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Financing Mechanisms and Public/Private Risk Sharing Instruments for Financing Small Scale Renewable Energy Equipment and Projects

Commissioned by

The Global Environment Facility (GEF)

and

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Energy Branch

Renewable Energy and Finance Unit

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Preface

This report, Financing Mechanisms and Public/Private Risk Sharing Instruments for Financing Small Scale Renewable Energy Equipment and Projects, was prepared by Mr. John C. MacLean, President, Energy Efficiency and Finance Corporation, and Ms. Judith M. Siegel, President of the Energy and Security Group, for the United Nations Environment Programme Division of Technology, Industry and Economics (UNEP DTIE), Renewable Energy and Finance Unit. UNEP commissioned this report to assess experience with and recommend designs for financial risk management instruments (FRMIs) that support scaled-up delivery and financing of small scale renewable energy (SSRE) projects. The assessment will provide guidance to the UNEP and the Global Environment Facility (GEF) to inform designs of future UNEP, GEF and other donor programs.

This report was guided by the management team of Ms. Aki Maruyama, Mr. Eric Usher, and Ms. Fatma Ben Fadhl of UNEP, and Ms. Virginia Sonntag-O'Brien of the Basel Agency for Sustainable Energy (BASE). Peer guidance and input to this study was provided by a Working Group on Small Scale Renewable Energy Technologies convened by UNEP. Working Group members included Ms. Judy Siegel, Working Group leader; Ms. Claudia Lucía Alvarado Ney, Banco Centroamericano de Integración Económica (CABEI); Ms. Anjali Shanker, GEF Scientific and Technical Advisory Panel; Mr. Pradeep Chauhan, ICICI; Mr. Alvaro Ponce, Isofoton; Mr. Hari Natarjan, IT Power India Pvt. Ltd; Mr. Martin Krause, United Nations Development Programme-GEF; and Ms. Myriem Touhami, UNEP.

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* Though some of these individuals have moved onto other organizations since the production of this report, the affiliations noted reflect their status during the time that inputs were provided.

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ADEME	Agence de l'Environnement et de la Maîtrise de l'Energie (French Agency for Environment and Energy)
ANME	Tunisia National Agency for Energy Management
APCF	Asia Pacific Carbon Fund
AREED	Africa Rural Energy Enterprise Development
BAPA	Baranguay Power Association
BIO	Belgian Investment Company for Developing Countries
BOOT	Build, Own, Operate and Transfer
BRI	Bank Rakyat Indonesia
CABEI	Central American Bank for Economic Integration
CAREC	Central American Renewable Energy and Cleaner Production Facility
CBP	Cooperative Bank of Palawan
CDM	Clean Development Mechanism
CEEF	Commercializing Energy Efficiency Finance
CERs	Certified Emissions Reductions
CLOs	Collateralized Loan Obligations
CO ₂	Carbon Dioxide
CREED	China Rural Energy Enterprise Development
CRREE	Centre for Renewable Resources and Energy Efficiency
CSB	Cseka Sportelna Bank
DBP	Development Bank of the Philippines
DCA	United States Agency for International Development (USAID) Development Credit Authority
DESI	Decentralized Energy Systems Private Ltd (initiative of ICICI)
DFIs	Development Financial Institutions
DHW	Domestic Hot Water
DVM	Developing World Markets
EE	Energy Efficiency
ESCOs	Energy Services Companies
ESD	Energy Services Delivery
FI	Financial Institution
Finnfund	Finnish Fund for Industrial Cooperation, Ltd
FMO	Netherlands Development Finance Company
FRMI	Financial Risk Mitigation Instrument
GEF	Global Environment Facility
GFA	Guarantee Facility Agreement
GHG	Green House Gas
GPMA	Guarantee Programme Management Agreement
GS	Grameen Shakti
GVEP	Global Village Energy Partnership
I&G	Investment & Guarantee Company
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IFI	International Financial Institution
ISLP	India Solar Loan Programme

KW	Kilowatt
kWh	Kilowatt hour
LGU	Local Government Unit
LPG	Liquefied Petroleum Gas
LRF	Loss Reserve Fund
MDBs	Multi-lateral development banks
MDGs	Millennium Development Goals
MEDREP	Mediterranean Renewable Energies Programme
MFI	Micro-finance Institution
MIF	Multilateral Investment Fund
MW	MegaWatt
NGO	Non-Governmental Organization
PCG	Partial Credit Guarantee
PCI	Participating Credit Institution
PLP	Practitioner Learning Program
PPAs	Power Purchase Agreements
PROSOL	Programme Solaire (in Tunisia)
PV	Photovoltaic
R&D	Research and Development
RCC	Rural Credit Cooperative
RE	Renewable Energy
RECs	Rural Electric Cooperatives
REDCO	Rural Energy Delivery Company
REDP	Renewable Energy Development Project
REEEP	Renewable Energy and Energy Efficiency Partnership
RESCOs	Rural Energy Service Companies
RFP	Request for Proposal
SCAF	Seed Capital Assistance Fund
SDF	Solar Development Fund
SEBs	State Electric Boards
SEEDS	Sarvodaya Economic Enterprise Development Services
SEEP	Small Enterprise Education and Promotion (SEEP) Network
SEF	Sustainable Energy Facility
SELCO	Solar Electric Light Company
SEWA	Self-Employed Women's Association
SHS	Solar Home System
SIDBI	Small Scale Industries Development Bank of India
SME	Small and Medium Enterprise
SPC	Special Purpose Company
SSPC	Shell Solar Philippines Corporation
SSRE	Small Scale Renewable Energy
STB	Société Tunisienne de Banque
STEG	Société Tunisienne de l'Electricité et de Gaz
SWH	Solar Water Heaters
SWHI	Solar Water Heating Market Transformation and Strengthening Initiative
T&D	Transmission and Distribution
TA	Technical Assistance
TNC	The Nature Conservancy

TREDF	Triodos Renewable Energy for Development Fund
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP DTIE	United Nations Environment Programme Division of Technology, Industry & Economics
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
Wp	Watt power

Introduction & Summary Recommendations

1.1. Report Objective & Target Audiences

1.1.1. Background: Financing for Energy Access. The United Nations Environment Programme (UNEP) has commissioned this study to assess experience with and recommend designs for financial risk management instruments (FRMIs) that support scaled-up delivery and financing of small scale renewable energy (SSRE) equipment and projects. The development of such instruments, and the design and implementation of related programmes, will be the subject of future UNEP, Global Environment Facility (GEF) and other international development initiatives. A main objective of this work is fulfilling the “energy access” agenda of GEF eligible countries: delivering energy services as a key component of programmes to alleviate poverty and promote economic development.¹

1.1.2. Target Audiences. This study is intended to inform designs of future programmes. Hence, this report addresses two main audiences:

(i) *programme strategists and policy makers*, in a range of government, international and development institutions, involved in setting strategies and allocating international development resources focused on climate change, promoting clean energy markets and investment, energy access and related Millennium Development Goals (MDGs) and creating enabling business environments via public policy; and

(ii) *programme designers and implementers*, including staff, consultants, and practitioners from government and development agency in cooperation with private sector firms (financial institutions and energy businesses) who design and implement finance and business development programmes in these markets.

For programme strategists and policy makers, this report provides assessment of current experience and strategic guidance and recommendations on design of new initiatives. For programme designers and implementers, it provides review of programme design options and descriptions of recommended instruments and mechanisms at a practical level of detail. Because such programmes aim to engage commercial and development financial institutions, develop SSRE industry delivery capacities, and build these markets, FIs and SSRE businesses are key constituencies of this report and it seeks to reflect their views accurately.

