigation Pump programmes have leveraged donor and public funds to engage private stakeholders and households in expanding energy access. IDCOL's use of partnering organisations to manage projects and maintain systems is a key factor in its success.



The Infrastructure Development Company Limited is a government-owned financial institution set up to encourage private investment in infrastructure and renewable energy and energy efficiency projects in Bangladesh (Haque, 2012). IDCOL's renewable energy programmes include Solar Home Systems (SHS), domestic biogas, Solar Irrigation Pumps (SIPs), solar mini-grids, solar-powered telecoms, a biogas-based electricity project, a biomass gasification project and improved cooking stoves (Islam, 2014).

Bangladesh's SHS programme has become one of the largest off-grid electrification initiatives in the world. Starting in 2003, it quickly exceeded its initial target of 50,000 units per month by 2008 and by 2014 three million units had been installed (Khandker *et al.*, 2014). The success of IDCOL's business model for the programme, which relies on private sector installation and maintenance of solar home systems, rests on its combination of price support with quality assurance, installation and after-sales support (Khandker *et al.*, 2014).

Following the success of SHS, Bangladesh's government launched the SIP programme through IDCOL. The aim is to expand access to solar-powered irrigation in off-grid areas, with an initial target of installing 1550 SIPs by 2017. The programme is closely linked to the government's objectives for food security and climate change mitigation, and reflects an acknowledgment that diesel imports are a drain on the country's fiscal resources: Bangladesh uses nearly two million tonnes of high-speed diesel (HSD) annually, all of which is imported and heavily subsidised, and around 40 per cent of which is used in irrigation pumps. Investment in SIPs is projected to reduce HSD use by 325,500 litres per year and to reduce emissions by 872.36 CO₂ tonnes annually. So far, 445 SIPs have been approved under IDCOL's SIP programme, 161 of which are in operation.

5.1 Programme overview: IDCOL's delivery model

IDCOL sets technical specifications for its initiatives, certifies products and components, and selects partner organisations (POs) based on clear eligibility criteria. POs may be suppliers of solar home systems, small and medium enterprises (SMEs) or micro finance institutions (MFIs). IDCOL's financing model is results based, involving partial subsidy and partial refinancing with the aim of ensuring effective outreach and uptake 'on the ground'.

5.1.1 Solar Home Systems (SHS)

The success of IDCOL's SHS programme rests in part on making donor finance accessible and in part on its delivery model.

The lack of finance for SHS purchase was a serious barrier to adoption for poorer rural households. Many banks were either unwilling to lend to the poor or required a large down payment and charged exorbitant interest rates. With IDCOL's support, MFIs are able to access loans and in turn provide the poor with credit, providing loans which are repaid over three years (Khandker *et al.*, 2014).

The microcredit mechanism enables poor households to access affordable energy services without having to pay either upfront costs or ongoing operation and maintenance costs on their own. This, along with the government's pledge to provide access to electricity for all by 2021, has enabled the programme to grow.

The SHS delivery model works to provide households with indirect grants in the form of a reduced unit price, as follows:

- **Households pay the upfront cost** The household makes a minimum down payment of 10 per cent of the solar heating system cost. The remaining percentage is financed by a loan.
- **Households take microcredit from POs** The 90 per cent loan is made available by the PO (an MFI) at a rate of 15–20 per cent per annum for around 3 years.
- **POs sell and install the equipment** On receipt of the down payment, the PO enters into a sale or leasing agreement with the household and installs the system; the system must meet the specifications of an independent technical standards committee (TSC) formed by IDCOL.
- **POs receive an output-based subsidy or refinancing** After installation, IDCOL inspectors carry out a physical inspection of the installed SHS. If this is satisfactory, IDCOL gives the PO the applicable grant and refinances 70–80 per cent of the household's loan at a lower rate of interest (Asaduzzaman *et al.*, 2013).
- **IDCOL reclaims from funders** IDCOL reclaims for loan refinancing from the World Bank, ADB, IDB or JICA; and for the grant from GPOBA, GIZ, KfW, USAID or DFID (see also Section 5.2 and Figure 11).
- **POs pay the suppliers** On receiving the funds from IDCOL, the PO pays the suppliers.

- **Households receive an after-sales service**

Suppliers provide warranties for the equipment, while the PO provides a three-year free after-sales service and enters into yearly maintenance agreements with the household. IDCOL quality assurance inspectors monitor the equipment and the after-sales service.

- **Households become sole owners** Once the household has paid off the loan, they are the sole owners of the system.

Table 6 shows how the cost of a solar home system may be met by IDCOL, the PO (an MFI) and the household.

5.1.2 Solar Irrigation Pumps (SIPs)

Because SIPs are a relatively new market and their cost is high, the grant proportion offered is higher than for SHS. Farmers do not directly own the SIP system, however; instead they pay a regular fee to a sponsoring borrower that runs the system and becomes the primary owner. The borrower receives support from IDCOL in the form of:

- Subsidy of up to 50 per cent of the total project cost
- Soft credit of up to 35 per cent of the total project cost
- Training and capacity-building programmes.

Instead of the PO model used for implementing the SHS programme, IDCOL selects the potential borrower, which might be an MFI, an NGO or a private company. The company selects the target area and potential customers, and is responsible for installing the system

and providing an after-sales service at least until the loan has been repaid.

With a view to ensuring the programme's success, IDCOL provides companies with technical, financial and promotional support and approves their proposals according to strict guidelines. The equipment to be used requires the approval of IDCOL's independent technical standard committee, while the installation and operation of the pumps must be inspected in the field by IDCOL teams.

IDCOL is also planning to introduce the PO model like SHS as well as exploring providing direct support to farmers instead of channelling funds through MFIs for faster implementation of the programme.

5.2 Choices by IDCOL in the financial landscape

IDCOL has deployed a range of intermediaries, financial instruments and planning systems to deliver LCRD investments. Figure 10 provides a summary of these choices and the extent to which they address the financing needs of LCRD investments.

The supply chain through which IDCOL promotes renewable energy, shown in Figure 11, involves a range of actors, including donors who fund the company's operations, policymakers who guide its activities, MFIs and private companies who act as further financial intermediaries and suppliers who provide equipment for IDCOL projects, as well as those who support and manage IDCOL.

Table 6. Example of financing a solar home system

<i>a</i>	Market price of SHS (20Wp)	US\$ 193
<i>b</i>	Buy-down grant	US\$ 20
<i>c</i>	System price to household ($a - b$)	US\$ 173
<i>d</i>	Down payment from household to PO (10% of <i>c</i>)	US\$ 17
<i>e</i>	PO loan to household ($c - d$)	US\$ 156
	Loan tenor	3 years
	Interest rate	15%–20% pa
	Monthly instalment	US\$ 5.40
<i>f</i>	IDCOL refinance (70–80% of <i>e</i>)	US\$ 109–125
	Loan tenor	5–7 years
	Interest rate	6–9% pa

