CHAPTER 3

Mainstreaming Environmental Finance Markets (I) – Small-Scale Energy Efficiency and Renewable Energy Finance

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Abstract

Energy efficiency and small-scale renewable energy (EERE) projects have huge and essential contributions to make to create a sustainable, low-carbon economy and achieve the Millennium Development Goals. But there remains a large gap between the strong economic and environmental potential of EERE projects versus their limited commercial realization. A major cause of this gap is the lack of effective project delivery and financing mechanisms, adapted to national and local market conditions.

The EERE market encompasses a diverse set of markets which fundamentally consist of large numbers of small, dispersed projects in a wide range of market segments. These markets are best approached programmatically, with market aggregation strategies. Successful programs combine a) access to finance with financial products structured and adapted to the target market, with b) marketing, project development and project delivery mechanisms that generate a steady flow of investment-ready projects, along with programs that build capacities of market participants to expand this business on a commercial basis. That is, they address both the supply side and the demand side of EERE financing.

A substantial body of experience exists with commercial financing of EERE projects and with EERE finance programs. These are conducted by commercial financial institutions (CFIs) in partnership with development finance institutions (DFIs) that organize and systematically deliver EERE projects, services and financing for the implementation of multiple projects in target markets. Such programs a) engage and mobilize financing from local CFIs, and b) are frequently supported by credit lines, risk sharing facilities and/or other investment instruments and technical assistance programs provided by DFIs. Further, CFIs can partner with EERE businesses, energy utilities, associations of energy users and

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governments acting on behalf of energy users to market their financial products and generate substantial flows of well structured projects for financing.

The public good features of clean energy produce a strong rationale for public investment to develop EERE finance markets. The urgency of scaling up EERE investments makes it imperative to assess experience and lessons of commercial EERE financing and EERE finance programs. It is important to share effective methods and define and implement scale-up strategies to capture the economic and environmental potential of EERE.

After characterizing EERE markets, the challenges of EERE financing and the rationale for development finance initiatives in this field (Section 1), this chapter reports on a range of methods to structure and market commercial financing of EERE projects (Section 2); and successful EERE finance program models involving partnerships between CFIs and DFIs, including technical assistance programs (Section 3). The chapter contends that sufficient experience exists with successful EERE transaction structures and finance programs to justify roll out and scale-up, provided such programs are properly adapted to country and target market conditions. Initial ideas on scale-up strategies are provided in Section 4. This chapter is intended to inform commercial FIs of the possibilities for building profitable business lines in this field, to provide ideas and recommendations to DFIs for design of future EERE finance programs, and to be useful to other national and international development agencies concerned with promoting EERE finance market development.

1 Overview: Promise and Challenges of EERE Finance

1.1 Innovative EERE Finance and Delivery Mechanisms: Getting Ready for Scale-Up

Energy efficiency and small-scale renewable energy (EERE) projects have huge and essential contributions to create a sustainable, low-carbon economy and achieve the Millennium Development Goals. However, there remains a large gap between the strong economic and environmental potential of EERE projects versus their limited commercial realization. A major cause of this gap is the lack of effective project delivery and financing mechanisms, adapted to national and local market conditions. The good news is that a substantial body of experience exists with innovative and effective mechanisms for a) commercial financing of EERE projects, and b) EERE finance programs which organize and systematically deliver EERE projects, services and financing to implement multiple projects in target markets. Many EERE finance programs have been implemented by governments, development agencies and development finance institutions (DFIs) in partnership with commercial financial institutions (CFIs).

This paper reports on a) a range of methods to structure and market the commercial financing of EERE projects (Section 2), and b) successful EERE finance

program models involving partnerships between CFIs and DFIs, including technical assistance programs (Section 3). Further, this chapter contends that sufficient experience exists with successful EERE transaction structures and programs to justify roll out and scale-up, provided such programs are properly adapted to country and target market conditions. Initial ideas on scale-up strategies are provided in Section 4.

1.2 EERE Market Definition

For the purposes of this chapter, energy efficiency and small-scale renewable energy (EERE) projects are defined as all forms of energy efficiency investment retrofitting a) existing equipment and facilities (as distinguished from construction of new facilities) b) in all end-user sectors (residential, commercial, industrial, agricultural, municipal/institutional) and c) including a full range of end-use equipment such as boilers, thermal plants, lighting, motors, controls, heating and air conditioning, industrial process systems, waste heat recovery, refrigeration, compressors, etc. plus d) small-scale cogeneration, distributed generation, and renewable energy systems in the size range of up to 5–15 MW.

Small-scale RE also includes household and community scale projects such as solar photovoltaic bio-gas systems targeting the 'energy access' market, to deliver energy services in off-grid and underserved communities and rural areas. These benefits have essential roles to play in meeting the Millennium Development Goals.[1] Single EERE project investment costs range from the micro (e.g., USD 250–500 for a solar home system) to USD 5–15 million, e.g., for an industrial biomass cogeneration system. The upper limit of the definition of "small-scale" is not a hard and fast number but is defined operationally by commercial FIs based on projects which are sufficiently large to be financed on a single, one-off project finance basis, such as larger 15–25+ MW grid-connected RE projects. This size will vary by country, market and institution.

1.3 EERE's Essential Contributions to a Low-Carbon Economy

Energy efficiency investments in lighting, heating and cooling, pumping, motors, cogeneration, thermal plants, control systems and other end-use technologies are economic and readily available. In its 2006 *World Energy Outlook* Alternative Policy Scenario, the International Energy Agency (IEA) estimated that efficiency measures could account for more than 65% of energy-related GHG emissions savings up to 2030. Furthermore, these investments will generate an estimated net savings of USD 386 billion between 2006 and 2030. In its *Energy Technology*

[1] See, for example, Worldwatch Institute, REN 21 Renewable Energy Policy Network, "Energy for Development: The Potential Role of Renewable Energy in Meeting the Millennium Development Goals", 2005.

Perspectives 2008 the IEA estimates that end-use efficiency can account for 36% of the emissions reduction required to return emissions to current levels by 2050. This is the largest share of any option.

The IEA's recent report *Deploying Renewables* (2008) finds that many renewables are commercial or near commercial and justified for deployment on a "massive scale". These renewables consist of on-shore wind, small hydropower, solid bio-mass combustion for heat, power and cogeneration, geothermal, bio-gas electricity and solar photovoltaics in many applications. Renewables, given an aggressive effort, as outlined in the IEA's *Alternative Policy Scenario 2007* and *Energy Technology Perspectives* BLUE scenario, are projected to produce 29% of global power generation by 2030 and 50% by 2050. Further, in its *Energy Technology Perspectives 2008*, the IEA estimates that renewables can create 21% of the emissions reduction needed to return emissions to current levels by 2050. This is the second largest share, after efficiency, of any option. Carbon capture and sequestration (CCS) represents 14% of the reductions, and nuclear energy, 6%.

1.4 Market Barriers to EERE Project Finance

Many EERE technologies are proven, economic and actionable for scaled-up deployment. Properly financed, they can pay for themselves from energy cost savings. Yet, many thousands and millions of projects with compelling economic returns remain unimplemented. With some exemplary exceptions, EERE has not yet been targeted strategically at a level of effort and investment warranted by its technical and economic benefits. A major cause of this gap is the lack of EERE finance and delivery mechanisms that are adapted to national and local market conditions. The reasons for this gap in the capital market are well-documented. EERE is not a single market, but constitutes a diverse range of end-user sectors, end-use equipment and technologies and, similarly, consists of very large numbers of small, dispersed projects. High pre-investment development and transaction costs, lack of customer awareness, complicated technical information requirements, long marketing cycles associated with selling EERE and the early stage of development of the EERE industry all result in a relative paucity of investment-ready projects.

Further, commercial financial institutions often lack experience with EERE. High perceived and real end-user credit risks, lack of collateral offered by EERE equipment and difficulties creating creditworthy financing structures discourage CFI entry into this market. These and other characteristics of EERE financing create marketing barriers, increase development risk and costs, reduce financial institution interest in this sector and contribute to the gap between EERE's technical/economic potential versus its commercial achievement. In some cases, local financial market conditions, e.g., lack of long-term capital, legal environments that negatively affect loan security or high interest rates may discourage borrowing generally. These factors may or may not be amenable to intervention by a DFI.

1.5 The Importance of EERE Finance Programs

The EERE market consists of a diverse range of end-users, each with their own institutional and financial characteristics. Financing must be adapted to each target market segment. A *programmatic* approach to EERE project financing is needed that *aggregates* end-users and projects, and that assembles sufficiently large demand for capital to attract commercial financing. Successful EERE finance programs combine a) access to finance with financial products structured and adapted to the target market, with b) marketing, project development and project delivery mechanisms that generate a steady flow of investment-ready projects. These must be complemented with programs that build the capacities of market participants to develop and structure finance for projects. That is, they must address both the supply side and the demand side of EERE financing.

The availability of finance to energy users is important because it overcomes the high initial costs and makes it possible for end-users to pay for projects out of the savings they have generated. But financing alone is not sufficient. EERE finance programs must also reach further into the project development cycle and generate a pipeline of investment-ready and creditworthy projects. Insufficient project pipeline development was a major weakness of many early EERE finance programs. An EERE finance program organizes and systematically delivers EERE project development services and financing to implement projects in a specific target market sector or sectors. Programs can target housing, SMEs, industry, public/institutional sector, energy access or other market segments.

1.6 Mobilizing Commercial Financing and Roles for Development Finance Institutions

The vast majority of EERE project finance must come from private sector commercial financial institutions.[2] This requires the mobilization of commercial financial institutions (FIs) that can offer properly structured EERE financial products. The commercial banking systems in many developing countries have ample liquidity and financial resources but are not mobilized for EERE lending. Commercial FIs are in the business to book profitable assets. If properly organized, CFIs will respond to demonstrated, ready, substantial and creditworthy demand for financing with manageable transaction costs. DFIs can be instrumental in mobilizing the resources and capacities of commercial FIs for EERE financing.

Where sufficient liquidity exists, credit enhancement and risk sharing products can be used to mobilize funding from commercial FIs. Where it does not, DFIs can provide credit facilities. In some cases, both may be required. Further, DFIs

[2] See, for example, United Nations Framework Convention on Climate Change, "Investment and Financial Flows to Address Climate Change", 2007, which prominently highlights this same conclusion.

can organize the market by designing and implementing EERE finance programs to generate demand for the financing facilities it arranges or supports with partner FIs. DFIs can arrange donor funding for technical assistance and capacity building and can also work with governments to formulate enabling policies.

2 EERE Financial Products and Marketing Strategies for Commercial FIs

This section presents several EERE financial products which local CFIs have offered – and can offer – in their markets. Further, marketing strategies that can generate a steady flow of demand are discussed. The financial products presented all use successful commercial financing methods. A general discussion of commercial FI perspectives on EERE finance, design of EERE financial products, structuring security, and marketing are provided.

2.1 Developing EERE Financial Products by Commercial FIs

Components of a Financial Product

Because the EERE market is so diverse, FIs should take a "financial product" approach to EE finance, designing specific financial products to selected markets. This facilitates standardized financing. Considerable financial engineering and product design are often required to serve these markets. Design of a financial product starts with assessment and selection. Choice of target market should be based on matching the CFI's interests and capacities with those of the prospective market. The EERE project economics should be strong and the CFI knowledgeable. The CFI should be able to assemble adequate security for the contemplated transactions, perhaps with support from a DFI.

The financial product design must define: tenor, pricing, down payment, required security and underwriting guidelines, required documentation and origination procedures. The objective is to design a financial product that is a) attractive, even compelling to the target borrowers, b) easy to use, and c) with reasonable security terms. Loan terms, tenors and payments should be matched with the target project benefit streams so that loans can be self-amortizing. To devise a well designed product, CFIs often do initial transactions to gain experience, then roll out the product through its branch network. Training for loan officers is helpful.

Typical EERE Finance Products

The most common EERE financial product is a loan directly to the energy end-user. When the end-user is the borrower, the project is implemented with two agreements, one for turnkey project installation and services between the end-user

and contractor,[3] and one for project financing between end-user and the financial institution. End-user credit risks are separated from project performance and project technical risks. The FI assumes all of the end-user credit risk, in which it has expertise, while all technical and performance matters are addressed between the contractor or energy service company (ESCO)[4] and the end-user directly. The end-user is obligated to make fixed loan payments. The loan payment amount is set to amortize the loan regardless of project performance. Guarantees of project performance are made between the ESCO and the end-user. The loan is on the balance sheet of the end-user.

The end-user assumes responsibility for equipment maintenance, repair, insurance, taxes and risks of loss or damage associated with the equipment. Provision for equipment operations, maintenance services and warranties can be addressed in an end-user/contractor agreement. Loan financing can be combined with savings guarantees from the contractor, effectively making the total arrangement a performance contract.

A second common alternative is for the ESCO to be the borrower. The ESCO packages financing with its turnkey project implementation and services agreement. The loan is on the balance sheet of the ESCO, not the end-user. In lending to the ESCO, the CFI's due diligence agenda is greatly expanded, similar to project financing. It includes the end-user credit risk because the ESCO's ability to repay its debt is strongly dependent on the payment performance of the end-user. This is a function of a) project economics, b) project engineering and technical performance, c) ESCO financials and equity contribution, d) ESCO management and performance track record, and e) all project contracts including critically the Energy Services Agreement. A variety of energy services or sales agreement structures are possible. Lending to ESCOs is discussed briefly below.[5]

Most commercial FIs offer term lending for plant and equipment. Some have leasing units. Others use structured finance and project finance capacities and thus may be familiar with lending similar to that used in EERE projects. Engaging CFIs may be a matter of learning their existing interests and capacities and seeing how these can be adapted and applied to EERE markets. In many markets, finance leasing can be used for EE/RE equipment, even when the equipment lacks collateral value. Leasing companies, often bank subsidiaries, have experience with vendor finance programs and other forms of equipment finance that are analogous to EE. They are often much more aggressive in marketing their financial services, and some have structured finance capabilities.

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[3] This agreement may also include provisions for operations and maintenance, savings monitoring and guarantees of project performance.

[4] The term "ESCO" is used broadly to refer to the EE project developer and contractor.

[5] Typical due diligence and appraisal agenda and related guidance materials on lending to ESCOs for EERE projects are available on request.

Security and Special Features of Credit Analysis for EERE Project Loans

- *Low Collateral Value*

  EERE equipment often has relatively low collateral asset value. For most EERE projects, equipment represents 60–65% of total project cost; EERE projects have high portions of engineering, development and installation costs.[6] EERE equipment is installed in the end-user's facilities, for example, lighting and motors and industrial process equipment, and is often difficult and uneconomic to remove and use elsewhere. For these reasons, EERE project lending is most frequently not based on the equipment asset value, but on the credit-worthiness of the energy end-user.

- *Positive Credit Features of EERE Equipment: Essential Use and Energy Cost Savings*

  EERE equipment has two important positive credit features. First, EERE equipment is "essential use" equipment, e.g., commercial buildings cannot operate without their lighting, controls and air conditioning, and the industry cannot operate without its motors or bio-mass thermal plants for processing energy. Because of this characteristic, the end-user's willingness to pay on EERE loans is enhanced. Second, EERE projects save money and these savings improve the end-user's ability to repay. Energy cost savings should be incorporated into lenders' analysis of free cash flow and ability of borrowers and end-users to meet debt service payments.

  In addition to full recourse to the end-user/borrower, major techniques for securing EERE equipment and project loans to end-users include the following:

- *Preferred Drawing Rights and Special Escrow Accounts*

  A preferred drawing right agreement or provision is included in the loan documentation whereby the borrower agrees that the lender is paid automatically at a defined payment date each payment period (monthly, quarterly), and this amount is automatically withdrawn from the borrower's bank account. Lenders can establish special escrow accounts where borrowers deposit cash flows from defined revenue sources. The lender would have first call on funds in the escrow account for debt service.