1.1.3. Resource Materials. To advance practice and research in this field, this report is accompanied by resource materials which compile both (a) public domain bibliographic

¹ Access to the efficient, affordable and reliable modern energy services is recognized as essential for sustainable development. Almost half of the world's population does not have access to modern forms of energy; some 2.4 billion people are still dependent on traditional biomass fuels to meet their cooking and heating needs, and 1.6 billion people do not have access to electricity. Much greater access to energy services is essential to address this situation and meet Millennium Development Goals (MDGs). The International Energy Agency estimates that if the MDG poverty reduction target is to be met, modern energy services will need to be provided to an additional 700 million people by 2015. Providing energy services makes rural economies viable and stems the flow of rural-to-urban migration. Renewable energy (RE) is a large part of this solution. RE resources are widely distributed and, with proper equipment and systems, can be captured to deliver economic rural energy services; financing is needed for these energy systems.

materials, and (b) sample documents and agreements corresponding to several of the financing mechanisms and instruments. These materials will be made publicly available on the project's website² and provided by UNEP DTIE Energy Branch upon request. The descriptions of the financing and credit enhancement mechanisms, coupled with the resource materials and illustrations of possible applications, are intended to make this report useful for practitioners.

1.1.4. Definition of SSRE Projects and Financing Needs

Three distinct types of financing needs are addressed in this report:

- *End-user finance* for individual/household stand-alone SSRE systems, typically less than 100 KW in size, such as solar photovoltaic (PV) and bio-gas systems, cook stoves and other equipment integrating energy supply and productive equipment; typically for lower income groups in rural, off-grid and peri-urban communities;
- *Business finance* for micro, small and medium size enterprises which deliver energy systems to these households and communities; and
- *Small scale project finance*, typically several hundred KW up to 5-10 MW in size, for such technologies as small scale wind, mini/micro-hydro and biomass systems; these can be either grid-connected or off-grid/community power systems.

The main focus of this Report are financing structures that meet the needs of households and small end-user markets in off-grid, rural communities, and the micro and small enterprises who serve them. In many cases, the same financing instruments and programme designs also apply to urban and peri-urban markets and SSRE applications such as solar domestic hot water systems and solar home systems for back-up power where grid power is unreliable. The primary FRMIs examined are:

- Credit enhancements backing consumer (or end-user) finance, including credit enhancements backing wholesale lending to micro-finance institutions (MFIs) for SSRE equipment on-lending to consumers;
- Credit enhancements backing SSRE business (or enterprise) finance, including discussion of enterprise development and innovation funding mechanisms;
- Financing mechanisms and risk sharing instruments for SSRE projects, including market aggregation and scale-up strategies.

Main findings and recommendations for these are summarized in Section 1.2, below, and then each topic is treated in greater detail in Sections 2, 3 and 4, respectively. Because this report is intended to inform the design of future donor programmes, it also addresses technical assistance (TA) programme designs related to each of these financial mechanisms and latest experience concerning justification and effective use of subsidies, i.e., public and concessional monies, to promote development of commercial markets for financing SSRE projects and equipment.

Section 5 concludes with a summary recommendation for programme strategists and policy makers at donor and development agencies for a new programmatic initiative: to set up an SSRE

² <http://www.unep.fr/energy/finance/risk>

Financing Support Facility. This Report provides a menu of mechanisms and TA activities. An SSRE Financing Support Facility would have funding to adapt and implement some of these mechanisms in particular countries and markets as opportunities are identified and selected. The Facility would be pre-arranged and available for certain (or all) countries and regions. Then, the Facility would seek out specific country projects and applications and have the menu of tools and funding readily available to be adapted and applied. Sample applications are given in Section 5.

1.2. Summary Recommendations

1.2.1. Consumer Finance. Consumer finance is a vital instrument to deliver energy equipment to households. It allows households to acquire equipment by paying over time, with monthly or periodic payments that are affordable.³ Those SSRE businesses that have achieved high levels of market penetration selling household energy systems, notably in India but also elsewhere, have a very high portion of their sales purchased by credit. However, consumer finance must be applied and promoted in those cases where the *market conditions are right and ready*. First, finance is necessary but not sufficient for expanded delivery of SSRE energy equipment and services. Before financing can be applied, there must be demand for financing on the part of consumers and capable SSRE vendors to deliver equipment and services. The SSRE enterprises drive the market by selling systems. So, market development must reach a level to generate sufficient and consistent demand to attract FIs to offer consumer financing. Second, there must be existing institutional capacities in the market place that can be recruited to deliver the SSRE equipment finance. Such capacities could include rural banking networks, micro-finance organizations, agricultural cooperatives or even electric utilities. These organizations can reach many households and implement the credit and collections systems needed to deliver financing.

Consumer Finance Mechanism. The design of effective appropriate consumer finance and of risk sharing mechanisms begins with the observation that the SSRE consumer equipment market consists of large numbers of very small projects. This creates challenges for consumer finance due to relatively high transaction costs per project. However, when pooled together 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 credit structuring is used. Based on these characteristics, the main elements of the most accepted and recommended methods to structure credit enhancements for SSRE equipment consumer finance in summary consist of:

(i) structuring the credit enhancement as either 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, Financial Institution (FI), Vendors (or ESCOs) and donor;

(ii) having the FI undertake Vendor Finance Agreements with qualified Vendors and require Vendors to provide forms of credit enhancements including buyback guarantees to repurchase equipment repossessed in loan default situations;

³ Grants and subsidies are often used to buy down the capital costs of energy systems and are combined with consumer financing programmes to make energy systems affordable, as per the ability to pay of target market groups.

(iii) applying additional complementary programme elements such as banker trainings, bank transaction cost support, incentives/subsidies to end customers, and SSRE business development programmes.

The Report includes full descriptions of the programme design concepts and mechanisms.

1.2.2. Mobilizing MFIs to SSRE Consumer Financing. Micro-finance institutions (MFIs) have developed tremendous capacities and networks to deliver small scale and micro-finance; these can potentially be tapped to deliver SSRE systems and finance. Testing and developing this thesis further as a programmatic initiative is one recommendation of this report. A new MFI initiative would need to build on and help coalesce existing efforts in this field. Its first goal would be to develop SSRE financial product(s) and other related business lines which would be attractive for MFIs to undertake and which would meet a market demand. Its second goal would be to undertake a series of investments. FRMIs can be useful to help pioneer new markets, e.g., guarantees to support MFIs to test new financial products and help extend loan tenors, and to provide risk cover for wholesale lending.

Wholesale MFI finance as a field has made major strides in the last two to three years, gaining access to commercial capital markets for MFI networks. Wholesale finance and related wholesale lenders and investment bankers may be effective entry points for organizing financial products and engaging MFIs. With the right kinds of tools and support, these organizations could potentially provide a channel to work with MFI networks. They could provide a node of communication with several MFI networks, help develop and market new SSRE financial products, deliver programmatic TA, and provide wholesale capital, potentially supported by a new FRMI. This is a relatively new opportunity and represents a potential scale-up strategy. Two levels of credit risk that can be addressed by an FRMI targeting SSRE lending by MFIs: (i) end-borrower credit risk which the MFI assumes when making equipment loans, and (ii) MFI credit and other risks which a wholesale lender assumes providing wholesale funds to MFIs for on-lending as SSRE equipment loans. Options for structuring a two-tiered risk sharing facility supporting wholesale finance for MFI on-lending for SSRE equipment are discussed.

1.2.3. Business Finance Programmes. Loan guarantee programmes are one main method to deliver finance to small and medium enterprises (SMEs), usually as debt and quasi-debt instruments. Improving access to finance for SMEs is a widespread and common economic development challenge and many programmes exist to address it. Many countries have state-owned and sometimes commercial SME loan guarantee agencies, sometimes as independent agencies or as units or programmes within their national development banks. These agencies represent existing capacities that can potentially be recruited and mobilized, with the right support, to deliver loan guarantees to SSRE businesses. A strategy and mechanism for this programme concept is described.

The SSRE business loan guarantee programme would be highly selective and seek SSRE firms which have strong growth potential but are capital constrained. The strongest SSRE companies will frequently have established networks of smaller SSRE equipment and service enterprises -- local franchises, dealers, collection agents, or service centres -- which help them cover an expanded geographic territory. Thus, the strong SSRE companies themselves are a platform for expansion, replication and scale up. The goal of this programme is to find and support these

firms. Even if only a few firms are chosen, the impacts can be large if the firms can achieve their growth goals and potential.