Source: IDCOL, 2015

Figure 10. Summary of IDCOL's choices in the financial landscape

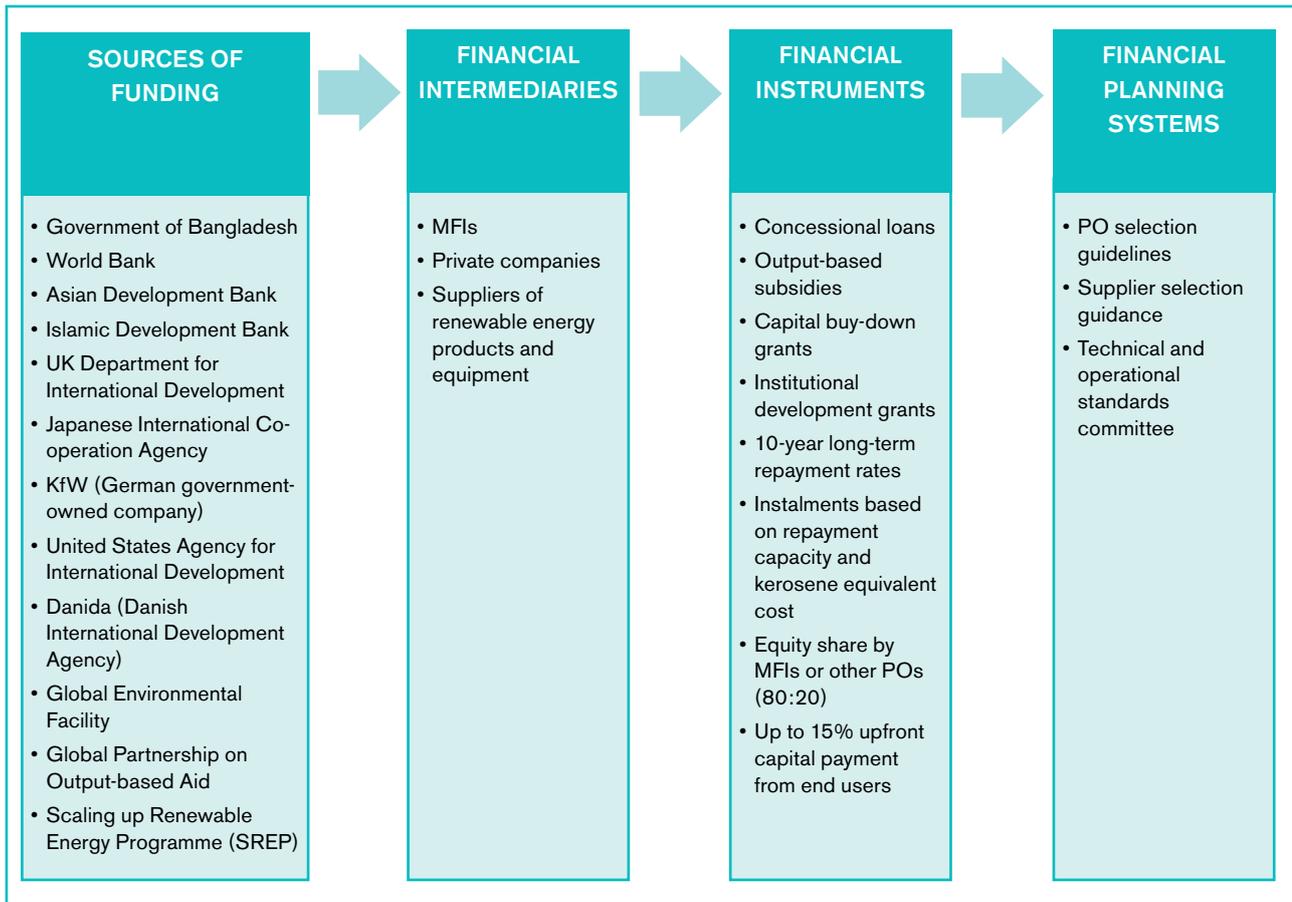
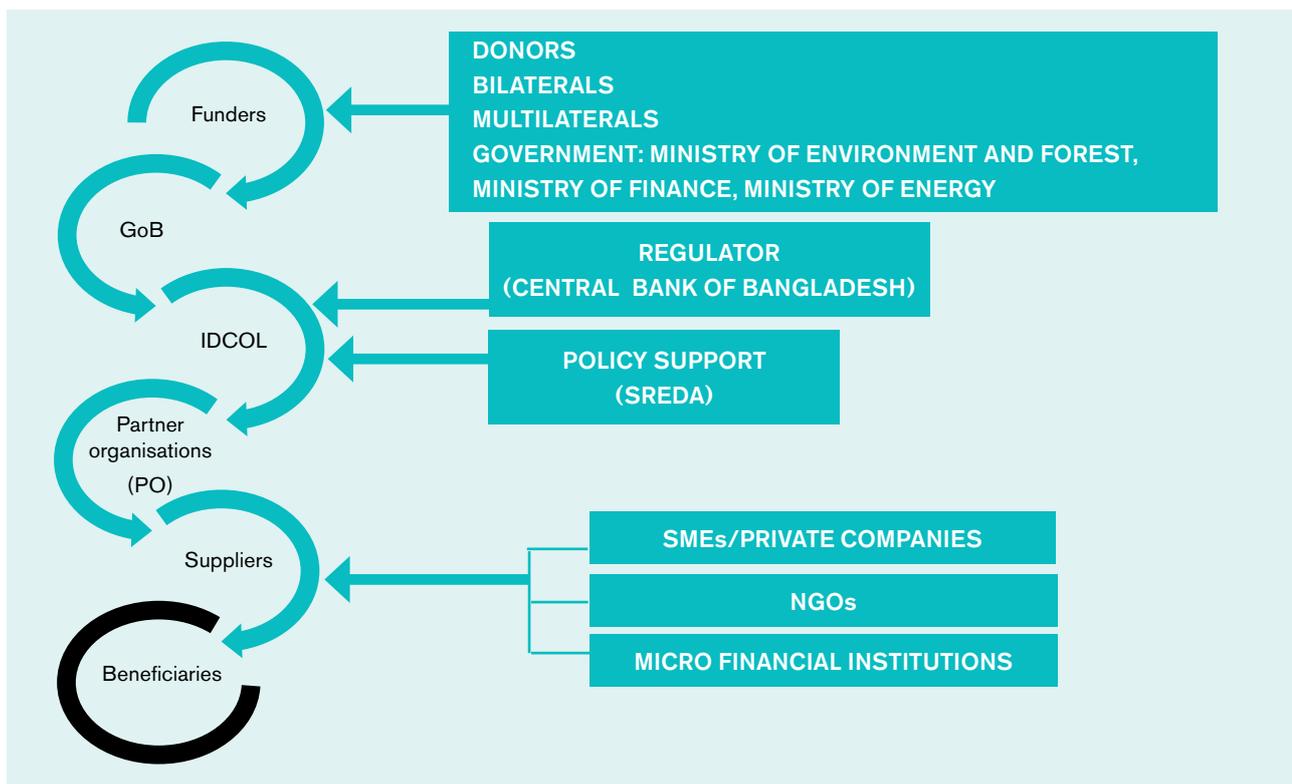


Figure 11. Actors in IDCOL's financing value stream



5.2.1 Sources of funding

The various bilateral and multilateral agencies (see Figure 11) provide funds to the government of Bangladesh that are then channelled to end users through IDCOL (Islam, 2014, IDCOL, 2015).

5.2.2 Financial intermediaries

IDCOL started out as an urban financial institution working on large-scale projects, so when it diversified into off-grid renewable energy with the SHS programme (see Figure 12) it needed intermediaries who could reach the largely rural target groups. Because Bangladesh has a good record and experience with microcredit and many micro finance institutions have a substantial presence in rural areas, IDCOL made the initial choice to use MFIs.