- *Reserve Funds*

  A common project finance technique is to establish dedicated reserves for debt service, repair and replacement of equipment or other purposes. Similar reserves can apply in EERE project financing. For example, debt ser-

[6] Some EERE project equipment, such as package cogeneration systems, or PV panels as a component of solar home systems, does have some collateral value, but considerably below project cost.

vice reserves can be combined with the escrow account method by requiring minimum balances in the escrow account, equal to, say, two to three months of loan payments.

- *Security Interest in Equipment and Project*

  Although EERE equipment may have relatively low collateral value, lenders should still perfect a security interest in equipment to assure that the lender's interests are protected. If a borrower defaults, a security interest in equipment may allow a lender to deny access to or use of equipment even if it is not repossessed. In defaults, the facilities in which the EERE equipment is installed may be foreclosed, vacated or sold. If the building itself is viable, i.e., in a good location and well-constructed, it is likely that the building will be re-occupied by another owner or tenant. This new occupant will use and benefit from the improvements made by the prior defaulting owner/tenant. Lenders with a perfected security interest or mortgagor waiver can require the new owner or tenant to assume the remaining payment obligation as a condition of use of the building. That party can therefore recover the loss due to default, providing an alternative way out of a defaulted loan.

- *Recourse to Equipment Vendor*

  Because equipment finance can increase the vendor's sales and profits, the equipment vendor has an interest in supporting the financing. This can be in the form of direct, limited or partial recourse, or repurchase or resale of equipment in default or impairment.

- *Portfolio Approach to Credit Structure*

  When many small financings can be pooled, credit analysis using a portfolio or statistical approach becomes possible. The large number of small transactions can become a virtue: no single default can cause the lender to fail to recover principal. Reasonable worst case default rates can be estimated for the structure and pricing of the overall program, with added reserves coming from fees, vendor recourse or even concessional risk sharing programs. Portfolio approaches to credit enhancement have been used to finance energy access equipment such as household-scale solar PV and biogas home systems, single- and multi-family residential EE finance products and vendor finance programs targeting SMEs and other loan portfolios.

- *Collections via Utility Bills or Property Taxes*

  Utilities can be important partners or originators for EERE equipment loan financing. If the utility can collect payments via utility bills, the credit structure of the loans will be enhanced. The convenience, habit and regularity of utility bill payment by customers result in dependable collections. The customer's utility bill payment history can be checked quickly and easily.

A major incentive to repay and improve collections may be used if the utility is able and willing to terminate utility service in the event of customer default. Utility participation in such a program also lends credibility, which enhances marketing. Banks can partner with utilities for this purpose. Similarly, banks are beginning to cooperate with local governments to collect EERE loan payments via property tax collections.

- *Extra collateral from the borrower*

  As a condition of lending, many lenders require borrowers to pledge hard or liquid asset collateral equal to a multiple, e.g., 150%, of the loan amount. Of course, extra collateral can be requested and obtained where possible; however, this requirement is often difficult for a borrower to fulfil and generally discourages borrowing. EERE finance marketing will prosper where lenders can make credit decisions on the basis of free cash flow and ability to pay, and realizing a prudent portion, e.g., 70%, of the estimated energy cost savings. Many DFI EERE finance programs that offer guarantees emphasize this point: help the partner FIs to create secure transactions that require less extra collateral from borrowers. Instead, underwrite the loans based on the project's benefit stream and the borrowers' ability to pay.

- *Guarantees and credit enhancement programs*

  In some cases, DFIs or other government agencies may offer credit guarantees to support EERE financing. When the terms are attractive, these can be used by the CFIs to share risks, making them a very effective tool to support expanded EERE lending. Further discussion of DFI guarantee products is provided in Section 3.

Security techniques for lending to ESCOs are discussed below.

Marketing

An EERE financial product must be launched around a marketing strategy and plan. Marketing strategies should include partnering with EERE equipment vendors, ESCOs, utilities and end-user associations to generate deal flow. Such partnerships are critical to generate and aggregate demand for financing. Multiple marketing channels can be used.

This approach is well-illustrated by the IFC China Utility-based Energy Efficiency Finance program. IFC has helped its partner CFIs establish EERE financial product marketing relationships with a gas utility, ESCOs and EERE project developers, and EERE equipment vendors. FIs can market their financial products directly and systematically to their existing customers. They can survey their existing customers, starting with those with whom they are willing to take on additional term credit exposure, to evaluate their potential for EERE investments. Most industrial and commercial companies will have some potential for cost effec-

tive EE projects. To take a proactive approach, the FI can partner with EE/ESCO companies[7] and offer to conduct an EE audit, the first step to develop a project. This type of offer can be included in a donor-supported technical assistance program.

2.2 Creating Demand for EERE Finance: Marketing Strategies for Commercial Financial Institutions

EERE markets consist of large numbers of small projects. Therefore, commercial FIs are recommended to apply programmatic methods for marketing their financial services. This is achieved by aligning with market aggregators and others whose activities could create effective demand for the EERE financial products the commercial FI offers. Partnerships can be created between CFIs and several types of market actors pursuant to strategies to aggregate the market. Examples include:

- vendor finance programs, partnering with EERE equipment suppliers
- energy service company (ESCO) programs
- utility-based programs supporting EE, demand side management (DSM), and renewable/distributed energy investments
- pooled energy end-user procurement programs which organize effective market demand and develop investment ready projects, partnering with governments or associations to aggregate groups of end-users
- housing EERE project finance programs
- EERE finance programs targeting small and medium enterprises (SMEs)
- energy access finance programs which mobilize capacities of microfinance institutions to deliver energy equipment financing

Each of these strategies work on the "demand side" of EERE finance to prepare a series of projects for investment that will meet the lending criteria of the CFI.

Vendor Finance Programs

A vendor finance program is a relationship between a company selling EERE equipment and a financial institution, whereby the FI provides financing for customers to purchase the vendor's equipment. Vendor finance programs are applica-

[7] EERE and ESCO firms should be qualified by the FI for such partnerships. The FI should assess: services/products offered, business methods used including form contracts, the firms' target end-user market and customer profile including related end-user credit characteristics, the company's reference projects and current project pipeline, their current and estimated project financing and projections as well as general corporate and financial statement information. Resource materials for conducting such assessments are available on request.

ble for virtually every end-user. For the FI, the vendor finance program creates a flow of financing business, aggregating demand for many small projects. The vendor markets the FI's financial services and performs certain finance origination functions which lower FI transaction costs. In some cases, the vendor can provide credit support, thus helping the FI to offer financing to more customers. For the vendor, such a program supports increased sales. The customer pays for the equipment over time, matching payments with energy cost savings benefits. (See Annex, Example 1: Vendor Financing Examples in IFC EERE Finance Programs.)

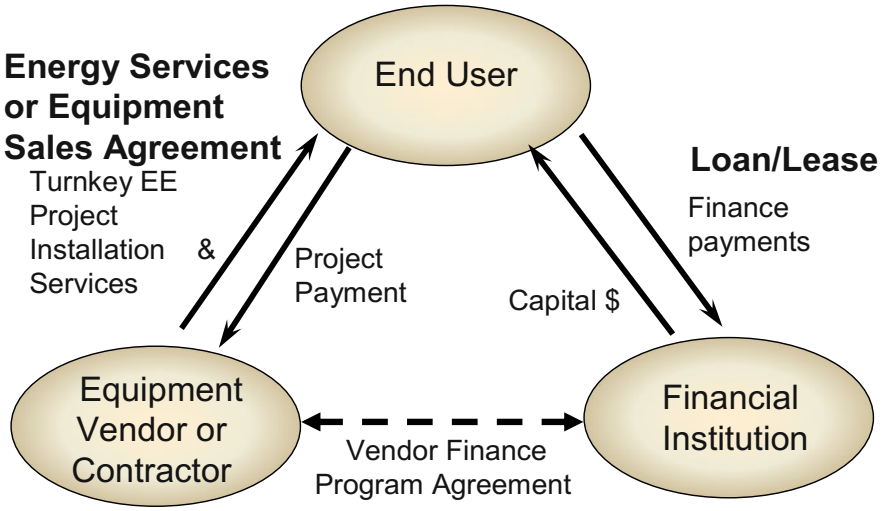

Fig. 1. End-user as Borrower: Vendor finance program

Alternative structures can be considered, for example: 1) Vendor borrows from FI and on-lends to Customer or otherwise has a long-term Energy Services Agreement with Customer; or, 2) Vendor enters into loan, rental or instalment purchase agreement with Customer, and then Vendor *sells* this payment stream to FI. This structure is called forfeiting. These alternative structures can be very effective for marketing by the vendor, as the vendor combines equipment sale with financing. They are depicted below.

ESCO Programs

An Energy Service Company (ESCO) is a business that develops, engineers, and installs clean energy projects in a variety of end-user sectors. For the energy user, the ESCO packages a complete turnkey offering. By combining financing with turnkey implementation, an ESCO has powerful marketing. ESCOs operate with a range of business models. The ESCO often provides or arranges financing for their projects. ESCO's are not a source of financing *per se*, as they in turn require

both debt and equity. Thus, ESCOs and/or their customers need debt financing from commercial financial institutions. ESCOs can form an important bridge between the energy user and the FI, especially in developing countries where finance is less accessible. ESCOs can structure their projects using a range of business models. Those that create the most secure financing include some fixed payment obligation from the customer to amortize the project capital investment.

The typical structure is depicted in Fig. 2:

- The end-user enters into an Energy Services Agreement (ESA) with the ESCO; a variety of ESAs are possible.
- The end-user payment obligation may be determined based on project performance, savings, delivered energy or the value of capital and services.
- The loan is typically on the ESCO's balance sheet. The ESCO assumes end-user credit risk and may require lender assistance to evaluate.
- The ESCO will typically fund a portion of the project with equity, typically 10–30%.

In lending to the ESCO, the FI must assess end-user credit risk, the ESCO's technical, managerial and financial capacities and the project economics, contracts and risks, which are similar to a project financing. Common alternative structures are depicted in Fig. 2 and 3.

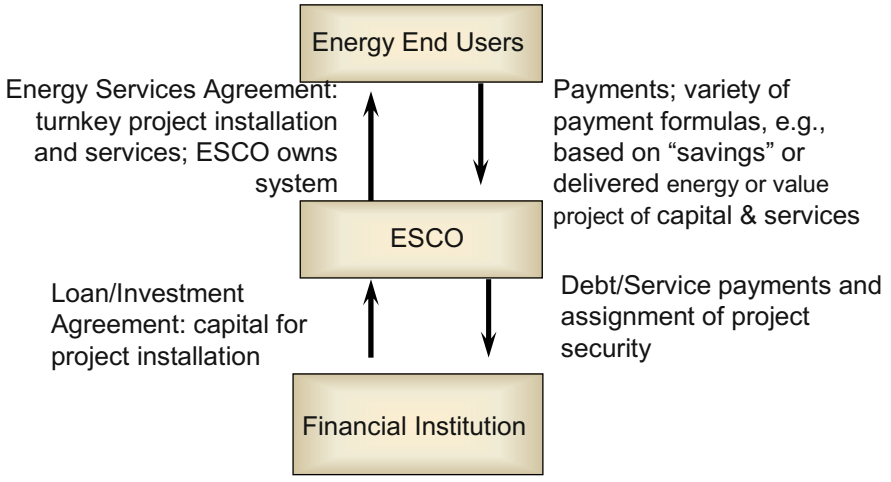

Fig. 2. ESCO as Borrower, Typical Performance Contract Structure

- End-user makes a fixed payment to ESCO, matched to amortize ESCO's investment.
- ESCO sells this payment stream to FI.

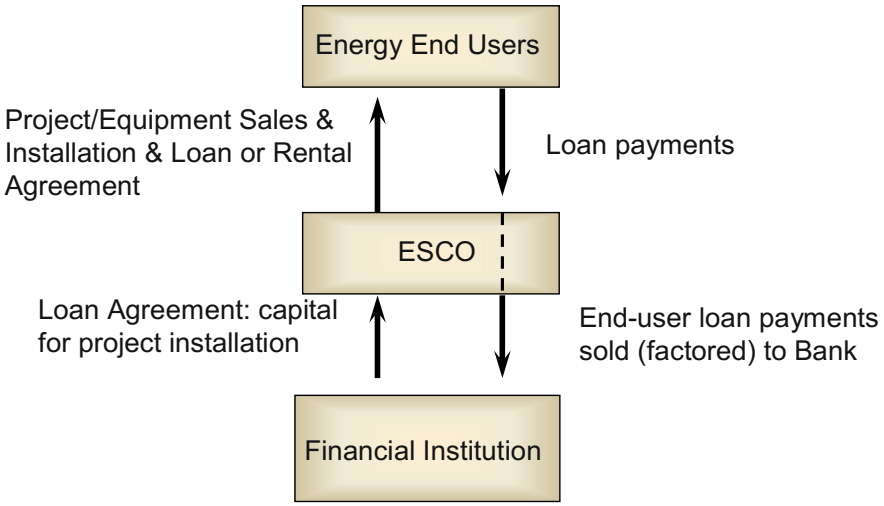

Fig. 3. ESCO loan to end-user; ESCO sells this payment stream to bank, factoring or forfeiting

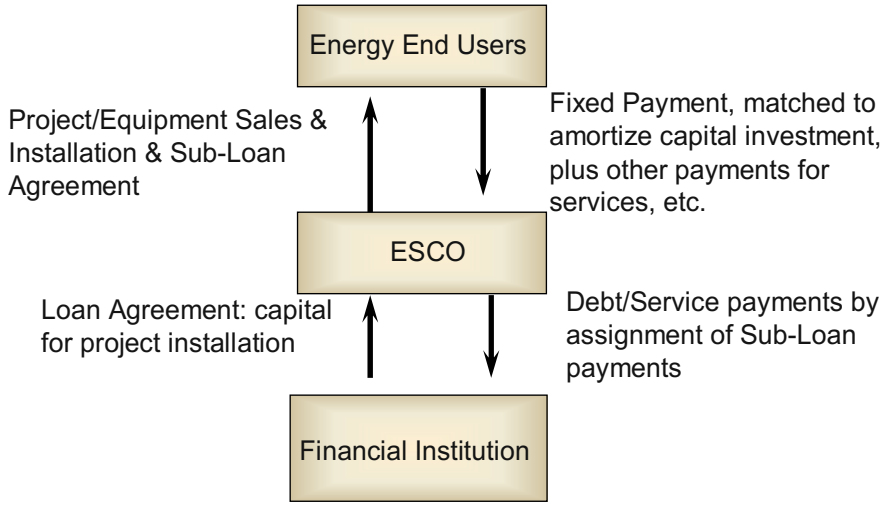

Fig. 4. Bank loan to ESCO, matching ESCO sub-loan to end-user

- End-user makes a fixed payment to ESCO, matched to amortize ESCO's investment.
- ESCO assigns these payments to lender.

- *Multi-project finance facilities for ESCOs*

  When financing an ESCO project, FIs should explore the possibility of financing a series of projects with a multi-project loan facility. To establish an ESCO project finance facility, a master loan agreement is executed between the ESCO and the financier. The master loan agreement commits the lender to provide a certain volume of funding according to defined terms and conditions. It would a) reflect the lender's acceptance of standard end-user agreements (ESAs), b) set parameters for project economics financed under the facility, c) define financing terms including rates, fees, financing amounts and security provisions, and d) lay out procedures and conditions precedent for closing transactions under the facility. Approval of financing for each specific project would typically be required based on a) due diligence demonstrating that the project meets the defined criteria, and b) credit approval of the end-user. Construction financing may also be provided, typically with a portion of funding withheld until completion, commissioning and acceptance. With a master loan facility commitment, the ESCO can develop projects that meet these criteria with confidence that funding will be available when the criteria are met.

  Many EERE programs have focused on developing ESCOs or have otherwise included ESCOs as a delivery mechanism. The World Bank China Energy Conservation program started three ESCOs in its first phase, and directly supported their capacity building, capitalization and project financing. In its second phase, it supported the development of many new ESCOs (building on existing EE firms with core capacities in project engineering, equipment supply and turnkey installation), established an ESCO association and also set up a guarantee program to support loans to ESCOs. This program has been instrumental in creating the ESCO business in China. In all markets, the viability of and potential for developing an ESCO industry should be researched. A broad definition of ESCO projects should be used, including mechanical and electrical contractors, along with a range of business models for structuring ESCOs.