The leading edges of this programme concept are business and financial advisory TA services offered to the SSRE companies. In effect, the business loan guarantee programme must follow the delivery of these services. In general, it is recommended that these activities be managed by an active programme manager different from the Guarantor. The programme manager could be a consultant organization, an NGO, an SSRE industry, an SME business development specialist with a strong knowledge base of the SSRE industry. Relying on the Guarantor and/or lenders to drive the programme is often ineffective. At the same time, the availability of finance, supported by the guarantee, can help drive development of good business loan proposals, so the guarantee programme can be readied as the delivery of business development services ramps up.

An SSRE SME guarantee could start as a transaction-oriented pilot scale programme, and then be increased in size as loan demand develops and more qualified SSRE companies are identified to participate. To develop the pilot programme, to test its thesis and develop its methods in practice, the programme manager could move immediately to identify several SSRE companies which are good candidates, who need financing and credit support, and then conduct appraisals on them, in conjunction with the selected Guarantor and prospective lenders. A key aspect of this strategy is to make it easy for the Guarantor to participate, to have the SSRE SME guarantee programme “piggyback” on an existing SME guarantee programme. Thus, its start-up costs for the Guarantor would be minimal. Guarantee terms would be similar to those the guarantor offers for other types of SME lending.

Enterprise Development and Innovation Funding Mechanisms. A successful SSRE equipment delivery and finance programme needs all the following elements: FIs who can deliver financing, and SSRE businesses who can market, deliver, and provide equipment and services within enabling business environments. Financing programmes without local capacities to market and deliver SSRE equipment and services would be premature and would not work. FRMIs supporting consumer finance, via commercial and micro finance institutions, and SME business loan guarantee programmes, are all necessary and can support business growth. But SSRE businesses need several types of funding and support including enterprise development TA services, equity funding, and creative grant funding for business innovation to penetrate and reach challenging market areas and segments. In many markets these services should be primary. This section describes and assesses SSRE enterprise development, innovation and finance methods currently that can be applied in the context as one component of programme designs.

1.2.4. SSRE Project Finance. Senior loan guarantees and subordinated debt financing facilities are two key types of FRMIs for supporting financing of SSRE projects. They enhance the overall credit structure of projects and help mobilize senior debt.⁴ The subordinated debt facility offers greater promise as a structure to be supported by concessional funders seeking to

⁴ Targeted FRMIs supporting specific project risks -- such as construction, operations, fuel supply and off-taker purchase commitments -- are best structured with the commercial parties involved, i.e., through the construction, operations, fuel supply and off-take agreements themselves and the plans to fulfill them. The corporations entering these contracts with the project sponsor can provide additional backing for their contractual commitments as needed. In certain markets, third-party guarantees backing power purchase commitments of electric utilities are conceivable as an effective instrument to mitigate one key project finance risk, but are probably most feasible for larger grid-connected projects.

promote SSRE project finance as it appears to offer greater leverage of concessional funds and also benefits for the project sponsor by reducing sponsor equity requirements. An indicative programme design and sizing for an SSRE project finance subordinated debt facility is provided in Section 4.3.2. Such a programme should be accompanied by TA to support preparation and planning for sound projects, in all their elements, and by strategies to aggregate the market.

1.2.5. Programme Recommendation: Establishing an SSRE Financing Support Facility. This Report describes several SSRE financing mechanisms and programmes, for the three types of target SSRE markets: consumer finance, business finance, and project finance. To support further initiatives and applications in this field, establishment of an SSRE Financing Support Facility is proposed. Such a Facility would provide funding and TA to implement SSRE financing and risk sharing mechanisms. Applications would be identified in particular countries and markets; these could be identified by Facility staff in collaboration with other organizations such as the REDCO Alliance and Renewable Energy and Energy Efficiency Partnership (REEEP), and/or via a call for proposals process designed to source and qualify potential applications. Identification of many good applications will require active outreach and development work by the Facility. Sample applications are discussed in Section 5. The Facility could be available to support projects for certain or for all GEF-eligible countries and regions, to be determined. As specific country projects and applications are identified, qualified and selected, the Facility would have a menu of tools and funding readily available to be adapted and applied. The Facility will be able to respond quickly to quality applications. By being quick and nimble, with tools at the ready, the time required to move from project concept through design and into implementation can be greatly reduced, compared to normal donor-supported processes. The Facility Operations Group would become a knowledge centre on these financing and TA methods, would compile information, case studies and methods and would share these for adaptation and replication. The Facility would provide on-going support to country-based project implementation teams and support development of in-country SSRE business and financial advisors with expertise in this field.

The typical loan size is a key parameter for design of a Facility. The three types of SSRE markets discussed herein -- consumer finance, enterprise finance and project finance -- have individual projects ranging widely in size and due to budget limitations likely should be addressed by different facilities. A typical budget for a new Facility developed by UNEP is in the range of \$3-10 million. Therefore, it is recommended that UNEP focuses on a Facility that would address a combination of consumer finance and micro- and small enterprise finance, and wholesale micro-finance for the same. There are strong synergies between these initiatives in three areas. Such a programme with a budget in the range of \$3-10 million could be undertaken which would support a series of applications big enough to have significant development impacts in their respective markets. SSRE project finance, because it deals with relatively larger project investment sizes and hence requires relatively more concessional funds for an effective programme, would be the subject of a separate facility.

2. CONSUMER FINANCE PROGRAMMES

2.1. Key Issues in Structuring Financial Products & Guarantees for SSRE Consumer Equipment

Key topics in structuring financial products and supporting guarantees for financing SSRE consumer equipment include:

- transaction size and target market characteristics;
- security and credit structure of the loans for lender and, if applicable, for guarantor;
- creditworthiness of the target class of borrowers, how to analyze it and manage it;
- who is the borrower, (a) the end-user, or (b) the SSRE system vendor or service company;
- defining the chain of the financial intermediation and the source of funding for making the loans;
- collateral value of equipment and how to realize it in default situations;
- transactions costs management, in loan origination;
- billing and collections and loan administration, including methods in recovery and to make guarantee loss claims;
- defining supporting roles for equipment and service vendors, often memorialized in a Vendor Finance Agreement between the FI and vendor;
- marketing plans and strategies to generate and scale up deal flow and expand geographic coverage of the products;
- maintenance and after-sales service;
- finance terms and making an affordable attractive offer to the customers.

All of these elements must be addressed to create a successful SSRE financing product and programme. Creating adequate loan security for the lender is a central task, and guarantees can help accomplish this. A guarantee can also be designed to allow the lender to offer more favourable financing terms to borrowers, e.g., with less or no additional collateral, longer tenors and perhaps lower interest rates. FRMIs, or other support such as TA and training, can be applied anywhere there is a gap amongst the set of elements required for a successful programme. Equally critical is organizing the SSRE equipment and service delivery capacities to create sufficient demand for financing in order to make the financial product viable. Both the supply and demand sides of the finance equation must be evaluated and addressed in the programme design.

2.1.1. Typical SSRE Equipment & Transaction Size. Typical SSRE equipment for households, micro-and small enterprises and community institutions include solar PV and bio-gas systems, end-use equipment such as cook stoves, and end-use equipment with integrated energy systems such as PV-powered commercial lighting, pumping, refrigeration and water purification. Most experience in this market is with solar PV home systems (SHS). Financing and guarantee structures suitable to this market can also often be appropriate for and adapted to other SSRE equipment markets. The size of individual transactions can range as low as \$200-500 and as high as several thousand dollars; the lower end of this range is typical for household systems. Thus, two key common characteristics of the SSRE consumer finance market are: (i) large numbers of very small projects, and (ii) borrowers which have typically lacked access to credit. Any SSRE consumer finance program and supporting FRMI or guarantee must be designed with these characteristics in mind.

2.1.2. Security and End-User Credit Risk. The main issues to be addressed to mobilize FI financing are:

- customer credit risk: can the customers meet their finance payment obligations?
- security structure: if the customer has problems, becomes unable to repay and then defaults on payments; how will the FI be repaid? What are the FI's alternative means to recover its investment?