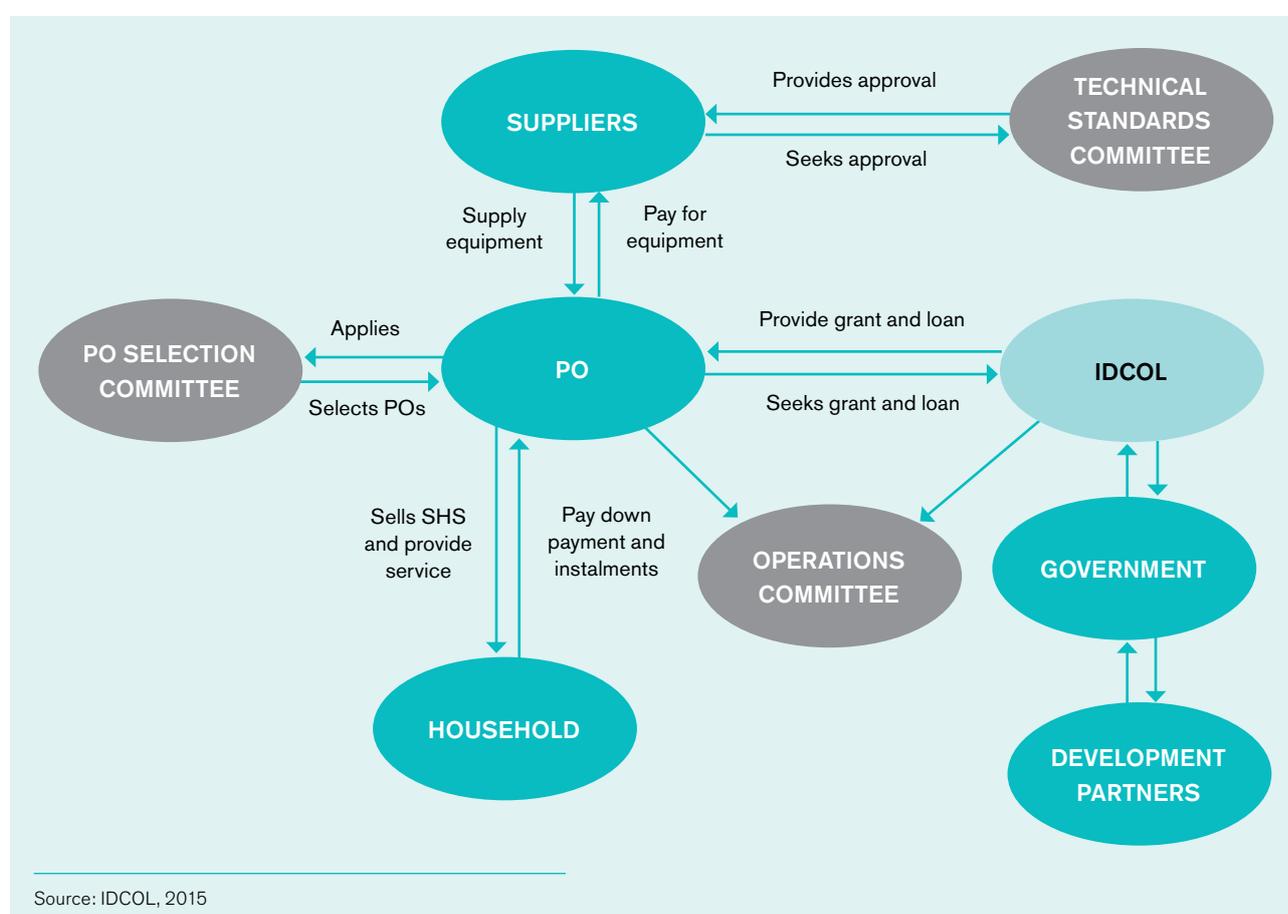
IDCOL has now selected 47 partner organisations which include MFIs, SMEs and NGOs to be responsible – once trained by IDCOL – for conducting household assessments of energy needs and affordability, selecting potential SHS buyers, installing the systems, providing after-sales services and maintenance, and

developing a robust market chain (Khandker *et al.*, 2014). These POs are chosen subject to stringent screening against eligibility criteria by IDCOL's selection committee, and it is their involvement – with their offices in rural areas and experience in microcredit programmes – that has enabled wider energy access for the poor.

Another group of intermediaries is formed by the suppliers and manufacturers who provide equipment, and in return are paid by the POs. IDCOL sets specifications for and certifies equipment, and the technical standards committee approves suppliers and equipment.

Each of these intermediaries' plays a key role in ensuring finance is channelled effectively through the chain. To keep the programme affordable, IDCOL provides POs with capital buy-down grants, which are passed on to buyers, via market competition, in the form of lower prices. Buyers are also offered microcredit. These incentives create a market chain that ensures quality, affordable and locally serviceable products (Khandker *et al.*, 2014).

Figure 12. Implementation of the SHS programme



5.2.3 Financial instruments

The two primary financial instruments used by IDCOL for investment in LCRD projects and programmes are output-based subsidy and credit support. IDCOL has developed innovative and partially subsidised SHS and SIPs delivery and financing systems that have proven to be very effective in reaching households and farmers all over Bangladesh. The SHS programme has made solar home systems affordable through a combination of consumer credit and (declining) subsidies (Khandker *et al.*, 2014). The SIPs programme is relatively new and therefore relies heavily on grants.

Output-based subsidy

IDCOL provides two types of grant under its subsidy model: a capital buy-down grant and an institutional development grant. To subsidise SHS buyers' payments, IDCOL initially provided an upfront grant of US\$70 for the US\$400 system. The buyer paid the remaining US\$330 to the PO, 10–20 per cent in a down payment and the rest in instalments over 1–5 years. POs also received an institutional development grant for capacity development.

As the programme has matured, the institutional development grant has been gradually phased out, while the capital buy-down grant has been reduced and is now only available for the small systems (up to 30 watt-peak) usually purchased by the poorest households

(Table 7). Though the subsidy is not direct, buyers have benefitted from 'trickle down' in the form of a lower price per unit, making renewable energy more affordable for the rural poor.

In the case of SIPs, the borrowers receives grants and loans directly, as primary owners of the solar irrigation pumps. The grant component is relatively high, at up to 40 per cent of the total project cost. IDCOL has now raised this to 50 per cent, however, to help achieve their target of installing 1550 SIPs by 2017, before reverting back to 40 per cent and then to 25 per cent over time. According to recent IDCOL estimates, farmers find SIPs financially viable and more cost effective than diesel pumps, but only with a grant above 35–40 per cent (Matin, 2015). With a higher percentage of grants to 50% this will further increase their ability to use SIP. There are also plans to make SIPs directly available to farmers.

Credit support under the refinancing scheme

IDCOL initially provided concessional finance for SHS at 6 per cent interest over 10 years (Table 8). The PO paid for 80 per cent of the US\$330 system cost through refinanced credit and 20 per cent as equity sharing, lending to buyers at 15–20 per cent interest over 1–5 years. Over time households' grant and term of loan were gradually reduced and interest rates gradually raised.

Table 7. IDCOL's output-based subsidy for SHS

	2003	2004–05	2006–07	2008–09	2010–11	2012	2013–14
Capital buy-down grant	\$70	\$55	\$40	\$40	\$25	\$25	\$20*
Institutional development grant	\$20	\$15	\$10	\$5	\$3	–	–

* for small SHS (up to 30Wp) only
Source: IDCOL, 2015

Table 8. Credit support from IDCOL for SHS

	2003–8	2009	2010	2011	2012–15
Loan tenor	10 years	6–10 years	6–8 years	6–8 years	5–7 years
Interest rate	6%	6–8%	6–8%	6–8%	6–9%
Percentage of loan refinanced	80%	80%	80%	80%	70–80%

Source: (IDCOL, 2015)

In the case of SIPs partners receive soft credit of up to 35 per cent from IDCOL, with the remainder funded by IDCOL grants and themselves.

5.2.4 Financial planning systems

Apart from acting as a primary financial entity, IDCOL has developed a model that can create win-win opportunities. Its SHS and SIPs programmes represent a complete package that incentivises market creation, developing delivery networks, access to capital, quality assurance, after-sales services, training and institutional support, and so on. To achieve this, the company has had to establish a strong set of planning and procedural tools:

IDCOL has established strong guidelines for selection of partnering organisation and procedures to ensure technical assistance.

- The company's PO selection guidelines specify that POs should be able to demonstrate institutional capacity: audit and accounting management, adequate staffing, a certain number of years of operation, and experience of managing credit-based instruments and in off grid areas.
- IDCOL's procedures, inspectors and technical standards committee ensure the quality of equipment and after-sales services: suppliers must provide only TSC-approved equipment and offer specific warranties; POs must provide maintenance and after-sales services for a minimum of 3 years; IDCOL's 150 inspectors operate from 13 regional offices to monitor the quality of equipment and services; IDCOL officials and independent technical auditors conduct random re-verification of systems; and a dedicated call centre at IDCOL head office handles customer complaints.

5.3 Incentives driving choices

A wide range of incentives can underpin decisions to invest. These incentives, which may relate to policy, economic, capacity, reputational or socio-economic factors (see Section 2.1), provide the motive to invest. In this section we explore the incentives that drive investment in energy access projects, as well as how they influence the use of specific instruments and modalities. Our findings show that incentives at a higher, policy level help to create incentives further down the value stream.

5.3.1 Incentives to invest in renewable energy access projects

Table 9 summarises the view points and discourses around main drivers for investment in renewable

energy access in Bangladesh, by different stakeholder category.

Policymakers

The primary objective of the government of Bangladesh was to increase access to electricity, particularly in rural areas. Instead of backing a grid extension that would reach relatively few people, the government decided to direct its subsidies to small-scale infrastructure that could reach the maximum number of people: "Low-carbon energy was not the purpose behind any of these initiatives in the beginning; rather it was rural electrification to meet the energy demand, and renewable development came about as a by-product" (Nazmul, 2014, personal communication).