Utility-Based EERE Finance Programs

Energy utilities – electric, gas, heat – can be effective agents and aggregators for marketing and delivering EE and customer-sited RE equipment, projects and financing. Utilities can partner with commercial FIs for funding. The utility billing and collections mechanism can be used to collect payments from end-users. This method can enhance credit structure and collections performance. It can also reduce collection costs which is useful especially in the case of smaller end-users. All customers can be targeted: large/small, commercial/industrial, governmental and residential. Utilities can act as financial intermediaries or establish them to finance EE projects for their customers, partnering with CFIs. Utilities can also directly purchase or dispatch the saved or produced energy (e.g., kW and kWh) as

part of integrated resource plans where this benefits their system. (See Annex, Examples #2–5: Utility-Based EE Finance Example, Pacificorp, USA; Tunisia PROSOL Solar Water Heating Equipment Finance Program; Opportunity Example: Agriculture Demand Side Management with Power Utilities in India; Opportunity Example: India Pooled Mini-Hydro Development & Finance Program.)

- Utility acts as FI and provides or offers financing to its customers.
- Customer makes payment via utility bill surcharge. Collections are less expensive and collections performance is enhanced.
- EE equipment and service companies are qualified to co-market and deliver projects.
- EE project development services and energy audits can be provided to customers.
- Financial institution provides debt finance to utility, full or limited recourse.
- IFC program operating in China, with Industrial Bank and Bank of Beijing.
- Xinao Gas is utility partner; program just beginning.
- Utility markets program and EE projects to customers; EE project development services provided to customers.

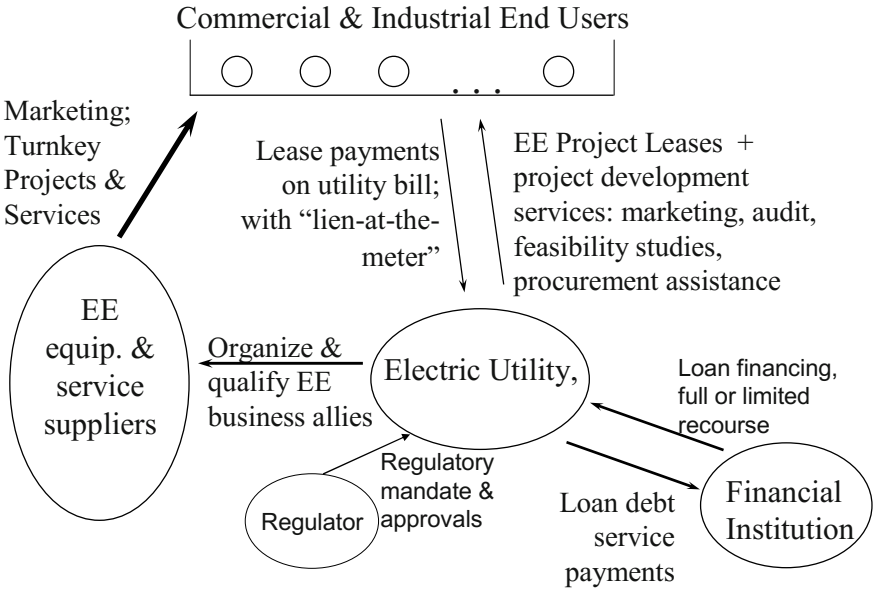

Fig. 5. Utility as Financial Intermediary

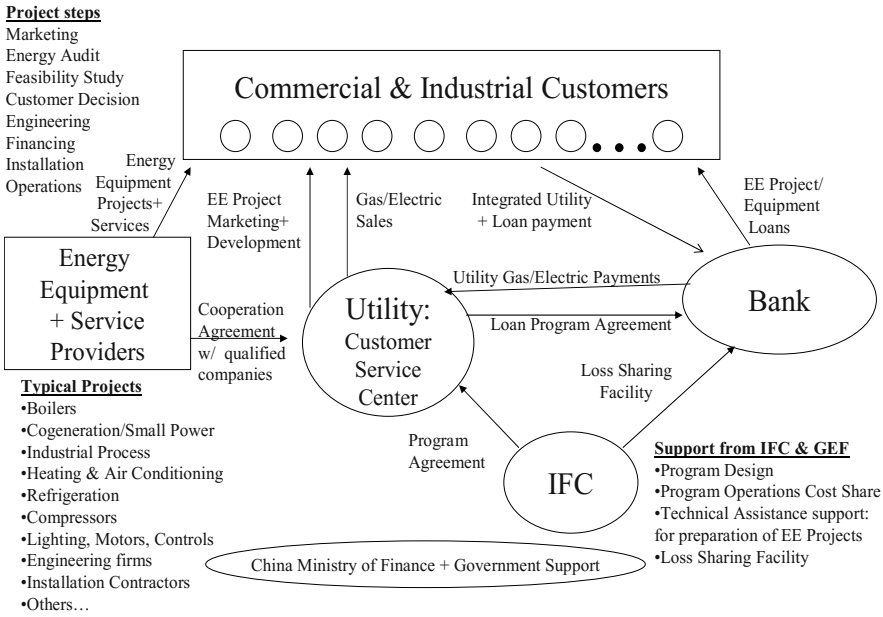

Fig. 6. IFC China EE Finance Program

- Bank partner provides financing to utility customers.
- Loan payments and collections are integrated with the utility bill. Default leads to suspension of gas service.

- *Use of Utility Collections Mechanism*

  The utility billing and collections mechanism can be used to collect payments from end-users. This method can enhance credit structure and collections performance and reduce collection costs which is useful, especially in the case of smaller end-users. In some cases, the utility can impose a "lien-at-the-meter": if the customer defaults, the utility service is suspended; it would be restored when the payments are brought current. If a customer defaults, a new occupant of the facility where the EERE equipment has been installed can be required to assume the remaining balance of payments as a condition of new service. This method is applied in many cases, in both developed and developing countries, as an effective means of delivering credit, and enhancing security and collections. In some cases, the FI can make the collections of an integrated utility bill and loan payment. This method is used in the IFC China Utility-based Energy Efficiency Finance program. The method chosen must be consistent with applicable utility regulation and loan agreement terms with customers.

Pooled Procurements

Market aggregation is crucial for scaling up EERE finance. Pooled procurement programs organize groups of end-users, get them ready to purchase EERE projects and services, and conduct procurement on their behalf. This approach can be and has been used in many sectors. End-user associations – in industry, housing, commercial real estate and state and local governments in particular – can be important coordinating partners. Cities are increasingly important actors in organizing local action and mobilizing investment in climate change. This applies to municipal facilities as well as residential, commercial, industrial and institutional end-users. Organizations such as the Clinton Climate Initiative and the International Council for Local Energy Initiatives (ICLEI) are promoting this approach.

Two exemplary and instructive new initiatives are in Berkeley, California and Cambridge, Massachusetts. In Germany, the Berlin Energy Agency is a successful model. (See Annex, Examples #6–10: Berlin Energy Agency; Cambridge Energy Alliance; Berkeley Sustainable Energy Financing District; Opportunity Example: Pooled Bond EE Finance Program for Local Governments in India; IFC Hungary, National Schools EE Finance Program.)

Small and Medium Enterprise (SME) EERE Programs

SMEs can be a target for clean energy finance programs as energy end-users and as EERE businesses. The tools described in this chapter – guarantees, vendor finance programs, ESCOs, utility-based programs, etc. – can be applied to the SME sector. Many nations have programs to improve access to finance for SMEs. These can be applied directly to EERE finance. In India, a creative example of an EE finance program business model targeting SMEs and cooperating with SME business associations is under development. The history of India has resulted in many SMEs in the same industry group clustered in the same geographic location. These "cluster associations", of which there are many, are a natural marketing partner and aggregator. They are a nodal point for communication and organization of EE projects with groups of end-users. Industries can use common technical solutions. An example for textiles would consist of a package of motor efficiency, power factor correction, smart metering, lighting, and solar thermal for dye-processing hot water. These elements can make an attractive and rather standard technical solution offering combined average payback periods of typically two years.

Several commercial banks in India are developing EERE finance business lines, in part because of priority sector lending policies of the Government of India (See Section 4.4 on supporting financial system regulation and policies). The Small Industries Development Bank of India (SIDBI) can apply its term loan guarantee program to share in the risk of bank loans. (See Annex, Example #11: Small and Medium Enterprise EERE Finance, India SME Industry Cluster Program.)

Housing EERE Finance Programs

Housing is a large energy user and a market with multiple ownership structures, relevant financing instruments and sub-sectors: single family, small multi-family, large multi-family, retrofit and new construction. Many examples of housing EERE finance programs include loans provided by commercial FIs to households or to homeowner associations (e.g. condominiums and co-operatives) for EE investments in individual dwellings or common areas of multi-family residential buildings. Loan products are typically first or second mortgages, or, in the case of multi-family housing, secured by a pledge and assignment of common charges. Cooperation with district heating utility companies has also been arranged to facilitate marketing and financing.

DFIs have worked with commercial FIs to support housing EERE finance via credit lines, risk sharing facilities, and equity or quasi-equity to the FIs. Some initiatives also focus on developing new EE mortgage finance products, and incorporating EE into underwriting criteria for secondary mortgage market funding sources.

- *Single Family*

  Loans to single family households are typically structured as second mortgages. Loans can be secured simply by a security interest in the equipment being financed, e.g., if the equipment is the building's primary heating system. Loans for EE retrofits can also be included within the first mortgage. One strategy is to work with primary mortgage lenders to fund this type of facility, and include expanded EE project loans as an option when new first mortgages are originated. (See Annex, Example #12: IFC Hungary Retail Gas Program.)

- *Multi-family*

  Multi-family housing can pose challenges in obtaining proper security. Often the common areas of buildings are owned proportionately by the individual homeowners and not by the homeowners' association, precluding mortgage on real estate. Ownership and institutional and legal structures pertinent to a nation's multi-family housing stock and to particular buildings must be researched to develop an appropriate financing product: a) who owns the property, b) how is it governed, c) who pays the energy bills and how are they paid, d) is there a homeowners' or condominium association, e) does it have borrowing powers, f) what are the rules governing borrowing, g) can it levy common charges to collect debt service payments, h) what are the enforcement mechanisms for collections, I) is there an association of homeowners associations which can act as a market aggregator, etc.

  EERE finance credit structuring for housing co-ops can involve: a) access to and analysis of utility bill payment history, b) tenant/owner payment history of common charges, c) analysis of the co-op income state-

ment, d) assignment and use of building reserve funds, e) analysis of energy cost savings for estimating the ability to pay and security as real estate, f) security in assignment of rental incomes from service/retail stores in the coop, and g) cooperation with the district heating company serving the co-op in delivering credit or performing billing and collections functions. (See Annex, Example #13: Financing Energy Efficiency for Low Income Blockhouses in Central Europe.)

Energy Access Finance

"Energy access" refers to providing energy services to communities and households in rural, off-grid areas as a key component of programs to end poverty and promote economic development. Energy is an essential input for a productive enterprise. Examples include valued-added processing of agricultural products and cottage industries and for social services, including lighting for education, power for information and communication technologies, refrigeration for clinics and vaccines, and purification of drinking water. Finance for energy access equipment has multiple dimensions: end-user equipment finance, finance for EERE enterprises, and small-scale project finance for small grid-connected or off-grid/community power systems.

End-user or consumer finance is a vital instrument for the delivery of energy equipment to households and micro-enterprises. This equipment is typically less than 100 kW in size, such as solar PV and bio-gas systems, cook stoves and other equipment integrating energy supply and productive equipment. Access to finance enables end-users to acquire equipment by paying over time, with monthly or periodic payments that are affordable.[8] EERE businesses that have achieved high levels of market penetration selling household energy systems have a very high portion of their sales purchased by credit. A notable example is India.

However, consumer finance must be applied and promoted only in cases where market conditions are right and ready. There must be capable EERE vendors to deliver equipment and services. EERE enterprises drive the market by selling systems, and market development must generate sufficient and consistent demand to attract FIs to offer end-user financing. Second, institutional capacities in the market must be able to deliver EERE equipment finance. Such capacities could include rural banking networks, microfinance organizations, agricultural cooperatives, or even electric utilities

The design of effective, appropriate end-user finance and risk sharing mechanisms begins with the observation that the EERE consumer equipment market consists of very large numbers of very small projects. This creates challenges for consumer finance due to relatively high transaction costs per project. However,

[8] Grants and subsidies are often used to buy down the capital costs of energy systems and are combined with consumer financing programs to make energy systems affordable, as per the ability to pay of target market groups.

when pooled in a portfolio, the large number of small transactions can become a virtue from a credit analysis point of view if a portfolio approach to is used to structure credit.

Based on these characteristics, the main elements of the most accepted and recommended methods to structure credit enhancements for EERE equipment consumer finance can be summarized as follows: a) structure the credit enhancement either as a first loss portfolio guarantee or a loss reserve scheme, both of which take advantage of a portfolio approach to credit structuring, with appropriate risk sharing amongst the several parties (FI, vendors, and donor); and, b) have the FI undertake vendor finance agreements with qualified vendors, and require vendors to provide after-sale service and credit enhancements including buyback guarantees to repurchase equipment repossessed in loan defaults. Complementary technical assistance program elements include banker training, bank transaction cost support, incentives/subsidies to end customers, and EERE business development programs.

A promising method for end-user finance is to mobilize microfinance institutions (MFIs) to deliver energy access. MFIs have developed tremendous capacities and networks to deliver small-scale finance and microfinance. These can potentially be tapped to deliver EERE systems and finance. Mobilizing MFIs for energy access finance has been called “a convergence waiting to happen”. MFIs can be a delivery mechanism. Their main product is typically short-term working capital loans for micro enterprises, often in urban areas. Several issues arise in adapting MFI lending capacities to the energy market. Term lending for energy equipment may be a new financial product, involving new risks, lending practices and security, and also requiring additional wholesale funding resources. Thus, MFIs will require assistance to develop and offer new EERE equipment loan products. Because energy access has such positive developmental benefits, an EERE financial product is aligned with MFI objectives.

Some MFIs are becoming deposit-taking institutions, pursuant to evolving MFI financial regulation. However, most MFIs rely on DFIs or commercial FIs for wholesale funds. To offer a new EERE loan product, MFIs will need matching wholesale loan resources. UNEP has developed an approach to work with wholesale lenders, offering a two-tiered credit enhancement mechanism. Through this a) end-borrower credit risk is assumed by the MFI when making equipment loans, and b) MFI credit and other risks are assumed by a wholesale lender that provides funds to MFIs for on-lending as EERE equipment loans. Wholesale MFI finance as a field has made major strides in the last two to three years; working with wholesale lenders to support a network of MFIs that offer EERE finance can therefore be a good scale-up strategy. (See Annex, Example #14 Palawan, Philippines Solar Home Systems Finance Program.) Another promising strategy for energy access finance is to work with mobile phone service companies, which have built and are building networks of cell towers that require power solutions. This capacity can be used to deliver energy services in adjacent communities.