A guarantee instrument offers credit enhancement to address these issues and should be designed to *supplement* the end-user credit and security that can be arranged on a normal commercial basis between the customer, Vendor and FI.

The objective of the financial risk management instrument is *not* to support financing to borrowers who can not repay; rather, the objective is to mobilize financing for those borrowers that can, but which may not have access to finance or otherwise meet the FI's underwriting guidelines. The FRMI will mitigate the FI's risks so that the FIs are willing to lend, and do so on terms that are attractive to the borrowers and move the market.

Normal security for an SSRE equipment financing will consist of several elements: a) customer payment obligation, b) first security interest in the equipment, and some plan to realize its collateral value, c) recourse, credit enhancements or other services from the Vendor, and d) FRMIs provided by third-parties, e.g., those supported by concessional funding.

The borrower's ability to pay in many cases may be difficult to quantify. Typical data points used by lenders in other countries and contexts to determine household and micro-enterprise creditworthiness -- such as employment, income, home ownership, credit card payment history, utility bill payment history, bank checking account balances, bank references, etc. -- may not be available or relevant. One simple means is to require a down payment or security deposit from the borrower, using their ability to assemble the down payment as primary evidence of ability to pay. Methods to assess credit must be defined by lenders who would know their given markets. An FRMI can support lenders to test new markets so as to gain experience. Creditworthiness is determined not only by *ability-to-pay* but also by *willingness-to-pay*. Willingness to pay in the case of SSRE equipment is generally very high because the energy services they provide improve quality of life and productivity.

2.1.3. Transaction Structure: Who is Borrower from the FI. Two basic structures are used. In the first (Model 1), the end-user or consumer is the borrower from the Financial Institution (FI). The SSRE system vendor ("Vendor") makes the sale, helps arrange the financing between the end-user/consumer and the selected FI (usually according to pre-defined terms), and completes the installation of the system. The Vendor may also provide some additional after-sale services, such as maintenance and extended warranties. The FI provides direct financing to the borrower, directly assuming customer credit risk and likely assuming all billing and collections responsibilities.

In the second (Model 2), the Vendor or energy services company (ESCO) is the borrower from the FI. The Vendor, from the customer's point of view, provides the financing for the SSRE system, along with the sale, turnkey installation and any other services. There are many ways to structure the Vendor/Customer contract, principal ones being: instalment purchase (rental)

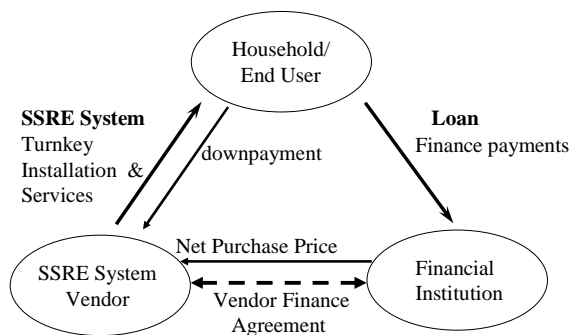
(Model 2 in diagram, below), and fee-for-service (Model 2a). Typically, with an instalment purchase, the customer acquires ownership of the system with payments over time; the Vendor is, in effect, on-lending to the customer. The Vendor would borrow from the FI, providing assignments of customer payments and equipment assets as primary security for the loan, in which case the Vendor assumes the end-user credit risk. In the fee-for-service arrangement, the Vendor typically retains ownership of the equipment, provides full maintenance services, for the monthly customer fee. There are hybrids and variations of this basic model.

Model 1 is the most typical and acceptable structure for the Vendor, mainly because the Vendor does not assume any financing obligation nor take the financing on its balance sheet. Model 2 may offer some advantages for marketing purposes, but requires more equity from the Vendor and capabilities and willingness to perform finance origination and administration functions and assume greater financial risk. In both models, it is possible for the Vendor to provide some limited recourse to share in the customer credit risk assumed by the lender pursuant to a Vendor Finance Agreement between Vendor and FI; vendor finance programmes are discussed below.

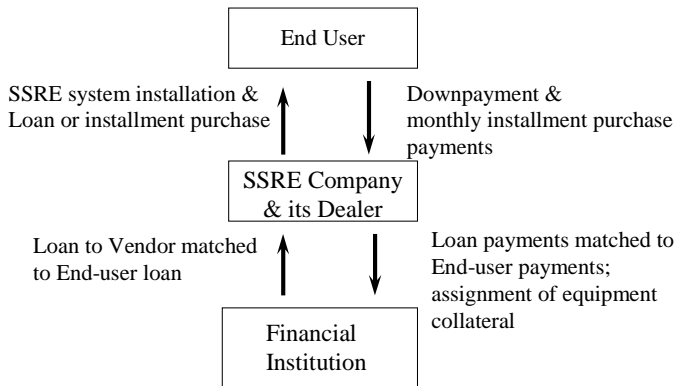
For the purpose of structuring guarantees, it is important to (i) understand which transaction structure(s) will be used in the given target market, and (ii) design the guarantee programme in order for the guarantees to be flexible to support the various structures the market is generating so it will have the broadest possible application.

Forfeiting is another type of transaction structure which can have application for SSRE consumer equipment finance, and is a useful variation of Model 2, depicted as Model 2b, below. In this structure, the equipment Vendor provides the loan to the Customer. Then the Vendor assigns and sells the customer payment stream and all related security to the lender. This assignment is acknowledged by all parties, including the customer. The customer then makes its payments directly to the lender. The Vendor receives payment for the equipment and does not retain the loan on its balance sheet. The lender assumes the customer credit risk. Credit support from the Vendor can be included in this arrangement, using the range of vendor finance techniques. The Vendor's maintenance and service obligations are typically expressed in a separate agreement.

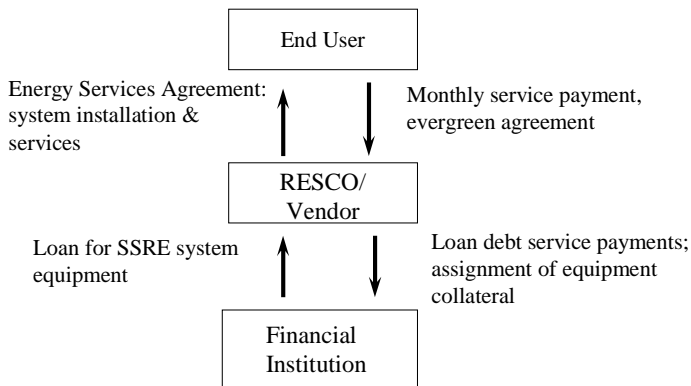
Model 1: End-User as Borrower:
Vendor Finance Program



Model 2: Vendor as Lender

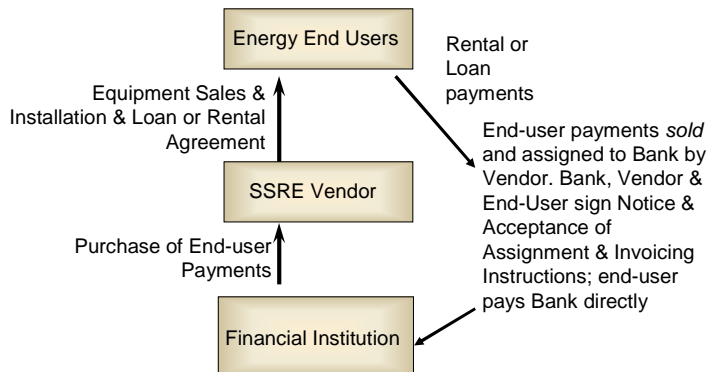


Model 2a: RESCO Fee-for Service



Model 2b: Forfeiting

**Vendor makes loan to End-User;
Vendor sells this payment stream to Bank**



2.1.4. Stages of Financial Intermediation. Because financing SSRE equipment involves micro-loans in rural and sometimes remote market areas, raising and delivering the financing to SSRE markets can require extra stages of financial intermediation. In the simplest case, the FI lends directly to the end-user. In some markets, such as India with its strong rural banking network, these capacities exist, and many FIs are already engaged in SSRE finance. In other markets, such as many areas in Africa, they are weak or non-existent, and must be built. Other areas often have existing rural institutions which deliver short term working capital financing to their members and clients and have established credit analysis and loan collections capacities, such as rural credit cooperatives in China or agricultural cooperatives in the Philippines and other micro-finance institutions (MFIs) of various types; these institutions can potentially be recruited to deliver SSRE equipment term loans provided they have wholesale funding and proper training.

