

Renewable energy and
energy efficiency
financing for poorer
households and small to
medium enterprises



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**EVIDENCE
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Table of contents

Report summary	3
Acronyms	4
Barriers to achieving progress	5
Examples of financing schemes and results.....	6
Priority financing areas to unlock potential.....	8
Elements to consider in design	9
References.....	11



Report summary

This brief report has been produced in response to an Evidence on Demand Help-Desk request. It supports a DFID project business case for proposed renewable energy and energy efficiency financing schemes for poorer households and small to medium enterprises to be implemented in four Caribbean states. Capitalised by financial institutions, these schemes will use experience from other initiatives to work towards achievement of results.

The report outlines evidence on barriers to scaling up, lessons from financing schemes and energy smart funds and their use and considerations for effective design. It covers examples of financing schemes that have been used before to target households and SMEs.

The review finds that there is some good evidence of the barriers to scaling up renewable energy and energy efficiency for households and SMEs, but that this is very specific to country context. There is relatively limited evidence of the impact of financing schemes, although some specific country level cases that take a comprehensive approach do show some evidence of good results.

The more successful schemes recognise that responding effectively to demand and tailoring to the local context is paramount. To ensure sustained impact and successful exit in the future, adequate resources are needed to reduce investor risk and close gaps in government, consumers and civil society capacity.



Acronyms

ACP	African, Caribbean and Pacific countries (associated with EU)
CO ₂	Carbon dioxide
CREDP	Caribbean Renewable Energy Development Programme
CREF	Caribbean Renewable Energy Facility
EE	Energy Efficiency
ESCO	Renewable Energy Service Company
GEF	Global Environment Facility
GHG	Greenhouse Gas
IFC	International Finance Corporation
IFI	International Finance Institution
IMF	International Monetary Fund
MDB	Multilateral Development Bank
MFI	Micro-finance Institution
MSME	Micro, Small and Medium Enterprises
NGO	Non-Government Organisation
O&M	Operation and maintenance
PV	Solar Photovoltaic
PVMTI	Photovoltaic Market Transformation Initiative
RERED	Renewable Energy for Rural Economic Development
RET	Renewable Energy Technology
SHS	Solar Home System
SME	Small and Medium Sized Enterprise
TA	Technical Assistance
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank



SECTION 1

Barriers to achieving progress

There is limited high quality research on addressing barriers to progress in Renewable Energy Technology (RET) and energy efficiency (EE) for households and Small and Medium Sized Enterprises (SMEs) in developing countries. Therefore it is difficult to draw clear conclusions about the most important barriers and the effectiveness of different interventions. The available literature largely focuses on financial barriers and interventions, electricity services, a few technologies, and a small number of countries. Barriers are typically categorised into policy, financing, capacity, and awareness/information.

However, there are areas where global evidence¹ on barriers is quite conclusive namely²: a) high upfront costs of energy technologies and connection charges; b) cost-recovery difficulties; c) poor performance of equipment, and d) technical capacity for operation and maintenance. There is weaker evidence in the literature for the importance of political and cultural barriers and related interventions. Interaction between different barriers is important and requires systemic approaches to identifying and reducing them.

It is widely agreed that a perception of high risk deters investors and stifles market development³. If available at all, financing terms for projects focused on RETs and EE for households tend to be unattractive to project developers. Developers may be unable to meet financiers' requirements regarding the financial performance of their projects and in turn financiers may also lack sector experience.

Public private partnerships are important especially in targeting the poorest households⁴. Whilst the private sector is not alone in delivering RETs and EE solutions, there is good evidence that private finance is crucial in most countries and that public finance can help in unlocking private investment. Table 1 summarises constraints to private sector engagement.

Table 1 - Five constraints to private sector engagement⁵

Risk	Private Finance Mechanism Proposal
Country Risk. Institutional investors do not know whether projects will be exposed to country risk.	Make country risk guarantees more explicit to investors
Low carbon policy risk. Possibility that policies underpinning low carbon investment will be reversed.	Offer low carbon policy risk cover
Currency risk. Exchange rate fluctuations make returns volatile, potentially to undermine profitability.	Establish currency funds offering foreign exchange hedging products
Deal flow problems. Insufficient number of commercially attractive, easily executable deals.	Create low carbon project development companies
Difficulty evaluating multiple, overlapping risks. With limited time and numerous alternatives, private sector finds it difficult to fully evaluate risks.	Public sector takes ' first-loss ' equity position in funds

¹ Note: In this report, "agreement" is used in place of "evidence" where the literature is not backed up by hard data.

² Watson (2011), Addy-Nayo (2012)

³ REEEP (2010)

⁴ Wilson (2012)

⁵ From UNEP (2009)



SECTION 2

Examples of financing schemes and results

Historically, financing for RETs and EE projects in developing countries has focused on development assistance for larger demonstration projects, initiated and managed by national government or external donor programmes. But more recent schemes also target local capacity and consumer involvement. The best known are micro credit consumer schemes for RETs and those that focus on financing SMEs. Examples below are illustrative and should not be taken as a guide to the general merits or suitability of the various approaches.