3 EERE Finance Which Development Finance Institutions Can Provide to Commercial Financial Institutions

The second aspect of this discussion concerns investment instruments and technical assistance programs that development finance institutions can offer to local CFIs for EERE finance. DFIs can be multilateral (World Bank, IFC, ADB, IADB, EBRD, AfDB), bilateral (e.g., KfW, FMO), national development banks (e.g., Nafinsa in Mexico, IREDA in India) or even sub-national development banks, (e.g., Maharashtra State Energy Conservation Fund in India). DFI's have a mandate to invest with development impact. Hence, to build EERE finance markets, DFI funding should be used within commercial structures and market processes. DFIs are capable of assuming risks and mobilizing substantial donor funds to blend with their investments and to fund technical assistance and capacity building programs. EERE projects are usually far too small for DFIs to finance directly, but DFIs can be instrumental in supporting local FIs to provide EERE financing. DFIs offer a range of investment instruments to commercial FIs including credit lines, credit enhancement products, and equity investments.[9]

3.1 DFI EERE Finance Programs and the Financing Chain

Proper design of EERE finance mechanisms requires understanding the full chain of financial intermediation, from the DFI instrument offered to the CFI, to the CFI financial product offered to its target EERE markets, to the structure and security details of the underlying transactions. DFIs use public grant monies to blend with their investment instruments, to provide softer terms and/or to accept greater risks, and for technical assistance, capacity building and program operations costs. The typical chain of financing is depicted simply as follows:

Grant/public monies → DFI → CFI → projects

Public funds are typically provided as grants to the DFI. The DFI provides the public finance mechanism to the CFI, blending grant funds with its own resources, equity and debt raised on capital markets. The CFI provides structured, adapted financing to the EERE project sponsors. The sequence in the chain will vary for different mechanisms, applications and circumstances. For example, DFIs could invest directly in projects, which is common for larger grid-connected RE. But,

[9] DFIs can also offer financial products directly to EERE businesses, most frequently in the form of equity investments. In many cases, the DFI will invest in a clean energy equity fund, with professional fund management, which will make a series of clean energy corporate and project equity investments. DFIs may also provide loan facilities to EERE businesses, e.g., for projects or manufacturing facilities, but these are less common. Equity investments may also be made through special enterprise development funds targeting seed capital and early stage EERE enterprises. The DFI manages concessional funds, blended with its own investment, and has grant support to cover the high transaction costs.

the general point remains: design of successful public finance mechanisms should plan the entire chain of financial intermediation, including the last step where the project investments are made. An example is illustrated in Fig. 7.

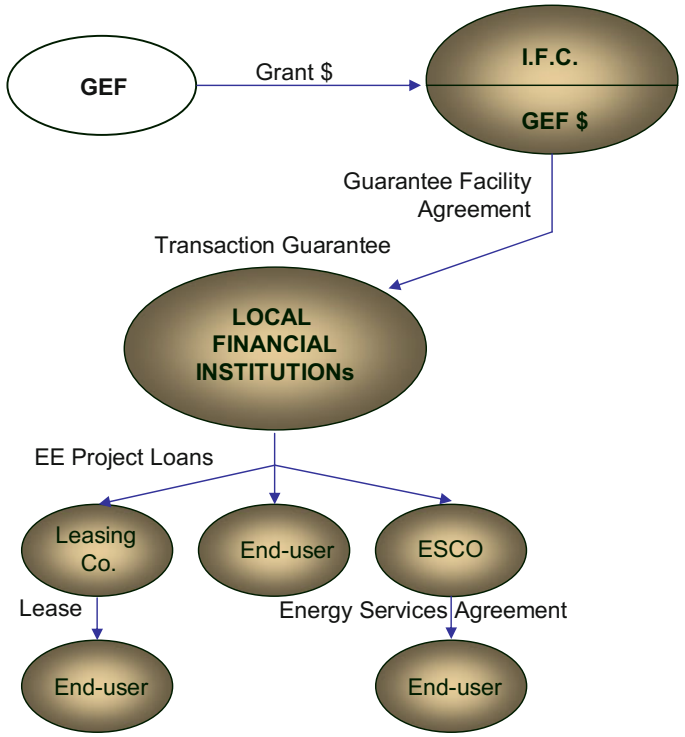

Fig. 7. Chain of Financing, Example

1. The International Finance Corporation (IFC) operates energy efficiency (EE) finance programs using partial credit guarantees (PCGs) in seven countries. These programs employ the following chain of financial intermediation:
2. The Global Environment Facility (GEF) provided grant funding to IFC. These funds are used (a) as reserves backing a portion of IFC guarantee liabilities, and (b) technical assistance and program operations costs.
3. IFC provides guarantees to local FIs. (Although one local FI is shown, multiple FIs are participating.)
4. Local FIs use the risk sharing support from IFC to provide financing to various EE market segments, including residential, commercial, industrial, municipal, energy supply and distribution. Multiple financial products have been used.

Over time, the guarantees from IFC can be phased out as familiarity with these sectors improves and risk perceptions decrease. When effectively structured, one dollar in GEF funds can directly leverage 12–15 dollars of commercial investment into EE projects and indirectly catalyze long-term growth of financial commitments to the sector.

This example illustrates several principles in the design and operation of effective public finance mechanisms:

- the catalytic role of public funding (from the GEF in this case) to assume extra risks within the investment structure, and to fund the costs of program operations, technical assistance and capacity building
- the role of the DFI to a) provide a tailored public finance mechanism (guarantees in this case) to local FIs, and b) combine this with technical assistance to structure transactions, c) turn individual transactions into replicable financial products, d) create marketing relationships between the FIs and the EE companies, and e) build EE finance into a commercially viable business line for the partner FIs
- the "branching" effects within the program design, that is, the DFI works with multiple FIs, and each FI can offer a series of financial products to various EE market segments. The success of this work takes time and grows with experience
- the leveraging of the public monies through the financing chain

3.2 Objectives and Design Criteria for DFI EERE Finance Programs

Effective EERE finance programs seek a) to support directly the financing of EERE projects, and (b) to build EERE finance markets and the capacities of CFIs and other market actors – EERE businesses, utilities, energy users, government policymakers – to develop and implement an on-going series of projects on a market basis after the public program has concluded. To make best use of public funding, it is essential that both these direct and indirect outcomes are sought when designing and implementing clean energy public finance mechanisms.

EERE finance programs must be designed using in-depth analysis of country market conditions and based on the specific institutional and credit characteristics of the target end-user sector(s) within the country. Target sectors – industry, SME, commercial, single and multi-family residential, public/institutional/municipal, agriculture – vary widely, and each has its own special circumstances that have to be addressed in designing an appropriate finance/credit structure and program marketing plan.

Market research for an EERE finance program design must include assessment of: a) the economics of individual EERE investments from the point of view of all parties, especially the end-user; b) the commercial contract, finance and credit

structure of the investments, especially to satisfy CFI lending criteria; c) definition of a marketing strategy and plan; d) consultation and negotiation with market actors and specific arrangements with market aggregation partners; e) conduct of a complete roles and risk analysis of the entire project development and implementation cycle and definition of a clear allocation of project roles and responsibilities amongst the various parties to the transactions, consistent with their respective objectives and capacities; f) identification of structures that have scale-up potential; and g) definition of the DFI and donor development role and how the public grant and DFI investment instrument(s) will leverage commercial financing. The EERE program design must address all of these levels.

CFIs want and will respond to a sufficiently large, steady, creditworthy demand for capital with manageable transaction costs. These three points – deal and market size, credit, and transaction costs – are key to meeting lender criteria. Strategies to aggregate projects and the demand for capital through market aggregators, development and provision of credit enhancement to create creditworthy finance structures, and preparation of projects to reduce transaction costs, should all be considered as part of an EERE finance program design. EERE finance programs should work with and support commercial parties, incorporate commercial financing, and strengthen rather than distort the marketplace. The program should define a pathway and vision for how EERE financing systems can proceed on a full- or near-commercial basis following completion of the program and how the capacities of all parties to do so will be enhanced.

3.3 Credit Lines

Provision of credit lines to FIs for on-lending to EERE projects is a common DFI investment instrument. The following questions are useful in determining whether credit lines are an appropriate instrument.

- Does the FI lack liquidity, especially finance for medium-to-long tenors (three to seven, or even 10+ years) that are required by EERE projects? If so, then a credit line can be an effective and necessary DFI instrument, with the tenor matched to the target market. DFI resources can be used to fund sub-loans, in full or blended with FI resources. Eligible projects and use of proceeds must be defined, and the target EERE market selected, based on market research.
- Is the credit line full recourse to the FI? Or, does the DFI share in the credit risk of the sub-loans funded with the credit line? Full-recourse lending is far more common and much simpler to originate and administer. If the DFI loans are full recourse to the FI, the only barrier the program would address is the lack of available capital in the market, not the credit risk of the project loans. If the DFI shares in the credit risk, then the DFI will typically prescribe underwriting guidelines, and it must have procedures to comply with them. Even with full recourse credit lines, DFIs will prescribe underwriting guidelines to assure that development objectives are met.

- What is the pricing of the credit line? Will it allow the CFI to on-lend at rates that are attractive to end-borrowers and make a profitable margin? Some DFIs provide EERE credit lines at below-market interest rates. The pricing of the EERE loans which the CFI makes is then prescribed to assure that a) the end borrower enjoys the interest rate subsidy, and b) the CFI is allowed to make higher than normal margins on the portion of their loans funded with the DFI credit line. Thus, the interest rate subsidy can benefit both the borrower and the FI, giving them an added incentive to make the EERE project loan. This is the case in the Thailand Energy Conservation Fund, operated by the Government of Thailand.

Interest rate subsidies are unacceptable for some DFIs due to concern about distorting financial markets, driving out or delaying entry of other non-participating FIs, or causing borrowers to delay or gear project decisions according to the availability of the subsidy. Also, interest rate subsidies by themselves do not address other barriers to EERE finance, e.g., end-user credit risks. In countries having financial markets that are less mature, or that have very high prevailing market interest rates, an interest rate subsidy can be instrumental in stimulating borrowing and EERE investments. (See Annex, Example #15: Thailand Energy Efficiency Revolving Fund.)

Debt co-financing addresses barriers associated with lack of medium and long-term funds available in the market, and in some cases with high interest rates. While debt co-financing can be effective, it is relatively resource intensive and therefore tends to have lower leverage ratios (ratio of public grant and DFI funds to total CFI financing mobilized).

3.4 Mezzanine Debt Facilities

DFIs can offer subordinated or mezzanine debt facilities to support small-scale (e.g., <15 MW) renewable energy project lending through local CFIs. "Subordination" refers to the order of or priority for repayment. Subordinated debt is structured so that it is repaid from project revenues after all project operating costs and senior debt service has been paid. The senior lender gets paid first, and then the subordinated lender. Thus, the subordinated lender assumes greater risk, but still has a claim on project revenues that ranks before that of the project equity owners. Subordinated debt provides capital to a project finance structure and is typically in the range of 10–25% of a project's sources of funds. Use of subordinated debt in a project's source of funds can substitute for and reduce the amount of senior debt. This will improve the loan-to-value ratio and the debt service coverage ratio for the senior lender, thereby reducing risk and strengthening the project's financial structure from the senior lender's viewpoint.

Subordinated debt can be undertaken in partnership with senior lenders and thus is incorporated in the loan origination capacities of the senior lender. The CFI acts as manager of the subordinated loan funds and an aggregator of capital demand. Subordinated debt facilities could readily incorporate concessional and do-

nor fund components. Concessional funds could be blended with DFI monies and provided on a "first loss" basis, thereby improving the DFI's risk position on the subordinated loan facility.

The subordinated loan can be made alongside senior loans. This structure gives the senior lender an effective tool to increase debt financing of EERE projects prudently while making the senior debt component of the loan more secure. Subordination can also be effected by having all sub-debt principal repayment deferred until after the senior loan principal is fully repaid. This allows the senior lender to have a shorter loan tenor, also reducing the senior lender's risk time horizon. The subordinate loan typically commands a premium over the senior loan rate, e.g., 400+ basis points. Subordinated lenders can also often get some form of equity-like returns, e.g., a share of project profits in addition to their loan coupon.

Use of subordinated debt can also substitute for and reduce project sponsor equity requirements. For many project sponsors and developers of EERE projects, a key limiting factor to project financing is a lack of available equity for investment. Subordinated debt can fill this gap and lower a sponsor's equity requirement. It also allows the project developer to preserve controlling ownership interests in its project or company. (See Annex, Example #19: E+Co Central America RE Investment Fund Using Mezzanine Financing Instruments.)

3.5 Guarantee and Risk Sharing Facility Programs

Guarantees can be well adapted and are a good match to support financing for EERE projects. Financial institutions in many developing countries have adequate, even ample medium and long-term liquidity. The DFI's development role is to mobilize these domestic funds for EERE finance. Guarantees support CFI lending by sharing in the credit risk of project loans which the FIs make with their own resources. Guarantees address the credit risk barrier, which are common in many EERE market segments. In financial markets that are developing, gaps often exist between perceived credit risks, as reflected in credit underwriting practices, and actual credit risks. Guarantees can help bridge these gaps. Further, guarantees support local currency lending, thus avoiding foreign exchange risks associated with hard currency lending, risks which many borrowers are ill-equipped to assume.

Financial market conditions where guarantees are best applied include: a) adequate liquidity, especially for medium to long-term funds; b) reasonably attractive market interest rates, that is, rates not so high that they represent *prima facie* a deterrent to borrowing; c) competition and reasonably mature FIs interested in EERE financing; d) conservative credit practices, which typically use a fixed asset collateral approach to loan security, and e) existence of credit risk barriers. A guarantee is a risk management tool that supports the FI to provide financing on more attractive terms to borrowers.

Development agencies and multi-lateral development banks often use concessional funds in guarantee structures. Typical structures include: a) pari passu partial guarantees, b) subordinated recovery guarantees, c) portfolio first loss and second

loss guarantees, d) loss reserves acting as first loss guarantees, and e) liquidity support guarantees. In all of these cases, the concessional funds are used as reserves against guarantee liabilities. (See Annex, Examples #16–18: IFC/GEF Hungary Energy Efficiency Co-Financing Program (HEECP); West Nile (Uganda) Hydro Project Financing; International Finance Corp. (IFC) Senior Loan Guarantee for EERE Projects in the Czech Republic.)

A summary table of DFI co-financing instruments for CFIs to support financing of EERE projects is provided below. These finance program options are not mutually exclusive, i.e. more than one can be used. This list is not exhaustive. Alternative versions or hybrids can be developed.

Table 1. Summary of Select DFI EERE Co-financing

Instruments for CFIs				
Option	**Description**	**Barriers Addressed**	**Leverage Potential**	**Examples**
1. Senior Debt Co-financing to FIs	Provide senior debt facilities to CFIs for on-lending to end-users & ESCOs for EERE projects	(i) Lack of available long-term funds; also, possibly (ii) high interest rates	Low to medium	DFI credit lines to CFIs in Russia & E. Europe
2. Subordinated Debt Co-finance	Loans to FIs for on-lending to projects in combination with FI senior debt; subordination leverages and improves security for senior lender	(i) Credit risk barriers, via subordination; (ii) lack of available financing including for long term; (iii) lack of project sponsor equity	Medium	E+Co Central America RE Investment Fund
3. Interest Rate Subsidies	Below market rate credit lines or direct buy-down of interest rates on funds provided by CFIs	high interest rates; induce interest of FIs in lending and end-users & ESCOs in borrowing	Low	Thailand EE Revolving Fund, credit lines
4. Partial Guaranttees on Parity	DFI provides pari passu risk sharing, e.g., 50–80%, on loans CFI makes with its own resources; concessional funds used as reserves for guarantees	(i) credit risk barrier; (ii) can also structure guarantee to lengthen FI loan term; (iii) stimulate FI interest in market	Low to medium	IFC Hungary EE Co-financing Program

Table 1 (continued)

Instruments for CFIs				
Option	**Description**	**Barriers Addressed**	**Leverage Potential**	**Examples**
5. Subordinated Recovery Guarantees	Same as #4, except that FI has first claim on all recovered monies in default events; (concessional funder subordinates in recovery)	(i) credit risk barrier; (ii) can also structure guarantee to lengthen FI loan term	Medium	IFC Hungary EE Co-financing Program
6. First Loss & Second Loss Portfolio Guarantees	Like #4 except risk sharing formula defined on a portfolio basis and includes first loss & second loss compo-nents; grant funds can be first loss cover for the DFI	credit risk barrier	High	IFC China EE Finance Program
7. Loss Re-serves	Concessional monies used to establish dedicated loss reserves to cover portion of first losses in a loan portfolio	credit risk barrier	High	UNDP Philippines Palawan Solar Home Systems Finance Program
8. Liquidity Support Guarantees	Guarantor keeps loan current in late pay events and institutes work out remedies; appropriate where borrower is a public utility	credit risk barrier	Medium	World Bank Philippines System Loss Reduction Rural Electric Cooperative Loan guarantee program

3.6 Supporting Technical Assistance Programs

Finance is necessary, but not sufficient to stimulate EERE investments. Other barriers – e.g., project development risks and costs, failure to aggregate projects, marketing and education of end-users to get them "decision-ready" to buy EERE projects, transaction structuring, credit structuring and enhancement – must be

addressed. EERE finance programs, in addition to organizing access to finance, must also reach back into the project development cycle and promote systematic project development by capable parties who can generate a pipeline of investment ready and creditworthy projects.