The government was also eager to reduce reliance on imported diesel and natural gas, and agricultural subsidies, all of which pointed the way to using renewable energy. The government responded with policies and initiatives which would in turn incentivise other players in the value chain: a coordinating agency (SREDA) was established, fiscal incentives included reduced import tariffs and lower taxes on renewable energy products, private-sector investment was encouraged using the independent power producer (IPP) model, and new targets were set for renewable energy projects.

Funders

Most of IDCOL's donors are now contributing to the SHS programme. The GEF has been a supporter since 2002, and GPOBA, USAID and KfW contributions are pooled in national climate funds, such as the Bangladesh Climate Change Resilience Fund (BCCRF), to which IDCOL has access. These different actors are also responding to a range of incentives, principally their support for the objectives of Bangladesh's government and their awareness of the demand for and benefits of the programmes.

Core financial intermediary: IDCOL

The main drivers behind IDCOL's decision to start investing in renewable projects were commercial and developmental. As a government-owned financial institution, it shared the government's goals of meeting Bangladesh's energy demands, including rural electrification (when the company was first established, 60 per cent of the country was off grid). Economic drivers included a large market for solar energy and the availability of finance from donors keen to fund programmes. IDCOL has benefitted from concessional finance and technical assistance from development partners.

Table 9. Incentives to investment in energy access projects in Bangladesh, by stakeholder category

STAKEHOLDER	INCENTIVES TO INVESTMENT IN ENERGY ACCESS PROJECTS	
	TYPE	DESCRIPTION
Policymakers	Socio economic	<ul style="list-style-type: none"> • More than 40% of the population do not have access to grid electricity • 15 million households use kerosene lamps
	Economic	<ul style="list-style-type: none"> • Reduced diesel imports and agricultural subsidies • Reduced dependence on gas
	Policy	<ul style="list-style-type: none"> • Addressing carbon emissions • Policy goal of electricity for all by 2021 • Targets of 5% of electricity generated from renewable sources by 2015 and 10% by 2030
Funders	Policy	<ul style="list-style-type: none"> • Support of government objectives and IDCOL targets
	Knowledge and capacity incentives	<ul style="list-style-type: none"> • Knowledge of huge demand for SHS • Knowledge of SHS benefits, eg direct reduction in use of fuel wood and fossil fuels
Core financial intermediary: IDCOL	Socio economic	<ul style="list-style-type: none"> • Rural electrification and meeting energy demand • Affordable and reliable energy supply for rural people
	Economic	<ul style="list-style-type: none"> • Large market for solar energy • Availability of finance from donors
	Policy	<ul style="list-style-type: none"> • Change in IDCOL's remit, from large-scale to a wide range of sectors.
Partner organisations: SMEs, MFIs, NGOs	Economic	<ul style="list-style-type: none"> • Institutional grants for delivery of services in rural areas. • Refinancing scheme with subsidised interest rates and long-term repayment, making investment commercially attractive
Suppliers	Economic	<ul style="list-style-type: none"> • Tax holidays and exemptions on imports and local manufacture of renewable energy equipment
Beneficiaries	Economic	<ul style="list-style-type: none"> • Reduced costs and availability of credit • Buy down grant, affordable terms of credit • Lower energy cost and better irrigation

Partner organisations

These are the SMEs, NGOs and MFIs receiving IDCOL support. Examples include Grameen Shakti, an SME providing credit and one of IDCOL's oldest success stories, and IDCOL's work with 3900 SMEs who make and sell improved cook stoves (ICS).

IDCOL's financing model provides POs with economic incentives to deliver services in rural areas. For example: capital buy-down and institutional grants help them extend their lending reach; an institutional development grants allow new POs to develop capacity; the refinancing scheme with subsidised interest rates and

long-term repayment provides a strong commercial incentive to invest.

Suppliers

The IDCOL delivery model offers suppliers a package of incentives, helping market creation by establishing a network of dealers. Economic incentives such as tax holidays and exemptions on imports and local production of renewable energy technologies encourage suppliers to set up and remain in the renewables industry.

Beneficiaries: households and farmers

Reduced costs and availability of credit are the primary incentives for households to invest in renewable energy. For example the capital buy-down grant for a solar home system reduces the overall cost, while the credit terms make repayments affordable for rural consumers. Consumers also benefit from lower energy cost and better irrigation.

5.3.2 Incentives for Choices made by IDCOL in the financial landscape

Incentives also influence IDCOL's decisions about intermediaries and financing instruments. These are summarised in Table 10.

Intermediaries

IDCOL uses multiple partner organisations to deliver the SHS and SIPs programmes. It began working with MFIs and NGOs because they were already established in rural areas of Bangladesh and because of their experience in microcredit.

The company also engages with private sector entities, including many SMEs, purely for business reasons (Nazmul, 2014, personal communication): private suppliers are competitive, skilled in marketing, keen to sell their products and can provide the engineering support IDCOL needs for its projects.

Financing instruments

IDCOL made the initial decision to offer 'upfront' SHS grants for reasons of market creation, helping POs market the systems by making them more affordable while also helping to cover the costs they incurred in setting up a solar home systems business.

IDCOL provided POs with refinancing credit so that they could pay suppliers, giving small businesses access to affordable, flexible and long-term capital and allowing them to invest in decentralised energy. They were also given ownership, in the form of 10–15 per cent equity stake in each system, to encourage their buy-in to a sustainable business model (the household has another 10–15 per cent and IDCOL provides 80 per cent in the form of refinancing credit).

5.4 Effectiveness of finance for poor

The choices made in the financial landscape help to determine the effectiveness of energy access investment in benefitting low income families. This section explores the extent to which the public investments in energy access made through IDCOL have been effective in terms of targeting the poor, generating appropriate finance and facilitating co-benefits.

5.4.1 Targeting the poor

Our study examined the extent to which IDCOL's funding programmes and instruments have been successful in targeting low-income groups, women and children, SMEs and informal markets, and particular geographical areas. According to IDCOL officials, IDCOL programmes target the poor and vulnerable by default, since they operate in off-grid areas (Nazmul, 2014).

Lower-income groups have been further targeted by reducing the solar home system sizes supported: initially systems in the range 30–130 watt-peak qualified, but the lower limit was later reduced to 10Wp. Fixed subsidies also mean that a larger proportion of the

Table 10. IDCOL's incentives for selecting intermediaries and financing instruments

CHOICE	INCENTIVES	
	TYPE	DESCRIPTION
Intermediaries	Capacity	<ul style="list-style-type: none"> • MFIs have established presences in target communities and are experienced in managing microcredit programmes • Vendors are assured payments if MFIs are engaged • SMEs and other private companies are skilled in marketing, keen to sell their products and can provide the necessary engineering support
Financing instruments	Economic	<ul style="list-style-type: none"> • Grants help to develop markets, enabling access to capital and making products affordable • Loans ensure commercial viability, so that funding continues to revolve • Subsidised interest rates and long-term repayment encourages MFIs and SMEs to invest

cost of smaller systems is covered. Subsidies are being phased out, but capital buy-down grants remain available for systems below 30Wp.

5.4.2 Leveraging finance for low-income users

The low-interest credit offered by IDCOL has incentivised MFIs, private companies and suppliers to invest in pro-poor LCRD projects by promoting commercial viability. The long-term tenor also allows MFIs and private financiers to revolve funds and achieve better profit margins: an MFI receiving IDCOL's ten-year concessional loan in turn offers households 4–5-year loans, and so can revolve funds twice during the tenure period.

Complementary government policies, such as tax incentives and low-cost finance, also motivate many manufacturers and suppliers to enter the off-grid market, using their own capital to start businesses. Households contribute to SHS by providing upfront capital, while POs share 20 per cent equity in each system. Fiscal support from the government and semi-concessional credit facilities offered by IDCOL to local industries also encourage new domestic manufacturers.

The SHS programme's demonstrable success has leveraged more funds from donors. The World Bank and the GEF were the initial funders; subsequently GIZ, KfW, ADB, JICA, USAID and DFID supported the programme's expansion, as well as new initiatives such as SIPs.