Consumer finance and/or leasing schemes allow consumers to purchase their system on credit by making a down-payment and financing the balance with a loan or lease. Down-payments in successful schemes are around 25-30% of the cash cost.

- **ESD/RERED Project (Sri Lanka).** Some qualitative and sustainability concerns, but programme targets achieved: 100,000 Solar Home Systems (SHS) installed from 2002-08, 41 grid and 118 off-grid hydro projects.⁶
- **Grameen Shakti (Bangladesh).** Globally recognised scheme, with 500,000 SHS installed by 2010 and evidence of positive development impacts.⁷
- **SELCO (India).** Customer focused business model with microfinance (MFI) partner, delivering to 100,000 SHS rural homes and institutions by 2010.⁸
- **Microfinance for MSMEs (Bolivia).** MFI credit line started in 2011, with early success reported: \$550,000 in credit to 137 borrowers by March 2012.⁹

The fee-for-service or energy service company (ESCO) approach is where a service company helps identify suitable solutions and assists in project design, equipment selection, implementation and testing to verify results. The focus, where it applies to EE, is on industries whose energy costs represent a relatively high proportion of expenses. It is less widely used for providing RETs and EE for poorer households and SMEs¹⁰.

- **Rural Concessions (South Africa).** Around 10% of the targeted 300,000 SHS reached from 1999-2004.¹¹
- **Rural Solar Photovoltaic Electrification Project (Morocco).** 24,800 SHS from 2002-07 and evidence of positive social impact (education, gender).¹²

Green energy financing for SMEs offer a direct financing scheme to support clean energy at a small scale through loans, sometimes supported with technical assistance.

- **PV Market Transformation Initiative. (India, Kenya & Morocco).** IFC loans, grants, training and TA from 1998 onwards. Limited evidence available.¹³
- **Sustainable Energy Facility (East Asia and Latin America).** USD18m Technology neutral facility for SME clean energy investment (IFC loans equity and TA).¹⁴

⁶ Nagendran, J. (2007), Rogers (2006), RDC (2008)

⁷ Ashden (2008)

⁸ UNDP (2011a)

⁹ BNEF(2012)

¹⁰ Ellis (2010)

¹¹ Prasad (2007)

¹² UNDP (2011b)

¹³ IPA (2009)

¹⁴ IPA (2009)

- **MIPYME Verde initiative – credit line (Honduras).** This reports disbursement of \$6.9m in loans for RETs and EE with small hydro plants dominating.¹⁵
- **Renewable energy line of credit for MSME sector and households (Jamaica).** Limited data available. By early 2012, \$3.7m in loans approved for SMEs.¹⁶
- **China Utility Energy Efficiency SME program (China).** Initiated in 2006, first loss guarantees with high reported financial leverage.¹⁷

Lessons learned

Low demand for interventions from countries may be caused by **lack of awareness** of the issues at stake by the majority of the affected populations and by many governments.

Consumer credit is agreed to be a crucial component in most emerging market cases, usually provided **through a specialist finance institution**¹⁸. There is evidence that energy lending to this market in the Africa, Asia, and Latin America and Caribbean regions tends to feature partnerships between an MFI and one or more energy enterprises, but there is little hard data to show trends or impact. There are examples of for-profit energy companies offering financing using their own credit programmes largely in response to lack of MFI market presence (e.g. Dominican Republic and Honduras).¹⁹

The evidence suggests that programmes to support household and SME access to RETs and EE are challenging even when there is a broad, well-resourced and sustained programme of support. Programmes need to **responsively meet consumer demand whilst boosting sustained market activity** over the long term, often in the face of non-financial barriers. They should “crowd in” rather than “crowd out” competition. There is some agreement that **financing facilities should generally not to be “technology specific**, i.e. limited to one technology, such as hydro or solar PV.²⁰

The prevalence of mobile banking payment systems is increasing globally, although there is little evidence yet as to the effectiveness of such systems in the RETs and EE context for households and SMEs. Energy product metering allows the end-user to pay for energy use in small increments, including bill payment/financing via mobile phone with some references to this in grey literature²¹. **Net metering** is also an emerging technology but with little evidence of impact on poor households or SMEs.

Financial institutions with RE/EE loan portfolios often have very different approaches. Loan products can be very different and this is due to the complex business environment or **formal requirements imposed on the institutions** either internally or externally. Such requirements differ both within regions (urban/ rural areas) and across countries.

A **sustainability or “exit plan”** is critical. Many of the efforts to promote financing of energy efficiency focus on generating investments rather than on the sustained investments after programme completion.

¹⁵ BNEF (2012)

¹⁶ There are some references (2010) to slow progress with MSME lending. Household facility started 2012.