A typical agenda of possible supporting technical assistance (TA) activities for FIs is described below. Strategies for recruiting, engaging and working with FIs are also summarized. Key components of TA to support FIs in EERE finance include: a) market research, b) marketing support, c) transaction structuring support, d) development of new financial products, e) staff training and business planning, f) establishing technical standards and engineering due diligence, and g) development of market aggregation programs to build deal flow and carbon finance.

- *Market Research and Marketing Support*

  Thorough market studies can be valuable and useful to FIs. Market studies can a) assess demand for various EERE equipment and financial and non-financial products, b) analyze equipment and project economics, c) identify active and qualified EERE system vendors and project developers, d) identify and assess target markets and their credit characteristics, and e) evaluate perspectives and programs of other key government, NGO, donor and policy actors which affect the market. Such studies can demonstrate to the FI its market and the potential demand for EERE financing. TA programs with FIs can focus particularly on marketing, especially by assisting FIs to establish relationships with EERE businesses, equipment vendors, contractors and project developers; and these companies need FI financing to support their sales.

  A primary means for FIs to market EERE finance services is through relationships with EERE businesses. Assistance can be provided to FIs to establish relationships and structure vendor finance programs and multi-project finance facilities with EERE and ESCO businesses. Other marketing and market aggregation partners include utilities, end-user associations and local governments. TA programs can help develop these programs and link partner CFIs to them. These programs include the provision of financing facilities. Implementing such strategies can help aggregate demand for financing, build quality deal flow for EERE finance programs and be beneficial to participating FIs.

- *Transaction Support and Development of New Financial Products*

  EERE finance may be new to prospective partner FIs. In these cases, TA is highly valued to structure initial transactions. An FI can proceed opportunistically to finance initial transactions which meet their credit criteria, while seeking to define target markets and design financial products with strong replication potential. TA can help FIs learn from international experience and best practices, and create new products adapted to their internal credit procedures.

- *Training and Business Planning*

  EERE finance training for FIs can cover a) EERE technologies and applications, b) EERE project economics, c) structuring EERE equipment and project loans, d) lending to ESCOs, special risk and credit features, e) case studies, f) marketing FI financial services, and g) other topics. Training can be offered initially for an FI's headquarters staff. Then, as financial products are defined and adopted, ready to roll out, branch staff can be trained in promoting those specific products. Some FIs can use tailored assistance to prepare business and marketing plans for the implementation of their EERE finance programs. Many DFIs (EBRD, IFC, World Bank) and other development agencies have developed and implemented EERE finance training programs for FIs. Compilation of best practices in this field is recommended.

- *Engineering Due Diligence*

  FIs will require set technical standards and due diligence procedures for the EERE projects they will finance. FIs have a material interest to ensure the equipment and systems are technically sound, durable, well-designed and installed, backed by strong warranties and with accessible after-sale service. Borrower willingness to repay is strongest if the equipment works properly and can weaken significantly if it breaks or fails to perform as expected. Participating EERE vendors can be selected on the basis of their ability to meet minimum standards and be required to follow the standards in practice. This will mitigate potential loan portfolio risks. A TA program can help establish the standards and support FIs with technical knowledge, vendor criteria and selection, training of loan officers and lead staff and support for product development and necessary changes in internal processes. For EERE project financings, a TA program can provide engineering due diligence on equipment and systems, and independent engineering reviews to confirm technical viability and economics of given projects. This type of service is highly valued by FIs. Post-project implementation performance reviews are valuable to FIs as a means of monitoring their loan portfolios.

- *Technical Assistance for Financial Institutions on Carbon Finance*

  Most EERE projects and equipment will reduce greenhouse gas (GHG) emissions. Capturing these carbon values as Certified Emissions Reductions (CERs) through the Clean Development Mechanism (CDM) can help make many EERE projects and investment programs more economic and easier to finance. Selling CERs can provide important revenue support and upside profit potential for project sponsors, or be passed through to customers to make projects more affordable. There is strong potential for FIs to act as carbon aggregators and market makers for carbon credits for

EERE projects.[10] FIs financing projects are natural aggregators for small-scale projects; as a capable nodal agency, an FI, will have a formal contractual relationship with a series of project sponsors. A TA program could help FIs develop this type of program, work on specific EERE markets, help gain approval for the CDM methodology, and assist the FIs to create CER purchase agreements and relationships with qualified buyers. (See Annex, Example #20: India Compact Fluorescent Lamp Program of Activities.)

3.7 Engaging Commercial FIs to Participate

Many EERE systems are capital intensive. Most projects and end-users require initial financing for start-up for initial operation. At the same time, EERE projects can be self-financing from the costs savings or energy production benefit stream. Most EERE companies market on this basis. If given the financing tools, EERE and ESCO firms will market financing at the point of sale of their projects and services to end-users.

FIs' motivation is to book profitable assets. Attracting commercial FIs to EERE finance requires a substantial, steady, and creditworthy flow of demand for their financial products that can be originated profitably, with manageable transactions costs. These, in turn, require marketing, project investment preparation, market aggregation and use of secure transaction structures and in some cases credit enhancement. So, regarding FI perspectives: a) borrower credit-worthiness, transaction structure and security are primary considerations; b) technical assistance to educate banks on engineering and technical aspects and due diligence of EERE projects is very useful and may be instrumental; c) banks must be convinced there is a real business which can best be accomplished by bringing banks real transactions for funding through established relationships with equipment vendors and ESCOs that seek financing for their projects and sales; d) FIs are often interested in cross-selling other services – opportunities to do so should be explored in an EERE finance program brings them new customers and deposits. Generally, FIs do not initiate projects and cannot drive the market or be the market protagonist. But they can be brought to the table to finance EERE projects provided their underwriting criteria, appraisal methods, technical information requirements and market strategies can be addressed.

- *Developing Programs by Building Business Relationships*

  In developing EERE finance programs, DFIs and development agencies must conduct research and interviews with prospective partner CFIs. Many commercial parties have been wearied and become wary of development

[10] Canara Bank (India) is financing solar domestic hot water heating systems that typically displace LPG or electricity use, estimated at USD 10 million per year (source, personal conversation with senior bank officer, May 2006) and has expressed interest in being a CER aggregator.

agencies, and rightly concerned about the time spent responding to development agency research requests. Thus, it is important to treat the research process in the same way as if one were establishing a business relationship. The value proposition for the CFI must be clear from the beginning. One way to achieve this is to conduct EERE market research in advance, provide valuable market information to the CFI in initial contacts, and even put potential transactions on the table, basing the relationship with real financing opportunities.

- *Introducing and Effecting Innovation Within an FI*

  FIs should be understood as large corporate organizations acting in a policy and regulatory environment. Getting FIs to readily adopt and promote EERE financial products involves an organizational process that introduces innovation. This requires leadership at the Board level, plus active understanding and advocacy by senior management. Further, to get middle management to implement the program, senior management must provide a clear mandate, especially when the innovation involves new credit risk management practices. New financial products are usually tested and originated initially at the headquarters level. Then, when the new products, including underwriting guidelines are defined, they can be rolled out through training at the branch level. Middle management needs to be recognized and rewarded for promoting the new product line. This support must come from the top of the organization and followed through with reporting and recognitions. Supporting government and central bank policies and regulations can be instrumental in mobilizing and directing the resources of commercial FIs to this market. These are discussed in Section 4.

4 Challenges and Strategies for Scale-Up

EERE project investment needs and opportunities are pervasive, diverse and dispersed. They involve changes and retrofit in the economy's capital stock in all sectors and thus touch the lives of virtually every citizen and organization. Many effective transaction structures and programmatic models that aggregate the market have been demonstrated which enable EERE investments. The challenge is that implementation of each model in each respective target market requires sustained attention and capacity building. Scale-up does not imply blind replication, but rather adaptation and application of good transaction structuring and program design principles. In many ways, the challenge of scale-up is an institutional development and human resource challenge. As the World Bank has concluded in its recent and important study on financing energy efficiency:

Development and operation of energy efficiency investment delivery mechanisms is an *institutional development issue* [emphasis added] … Lack of domestic sources of capital is rarely the true barrier; inadequate organizational and institutional sys-

tems for developing projects and accessing funds are actually the main problem. Therefore, mechanisms to capture the opportunities for energy efficiency investment need to be created and strengthened. This entails sustained effort over years …[11]

Likewise, financial product standardization, the high set-up cost of introducing EERE finance and the low level of potential client awareness constitute further challenges for scale-up.

4.1 Knowledge Management and Capacity Building

A compilation of EERE transaction structures and finance program best practices is needed as a ready reference for commercial and development practitioners. This can be done on an "open source" basis that assesses experience and lessons and compiles effective methods in a ready-to-share format. This compilation would thoroughly document a) a range of EERE finance transactions, that is, the structures of individual deals between commercial parties, and, b) EERE finance programs of the type that governments, DFIs and development agencies undertake, which organize and systematically deliver EE project development services and financing. Such a compilation would include case studies of EERE transactions and programs. The case studies should go well beyond introductory descriptions and would be linked to substantive resource materials. Implementation of each finance transaction and program involve certain documents which could be called collectively "resource materials" or "business tools".

These include: a) energy service agreements, b) bank appraisal and due diligence guidelines, loan appraisal and underwriting guidelines, c) specialized loan agreements and term sheets, d) guarantee and risk sharing agreements, e) project financial analyses, f) procurement documents, g) program design documents, h) vendor finance program agreements, i) utility DSM contracts, j) program design documents for specific end-user markets such as multi-family housing and municipal end-users, etc. The resource materials would include: a) market research and diagnostic methods of the kind used to assess EERE market and sector-specific conditions, and productively engage various stakeholders in the process of program design, and b) technical assistance (TA) materials and methods useful during program operations. To make a tool kit useful, it should include an extensive library of these resource materials to enable development agencies and commercial practitioners to see exactly how transactions and programs have been implemented. It must also be able to apply and adapt these methods to their own applications.

Assembled materials could be refined through a process of peer compilation and review, with a view to making the resulting product practical and useful. The activity would first assemble, and then build on, materials already compiled. Additional in-kind contributions from participating institutions, including the DFIs,

[11] Robert P. Taylor et al., *Financing Energy Efficiency: Lessons Learned from Brazil, China, India and Beyond*, The World Bank, 2008, p.7.

would be requested including: a) participation in peer review processes, and b) assistance in compiling materials and case studies from experience which would be sanitized of confidential information and cleared prior to use.

This compilation would be designed to have immediate value to clean energy finance practitioners generally. Resulting resource materials could be made available through an appropriately sponsored on-line service. Preparing the initial compilation would produce solid value in and of itself. However it is not a terminal activity: it could become the core of an on-going activity. Further case studies and resource materials can continue to be compiled, by accretion, to deepen the body of materials. Thus, the tool kit would be a living document.

Applications and Replication Services

To place this information in the hands of practitioners, an on-going service should be established to link practitioners to relevant resource materials and provide follow-up remote and on-site consultation. This compilation could become the "go to" source for information, tools and resource materials on EE finance transaction structuring and program design. The on-line information service could include "application assessment forms", where users may prepare summary descriptions of their specific applications and situations in an organized format. These would be transmitted to the on-line EE/RE finance information service to initiate customized guidance on their transactions and programs.

This guidance can be provided remotely through written and phone consultations. The service could link the user/applicant to relevant resource materials and distribute them to practitioners. As needed, and subject to funding, deeper customized and even on-site guidance could be provided. Over time, a network of country-based financial advisors could be established to provide direct, local hands-on guidance. Country teams could be sponsored by an appropriate government agency or development bank, and include local consultants. Networks such as PFAN (Project Finance Assistance Network, providing financial advisory services on RE project finance) can expand to assist country agencies and practitioners at the project level. Similar initiatives would be used to develop and launch EE finance programs.

4.2 Recommendations for Development Finance Institutions

DFIs play a critical role in the EERE field. Because of the nature of the EERE market, DFIs must work through financial intermediaries. DFIs could:

- collaborate in the development of a thorough EERE finance tool kit and establishment of an advisory service
- expand staffing and strengthen the institutional placement of clean energy finance program offices within DFIs to assist development and commercial practitioners in adapting and applying EERE finance program models to their markets

- devote a portion of profits, alongside donor funds, for use similar to equity in higher risk position in combination with DFIs' investment funds; these could be utilized to implement and expand clean energy finance programs, working with local commercial FIs and other market actors
- incorporate EERE finance program lessons into the design and operations of new climate investment funds being proposed and developed in the UNFCCC, G-8 and in other contexts

These ideas are not new and many are being implemented.

4.3 Design of New Climate Mitigation Funds and Country-Based Programs

Commitment of substantial new public funding for climate mitigation and/or adaptation investment in developing countries is being considered in the context of the UNFCCC negotiations, and within the G-8, multilateral, bilateral and other forums. As new public funding is being considered, key questions arise: a) How can it be organized and deployed? b) What investment mechanisms, instruments and vehicles are available that are scalable and replicable for the climate mitigation objectives at hand? c) How can public monies be used to mobilize commercial finance, and deliver this financing to implement climate mitigation projects? Answers to these questions begin by identifying EERE transaction structures and finance program models.

If the design and scale-up of EERE finance programs is considered a priority, and the international community devotes considerable new resources to support such programs, then an institutional structure is needed, both within the MDBs and the countries being assisted. Much of this institutional infrastructure already exists, but it requires designation and capacity building to take the next steps. Expanded EERE finance programs will combine funding from new public grant resources, investment instruments from DFIs (multilateral, bilateral and national) and the resources of local CFIs.

As with the CDM and GEF mechanisms, a designated lead national agency is needed for each participating country. A logical country-based coordinator for EERE finance programs could be each country's national development bank or similar institution. The local lead agency, with support from international agencies, would become the lead agency to a) conduct market research, b) define investment priorities, c) develop program designs, d) become the knowledge leader and institutional home for applying the EERE finance tool kit, e) liaise with commercial FIs and other market actors, and f) provide program operations oversight along with the international donors and investors.

4.4 Supporting Financial System Regulations and Policies

National banking and financial system regulation often prescribes commercial bank loan portfolio limits and sets loan portfolio targets. For example, a prescribed maximum percentage of a bank's assets could consist of term loans greater than 1 year. In China this percentage is 30%. Loan underwriting guidelines are also often set, and rules are defined setting risk weightings for certain types of assets. To promote lending in socially important areas, such as housing, agriculture, rural economic development and even clean energy and other "green" investments, bank regulators a) often set targets for these priority types of lending as a percentage of banks' portfolios, and b) may differentiate reserve requirements for lending in different sectors as a function of risk.

India has an extensive system of "priority sector lending" to direct loans to specific economic sectors. For domestic banks, priority sector lending policies prescribe targets for a full 40% of bank lending. In the US, the Community Reinvestment Act promotes bank lending for housing by requiring lenders to invest a minimum portion of their portfolio in the communities in which they accept deposits. In China, "green credit" policies carve out certain types of lending, for new green buildings, for example, from certain lending limits. Clean energy financing by commercial FIs could similarly be promoted, based on its national macroeconomic, energy security, economic development and environmental public goods benefits. Such policies can be very effective in assuring that senior management of commercial FIs direct attention to this type of lending, and they provide additional motivation for expanded lending in this socially important area.