5.4.3 Generating appropriate finance for the poor

Whether the finance available through IDCOL's programmes has succeeded in creating finance channels accessible to small-scale end users is considered here in terms of ease of access and the availability of adequate, affordable, long-term finance on terms appropriate to the lowest income groups.

Affordability

The first priority of IDCOL funding for SHS continues to be commercial viability and energy access; the programme has nevertheless been to some extent successful in reaching low-income households. Systems have been made affordable through a combination of subsidy, in the form of buy-down grants, and consumer credit, in the form of long-term loans with flexible repayment structures. The intention was to bring monthly costs as close as possible to existing household spending on kerosene and dry cells; SHS monthly running costs remain lower than those for kerosene. The price of SHS has also come down significantly since the programme was launched in

2003, making SHSs more affordable for the poorer segment of the society.

However the extreme poor still find it challenging to make down payments and monthly instalments. The initial SHS subsidy of US\$70 per system has been reduced to only US\$20 and may end altogether. Withdrawing subsidies just as systems are becoming affordable for poorer people may compromise the model's effectiveness.

Flexibility

IDCOL does not provide poorer communities with cheaper capital but it provides \$20 subsidy for SHSs below 30wp capacity which are primarily availed by the poorer segment of the society. The proportions of loans and grants are also fixed in accordance with repayment ability; for example, SIPs grants are kept high to ensure loan repayments do not exceed the monthly amount farmers would usually pay for diesel pumps. In this way IDCOL provides low-income groups with greater and more sustainable access to finance.

Diversity of pro-poor products

IDCOL introduced a portfolio of smaller and therefore cheaper products tailored to low-income populations; an example is the reduction in the lower limit for qualifying solar home systems from 30 to 10Wp.

Appropriate grant instruments

IDCOL has employed subsidies and grants as early-stage, non-revenue-generating measures to catalyse risky pro-poor markets. For example the institutional development grant was used for PO capacity building.

5.4.4 Co-benefits

Actors derive a wide range of co-benefits from LCRD projects:

- Monthly repayments are lower than the equivalent monthly cost to households of using kerosene.
- Socio-economic benefits including improved living standards, better health, increased school enrolment and increased community awareness about access to energy were perceived as primary co-benefits by nearly all respondents – beneficiaries and POs as well as policymakers.
- Extension of working hours: it is now possible to work during night-time hours for beneficiaries.
- Reduced carbon emissions were identified as a co-benefit by MFI and NGO respondents.

5.4.5 Actors' views

Table 11 summarises actors' views and discourses around the effectiveness of IDCOL's programmes.

Table 11. Actors' views on the effectiveness of the public sector in enabling energy access for the poor in Bangladesh

ACTORS	TARGETING THE POOR	LEVERAGING FINANCE	APPROPRIATE FINANCE	CO-BENEFITS
Funders	No specific targeting but projects pro-poor by default: rural, off-grid, remote areas.	Revolving fund. Households contribute through upfront capital, MFIs/POs through equity sharing.	Funds should reach the poor, but first priority is viability and increased access to energy. Repayment ability is important. Doesn't provide cheaper capital to poor population, but provides diversified portfolio of smaller products for the poor.	Better living standards, health, education and communication. No specific benefits by gender.
IDCOL	Upfront grant targets the poor. Donors sometimes earmark more on a project basis. Targeted subsidies. Off-grid. Smaller and cheaper products. Fixed subsidy for all sizes – implies larger % of subsidies for poorer.	Initially WB and GEF funded programme for rural electricity; later GIZ, KfW, ADB, JICA, USAID and DFID came forward with additional financial support for the expansion of SHS programme.	Upfront grant and flexible repayment periods. Instalments set according to ability to repay and fuel costs. In practice, hasn't reached the most marginalized or ultra-poor, who don't have the purchasing power.	Reduced living costs, more time for work and education. Reduced cost of energy compared to burning fossil fuels or wood. Improved safety for women.
POs: SMEs	Not designed for poorest, but for those with basic minimum affordability. Assesses income levels and provides options. No subsidy for products that may be affordable only to higher-income buyers (>30Wp).	NA	Both SHS and SIPs still quite expensive: not reaching the poorest. Subsidy less and costs high for SIPs; SHS phasing out subsidy. Fewer subsidies needed for gas.	Reduced fuel costs compared to diesel. Positively impacts learnings and livelihoods. Empowers women and children.
POs: MFIs	By nature target the poor but must also be commercially viable.	NA	Down payment and monthly instalments difficult to pay, although monthly costs remain lower than for kerosene	Mobile phone use. Improved quality of life. Extension of working hours. Increased household income.

(continues)

Table 11. Actors' views on the effectiveness of the public sector in enabling energy access for the poor in Bangladesh (cont.)

ACTORS	TARGETING THE POOR	LEVERAGING FINANCE	APPROPRIATE FINANCE	CO-BENEFITS
Beneficiaries	<ul style="list-style-type: none"> Not targeting any specific section of the society. 		<ul style="list-style-type: none"> More affordable than diesel and kerosene equivalent. Flexible terms of payment Upfront capital is not always low specially in case of SIP 	<p>In case of SIPs</p> <ul style="list-style-type: none"> Reduced cost of water charges No time lost in purchasing fuel and maintaining equipment Lower costs than diesel run pumps in case of SIPs Increase agriculture production because of 3 cropping seasons. Diversified livelihoods due to time saved <p>In case of SHS</p> <ul style="list-style-type: none"> Better health conditions Cleaner fuel than Kerosene.

5.4.6 Conclusions

IDCOL's achievements in providing decentralised energy access can largely be attributed to its creation of effective working partnerships. The company realised very early on that its experiences as a large-scale, urban financial institution meant it lacked the capacity of MFIs and SMEs for reaching poorer and more rural communities, and it designed its programmes accordingly.

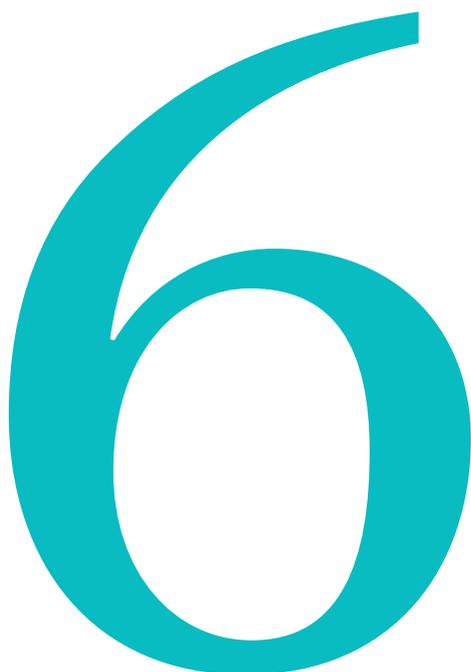
Widespread experience of microcredit in Bangladesh helped to create a reliable system. The programmes have been able to unlock finance in the form of long-

term soft loans and equity, which in turn enabled POs to provide SHS and SIPs in off-grid areas. Awareness of the demand for SHS in off-grid areas and working in line with the Bangladesh government's vision for energy access have been key reasons for the programme's exponential expansion.

The transparency and accountability of IDCOL's system is enhanced by its technical standards committee, which approves suppliers. Alongside its PO selection committee, responsible not just for PO selection and review but also for the company's inspection team, this has been essential to gaining increased support from donors over the years.

Analysing Central Bank of Bangladesh and IDCOL's approaches

An analysis of the key findings from the Central Bank of Bangladesh and IDCOL case studies shows how they have designed their approaches to target the specific needs of intermediaries and end users, and how incentives have shaped these approaches.



The IDCOL and Central Bank of Bangladesh case studies show that these institutions have been successful in addressing the financial needs of different actors in the LCRD value stream. They also show that delivering inclusive finance – finance which gives poor communities the opportunity to invest sustainably in LCRD – involves more than just providing access to credit. Suitable financial products must be complemented by a package of services that meet the specific needs of poor communities.

The ability to mobilise and deliver finance in risky sectors means that both Central Bank and IDCOL are important financial intermediaries in Bangladesh's LCRD. The bank regulates non-banking financial institutions such as IDCOL and also transfers low-cost financing to Bangladesh's commercial banking sector. In doing so, it has ensured the inclusion of consumers and markets that would otherwise have remained un-catered for by the 'mainstream' banking sector.