In designing a programme for a particular market, the full chain of financial intermediation must be defined. The risks assumed and the TA needs *at each level of intermediation and for each party involved in the value chain* must be assessed and addressed. For example, as MFIs are engaged to deliver SSRE financing, both credit risks assumed by the MFI while lending to its borrower and the credit risks assumed by the wholesale lender while providing medium term loans to the MFIs for SSRE may require credit enhancement to help these parties pioneer a new market. In the simplest case where the FI will lend directly to the customer a primary level of risk protection exists and can be addressed as required.

2.1.5. Dealer Financing. “Dealer financing” is another form of financial intermediation and refers to financing terms provided by an SSRE equipment supply company to SMEs which purchase and then re-sell the equipment to end-users, usually in more remote areas, and in small quantities. The dealers could be micro-enterprises or other small businesses or retailers. Dealer financing is often short-term, 6-12 months, and allows the dealer to inventory equipment for resale without having to fully pay for the equipment first, but rather pay the supplier from the proceeds of the sale to the final customer. The dealer may also offer short term financing to the customer, and match the customer payments with dealer payments to the supplier. The dealer typically assumes the full customer credit risk in this case. The ability to offer dealer financing can increase an SSRE equipment company’s sales and represents a need for short-term financing. Where applicable, this form of financing should be supported by any programme design.

2.1.6. Collateral Value. The collateral value of SSRE equipment can be an important component of loan security structure in many cases. SHSs tend to have a relatively high collateral value. The PV panels have a useful life of 20+ years, often have warranties of 10+ years and typically represent 50%+ of the total installed cost of a system. Collateral value of other components varies, but the PV panel value is reliable and can be repossessed in event of loan defaults. Further, the ability to sell and reinstall panels in subsequent installations exists in more mature SHS markets.⁵ Several companies (e.g., SELCO, Soluz, and Grameen Shakti) report successful experience repossessing panels, though cases are relatively rare and it can be difficult to repossess equipment inside a home. For financing to rely more on the panel’s collateral value, one suggested approach is to require customers to purchase and own the indoor system components and finance only the longer-lived and more easily repossessed outdoor PV

⁵ Development of used PV panel markets will be served if warranties are assignable/transferable to subsequent panel owners.

panel components. This would increase the overall down payment requirement, but make the financing more secure and possibly also allow loan tenors to be extended, reflecting the PV panel's long asset life.

To realize the collateral value of the equipment, an FI typically relies on a buyback commitment of the Vendor, and on the terms and price agreed in the Vendor Finance Agreement. Responsibility for repossession of the equipment must be defined and is typically assumed by the Vendor. However, it should be noted that in less mature markets, Vendors may not be able or willing to make repossession and buyback commitments.

To confirm that this buyback commitment is valuable, Vendors in turn may be required to provide security, reserves or cash collateral equal to some appropriate fraction (e.g., 10-15%, reflecting a relatively high default rate) of their total buyback liability. If and when the credit quality of the vendors' buyback commitment is questionable or not demonstrable financially, some funds backing the Vendor buyback commitments are needed. For example, in one Indonesia SHS financing programme, cash reserves for the Vendors' buyback commitments represented an important use of concessional funds. This approach can be incorporated into an FRMI guarantee structure.

Micro-hydro, wind power and other equipment can also have good collateral value, for some equipment components. Other SSRE systems have lower collateral value. For example, bio-gas systems used for decentralized cooking and lighting are made largely from simple non-reusable or local low grade materials (plastic, earth and masonry) materials. In this case, collateral cannot be part of the loan security structure.

2.1.7. Finance Terms & Achieving Affordability. Making the SSRE equipment sales offer *attractive and affordable* to the target customers is a key goal of a financing programme which an FRMI would be designed to support. Financing terms must be established based on market conditions and negotiations with the Vendor(s) and FI(s). Discussion of some key financing terms and how they can be influenced by the FRMI design follows.

a. *Finance term* must be matched with the customer ability to pay. Longer terms mean lower monthly/periodic payments but at the same time, a longer/higher risk profile. SSRE equipment loans to household and micro-enterprise end-users are typically one to three years, and have up to five in some cases.

Lengthening loan tenors can be an objective of an FRMI design and lead to greater affordability. If the tenor can remain well-matched with the equipment asset life, then this approach can be prudent. For example, for a \$400 SHS (typical price for a 40-50 Wp SHS, all in), lengthening the tenor from three to seven years could reduce monthly payments almost in half, from \$10.63/month to \$5.65/month⁶. At some point, the advantages of a lower monthly payment are offset by the considerably higher total loan interest the borrower must pay.

⁶ Calculation based on \$400 total system cost, 20% downpayment, net loan principal of \$320, interest rate of 12%, monthly payments in arrears. A ten year tenor results in a \$4.59 payment; lowering the interest rate from 12% to 6%, reduces the monthly payment to \$3.55.

b. *Customer down payment.* A down payment of minimum 10% to as much as 30-40% of total SSRE system cost is typical. The down payment is often expressed as two to three months of monthly payments, including, for example, the last 1-2 months payments as a security deposit. The FI would keep the interest earned on customers' security deposits as a means to boost their yield and offset transaction costs. Higher down payments reduce loan size, reduce monthly payments, improve loan-to-value ratios, and thus reduce lender risk. Requiring the customer to assemble a sizeable down payment can also be a good proxy for future ability to pay, demonstrating income and giving the customer a larger stake at risk should the customer default. Lower down payments make the financing offer initially more affordable to the customer and the down payment must be sized so as not to represent a barrier to participation. These are competing objectives.

c. *Interest rate.* Interest rates are typically based on market rates. FRMIs, by reducing lender risk, can result in lower rates to customers. FRMIs can also help MFIs and smaller FIs access wholesale funds at more attractive rates, and these savings can be passed through to customers.

d. *Payment schedule.* While monthly or quarterly payment schedules are typically preferred, to give the lender a regular check on the borrower's financial condition, in some markets, e.g., herdsman and farmers, cash income is seasonal and semi-annual or even annual payments are needed to match the borrower cash flow. An FRMI could be designed to allow a lender to accept such an altered payment schedule.

2.1.8. Billing & Collections. An effective cost-efficient billing and collections system is an essential component of a financial product, and an extra challenge in delivering finance in rural areas. The billing and collections system must include plans for rapid action in response to late pay and inchoate default situations. Borrowers must be contacted promptly to discover the nature of the problem, and provide appropriate time and support to cure. In the event of default, rapid action should be taken to repossess the equipment. The understanding needs to be clearly established that late payments lead to repossessions, or some other community action; at the same time, this action plan must be designed in ways that are culturally appropriate for the communities, and allow all parties to save face and find solutions. Community institutions can play this role. Where borrowers have bank accounts, preferred drawing rights can be established with the borrower's bank account, allowing automatic monthly deductions for the loan payment.

An SSRE consumer finance programme will have a big challenge if it seeks to create collections capacities anew. A far better strategy is to identify and build on existing collections capacities in commercial banking, rural banking, MFI and cooperative institutions, large employers and even utilities. Two examples are payroll deduction schemes, and energy utility collections schemes.