4.5 Conclusion: Financing for a Sustainable Low-Carbon Economy

Patterns of energy and resource use and waste outputs are imbedded in an economy's capital stock, which includes everything from buildings, factories and manufacturing equipment, appliances and vehicles, to transportation, water, energy and power infrastructure. Creating a green, low-carbon economy will require comprehensive investment over many years to transform our capital stock so that it provides economic services with far greater energy efficiency and wiser resource use, and far less generation of wastes, GHG emissions, environmental impact and depletion of natural capital.

This is a tremendous, long-term, systemic challenge. Capital stock is inherently capital intensive. Further, virtually every item of capital stock has investment and financial system analogs; that is, financial products and finance delivery mechanisms, whether they be commercial loan products, leases, bond financing, mortgages, consumer credit, or microcredit, that enabled the capital purchase. To make the green economy transition, we need to develop and implement investment programs that target and deliver financing with financial products adapted for green economy projects, including prominently EERE projects, wherever these projects are located.

5 Epilogue: Link Creation of New International Reserve Currency to Financing Global Public Goods

A proposal which dates to the mid-1970s, has recently been resurrected by George Soros, Joseph Stiglitz[12] and others. It proposes linking the creation of a new international reserve currency with purchases and investments in global public goods, such as EERE finance programs. The author strongly recommends this proposal for further development and consideration in light of the current financial system crises, the need to address imbalances in the international monetary system and the needs for public investment in a sustainable low-carbon economy.

ANNEX: EERE Financing and Program Examples

This Annex provides abbreviated examples of EERE project finance and program examples. Further information is available upon request. A list of all examples is provided following the table of contents.

A.1 Vendor Finance Programs

Vendor Financing in IFC EERE Finance Programs

IFC has used vendor finance programs frequently in its EERE finance programs that work with commercial FIs in providing credit lines and guarantees.

Russia – Centre Invest Bank, UNK Agroproduct: IFC has had a credit line with Centre Invest, a commercial FI in southern Russia, dedicated to EERE financing. An important target market for Centre Invest is loans to agro-industrial SMEs. A vendor finance program was developed with UNK Agroproduct, a supplier of small bio-mass fueled boiler systems, and multiple transactions were supported for agro-processors.

Hungary – OTP Bank, Tivi Street Lighting: IFC has a Guarantee Facility Agreement (GFA) with OTP supporting loans to small and medium size municipalities to acquire turnkey street lighting system retrofits. A vendor finance program was successfully implemented with Tivi, Kvt., a small firm specializing in municipal street lighting. Tivi's target market is small and medium size cities. The OTP finance facility financed a series of Tivi projects, using a fixed payment energy services agreement vendor finance structure.

Czech Republic – Cseka Sporitelna Bank (CSB), Siemens Building Technologies (SBT): IFC has a GFA with CSB supporting factoring of SBT long-term receivables on EERE projects being implemented with industrial Sees.

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[12] See, for example, Joseph E. Stiglitz, "Reforming the Global Reserve System", Chapter 9 in *Making Globalization Work*, W.W. Norton & Company, New York, 2006.

A.2 Utility-Based EERE Finance Programs

Utility-Based EE Finance Example, Pacificorp, USA

A US investor-owned electric utility, PacifiCorp, serves customers in seven states of the Pacific Northwest and Utah. Pacificorp is interested in promoting energy efficient motors, lighting and other technologies to commercial and industrial sector end-users in its Oregon service territory as a means of meeting its demand management goals. In designing this program, PacifiCorp was motivated to reduce ratepayer financed rebates and shift more of its EE program costs to the participating end-user while maintaining competitive rates. The utility organized a group of equipment vendors, engineers and contractors who offer EE products and services. The utility then provides these trade allies with two tools: a) funding for energy audits to assess the EE potential for qualified technologies with customers in the utility service area, and b) a lease financing program. The utility also provides technical assistance to end-users on project engineering, development and contracting.

Under the lease financing program, the utility provides financing to customers to implement the EE projects. The customer makes payments as an "energy service charge" on their utility bill based on a four or five-year term lease. The financing services are marketed by the trade allies to the end-user clients. When a customer signs up for the program, the trade ally completes the documentation, which is verified by the utility. The financing is then closed and the lease payment begins on the customer bill the following month. The utility takes the risk of customer non-payment but, because it has a "lien-at-the-meter" whereby power service can be cut in the event of non-payment, the default rate is very low. This program started operations in late 1992. In its first three years of operation, the program provided financing for over USD 32 million of projects. The utility eventually packaged and sold a portfolio of these lease assets to a major commercial bank.

Tunisia PROSOL Solar Water Heating Equipment Finance Program[13]

UNEP is implementing PROSOL, an effective and innovative program for financing domestic solar water heater (SWH) equipment in Tunisia as part of its Mediterranean Renewable Energies Programme (MEDREP). The high initial cost of SWHs was a substantial market barrier when compared to cheaper water heating alternatives. To address this market barrier, PROSOL introduced a credit mechanism that has resulted in greatly increased sales.

PROSOL was launched by UNEP and the Tunisia National Agency for Energy Management (ANME) with the support of the Italian Ministry for the Environment and Territory. PROSOL employs a range of institutional and financial support to develop and sustain the solar water heating market. These include a credit mechanism for SWH buyers, with loans provided of up to a 5-year term with col-

[13] This summary is based on information provided by Myriem Touhami, UNEP/Paris, "PROSOL Heats Up Tunisian Solar Water Heating Market", December, 2006.

lection of principal and interest through the customer's electricity bill. PROSOL also provides a subsidy of 20% of the system cost, funded by the Tunisian government. Finally, discounted interest rates are offered on SWH loans for the year 2005–2006 with funds from MEDREP.[14]

The PROSOL credit programme works as follows. First, a customer decides to purchase a solar water heater from a supplier who installs the solar water heater at the customer's home. The customer pays the loan processing costs and any residual system costs. After installation, the supplier receives the subsidy payment from ANME. The supplier then receives the remaining cost of the system directly from the bank. This sum is a credit granted indirectly to the buyers of the solar water heater, via the SWH suppliers, which will be refunded through the customer's Société Tunisienne de l'Electricité et de Gaz (STEG) electricity bill. The SWH suppliers carry the loans on their balance sheets. The PROSOL account at the Société Tunisienne de Banque (STB) receives the sums collected from STEG out of the loan principal and interest. These funds are then disbursed to the bank accounts of the solar water heater suppliers concerned, who use these funds to repay the loans.

Overall, about 70% of the costs of the SWHs are paid via the loan, with the balance from the subsidy and upfront deposits from customers. Once the SHW's are installed, customers benefit through reduced costs of water heating. An extensive communications and advertising campaign to market the program is included, paid in part by MEDREP. PROSOL creates three decisive advantages. First, SWH subsidies and loans have led to a substantial increase in solar water heater sales, with domestic sales reaching a record 23,000 m² over the period April-December 2005. Second, credit recovery through STEG electricity bills lowers collection costs and makes credit available to a broad class of domestic customers, including those without salaried employment or bank accounts. It reduces the risk of credit default. Taken together, these advantages reduce interest rates. Third, the local banking sector is effectively engaged in financing SWHs and has the resources and abilities for making loans and scaling up the program.

This structure has the potential to create a long-term, commercially sustainable program that can deliver credit even when the subsidies end. The program has ambitious growth targets and can also expand to financing SHWs for multi-family housing, commercial building and hotel applications. There is one limiting factor which could potentially hamper the ambitious growth targets of the program: suppliers, in effect, take on debt on behalf of their customers and they have limited ability to do so. UNEP is assessing various options to potential application of a loss reserve fund credit enhancement mechanism and other commercial finance methods such as forfeiting which would resolve this constraint.

[14] Once the US$1 million MEDREP fund is exhausted, the repayments via STEG on all sales will have to be increased, because interest rates will no longer be discounted. On 1 April 2006, the interest rate support was reduced from 7% to 4% in order to gradually diminish the subsidy and bring PROSOL financing up to market rates. The overall impact of this reduction was minimal as loan repayments increased only by about 2 Tunisian dinars per month.

Opportunity Example: Agriculture Demand Side Management with Power Utilities in India

The economics and investment opportunities of agricultural water pumping efficiency (Ag DSM) in India are compelling. India's agriculture sector typically consumes 30+% of State Electric Board (SEB) total electricity units sold and as much as 40% of connected load, but as little as 5% of revenue realization. Power tariffs for agriculture water pumping are far below the costs of service, which includes distribution costs and losses. Utilities incur large losses for every unit sold, which are made up by State government subsidies, which, nationwide, total an estimated Rs. 40,000 crores or approximately $10 billion per year.[15] Irrigation pumping systems are highly inefficient. Demonstration projects indicate that the energy required to deliver a given amount of water can be reduced by up to 55 percent by replacing the pump set with a smaller, efficient and correctly-sized pump set and installing a low-friction foot valve and piping, amongst other measures. Pumping systems also have very low power factors, often less than 0.65, increasing distribution losses.

Yet, farmers have little incentive to conserve, given the low costs of power, and poor voltage conditions preclude it. There are an estimated 20 million electricly powered agriculture water pumps nationwide with a total connected load in the range of 70 GW. Average investment costs for replacing pump sets are in the range of Rs 40,000 per pump set. An investment program to replace half of the pump sets would cost about $10 billion and have a simple payback period of about 4 years (prior to incorporating carbon values), assuming that savings of 45% in power consumption could be achieved and sustained.[16] Properly financed, these projects can yield net savings to State governments and SEBs as well as improve power and water pumping service to farmers. The projects can also open the way to metered tariffs that, over time, would approach the full costs of service. Innovative EERE business models for structuring win-win transactions and overcoming barriers to exploiting this potential are needed.[17]

Opportunity Example: India Pooled Mini-hydro Development and Finance Program

A final example is drawn from the field of small-scale renewable energy (RE), which is an important part of the clean energy field. RE and EE have similar economic and environmental benefits while facing similar market and financing

[15] Economic Survey, 2006–07, as quoted in *National Workshop on Developing Road Map for DSM in India*, Section III on "Agriculture DSM", Bureau of Energy Efficiency, presented at the National Workshop on DSM, Pune, October 1–2, 2007.

[16] This is a simplified calculation, and requires further analysis and commercial validation in specific State applications. Fully loaded project costs, including all necessary social components of a successful investment program, may lengthen the payback period.

[17] See MacLean, John and Hogan, Jim, *Financing Agriculture Demand Side Management Projects in India*, USAID, PA Consulting, February, 2008.

barriers. Several State Electric Boards (SEBs) in India (Karnataka, Himal Pradesh, Uttaranchal) have identified hundreds of small and mini-hydro sites (typically 1–5 MW) which currently operate as hydro plants and/or grain mills with the potential to be upgraded for greater power production.

Individual project sizes are small (typically 1–10 MW), but in aggregate they could provide significant power contribution to the local grid, contribute to peak power supply, all while avoiding high transmission and distribution costs. ADB has estimated the new power potential of such small sites in Himal Pradesh alone to exceed 1 gig watt. Thus, the state utilities (SEBs) are keen to license these projects, offer power purchase agreements and promote their development. A program could be developed that would consist of a finance facility combined with technical assistance (TA) to develop this market. An integrated program would work with the SEBs, FIs, system/equipment vendors, project developers and the local project sponsors. The project development process must begin with the party that has site control, typically the local government or local industry. If each individual site owner is required to learn, fund and suffer through the project development process, the potential of this resource will likely never be exploited to its potential. Thus, a programmatic approach is needed.

An integrated service package could include: a) resource assessment, b) feasibility studies, c) choice of turnkey project contractors, d) a standard offer power purchase contract with the relevant utility, and e) a financing facility. Financing could come from local FIs, perhaps supported by a partial credit guarantee. The program team could conduct an RFQ to select and qualify turnkey project contractors and system vendors. If project equity finance is needed, that could also be assembled. Or, project contractors which can build, own and operate can be identified and qualified to undertake such contracts with the site owner. The electric utility could be a main program sponsor and market aggregator, if the utility wants to promote this type of new power generation. The development agency could conduct program design and then help fund project marketing and development TA costs. Credit enhancement for the project loan facilities may also require concessional support.

A.3 Local and State Government Initiatives Using Pooled Procurements

Berlin Energy Agency

The Berlin Energy Agency (BEA) acts as an independent project manager to develop EERE projects in public and private buildings in the City of Berlin. Funded by the State and District Municipal Governments, the BEA pools a number of buildings and conducts pooled procurements for ESCOs to make EERE investments. The winning ESCO pays for the upfront cost of the retrofit project, costing the building owners nothing. Average savings have been 26% of energy use. The ESCO is repaid over an average of 8–12 years from these savings. The ESCO is able to shoulder the upfront costs through a loan provided by a financial institution.

The BEA has been operating since 1997 and has implemented over 43 million Euros in investment in 1400 buildings. These projects are saving over 10 million Euro per year in energy cost savings. BEA conducts the initial energy audits at no cost to the end-user and this information is used for the ESCO procurement. BEA used government grant funds to pay for these services. An average of 20 buildings are pooled for each procurement. The BEA program has been highly successful and is being replicated in Bulgaria, Romania, Slovenia and Chile. It demonstrates the power of local government to act as a market aggregator and procurement agent for EERE projects.

Cambridge Energy Alliance

In March 2007, Cambridge, Massachusetts launched the Cambridge Energy Alliance (CEA). CEA is a city-sponsored non-profit organization that offers comprehensive services to develop, finance and implement EERE and water conservation projects for end-users in multiple sectors: residential, commercial, industrial, institutional, and governmental. Pooled procurement methods are used. CEA has conducted a procurement process and selected ESCOs for small residential, large residential, small commercial/industrial (C/I) and large C/I end-users. For the ESCOs, CEA delivers organized demand; in the process, CEA gains better pricing and service terms for end-users by aggregating their purchasing power.

The ESCOs provide: energy audits, feasibility studies, and then turnkey installation of end-users' chosen investment program. To end-users, CEA provides a) independent expertise, b) project management, c) guidance through the full project cycle, d) procurement assistance, e) access to funding, f) inspection of completed installations, and g) project monitoring. Over five years, CEA targets $100 million in investments and a 10% city-wide reduction in both energy use (approximately 50 MW) and emissions (approximately 150,000 tons per year CO2). Moreover, CEA targets 50% market participation. The city actively markets the program. A financing facility has been arranged with a consortium of local commercial banks. Loan tenors up to 10 years are available, which are made directly to end-users.

Berkeley Sustainable Energy Financing District

The City of Berkeley, California is establishing a Sustainable Energy Financing District. The city will issue bonds and use the proceeds to provide loans to residential and commercial property owners to install solar PV systems and EE improvements in their buildings. The program is being developed in response to the "Measure G" ballot initiative passed in 2007 which sets GHG emissions reduction targets for the city. Loans to property owners will have 20 year terms with an estimated interest rate of 6%. This addresses the high up-front cost barrier which end-users face when considering making such investments. It also allows end-users to match their loan payments with the projects' benefit stream, i.e. the energy savings resulting from the new EERE project.

The city bears the credit risk of the loans, but, in an important innovation, it will collect loan payments with the property tax bill. The city will assess and obtain a lien on property for the loan amount. All property tax enforcement mechanisms apply: liens, transferability of liens, right to repayment at resale, foreclosure rights to enforce payment, plus the historic payment collection performance on property tax collections. The city is negotiating a private placement of the bonds with a green investment fund. In addition, a loss reserve fund is being raised to help cover the city's credit risk exposure.

The city is also responsible for qualifying participating PV system installers, operating the program and also helping property owners tap State of California incentive payments for solar PV. The City earns a service fee from property owners to offset the costs of the program. The program design can be used to fund EE measures as well. This mechanism is being followed closely by many interested governments in the USA and, given its integration with property tax collections, has great replication potential.

Opportunity Example: Pooled Bond EE Finance Program for Local Governments in India

State governments can be instrumental in pooling projects amongst their local governments. Several state governments in India (for example, Karnataka, Andra Pradesh, Tamil Nadu, Maharashtra) are interested in programs to develop and finance municipal energy efficiency (EE) projects for cities within their respective states. State governments have a responsibility and certain programs and budget authority for development of municipal infrastructure. State governments have a duty to promote municipal EE as part of good governance, prudent fiscal policies and infrastructure development. There may be direct fiscal benefits for states which have some financial responsibility for infrastructure, operations or energy expenditures of the municipalities.