The bank has used a variety of measures to influence different sections of the community. Its sequential strategy – starting with a CSR push before progressing to a new refinancing policy and mandatory green lending minimums – has gradually changed FIs' behaviour. Its ability to reach the poorest remains limited, however. Being a bank it aims to achieve a level of financial viability, which is difficult if borrowers lack the minimum capacity to repay loans. The bank's use of financial instruments is also limited to loans, and in the absence of grants, subsidies and risk guarantees it is unable to subsidise early-stage costs in new markets or support technical services alongside financial ones.

IDCOL is a more mature player in the market, having been involved since the 1990s. Bangladesh's government, with international support, created this special-purpose agency with clear objectives: to draw large amounts of funding from a variety of sources and speed up the flow of finance – in the amounts needed and on appropriate terms – to the poor and vulnerable in off-grid, remote areas of Bangladesh, so increasing uptake of renewable technologies. IDCOL's incentive-based, phased subsidy model is a 'one-stop shop' that provides a basket of services to support and complement the delivery of energy access. It creates markets and delivery networks, and provides access to capital, quality assurance, after-sales services, training and institutional support for partner organisations.

In accordance with its model IDCOL's subsidies are gradually being phased out, however it is unclear whether it is the right time, just as poorer people are beginning to be able to afford the renewable energy systems on offer. The impact may have implications for the effectiveness of the overall model. Nonetheless IDCOL's phased subsidy and concession to semi-

commercial credit have helped the market make the transition to a more sustainable financing arrangement, and prevented market distortion for other players.

6.1 Analysing financial choices across cases

6.1.1 Financial intermediaries

Availability of finance to the poor in risky LCRD markets is often hindered by lack of appropriate financial channels. Both Central Bank and IDCOL are channelling finance through a range of intermediaries to reach specific markets. Primary intermediaries for Central Bank are banking and non-banking financial institutions, which channel finance to suppliers or beneficiaries, either directly or indirectly, through MFIs, NGOs or private-sector suppliers. IDCOL channels funds principally through intermediaries such as MFIs or private companies that also perform other complementary roles.

Both Central Bank of Bangladesh and IDCOL, then, are using multiple intermediaries to reach isolated markets. Different intermediaries provide different advantages, at different stages of the financial cycle. For example:

- **Concessional funds channelled directly by commercial banks are relatively affordable** Increasing the number of intermediaries, by taking the 'indirect' channel through an MFI, for example, tends to increase the cost to the end user. Commercial banks are not always best placed, however, to reach marginalised and off-grid communities.
- **MFIs are suited to reaching rural communities** They have local knowledge and experience. But since MFIs represent an additional intermediary, they are less likely to provide affordable capital. To increase the competitiveness of interest rates, some commercial banks have now established rural branches to finance directly through farmers cooperatives.
- **Suppliers are effective in ensuring cost competence and better after-sales services** As a result, some suppliers and manufacturers are entering into agreements with financial institutions to provide credit and related services, in the same way as MFIs.
- **Harnessing community ties can enhance buying power** In contrast to individual farmers, co-operatives can provide risk guarantees, meaning that banks are able to finance their purchase of comparatively expensive solar irrigation pumps. Some commercial banks have established rural branches in order to offer direct finance to farmers' co-operatives.

These examples illustrate that an appropriate mix of entities can help to translate large-scale finance for the small-scale needs of low-income populations. For example, MFIs are most useful in reaching otherwise inaccessible communities during the early stages of market development, while later direct financing through FIs and suppliers becomes possible, bringing the cost of capital down.

6.1.2 Financial instruments

Both agencies have deployed financial instruments to incentivise green investments, but Central Bank of Bangladesh uses only loan-based instruments whereas IDCOL provides a combination of subsidies and credit support

IDCOL's approach is particularly effective in the early stages of market creation and for reaching out to the poor: its institutional grant builds capacity among various players and its buy-down grant helps to reduce upfront costs for the end user. Central Bank's use of loans is effective in ensuring financial viability, but grants can be used to support the complementary activities needed to nurture newer markets. Central Bank of Bangladesh and its participating FIs will require the resources to establish, among other things, quality standards, training programmes and grants for lower-income end users.

IDCOL offers finance on more flexible terms

It cannot provide cheaper capital, but in many cases it can offer smaller instalments and flexible repayment periods. Instalments are also set so that they do not exceed the cost of the main energy alternatives – kerosene in the case of SHS or diesel in the case of SIPs. This flexibility allows low-income consumers to make repayments more comfortably than would otherwise be the case, and so promotes access to finance.

Central banks and its partnering FIs has used innovative market-based instruments such as composite lending to mitigate risk

The composite lending offered by FIs working with Central Bank allows farmers to access crop loans along with loans for solar irrigation pumps, so increasing their repayment capacity. Lending to farmers' co-operatives also helps to mitigate risk, since they are better placed than individuals to provide guarantees and ensure regular payments. The need to provide security continues to be a major barrier, however, to extremely poor households and sharecroppers.

6.1.3 Financial planning systems

IDCOL's 'one-stop shop' has been helpful, particularly in early stages of market creation, in providing integrated services for all actors in the value stream

IDCOL's business model for SHS, for example, helps to create markets and establish sustainable delivery processes and capacity. It involves following guidelines for selection of partner organisations and systems for technical quality control. Central Bank of Bangladesh and its participating FIs, in contrast, has not established any similar procedures or standards; a number of suppliers exist in the market, but the quality of equipment is not monitored.

Central Bank's regulatory policy has been instrumental in catalysing private sector involvement and providing clear policy signals

Central Bank of Bangladesh deployed a stepwise strategy to develop FI investment in green lending, moving from CSR guidelines to offering low-cost refinancing, before setting mandatory green lending targets. This policy push has given key actors clear signals, which is essential to sustaining their long-term involvement in the green lending market.

6.2 Analysing incentives across cases

The two case studies highlight the existence of a range of policy, economic, and knowledge-based factors that are driving investment in LCRD. Both cases illustrate how incentives at a policy level in turn create further incentives for lower down the value stream.

6.2.1 Incentives at the level of policy

- **National policy** Policy goals and national targets – including “electricity for all by 2021” and the generation of 10 per cent of electricity from renewable sources by 2030 – were primary drivers for Central Bank and IDCOL's investments in decentralised renewable energy. These policy drivers were in turn shaped by social and economic incentives.
- **Social development** Improving energy access in rural areas and providing off-grid populations with better livelihoods were important ambitions for policymakers.
- **Economic incentives**
 - Fiscal gain: reducing diesel imports and dependence on gas, and the related drain on central resources.

- Availability of development finance: for IDCOL, the large off-grid market for renewables and the availability of domestic and international funding were factors pushing it to invest; IDCOL benefitted from concessional financing and technical assistance funding from development partners.
- **Reputation** Central Bank of Bangladesh is the first central bank to have developed a worldwide reputation for sustainable development, in large part due to the efforts and ambitions of its governor. Reputational considerations are also drivers, therefore, of the bank's promotion of green investment through central financial channels.
- **Economic incentives** IDCOL's partner organisations have strong commercial incentives to invest in renewables, in the form of access to low-cost capital and institutional grants to help with capacity development.
- **Fiscal incentives** Tax holidays and reduced import duties were primary drivers for suppliers and manufacturers' investments.
- **Knowledge and capacity incentives** MFIs' experience of financing low-income communities, together with their community acceptance and rural networks, are factors in their involvement.

6.2.2 Incentives at the level of implementation

- **Institutional policy** Central Bank's banking and regulatory policies – not least its mandatory green lending targets – were primary drivers for banking and non-banking FIs' investment in renewables. However, IDCOL-funded financial intermediaries have not similarly been driven by IDCOL policy measures, and it is notable that IDCOL funding is largely channelled through MFIs and small private-sector entities: in the absence of a regulatory push, a significant mass of private actors and commercial financial institutions have not been interested in accessing IDCOL funding.

6.2.3 Incentives at the level of beneficiaries or users

- **Economic incentives** Access to IDCOL's buy-down grants and affordable finance on favourable terms are primary incentives for end users to invest in SHS. Similarly, reduced electricity and cultivation costs and higher productivity are drivers for SIP investors, using Central Bank finance.
- **Social co-benefits** Improved health, education and income were cited by users as important reasons for investing in both solar home systems and solar irrigation pumps in both cases.