Payroll Deduction Schemes. To enhance the dependability of collections, households may pledge income from existing income sources. A frequently used approach to financing consumer durable goods is via payroll deduction programmes. The participating FI would establish a prior arrangement with the employer for this purpose. The payroll deduction arrangement is a form of financial risk management instrument. The credit structure of the finance programme is based on the credit and reputation of the employer, and the employment history and income of the employee's. To qualify, employees would typically have to have minimum employment tenure, e.g., 1-2 years, and a strong employment record. Once a programme is set up, the qualified

employees can access financing for equipment by authorizing the lender to deduct the loan payment directly from the employee's payroll. Loans will typically be 2-4 years, with low down payment requirements, rapid (1-2 day) credit approval and a small origination fee. Loans are generally unsecured except by the equipment itself and the payroll deduction authorization. The employment relationship also provides a ready and economic means of loan payment collections on an aggregated basis and also a means for rapid analysis and scoring of an individual's credit.

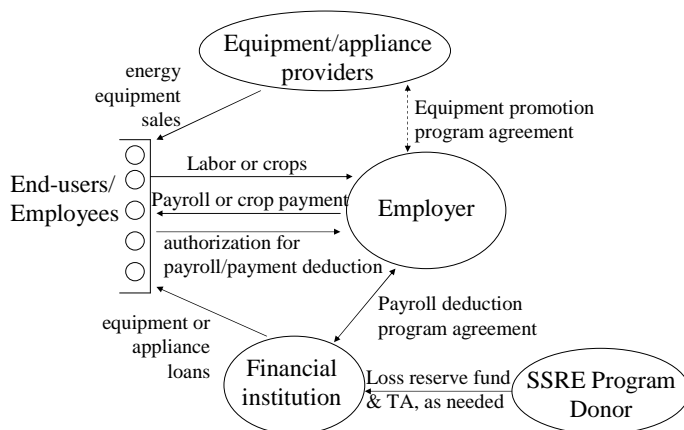
SSRE and energy efficient equipment and appliances could be qualified for purchase under such as programme, for example, solar hot water heaters, solar home systems, bio-gas systems, and, in urban areas, efficient models of appliances such as high efficiency refrigerators and air conditioners. Eligible appliances that qualify as energy efficient can be determined by the programme donor. SSRE and EE equipment providers and retailers can initiate such programmes by making agreements with employers. Employers can also be a channel for information on and marketing SSRE equipment to employees.

Government ministries for health and education commonly have large numbers of low income employees, often in rural areas as teachers, school workers, health clinic workers, etc. These employees can be served by payroll deduction schemes, and may become leading adopters of new SSRE technologies and can serve to open SSRE markets in their communities. Government ministries sponsoring payroll deduction programmes for their workers can thus serve two purposes: the energy access needs of their direct employees and indirect energy services market development benefits, especially if deployed along with other complementary programmes.

A variation of this scheme is to work with larger firms which process agricultural commodities. Agri-business firms which process agricultural crops (or similar firms processing for example hogs or fish) frequently buy from many small producers, for example, palm, coconut and other crops. These firms can also sponsor payroll deduction type programmes. Loan payments would be deducted from the crop payments made by the agri-business firm to the farmers.

Figure __ diagrams of a typical scheme.

Payroll Deduction Equipment Finance Scheme



Energy Utility Collections Schemes. Another collections method used for small energy efficiency equipment, e.g., compact florescent lamps, and potentially applicable to SSRE is to use electric or other utilities as collections agent, collecting loan payments as part of the utility bill. Collections costs are lowered by use of the existing system and collections performance is enhanced given the discipline of utility payments and the threat of suspending utility service in event of non-payment. In Tunisia, for example, the electric utility collected payments on loans for solar domestic hot water systems. This method can work in grid-connected urban areas.

2.1.9. Maintenance & After-Sales Service. There is certainly a connection between the customers' willingness-to-pay and continued successful functioning of the SSRE equipment. If the system is not functioning, the borrower customer is much less likely to pay. Thus it is material for the lender to assure that adequate arrangements exist for system maintenance and after-sale service. These are normally provided by the Vendor; the FI must qualify Vendors in this regard. FIs may even require that borrowers enter into service agreement coterminous with the financing. At minimum, the availability of these services needs to be established so the customer has clear means to fix problems as they arise. TA programmes can help build these capacities.

2.2. Vendor Finance Programmes

Vendors play several key roles in a financing mechanism and related credit structure, potentially including:

- marketing the financial product along with the equipment
- performing certain loan origination functions at the point of sale
- after-sales service, to assure functioning of the equipment
- equipment repossession and buyback or remarketing services in default events
- possibly billing and collections or other loan administration functions
- limited or full recourse to contribute to credit enhancement.

A vendor finance programme is a programmatic relationship between an equipment marketer, or "Vendor", and the FI designed to support the vendor's SHS equipment marketing and provide financing to the customer at the point of sale⁷ and is typically documented in a "Vendor Finance Agreement" between the FI and a Vendor. Vendor finance programmes are common in other equipment markets -- e.g., for cars, computers, construction equipment -- and are increasingly being used for SSRE equipment.

For the Vendor, the availability of financing, on pre-established terms and procedures, will increase sales. Thus, the Vendor is motivated to provide certain services and credit support to the partner FI. For the FI, such programmes create a flow of financing business and aggregate financing demand for many small projects. Further, the Vendor markets the FI's financial services and helps with loan origination, thus reducing the FI's transaction costs, and the Vendor can provide certain credit enhancements for the loans, helping the Bank offer loans to more customers.

⁷ Typically the FI lends to the Vendor's customers. Alternative structures can be use, , 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 or rental or installment purchase agreement with Customer, and then Vendor sells this payment stream to FI, i.e., a forfeiting structure.

“Vendors” can also include vendors of end-use equipment, e.g., water purification systems, or pumping systems, which integrate energy systems with their end-use equipment.

- 2.2.1. Vendor Finance Programme Agreements. The Vendor Finance Agreement defines:
- standard financing terms the FI can offer the customers, including rates, terms, documentation and security requirements,
 - procedures to market and originate loans, including marketing literature, loan applications, credit underwriting guidelines and credit analysis procedures,
 - equipment, services and credit support from the Vendor, and
 - other terms, e.g., on fees, exclusivity (or non-exclusivity), confidentiality, term, etc.

Sample Vendor Finance Agreements are included in the resource materials.

2.2.2. Credit Enhancement Techniques in Vendor Finance Agreements. The Vendor may be willing to provide certain credit enhancements to support FI lending so as to expand access to loans for Vendor’s customers. Typical types of credit enhancements are briefly described below. These descriptions are provided to stimulate discussion about possible structures.

- *Remarketing or Buyback Agreements.* In event of default by the borrower, FI or Vendor will repossess the equipment. The Vendor could commit to remarket the equipment or to buy it back, providing a means for the FI to realize the collateral value of the equipment.
- *Full or Partial Recourse on the Loans.* The Vendor can assume some defined liability to cover a portion of losses due to loan default, up to a defined limit of liability. The liability limit could be set at a fixed amount, or as a percentage of the original principal, or as a percentage of the current outstanding balances of all Loans under the programme.
- *Fees for Extra FI Loss Reserves.* The Vendor could pay a fee to the FI, equal to some fraction, e.g., 2-4%, of the amount of the Vendor’s equipment sale. The FI could use these fees as additional reserves against potential losses on loans.
- *Holdbacks or Partial Financing.* Another way to create reserves is for the FI to hold back from the Vendor a portion of the vendor's equipment sale price against the risk of future default for all leases in the portfolio. Holdback monies would be remitted back to the vendor when the lease portfolio matures. A portfolio approach is generally taken which allows holdback monies on performing loans to be used to recover losses on non-paying loans.

In general, the Vendor must be sufficiently strong financially and well-established to undertake provision of the defined services and limited recourse to result in meaningful credit enhancement for the FI. Security and cash collateral, including that provided by an FRMI, can help back the Vendor’s obligations and make them reliable for the FI.

2.2.3. Vendor Finance Programmes and Transaction Cost Management. A main goal of a vendor finance programme is to reduce and manage FI transaction costs. This is accomplished by defining standard financing terms and documents, having the Vendor assume some of the administrative responsibilities associated with originating financing, and spreading programme

set-up costs over a series of transactions. The FI may charge a programme set-up fee to the Vendor to start and an origination fee. Often, business volume targets are set and fees reduced as targets are achieved. Minimum fees may be charged regardless of actual business volume.