Project types include: efficient street lighting (including use of dimming technologies), efficient pumping of water and wastewater facilities, and EE in public buildings and facilities. Many states have already sponsored studies for municipal EE projects, providing an initial project pipeline. The state government acts as the market aggregator and marketing partner. The program could be led by appropriate state government nodal agencies (Urban Development, Energy, Water Supply and Sanitation, Urban Development Investment and Finance Corporation, as applicable) and would offer a) access to EE project finance, and b) project development TA services to a pool of municipalities.

The State may also play a role in the financing structure. One efficient method of raising capital budget money for state and municipal projects is through bond financing. The state could issue bonds and on-lend the proceeds to participating municipalities, using pre-defined credit and underwriting guidelines. To create a sound credit structure, the borrowing municipality must typically pledge a defined revenue stream and dedicate it to debt service. In some cases, it may consider allowing the

municipalities to pledge revenues they receive from the state government. For example, the state government of Karnataka directly pays municipal electricity bills. These funds could be placed in escrow as part of the loan security. Such an instrument could apply to all municipalities receiving this subsidy, thereby enhancing their creditworthiness. DFI guarantees may also be required to enhance the sale of local currency bonds in the capital markets. Providing such guarantees would mobilize local savings and contribute to financial market deepening. This practice has been adopted by IFC, ADB and others. The state may also offer grants and incentives for municipal EE capital investments.

For example, Maharashtra State offers 75% funding support to municipalities that conduct energy audits and 23.33% capital grants to implement EE projects for their water supply and sanitation systems. Procurement of EE projects could also be pooled amongst the several municipalities. This aggregates demand for EE project and services, as well. This type of program could significantly support ESCO development, a key barrier to which are the high project sales and development costs and risks. The program would prepare projects for investment and get the end-users "decision-ready". The project could then be the subject of a competitive procurement, as required in the public sector, via a "request for proposal" (RFP) process. The RFP would present the project to the EE and ESCO business community, reducing costs. A well-designed project will find a ready response.

Many EE and contracting firms have core capacities in EE systems, engineering and turnkey construction, but do not self-identify yet as "ESCOs". But they can be recruited to respond. Typical municipal projects will be in the range of $250,000 on the very small end to $10–15 million, with a typical average of $1–3 million. In aggregate this market can be sufficiently large to attract the larger, most capable contracting firms and also to justify the transaction costs of a bond issue. The sponsoring State agencies will need assistance to implement and institutionalize the program, building their capacities to sustain it in the medium to long term.

Development agencies can provide such assistance. States will need help in program design and structuring the financing mechanism. In operations, municipalities will typically need assistance such as: a) preparing system inventories, energy cost and consumption data and load profiles for participating municipalities; b) assessing EE investment opportunities at a preliminary feasibility level; c) supporting decision-making to determine appropriate project implementation plans ("detailed project reports" or DPRs), including desired levels of outsourcing, and project financing plans; d) assistance arranging project financing through the municipal fund mechanism; e) preparation of the RFP documents, including appropriate RFP provisions and evaluation methodologies for ESCO contracting, and advice in conducting the procurement process and evaluating proposals; f) preparation and negotiation of project implementing contracts, e.g., turnkey construction contracts, service agreements, performance guarantees, and/or ESCO Energy Services Agreements; and g) providing independent engineering reviews of project systems and savings estimates.

Investments of this type may also include assessment, development and sale of carbon credits, (CERs or "certified emissions reductions") and development of cooperative agreements with electric utilities which want to acquire demand side management and load management resources. Concessional funding could support the financing structure, help cover costs of structuring the financing program, and provide some credit support for the bond issue, such as first loss reserve funding within a DFI guarantee. Such a program is highly replicable amongst the many Indian states and in other countries. The public sector can be a leader in the development of the ESCO industry, as in the case in the USA, Canada, Europe and other markets where ESCOs have matured.

IFC Hungary, National Schools EE Finance Program

The Hungarian National Ministry of Education conducted a pooled procurement for ESCO projects and services in 2005 on behalf of medium and small school districts in the country. OTP Bank provided a $200 million project debt facility, to provide loans to school districts, supported by an IFC partial credit guarantee.

A.4 EERE Finance Programs for Small and Medium Enterprises

Small and Medium Enterprise EERE Finance, India SME Industry Cluster Program

A new initiative of the World Bank to develop and finance EE investments for small and medium enterprises (SMEs) is an example of an EE finance program business model. The industrial history of India has resulted in many SMEs clustered in the same geographic location and makingt the same product. These "cluster associations" are a natural marketing partner and aggregator. They are a nodal point for communication and organization of EE projects with groups of end-users. Main components of this business model are summarized below.

World Bank SME Cluster Association EE Program Model

Business Model Component	**Methods**
Target Market & Typical Deal Size	SMEs in industrial clusters, e.g., textile, metallurgy; range of EE measures (motors & VSDs, lighting, cogeneration, efficient boilers, etc.); typical investment size per end-user is $50–500,000, with $125,000 estimated as an average. Each industry cluster typically has several hundred SMEs, so the market size for each target cluster will be in the tens of millions total investment.
Market Aggregation Partner & Marketing Plan	Cluster Associations serve as market aggregators and marketing partners. A series of seminars will be conducted to market the program to SMEs.

Business Model Component	Methods
Project Development Cycle & TA Program	Interested and eligible SMEs will be offered engineering TA step-wise to assist them through the project development cycle.
Financing Mechanism & Credit Structure	Loans to end-users are offered by commercial banks. Banks will be drawn from those participating in prior WB/GEF EE finance programs[18]. A partial credit guarantee with SIDBI (Small Industries Development Bank of India) is being developed to enhance the credit structure and may include guarantee reserves from GEF funds. ESCOs can also be organized to offer financing packaged with turnkey projects, e.g., for cogeneration systems.
EE Project Design	EE project measures will be selected by individual participating SMEs. Many SMEs have common energy use patterns/systems, e.g., need for power factor correction and motor efficiency plus solar thermal water heating for textile plants. Standard packages of equipment & systems will be prepared which are cost-effective and technically suitable for each industry group. This will accelerate marketing and decision making and reduce development costs.
EE Project Implementation	A set of qualified EE equipment and service firms will be selected by the cluster associations via a "request for qualifications" (RFQ), assisting SME end-users to make purchase decisions. Cost advantages from pooled procurements will be explored. All purchasing decisions will be made on a market basis by the individual SME end-users.

This example illustrates the several components of an effective business model. Concessional and development agencies can apply their resources to design such programs, assemble the participants, fund operations of the TA program and provide grant or concessional finance components of the financing mechanism.

A.5 Housing EERE Finance Programs, Single- and Multi-family

IFC Hungary "Retail Gas" Program

As of its Hungary Energy Efficiency Co-Financing Program, IFC developed a product with Raiffeisen Leasing, a subsidiary of Raiffeisen Bank, to finance gas-fired heating systems for single family homes,packaged with other EE improvements, such as lighting, weather-stripping and hot water heater insulation. The program was marketed with a local gas utility in Szeged, Hungary. A set of equipment vendors were qualified and they marketed the leasing product at the

[18] For example, State Bank of India, Canara Bank, Bank of Baroda, Union Bank, etc.

point of sale to the household. A loss reserve portfolio guarantee was used. The program was successfully marketed in 1998–2000, consisting of several thousand projects, averaging approximately $1500 each.

Financing Energy Efficiency for Low Income Blockhouses in Central Europe

GreenMax Capital Advisors, based in Warsaw, has developed a Housing Energy Efficiency Financing Facility (HEEFF) which works with local commercial FIs to lend to condominium associations for investments in energy efficiency. The HEEFF is a financing facility operated under agreement between the Dutch International Guarantees for Housing (DIGH), a local housing agency, and the participating financial institutions. DIGH provides a cash deposit fund (CDF) to the participating bank as a financial security. The CDF which is initially funded by DIGH at 2 million Euros is used solely to back energy efficiency renovation loans to condominium associations. For each individual loan, a Project Cash Deposit (PCD) is allocated from the cash deposit fund. The PCD is used to replace the 20% owners' equity normally required from the borrowers and to cover the first 20% of losses of principal on each loan. An international financial institution (IFC) provides additional credit support to the participating bank which covers 80% of the loans not backed by DIGH. Through the backing provided by the CDF of DIGH and the IFI, the participating bank achieves a level of comfort to finance 100% of the investment required by the condominium associations.

A.6 Mobilizing Microfinance Institutions for Energy Access Finance

Palawan, Philippines Solar Home Systems Finance Program

With a small grant from the GEF, UNDP is operating a solar home systems financing program in Palawan, Philippines since 2004. This is part of an effort to promote the use of renewable energy and to increase support of livelihoods in rural areas. Because of Palawan's island geography, more than 60% of all villages lack grid power. Many households rely solely on stand-alone household energy systems because of their remote locations, which provide an excellent application of Solar PV home systems.

Shell Solar Philippines Corp. (SSPC), the sole vendor in the region, has been active marketing and selling SHSs, but sales momentum was hard to achieve due to lack of consumer financing. UNDP has established a vendor finance program involving SSPC and the Cooperative Bank of Palawan (CBP or Bank). This small local rural bank has total assets of approximately USD$3 million equivalent. CBP. It is experienced in capital loans to farmers and fishers, but had not yet provided term loans to households for consumer equipment.

The program design uses a loss reserve fund (LRF), co-funded by UNDP with GEF monies, to provide credit enhancement for backing loans to households that acquire SHSs. The vendor, SSPC, committed to buy back any SHS's repossessed from defaulting borrowers. The price was matched to the value of the PV panel alone and was equal to at least 50% of the remaining principal balance of the loan.

The LRF was sized to cover all the net losses, net of the proceeds from SSPC's buyback of the PV panel, with an estimated default rate of 20%. This default rate was greater than the level expected. The LRF was funded primarily by UNDP with the balance contributed by both the vendor and the bank. The typical loan term is four years. Customer down payments are small, but a minimum of 10% is required, plus a security deposit of two month's payments. On these terms the household's monthly payments are generally considered to be affordable.

SSPC provides system warranties and training for local technicians to provide after-sale services. The program was implemented on a pilot scale with an initial deposit $35,000 by UNDP,, which could support financing of over $400,000 in SHS systems, approximately 1200 SHSs. The LRF was deposited with the Development Bank of the Philippines (DBP) which served as escrow agent. DBP is also considering providing wholesale loan funds to CBP to expand its lending resources for this program. The design of this program is depicted in Fig. 8. Loan defaults have been less than 4% of total loans to date. Successor programs can therefore use a smaller planned default rate to size the LRF and therefore achieve greater leverage of donor funds.

Similar program designs are underway by UNEP for several countries in Africa.[19]

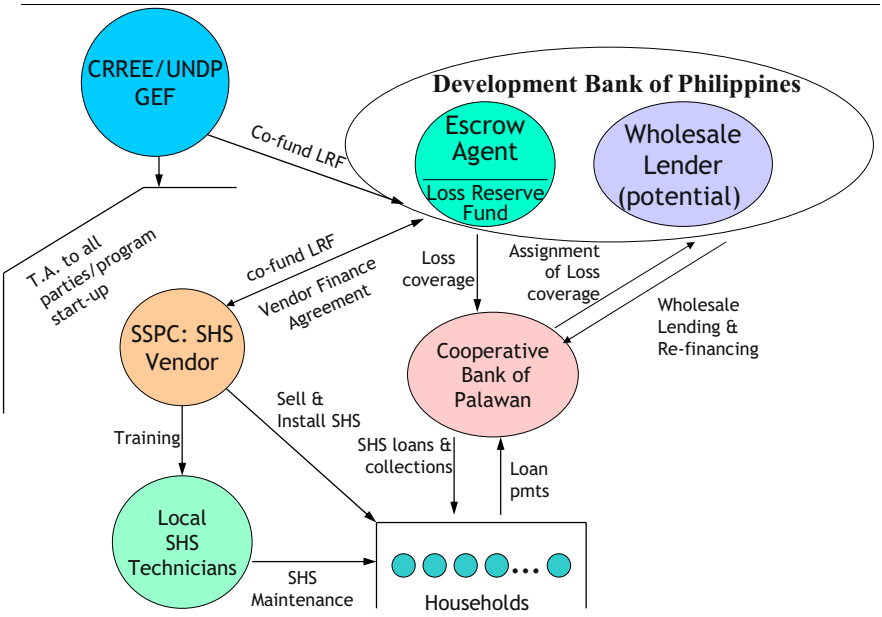

Fig. 8. UNDP/GEF SHS Direct Sales Finance Scheme, Palawan

[19] See MacLean, John and Siegel, Judith, *Financing Mechanisms and Public/Private Risk Sharing Instruments for Financing Small Scale Renewable Energy Equipment & Projects*, UNEP, Paris, 2007.

A.7 DFI Credit Lines to CFIs

Thailand Energy Efficiency Revolving Fund

The Thailand Energy Efficiency Revolving Fund has been established by the Government of Thailand, and managed by the Ministry of Energy, Department of Alternative Energy Development and Efficiency (DEDE). The Fund receives revenues from a petroleum tax (USD 0.0001 per liter) on all petroleum products sold in Thailand, which was first levied in 1993. This tax yields approximately USD $50 million per year. The Fund also pays for EE and RE technical assistance programs, such as funding for energy audits and project feasibility studies. It presently has an accumulated balance of approximately $350 million.

The Fund initially (2003–2007) provided up to 50% of a project's total loan requirements, and fund monies are blended with the bank's own resources. In its second phase of operations, the Fund reduced its share to 30%. The Fund lends to banks on a full recourse basis. The Fund provides loan capital on up to seven year terms and at a below market interest rate (between 0–4%) to participating banks. Banks must pass through most, but not all of this lower interest cost to the project borrowers. Thus, the banks are able to make a higher margin on their loans funded in part by the Fund. Six major Thai commercial banks namely Bank Thai, Bangkok Bank PCL, Sri Ayutthaya Bank, TMB Bank, Siam City Bank, Siam Commercial Bank participate in the program.

The banks are responsible for most aspects of the lending process, including marketing, appraisal and credit approval, loan collections and enforcing all remedies in defaults. DEDE assists banks with project appraisals, which are an important component of Fund operations. The maximum size of any single project loan from the Fund is THB 50 million (about USD 1.25 million). Setting the maximum loan size at THB 50 million ensures that money from the Fund will be distributed to a large number of medium-sized projects rather than being taken up by a few large projects. Eligible borrowers include owners of commercial or industrial facility and third parties such as energy service companies (ESCOs). Eligible projects include energy conservation, including renewable energy. The Fund has supported many bio-mass cogeneration projects.

DFI Guarantees with CFIs

Important features of a guarantee include: a) definition of event of loss which triggers the guarantee payment, b) the risk-sharing formula, c) timing and calculation of guarantee claim payment, d) responsibilities for collections against defaulting borrowers, e) disposition of recovered monies, e) maximum single loan guarantee exposures, f) guarantee approval and issuance procedures, and g) guarantee fees. Typically guarantees are partial, covering less than 100% of the outstanding loan principal, with 50–80% being typical. This assures that the FI remains at risk for a portion of its lending as a means to assure sound credit practices. The FI typically retains responsibility for exercising remedies and taking collection actions in events of default, as the FI is typically better equipped to do so.

Guarantee pricing is typically expressed as a percentage per annum of the guarantee liability and paid semi-annually or annually. Some guarantee pricing formulas call for a single guarantee payment at origination. The role of the guarantor in approving each guarantee transaction is an important topic. For larger guarantees, the guarantor may have loan-by-loan approval rights. In some cases, e.g., portfolio guarantees, the guarantor and lender agree on loan underwriting criteria in advance, and the lender can automatically include new loans meeting these criteria in the loan portfolio covered by the guarantee.