Solar irrigation farming in Bangladesh © Neha Rai.

Conclusions and Recommendations: improving inclusion by aligning incentives

Developing effective finance for LCRD projects involves selecting and combining intermediaries and financial instruments in a way that achieves cost-effective targeting of the poor, and ensuring that incentives are structured to prioritise their needs.



Both IDCOL and Central Bank's achievements in providing decentralised energy access can be credited to their use of effective financing instruments, systems and working relationships. Central Bank of Bangladesh opted for multiple direct and indirect financial channels based on their ability to target particular areas and groups, similarly IDCOL realised very early on that it lacked the reach of MFIs and SMEs, and designed its programmes accordingly; existing widespread experience of microcredit in Bangladesh also helped. The programmes have been able to unlock finance in the form of long-term soft loans and equity, and in turn have enabled partner organisations to provide the SHS and SIP services to off-grid areas.

Central Bank's strong regulatory policies and their innovative lending structures have been important in incentivising banking and non-banking financial institutions' involvement. IDCOL's transparent and accountable system – enhanced by their technical standards committee (which approves suppliers), their PO selection committee and their inspection team (which monitors POs) – has been essential in gaining donor support. Working in tandem with the government's vision for energy access also helped catalyse the widespread uptake of solar projects.

Although Bank's low-cost fund has been effective in reaching the rural population, the poorest sections are not entirely catered for. Repayment capacity and some level of bankability is considered important for customers to access finance. As a result, some remain excluded, and a lack of subsidy-based instruments and risk guarantees makes it difficult to improve their access. Innovative measures such as composite lending and lending through suitable intermediaries such as farmers' co-operatives have addressed some of these issues, however.

IDCOL's incentive-based financing scheme uses grant-based instruments to reach out to the poor. Subsidy-based lending funded by donors allows IDCOL to provide funds for renewable investments at a lower rate. This means, however, that potential investment by commercial FIs is crowded out, since they cannot compete on price.

By investing in off-grid areas, IDCOL's SHS and SIP programmes target the poor and vulnerable by default, and there is a trickle-down effect from the grants provided by donors; however, more specific targeting of the ultra-poor could improve their access and provide greater benefits.

Recognising the need to ensure finance reaches the poorest, in the rest of this section we explore what more can be done to ensure policymakers choose appropriate instruments, intermediaries and planning systems. We also identify how incentives can be aligned to encourage pro-poor choices and inclusive outcomes.

7.1 Making appropriate choices in developing finance for the poor

7.1.1 Identifying appropriate combinations of intermediaries

The availability of finance for the poor is often hindered by a lack of appropriate financial channels, and the actors who are best placed to mobilise finance for the poorest may not be best placed to deliver it. As we have seen, each intermediary will have relative advantages and disadvantages. For example, though national institutions and large 'mainstream' operators may be able to access funding, they often lack the experience and organisational structure appropriate to low-income consumers.

In prioritising the needs of the poorest, an appropriate combination of intermediaries should be selected, taking into account the financial needs of the actors, the stage of market development and the target market segments. This combination will include entities that:

- Are able to draw down targeted finance for the poor
- Are able to blend finance that benefits the poor
- Can design projects and programmes in a participatory manner, including financial instruments that are most effective for reaching the poor
- Have the capacity to deliver and implement finance for the poor.

A number of factors in Bangladesh's success can inform LCRD projects across the world. Based on the Central Bank and IDCOL case studies, we can identify the characteristics of suitable intermediaries for providing inclusive finance, as well as drawing out some key policy lessons.

- **Countries can use national development banks to cater for those consumers excluded from mainstream banking** Domestically funded national development banks such as Central Bank of Bangladesh have a specific public policy mandate to provide long-term financing to risky sectors that remain un-catered for by commercial banks. They have been used for some time to channel development finance and are increasingly being used to channel climate finance. Central Bank's example shows how a strong regulatory command-and-control approach and national authority can be effective in channelling finance to marginalised communities, and encouraging the involvement of commercial banks and the private sector.

- **Special-purpose financial institutions can be used to generate finance and channel it according to the specific needs of low-income consumers** The financial needs of poor consumers differ from those of mainstream consumers. As a dedicated government agency, IDCOL has been able to draw down international and domestic funding for decentralised energy and poor communities. It is able to blend grant and concessional loan-based finance to meet the particular needs of low-income consumers – something which Central Bank is unable to do.
- **MFIs and NGOs have better reach in low-income communities, but mechanisms are needed to ensure the finance they offer is affordable** Our analyses of IDCOL and Central Bank show that MFIs are playing a wide range of roles in Bangladesh's energy access markets. Both IDCOL and commercial banks prefer working with MFIs and NGOs, given their established local presences and their experience in administering microcredit schemes. MFIs can have high transaction fees, however, which can increase interest rates for end users. One option may be to use MFIs while markets develop, then to phase them out once other financial institutions are well established. Alternatively, national banks could regulate the interest charged by MFIs.
- **The commercial banking sector may be better positioned than MFIs to provide low-interest loans** As markets mature and banks set up more branches, they can channel cheaper capital directly to end users. In Bangladesh, banks such as MTBL are setting up new branches to channel funds for solar irrigation pumps directly to farmers' co-operatives. Banks can also provide larger-scale finance, but their profit motive limits their appetite for high-risk investment. In contrast, MFIs' social development orientation incentivises them to invest in the poorest markets.
- **Suppliers, manufacturers and SMEs can take on a broader role in low-income markets** Traditionally private companies, traders and manufacturers acted as only suppliers for LCRD programmes. Over recent years however, they have begun to offer complementary services, ensuring cost competence and better after-sales for renewable products. Under Central Bank's refinancing scheme, some suppliers and manufacturers have reached agreement with financial institutions to provide credit.
- **Where product costs are high, group co-operatives can provide access for small-scale users** Channelling finance to farmers' co-operatives has been an effective strategy for promoting uptake of solar irrigation pumps, which are relatively expensive and require borrowers to give risk guarantees. Direct financing of co-operatives has also reduced the

intermediary cost and as a result the interest rate charged to the end user.

These examples show that, beyond identifying the appropriate combination of intermediaries, it is important to deploy them at the right time, according to investment needs – for example, MFIs may be most useful in the early stage, then suppliers and commercial banks once markets are more mature. Cooperatives are effective when costs are unmanageable for individual customers.

7.1.2 Identifying financial instruments appropriate for targeting the poor

Mainstream financial institutions have traditionally emphasised instruments such as high-interest loans that target upper market segments. Lower-income segments remain outside the picture because of high transaction costs, low profit margins and their limited creditworthiness. More inclusive financial instruments, however, can help poor households' access affordable finance, manage risks and escape poverty.

Banks and development partners often assume credit is the primary need in low-income populations, but in many cases grants to support savings or risk guarantees are needed to address constraints beyond access to capital, including limited market access, inadequate access to technology and lack of maintenance.

A range of financial instruments can be combined and sequenced to achieve cost-effective targeting of the poor:

- **Grants should be used for non-revenue generating activities in the early stages of market development or for reaching out to poorer communities** Financial institutions may have limited experience of investing in particular markets, while households lack technological knowledge. Flexible grant funding is therefore needed in the initial stages for capacity building, covering, for example, feasibility research, product development and technical assistance. Grants can also be used to subsidise high-interest loans, reduce upfront costs for end users or create market incentives for SMEs. IDCOL's combination of subsidy and credit is effective in the early stages of market creation and in targeting the poor: its buy-down grant reduces upfront cost and its institutional grant is used by various actors for capacity development. Central Bank of Bangladesh, which currently employs only loan-based instruments, is likely to need more resources of this type.
- **If grants are for general market development, they should be phased out over time to avoid market distortion but continued for the poorest market segment** Under IDCOL's incentive-based financing scheme, FIs receive grants which allow them to provide low-cost funds for renewable investments.

Banks and other FIs cannot compete on price, even with the help of refinancing, meaning that commercial investment is effectively excluded. Declining grants can be used to prevent this market distortion, however it may not be ideal to remove subsidies altogether as the ultra-poor are likely to require continued support.