2.2.4. Conclusions about Vendor Finance Programmes. Vendor finance programmes or various types have broad application for SSRE finance and can play an important part in the credit structure of such programmes and hence will often be incorporated into the design of related FRMIs. Vendors typically drive SSRE equipment markets. They are the interested entrepreneurs who profit from equipment sales. FIs follow when creditworthy demand for financing is demonstrated.

There are cases where FIs have led SSRE market development. For example, Grameen Bank in Bangladesh began its own energy services business, Grameen Shakti; to serve its existing micro-finance customers and build off its MFI infrastructure; this business performs many vendor functions. In Hungary, Raiffeisen Leasing, a subsidiary of Raiffeisen Bank, started a programme to finance efficient gas heating systems and other EE equipment to households; Raiffeisen set up its own network of equipment vendors and small contractors to market and deliver the equipment, installation and services, in collaboration with gas utilities. These cases are the exception.

2.3. Guarantees Options & Design Criteria

2.3.1. Guarantee Structure Options Using Concessional Funding. Many banking system have plentiful liquidity but these funds are not provided to priority development projects due to credit risk barriers, real and perceived, and other market conditions. Guarantees can mobilize these resources by sharing in the credit risk of project and equipment loans financings which the FIs provide with their own resources. Guarantees typically support local currency lending, thus avoiding foreign exchange risks associated with hard currency lending, risks which many borrowers are ill equipped to assume.

Development agencies and multi-lateral development banks often use concessional funds in guarantee structures. Typical structures include: (i) *pari passu* partial guarantees, (ii) subordinated recovery guarantees, (iii) portfolio first loss and second loss guarantees, (iv) loss reserves, acting like first loss guarantees, and (v) liquidity support guarantees. In all of these cases, the concessional monies are used as reserves against guarantee liabilities.

Important features of a guarantee include: definition of event of loss which triggers the guarantee payment, the risk sharing formula, timing and calculation of guarantee claim payment, responsibilities for collections against defaulting borrowers, disposition of recovered monies, maximum single loan guarantee exposures, guarantee approval and issuance procedures, and guarantee fees. Typically guarantees are partial, that is they cover a portion, 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 their 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.

The risk sharing formula and amount of the guarantee must be defined and is typically expressed as a percentage, e.g., 50%, of the FI's remaining principal balance at the time of the loss or default. (In some cases, a guarantor may also cover past due interest, but this is less common.) When a default occurs, then a guarantee claim payment would be made to the FI for the agreed portion of the loss. 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 FI must share recovered monies proportionally with the guarantor, the *pari passu* structure is weaker as a credit risk management tool; for the FI 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.

A *subordinated recovery guarantee* acts just like a partial parity guarantee *except* in the dispositions 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 guarantor. This approach makes the partial guarantee much more meaningful to the FI and powerful as a tool to create creditworthy financing packages, even at lower percentages of guarantee coverage.

Portfolio guarantees are applied to portfolios of loans and typically distinguish between first losses and second losses on the whole loan portfolio. Portfolio guarantees have good application when the loan portfolio being covered consists of a very large number of smaller and relatively more homogenous loans, as is the case with the SSRE 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 for 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.

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 and 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. If a portfolio consists of five equal size transactions, even a single default results in a 20% loss on the portfolio, in which case a reserve of 10% to even 20% could be fully spent with one default. If the portfolio consists of 2000 equal size transactions, a single default results in a maximum 0.05% loss, and a reserve of 10%, for example, where the FI is estimating default rates at <10%, would be very meaningful as a credit enhancement instrument.

In some cases, an FRMI, 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 cures, if that is judged a good prospect as a means of avoiding final default and loss. This approach is being used in a World Bank GEF guarantee programme in the Philippines supporting loans to rural electric cooperatives (RECs) for making power distribution system upgrade 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 declare default on and accelerate a loan for which payments are past due, it is better to seek work out remedies. Loan acceleration always remains an option.

2.3.2. Guarantee Design Criteria. Design of an appropriate FRMI 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, expand their risk profiles and horizons, and provide the kind and amount of support needed to meet their lending criteria and credit requirements and mobilize their lending for the target markets, while also maintaining and aligning incentives of the parties 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 programme, in ratio to (B) the amount of concessional funding provided. In guarantee structures, leverage can be achieved at several levels of financial intermediation. Each structure option should be assessed for this metric.

At the individual loan level, the *pari passu* partial guarantees provide leverage according to the guarantee percentage, e.g., on a 50 % guarantee leverages, \$1.00 in guarantee liability leverages \$2.00 in lending. If the project sponsor also provides owns funds equal to 20% of the equipment cost, then the total investment is \$2.50. Further, the guarantor may be willing to take on guarantee liabilities as a multiple of the concessional funds available as guarantee reserves. A typical ratio is between 2-5 times, knowing that the likelihood of all guarantees being called is quite small; the guarantor can prudently assume guarantee liabilities equal to several times their reserves. If the guarantor is so willing, this approach can provide significant additional leverage of concessional monies; this leverage ratio, maximum guarantee liabilities as multiple of guarantee reserves, is a key aspect of negotiation in the arrangements with a guarantor.

With subordinated recovery guarantees, a lower guarantee percentage can be used to provide the same or even greater level of risk protection to an FI and therefore achieve greater leverage. Loss reserves can often achieve even greater leverage, as they are typically sized to be a margin above the estimated default or loss rate. If the loss reserve equals 10% of the total original principal of a loan portfolio, \$1.00 in loss reserves can support \$10.00 in lending; if a portion of the loss reserves is contributed from the commercial parties involved, e.g., FI and vendors, then leverage of concessional funds is increased.

Subordinated recovery and first loss guarantees and loss reserves all take on incrementally greater risk. Therefore, the likelihood that these funds will be spent to cover loan losses is greater. Retrospectively, leverage can also be measured as the ratio of (A) total loans and/or project investments supported, to (B) actual concessional funds expended in loss claims.

Flexibility, Suitability, Replicability. The instrument should be suitable and matched to the types of financial products that meet the needs of the target market, address market barriers and conditions. It should also be flexible to support the range of financial products that can be developed to meet market needs. Transaction structures include: (i) loans to end-users; (ii) loans to SSRE enterprises for on-lending to end-users (via rental and fee-for-service arrangements) being sure to cover not only credit risk exposure of the lender, but also some of the credit risk exposure of SSRE enterprise to the end-user; (iii) loans to SSRE enterprises for on-lending to dealers; and (iv) small business loans to SSRE enterprises for both working capital and plant/equipment term lending. The selected instruments should apply to a range of small scale renewable energy technologies and applications, including biomass, photovoltaics, small scale geothermal, small scale hydropower, small scale wind, and solar thermal and for a variety of applications, including remote, stand alone, and mini-grids for consumptive, productive, and social end-uses. FRMIs should be matched up to support SSRE delivery mechanisms that aggregate end-users and the demand for capital and hence creates sufficient business scale. Selected instruments should be replicable across a range of financial institutions in other countries/regions.

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

Commercial Viability and Pathway to Commercialization. Instruments proposed should work with and support commercial parties, incorporate commercial financing and strengthen, not distort, the marketplace. They must address market barriers, meet the specific needs and business objectives of the SSRE business and the customers, support financing that is matched to the economics of the SSRE projects and the customer's ability to pay so as to create a marketable and offer to the customers, and achieve a distribution of roles and risks that meets the objectives of all parties. The programme should define a pathway for declining public support over time and a vision for how the SSRE financing systems can proceed on a full- or near-commercial basis following completion of the programme and how the capacities of all parties to do so will be built.

Many of these objectives can be served by related TA programmes.

2.4. Recommended FRMI Structure for SSRE Consumer Finance

Based on this review of SSRE end-user market and financial product characteristics and guarantee structure options, the main elements of the most accepted and recommended methods to structure credit enhancements for SSRE equipment end-user finance can be summarized, as follows.