¹⁷ World Bank (2010)

¹⁸ Levai (2011)

¹⁹ Allderdice (2007)

²⁰ IPA (2009)

²¹ <http://www.cleantechfinance.net/2012/crowdfunding-solar/>



SECTION 3

Priority financing areas to unlock potential

As discussed in Sections 1 and 2, there is some evidence for the relative importance of financing as a barrier to expanded renewable energy and energy efficiency, largely due to high up-front costs of technologies and weak market activity.

Local context is very important and barriers other than finance may be relatively more significant. A ‘one size fits all’ is unlikely to be effective. For this reason, programme design requires a systemic approach to targeting interventions, with financing schemes aligned with other measures.

A range of economic strategies and interventions have been tried, many of which have included funding equipment installation. There are isolated strong examples in evidence showing that financing schemes are more likely to work if users are willing and able to cover the full operational costs of new equipment (but not necessarily the upfront costs).

Overall, there is mixed evidence for the effectiveness of interventions that strengthen access to finance and credit. Fee-for-service approaches are discussed in the literature, but the evidence for their effectiveness is mixed particularly in reaching the poor.

Some studies emphasise the importance of supporting income generating activities through energy access, though the evidence for this is based on some strong cases only²². Table 1 in Section 1 highlighted some private sector financing proposals and table 2 indicates examples of types and sources of financing needed.

Table 2 – Financing needs and sources for micro-energy sector²³

Market	Needs/systems	Cost /financing	Finance Providers
Basic Domestic energy (<5 watts)	Lighting, cell phone charging, portable solar lanterns, improved stoves	USD 10 - 60 Direct purchase Savings Microloans	Savings groups MFIs
Convenience, Home Improvement (5–100 watts)	Room light in the house, radio, TV Fixed panel solar home systems Solar water heaters, Biogas digesters	USD 100 - 1,000 Savings Microloans	MFIs
Productive energy (0.1 - 5 kilowatts)	Longer working hours, new products, faster/better production (e.g., refrigerators, water pumps). Large solar home systems, larger biogas systems, solar water pumps	USD 1,000 - 10,000 Microenterprise Loans, Fixed-asset loans, Leasing	MFIs Banks
Community energy (>5 kilowatts)	Microgrids at village or multiple village level: households, community services (water pumping or street lighting). Microhydro, solar, wind farm, biodiesel	Larger, longer-term project finance Utility payments	Banks Large established MFIs
Energy SME	SMEs supply energy devices: manufacturers, importers, distributors	Equity, Working capital, Fixed-asset loans, Import- export loans	MFIs Banks

²² Watson (2011).

²³ From Levai (2011).



SECTION 4

Elements to consider in design

Tailoring and flexibility in programme design

User needs and preferences must be given priority. The design process must address consumer demand, their ability to pay, the state of RETs and EE markets and the state of the finance sector relative to RETs and EE. Flexibility is important to respond to external change, including financial sector competition, energy prices, subsidies, the business environment and (new) product/service availability. A high level of technical competency is needed at the project administration level, especially when targeting multiple territories and sub-sectors. Schemes should focus any subsidy on areas where there are market failures and include TA to increase the chances of success. Donor reporting should be streamlined and outsourcing to a fund manager with a performance incentive can be effective.

Supply- versus demand-driven assistance

Energy agendas and related actions can be influenced and even driven by multilateral, regional and bilateral organisations, yet national demand and ownership is essential. There is risk of distortions as governments and the private sector neglect needs outside the areas that are supported by external partners.

Financial and Non-financial barriers

All RETs and EE development requires finance. Schemes can improve access to long term capital. Subsidies need to be transparent and results-based. But non-financial barriers can be very challenging. Financing projects that face such barriers is unlikely to achieve impact. Successful programmes include or link explicitly with policy processes to ensure systemic scale up over time, introducing new systems and technology through market principles.

Targeting small levels of support effectively

Changing donor priorities leads to support that is often too short-term to produce lasting results. High transaction costs also mean that larger projects are preferred. Traditional utility solutions may receive disproportionate support, at the cost of other important areas and IFIs may not be best placed to support targeting of limited funds to where they are most needed.

Capacity

Emphasise strategic and multi-stakeholder partnerships, advice and technical support based on global experience, support for associations, and good information for beneficiaries. Capacity building initiatives like O&M and management training should be given consideration. Public awareness campaigns are often important.

Actors

There is broad agreement that multi-stakeholder engagement is important including:

- Local and national government, energy regulators and utilities
- Development banks, commercial banks and MFIs
- Industry/energy associations, including mobile banking and communications
- Consumer groups, SMEs
- Civil society organisations



Evidence Rating

The evidence for the use of financing schemes to scale up the implementation of RETs and EE in households and SMES in the developing world is **Medium**.

There are few independent impact evaluations available in this field. Evidence exists in specific examples and there is only anecdotal or inconclusive evidence from relevant contexts. Some non-impact evaluations and progress reports of previous schemes are available.



SECTION 5

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