- **Grants should be blended with concessional loans to provide scaled-up and long-term finance for end users with limited access to affordable mainstream finance** When making loans to SMEs or MFIs with access to pro-poor markets or poorer end users, governments can introduce concessionary terms such as lower interest rates, long-term repayment, no collateral requirements and a lower qualifying bar. For example, Central Bank of Bangladesh and IDCOL offer loans to commercial banks or partner organisations at preferential rates: 5 per cent under Central Bank's direct credit model and 6–9 per cent for IDCOL. The borrowers lend on to end users at rates of 9 per cent or 12–15 per cent, respectively.
- **Terms of finance offered to lower-income customers should be appropriate and flexible** Poor customers typically need long-term, flexible finance with affordable repayment terms and limited security requirements. IDCOL offers users flexible instalments and repayment periods, according to their repayment capacity. Instalments are set so that they cost less than using equivalent non-renewable energy, and equity sharing means that individual households are not required to provide collateral. Similarly, for Central Bank-funded solar irrigation pumps, the fixed-term post-harvest tenor for loan payments is better suited to farmers' circumstances than the advance payments expected by diesel suppliers.
- **Targeted social protection instruments and safety nets may be used to ensure financial inclusion of the ultra-poor** For the most marginalised segments of the population, approaches such as social protection instruments and safety-net measures may be more appropriate than microcredit or concessionary loans. Even MFIs that in principle target poor communities tend to avoid offering finance to the ultra-poor, due to their inability to cover upfront costs and poor track record of repayment. Targeted social safety net programmes therefore offer better alternatives than micro-credit schemes.
- **Innovative market-based instruments such as composite lending can be effective** Commercial banks in Bangladesh offer composite lending, combining a crop loan and a solar irrigation loan. The crop loan enables farmers to buy seeds, fertilisers, and so on, improving their cash flow and so their repayment capacity.

- **Tailored products can improve access for poorer segments of the population** The minimum size of solar home systems was lowered from 30Wp to 10Wp in order to target lower-income households: fixed subsidies for all system sizes mean a larger subsidy, by proportion, for the smaller systems used by poorer households. Tailoring like this can help low-income sections of the population access finance – although not always for the ultra-poor.

7.1.3 Setting up appropriate planning systems

- **An innovative, integrated and holistic financing model can create win-win opportunities for all actors in the value stream** For example, IDCOL's business model for SHS incentivizes partner organizations and SMEs' involvement in market creation, as well as establishing delivery networks, quality assurance, after-sales services, and access to capital and training.
- **Central Bank's phased and clear regulatory policy has been instrumental in engaging the private sector** Central Bank's strategy for developing investment in green lending has progressively incentivised FIs' involvement, engaging their interest for the long term.

7.2 Aligning incentives to pro-poor choices

Actors require appropriate incentives to ensure they make the choices that prioritise the needs of the poor:

7.2.1 Policy incentives

- **Higher-level policy incentives are key in establishing incentives all along the value chain** Enabling decentralised renewable energy access requires strong political will, policies, targets and fiscal measures that communicate to actors at all levels and scales, triggering incentives for financial intermediaries, MFIs and SMEs, and end users. The Bangladesh government's vision for universal energy access and electricity generation targets have provided the starting point for leveraging concessional and grant-based donor funding, the creation of a dedicated policy co-ordination agency for renewable energy, and the development of public policies that engage actors at all levels.
- **Regulatory incentives can help recruit the private sector** Green policy guidelines can help engage private sector players who otherwise would be interested only in 'mainstream' bankability. Regulation can also make investment mandatory.

7.2.2 Economic incentives

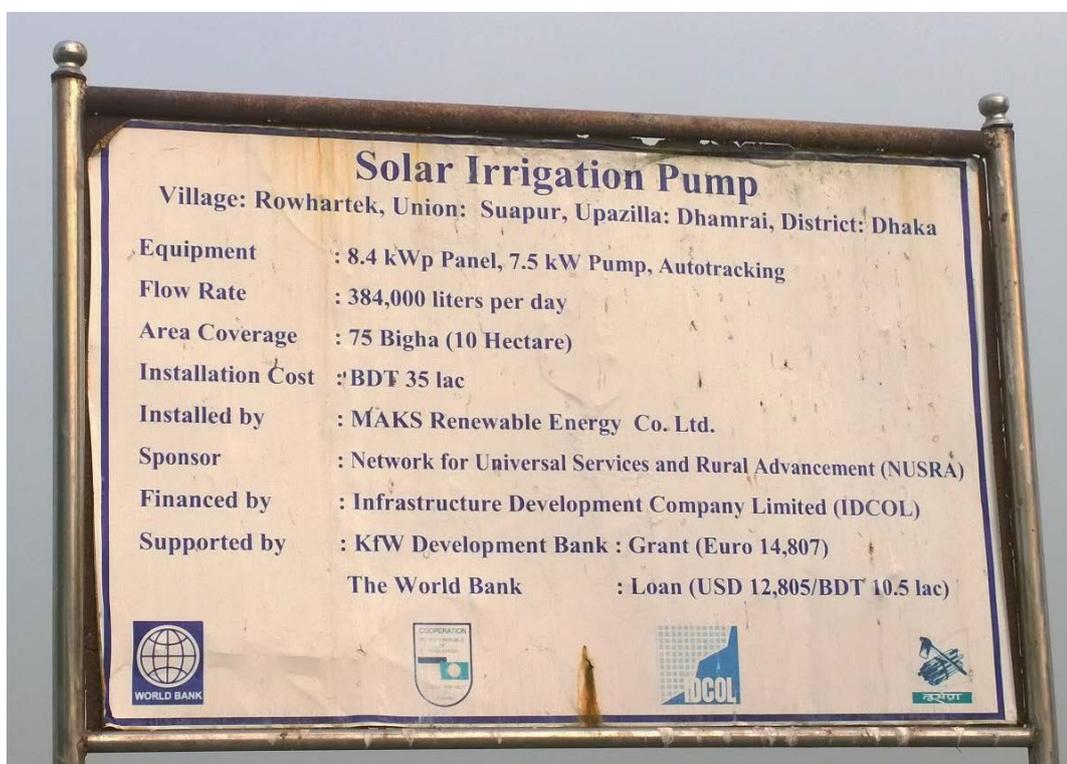
- **Economic incentives from concessional financing are crucial for financial intermediaries** Financial entities such as banks and MFIs require low-cost capital, so that channelling funds to risky markets makes economic sense, in terms of the profit margin they earn by relending to customers and the revolving earnings they receive in the case of long-term tenures.
- **Suppliers also require economic incentives to invest in novel markets** Tax holidays, reduced import duties and other favourable incentives can help signal market stability.
- **Beneficiaries need incentives to sustain their use of renewables** These incentives include access to long-term affordable capital and favourable tenure. Tailoring products to different market segments can also help with access at the bottom of the pyramid.
- **Donors can help target the poor** Bangladesh has made use of external funds from donors to create specialist agencies such as IDCOL, with the capacity to deploying the full range of instruments necessary to ensure renewable energy becomes genuinely affordable and sustainable in remote and low-income communities. This avoids some of the limitations imposed by institutional roles, including that of Central Bank of Bangladesh.

7.2.3 Knowledge and capacity incentives

- **Intermediaries and partnering organisations may require institutional support** Capacity incentives, such as IDCOL's technical assistance and market development, can strengthen different players and encourage them to invest.
- **Building awareness about co-benefits can encourage uptake** Informing communities about co-benefits such as lower costs and improved income-generation potential can help them make the decision to switch to using renewable energy.

7.2.4 Reputational incentives

- **Brand imaging and official recognition can encourage the involvement of commercial banks** For example, Central Bank of Bangladesh has regularly announced a national ranking of the ten leading green banks.



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How can we deliver climate finance to those who need it most? We examine the choices countries make in financing low-carbon resilient development, focusing on experiences in Bangladesh. Case studies of two financial institutions, Central Bank of Bangladesh and Infrastructure Development Company Ltd. (IDCOL), illustrate how core actors and incentives shape the delivery of climate finance, and how well-designed systems and carefully chosen intermediaries can provide lower-income communities with access to this finance. Our analysis suggests some key principles and strategies for ensuring finance are inclusive and reach the poorest.

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