- *Pari Passu Partial Credit Guarantees*

  In the case of a pari passu partial guarantee, recovered monies net of an appropriate allowance for collection costs are distributed in the same proportion that the loss was distributed. Because the CFI must share recovered monies proportionally with the guarantor, the pari passu structure is weaker as a credit risk management tool. For the CFI to be made whole, and have a "second way out" of a defaulted loan, it still must require full security for the loan, in addition to the guarantee.

- *Subordinated Recovery Guarantee*

  A subordinated recovery guarantee serves like a pari passu partial guarantee except in the disposition of recovered monies. With a subordinated recovery guarantee the FI can apply all monies collected from a defaulting borrower, (recovered from legal action, from liquidation of collateral, etc.) first to recover the FI's own losses of principal, (typically including reasonable collection costs), before any recovered monies are repaid back to the guarantor. This approach makes the subordinated recovery guarantee more powerful for the CFI as a tool to create creditworthy financing packages, even at lower percentages of guarantee coverage.

- *Portfolio Guarantees*

  Portfolio guarantees are applied to portfolios of loans and typically distinguish between first losses and second losses on the whole loan portfolio. Portfolio guarantees are useful when the loan portfolio being covered consists of a very large number of smaller and relatively homogenous loans, as is the case in the EERE equipment consumer market. Thus, a statistical approach to credit risk for the portfolio as a whole can be taken. An estimated default rate can be planned in the credit structure of the portfolio as a whole. By covering a large share of first losses, and sizing the definition of first losses to be a comfortably high proportion of the loan portfolio – higher than the estimated default/loss rate – a first loss portfolio guarantee can provide very meaningful risk coverage to the FI, with low levels of total guarantee liability relative to the total size of the portfolio.

- *Loss Reserves*

  Concessional funds can also be used to create or supplement loss reserves to provide risk coverage. The loss reserves also would be applied to cover

an FI's losses on a portfolio of concessional loans which an FI would make with its own resources. Loss reserves provide risk coverage very similar to a first loss portfolio guarantee. They are best used when the loan portfolio consists of large numbers of smaller loan transactions where a statistical approach can be taken to the credit structure of the loan portfolio as a whole. For example, if a loan portfolio consists of 2000 equal size transactions, a single default results in a maximum 0.05% loss. A reserve of 5%, for example, where the FI estimates default rates at <5%, would be very meaningful as a credit enhancement instrument.

- *Liquidity Support Guarantees*

  In some cases, a guarantee or some portion of it can be structured as a liquidity support guarantee. Guarantee payments could be drawn down to keep the loan current, extending time periods for effecting recoveries, if it is possible in avoiding final default and loss. This approach is being used in a World Bank GEF guarantee program in the Philippines that supports loans to rural electric cooperatives (RECs) for power distribution system upgrades and loss reduction investments. A liquidity support feature to the guarantee structure is used because an REC provides an essential service and will not go out of business. Hence rather than immediately declaring default and accelerating a loan for which payments are past due, it is better to seek work out remedies. Loan acceleration always remains an option.

  Design of an appropriate guarantee structure supported by concessional financing should meet several criteria.

- *Appropriate Risk Sharing*

  The instrument must provide levels of risk sharing sufficient to attract and motivate FIs and expand their risk profiles and horizons while also maintaining and aligning incentives of the parties concerned for good loan origination and administration.

- *Leverage*

  Concessional funding sources seek good leverage for their monies, usually measured in terms of a) the total energy project and equipment financing accomplished through a program, in ratio to b) the amount of concessional funding provided. In guarantee structures, leverage can be achieved at several levels of financial intermediation.

- *Flexibility, Suitability, Replicability*

  The instrument should be suitable and matched to the types of financial products that meet address the target market, market barriers and conditions. It should also be flexible to support the range of financial products that can be developed to meet market needs.

- *Alignment of Incentives*

  Guarantees should be structured to maintain incentives for the CFI for prudent, effective underwriting and loan administration practices and to avoid moral hazard.

- *Administration*

  The instrument should be designed to be easy to administer and responsive to commercial needs and timing, and to provide for proper reporting and accountability.

- *National Banking Regulations*

  Guarantees should be structured in consultation with banking regulators to maximize regulatory benefits to the beneficiary CFI, e.g., to allow the guarantee to substitute for CFI loss provisioning.

IFC/GEF Hungary Energy Efficiency Co-financing Program (HEECP)

This program was initiated by the IFC Environmental Finance Group (EFG) and was funded with a total of US$5.0 million by GEF. In 2003, similar guarantee programs were rolled out in five additional Central European countries. HEECP is designed to overcome barriers to EERE project finance and development, primarily credit risk and the lack of well-prepared projects. To address these barriers, HEECP has two tools: a) a guarantee program, supporting and sharing in the credit risk of EERE financing undertaken by domestic FIs with their own funds; and b) a technical assistance program to help prepare projects for investment and aid general EE market development. HEECP aims to support projects which a) are economic and achieve energy savings and greenhouse gas (GHG) emissions reductions; b) promote the entry of domestic FIs in the EERE financing market, and increase the ability of domestic FIs to provide such financing; c) support FIs to develop and use innovative financing structures and provide more favorable credit terms to borrowers; d) promote development of the EE market and commercial ESCO industry; and, e) develop and demonstrate new non-grant finance tools for the GEF, including methods of leveraging commercial finance.

Under the guarantee program, participating FIs execute Guarantee Facility Agreements (GFAs) with IFC. FIs propose EERE project transactions to IFC, which in turn reviews the transaction for approval. Each Guarantee Facility Agreement defines the maximum amount of guarantee claims that IFC would ever pay out under a GFA (a “Facility Liability Limit” or FLL). IFC makes the guarantee payment within 90 days. Thereafter, the FI has responsibility to continue legal remedies, take collections actions and sell collateral to recover the loss from the defaulting borrower. HEECP has developed a second guarantee product structured on a portfolio basis where large numbers of small projects are being financed systematically. This guarantee program gives participating FIs a risk management tool to create creditworthy financing and allow projects to be funded that otherwise might not be funded because of credit risk concerns.

In conjunction with its FI partners, HEECP has developed financing products and supporting guarantee structures for EERE financing for a) multi-family housing, b) single family housing, c) municipal street-lighting, d) district heating, e) industrial cogeneration implemented pursuant to energy sales agreements, and f) hospitals, with financing offered both direct to end-users and to ESCOs. Financing structures have been adapted to the institutional and credit requirements of each type of end-user and include direct recourse to end-users, direct recourse to ESCOs and limited recourse project financing. The complementary technical assistance (TA) program is essential to the program's success through its support of the marketing of EE finance services by participating FIs and its help in identifying EE projects through energy audits. The TA program also supports EE project development and investment preparation, corporate finance advisory services to ESCOs and general EE market promotion and program evaluation activities.

West Nile (Uganda) Hydro Project Financing

Providing longer loan tenors can often address the need for long term debt capital that can reduce annual debt service to a level that better matches a project's stream of benefits. This need is often manifest for RE power generation systems. This approach can be critical to create affordable energy services. For example, in Uganda the West Nile Rural Energy Agency implemented a 5 MW small hydro project with support from a World Bank program that used concessional funds to allow Barclays, a commercial lender, to extend the loan tenor from seven to 14 years. This made the price per kWh affordable.

Given their lack of experience with this type of project and other financial market conditions, Barclays was willing to undertake a maximum seven year loan term for the project. The World Bank provided a form of partial guarantee on the loan. The guarantee amount was sized and structured to fully repay the remaining principal balance on the loan after seven years. By assuming all the loan exposure risk after seven years, the guarantee allowed a 14 year loan term to be used. To make the guarantee, the World Bank provided a cash instrument equal to the full guarantee liability amount. A zero-coupon bond was used that would have a future redemption value in seven years, equal to the agreed amount. At Barclay's option, this instrument can be redeemed at the end of the first seven year loan term to prepay the loan. If the project performs well and meets its debt service obligations, the parties expect that at the end of the first seven years, Barclays can simply extend its loan for the remaining second seven year term, and the WB guarantee can be retired.[20]

[20] This type of guarantee is very useful. In this case, however, because a cash-type instrument was used, it also required a large sum from the World Bank to implement. After seven years, the remaining principal on a 14 year loan will equal about 67% of the original loan principal. Depending on the effective yield on the zero-coupon bond, the purchase price of the bond will approximate 65% of the planned seventh year redemption

International Finance Corp. (IFC) Senior Loan Guarantee for EERE Projects in the Czech Republic

IFC, through its Commercializing Energy Efficiency Finance (CEEF) guarantee program has financed several grid-connected EERE projects by Cseka Sporitelna Bank (CSB) in the Czech Republic. These include wind, small hydro and bio-mass projects, all less than 5 MW in size. IFC has a Guarantee Facility Agreement (GFA) to provide a 50% pari passu (on equal terms) partial credit guarantee to CSB, facilitating the bank's financing many EERE projects. One 2 MW wind project was financed on a limited recourse project finance basis. IFC has $15 million in GEF funds in a first loss position supporting its guarantee liabilities, where any claims to the fund would come first from IFC and secondarily from CSB. IFC has approved undertaking guarantee liabilities of up to five times the amount of its GEF reserve funds. IFC has also developed first loss, subordinated recovery and portfolio guarantee structures for use in the CEEF program and the related Hungary Energy Efficiency Co-Financing Program, although the pari passu guarantee structure has primarily been employed for EERE project financing. IFC also provides technical assistance in loan structuring and appraisal, development of new financial products, and marketing and project pipeline development. These TA services have been critical and instrumental in engaging CSB effectively and making the CSB program successful.

A.8 DFI Mezzanine Finance Facilities

E+Co Central America RE Investment Fund Using Mezzanine Financing Instruments

E+Co has recently established an investment vehicle to provide innovative mezzanine and debt financing to clean energy enterprises in Central America and the Caribbean. The Central American Renewable Energy and Cleaner Production Facility (CAREC) signed their partners' agreement in August, 2006 to fund US$17 million of a total targeted capitalization of US$20 million. The target market is mainly RE projects, <5 MW typically, and mostly grid connected, but also including a range of

value based on a 6% yield. Therefore, the sum required to purchase the bond will be about 45% of the total loan amount. Thus, it would be costly in terms of concessional and development funds to replicate on a large scale. If this type of instrument were replicated, a guarantee program would be established whereby a local guarantor offers similar partial loan guarantee instruments for a series of transactions; concessional funds could be used as equity or as a first loss reserve by the guarantor to support undertaking such liabilities. The parties would need to agree in advance that the redemption option is available only if the project loan does not perform. Then, it can be estimated that only a portion of the guarantee liabilities will in fact be called. Then, total guarantee liabilities could be a multiple of the concessional reserve funds and the concessional funder would achieve better leverage of its resources.

clean energy enterprises. The CAREC facility will use mainly mezzanine-financing mechanisms such as subordinated debt, convertible debt, preferred shares and other quasi-equity structures. These instruments will strengthen the projects' financial structures and successfully leverage the always-needed senior debt component. The instruments are typically designed to earn a fixed rate of return, matched to the given project's revenue stream, and paid from revenues net of operating costs and senior debt service, plus additional returns in the form of profit sharing, ownership shares, and, potentially, acquisition and sale of carbon emission reduction credits. A maximum 25% of a project's capital cost can be financed.

CAREC provides flexible capital, like a strategic investor, that can help mobilize commercial and development bank debt from both local and international sources, thus helping to fill an important financing gap. E+Co Capital Latin America has secured a loan guarantee facility from the USAID Development Credit Authority (DCA) for support of private sector debt to the CAREC fund.[21] CAREC, managed by E+Co Capital Ltd., a subsidiary of E+Co, Inc., was initiated with core financial and institutional support from the Multilateral Investment Fund (MIF) of the Inter-American Development Bank (IDB). Also, with grant funding from MIF and the Netherlands Development Finance Company (FMO) the fund will have a Technical Assistance facility to help cover investment preparation and project and business financial advisory services.

A.9 Carbon Finance

India Compact Fluorescent Lamp Program of Activities

The Indian Bureau of Energy Efficiency (BEE) is piloting a program in Pune, India to support replacement of incandescent lighting with compact florescent lamps (CFLs) in the household and commercial sectors. Revenues from the sale of Certified Emissions Reductions (CERs) finance the program. The project distributes 500,000 CFLs manufactured by Siemens Osram to household customers of the Maharashtra State Electricity Board. Up to 450,000 households are eligible to receive up to two CFLs each of 15 or 20 watts to replace high usage incandescent bulbs, at a price roughly equal to that of an incandescent on the Indian market, or $0.32 USD. Program marketing will use door to door canvassing as well as being accompanied by an awareness campaign. This project achieves demonstrable GHG emission savings. Conservative estimates provided by the program designers calculate a total of 299,881 tonnes of CO2 will be avoided, producing an equal amount of CER's[22]. CFL's sold to households through this program must involve an exchange of the incandescent that is being replaced, which will then be destroyed to prevent future use.

[21] For more information, please see http://eandco.org/.

[22] 1 CER = 1 tonne CO2e.

The CFLs will be produced in India with German/Italian parts and technology which will create jobs and lower the mercury content compared to current Indian CFL production methods. Financially, the program is not profitable without the revenues available from the sale of CER's. The estimated full cost per distributed CFL for this project is approximately $4.20, and overall the project is estimated to cost approximately $2.2 million. Present value of CER revenues are estimated $4.2 million based at $24.00/CER, sufficient to buy down the costs of the CFLs to the price of the incandescent bulbs and pay for program operating costs. This approach appears to be a highly replicable production and distribution model.[23]

A.10 Specialized National Development Bank EERE Project Funds

The Bulgaria Energy Efficiency Fund (BEEF)

The BEEF was established in 2005 as a self-sustaining, public-private partnership to finance EE projects in the municipal, residential, commercial and industrial sectors. Seed funding of $10 million was provided by the Global Environment Facility (GEF) with additional funds from the governments of Austria and Bulgaria. BEEF provides technical assistance to its energy user clients to help prepare projects, and then provides loans for project implementation. BEEF built a project portfolio of over $32 million in just over two years of operation (as of June, 2008), many in the municipal and district heating sector. BEEF is considering ways to increase its capitalization, and could become a vehicle for commercial FIs to channel funds into EE projects. Its success, though small, demonstrates demand for adapted financing, and the importance of combining technical engineering capacity with funding capacity.

India Renewable Energy Development Agency (IREDA)

IREDA provides debt financing for RE and EE projects. It was incorporated as a government-owned company in 1987. It has received credit lines from the World Bank, ADB and KfW, amongst others, as well as grant support from the GEF. IREDA has built up its capability to originate clean energy project investments. It has developed significant experience and project finance capacities. Eligible borrowers include energy end-users, ESCOs, equipment manufacturers and vendors, and electric utilities. Small and medium projects are eligible. Projects as small as $200,000 and as large as $25 million have been funded.

IREDA also makes technical assistance funding available to help prospective project sponsors develop projects. This serves IREDA's development functions and builds the pipeline of prospective investments. IREDA invests mainly as a

[23] See Pune (India) OSRAM CFL distribution CDM Project, CDM Project Design Document, Version 03 – in effect as of: 22 December 2007; and, A. Mathur, "Cooperation for CM Project", 2nd Meeting of the Indo-German Energy Forum, 2007.

senior lender, loaning up to 80% of a project's total investment cost on terms up to 10 years with up to two year grace periods. IREDA has applied project finance principles to its investment structuring and underwriting, lending to special purpose project companies and ESCOs for example. Funded projects total over USD $1 billion and have included wind, hydro, bio-mass cogeneration, industrial waste heat recovery power plants, and industrial process efficiency. Industries include: steel, cement, sugar, chemicals, paper, textile and power generation. Special programs working with local commercial banks to fund energy efficiency projects with SMEs are also being developed to further extend IREDA's financial products to the SME sector. In India, the Energy Conservation Act of 2002 authorizes state governments to establish state energy conservation funds. IREDA, as a national entity, has the potential to replicate its capability by supporting the development of these funds.