- Structure the credit enhancement as either a first loss portfolio guarantee or a loss reserve scheme. Both these structures take advantage of a portfolio approach to credit structuring. Both will use a risk sharing formula designed to cover a large portion of first losses on the SSRE loan portfolio, with appropriate risk sharing amongst the several parties: FI, Vendors (or ESCOs) and donor.

- Undertake Vendor Finance Agreements with qualified Vendors. Require Vendors to provide some forms or combination of credit enhancements including: buyback guarantees (to repurchase equipment repossessed in loan default situations to realize the collateral value of equipment where applicable), fees or contributions to loss reserves, and limited or full recourse on the loans.

2.4.1. Portfolio Approach to Credit Structure & Use of Loss Reserves. The SSRE equipment market generally consists of large numbers of small projects. This creates challenges due to relatively high transaction costs per project. However, when pooled together 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 credit structuring is used. A portfolio of SSRE loans will typically be built up to have hundreds if not thousands of transactions. Each loan will have certain security. At the same time, an estimated default rate can be planned for in the credit structure of the portfolio as a whole. Sufficient loss reserves can be included into the finance structure to cover the planned level of losses. Then, the lender will remain whole, at least to recover principal, at loss levels at or below the planned level. Loss reserves can come from several sources: finance pricing in fees and spread, contributions from the Vendor, and supplemental funds from concessional sources. A first loss portfolio guarantee acts like additional loss reserves for the FI.

2.4.2. Guarantee versus Loss Reserve Structure. If a guarantee is used, the entity which makes the guarantee, i.e., the "guarantor", must be determined. Donor funds would be used as reserves backing the guarantor's liabilities. Some development banks, e.g., International Finance Corporation, or Asian Development Bank, can serve as guarantor directly. Other development banks or donor agencies setting up guarantee programmes can not act directly as guarantor and so must recruit, select and motivate a guarantor to operate a programme. This task can prove difficult and time-consuming. National development banks or other state-owned loan guarantee agencies are typical candidates. The guarantor may lack motivation and understanding, or may also be risk adverse in ways similar to local FIs, and hence unable to move the market. At the same time, engaging a local FI to serve as guarantor can build local capacities and provide the basis for market delivery of on-going guarantee products as part of a programme's long-term commercialization strategy. For example, with a guarantee, second loss coverage can be layered into to a portfolio guarantee product, if needed. Or, the same guarantor who offers end-user finance guarantee product could offer guarantees for larger loans, e.g., targeting SSRE businesses or community scale RE systems.

If a loss reserve scheme is used, donor funds would be contributed to the loss reserve and a guarantor is not needed. Rather, a financial institution is needed to hold, manage, reinvest (in permitted investments) and disburse the loss reserve, serving as a fiduciary, trustee or escrow agent. This FI could be the lending FI, but it must be judged whether having the same FI manage the reserve which is also the lender could pose a potential conflict of interest. In most cases, a separate escrow agent will be selected. The management of the loss reserve would be the subject of an Escrow Agreement, or similar instrument, between the lending FI, the escrow agent and the donor agency. Such an Escrow Agreement must provide clear unambiguous instructions and algorithms to the escrow agent regarding the how the loss reserve monies are to be managed and rules for their disbursement. In general, the responsibilities of an Escrow Agent are easier and simpler than a Guarantor. Further, the Escrow Agent assumes no risk, other than fiduciary responsibilities to execute the Escrow Agreement terms. So, an Escrow Agent is an easier position to recruit, compared to a Guarantor, and a loss reserve scheme may therefore be quicker

and easier to implement. The Escrow Agent will need to earn fees for performing its functions. These could derive all or in part from interest earnings on reserve funds.

2.4.3. Key Terms of Recommended FRMIs. Key terms of a consumer finance portfolio first loss guarantee or loss reserve scheme are discussed below.

Risk sharing formula. The risk sharing formula defines how losses are distributed amongst the parties and what portion is covered by the credit enhancement instrument. These terms must be matched with the terms of the loan financial product and the perceived risk profile of the target borrower market. Risk sharing should be designed to maintain incentives from all parties for good loan origination and administration and avoid the “moral hazard”.

Loan underwriting guidelines are agreed up-front, and cover standard loan terms, loan security, and credit analysis procedures and approval criteria. The lender can proceed to originate loans according to these guidelines. The guarantee is intended as a back-up method for the lender to recover principal in loss situations. Good design of the collections and security primary methods should be employed first. But, when these fail, the guarantee should provide reliable loss coverage.

The risk sharing formula for both a portfolio first loss guarantee starts with a definition of “first losses”, defined typically as all losses up to a percentage, e.g., 10%, of the total original loan principal on all loans in the portfolio. This sizing is a point of negotiation with the FI. To give the FI strong risk protection, the first loss percentage can be sized to be *greater* than a reasonable worst case estimate of customer defaults. The guarantee or loss reserve would then be drawn upon to pay for an agreed portion, e.g., 75-100%, of all losses up to this defined limit.⁸

Similarly, loss reserves would be sized for a planned loss amount, e.g., 5-20% of the original principal amount of the loan portfolio. The sizing is determined according to the level of risk protection needed by the FI to enter and deliver financing to the target market. Loss reserve funds would be drawn on to cover all or an agreed portion of principal losses the FI incurs in the event of borrower default on the covered loans, net of monies recovered through liquidation/resale of subject collateral, up to a planned loss percentage. In effect, the LRF acts as cash collateral for the FI’s loans. The loss reserve can also be used to back a Vendor’s buyback guarantee.

Loss reserves can be funded with monies both from concessional sources and the partner FI, even from vendors. A typical formula could start with a 15% loss reserve, with 2/3’s or 10% coming from the donor source, and the balance coming from the FI, and a portion from the Vendor. As payment performance history is established, the levels of loss reserves (or first loss coverage) can be diminished. Initially, a large portion of loss reserves can come from the concessional/donor source. Overtime, the loss reserves can derive from and be built into the finance and equipment transactions themselves, so that this mechanism is commercially viable on its own.

⁸ A portfolio first loss guarantee could also include second loss guarantee coverage. “Second losses” would be defined as all losses in the portfolio after the first losses. The portfolio guarantee typically covers a lower share, e.g., 0-50%, of the second losses. In most cases on SSRE loan portfolios, second loss coverage is not necessary. Loss or risk tiers within a portfolio can be further divided, if needed.

Donor funds would be distributed according to donor policies. A separate “deposit account” can be created by the Escrow Agreement to hold donor funds ready to be committed by transfer into the loss reserve account in the proper proportions as the loan portfolio builds. At the end of the portfolio life, any remaining loss reserve balances would be distributed to their contributors in defined proportions and priorities.

It is important for the implementing agreement to allow for redeployment of donor funds if the guarantee or loss reserve facility remains underutilized. Further, if one portfolio is closed and another is opened, then uncommitted funds can be deployed for the subsequent portfolio; the creation of a new portfolio also allows for renegotiating the risk sharing formula. If the planned loss rate is reduced, this reduction can come mainly or solely from donor contributions. Thus, a smaller amount of donor funds can support a greater amount of financing.

If the FI is lending to the Vendor or Energy Services Company, then the structure must be modified so that some portion of the guarantee or loss reserve scheme should be applied to cover the end-user credit risk which the ESCO assumes. [Note: More needed on this point.]

Maximum Single Loan Size. A maximum single loan exposure is also defined, to assure that no single loan is disproportionately high share of the portfolio and maintain portfolio diversification. This is an important decision as it will affect the SSRE equipment market that can be addressed by the FRMI. End-user finance for single household systems will typically range in cost from a few hundred to perhaps \$1000. However, to allow the loan programme to also address other markets, a maximum single loan size perhaps as large as \$2000-10,000 could be considered. A parameter could be agreed to that no more than, 10-20% of loans by number or 20-30% of loans by cumulative original principal be in loans of greater than a given amount, say \$1000, thus allowing a portion of the portfolio to be in the relatively larger loans. In this way, the same programme that treats the household market could also support financing for SSRE equipment micro-enterprise or small community systems. These numeric values are offered as examples, only, and must be geared and sized to address the target market. The general principal is to design the FRMI to be both flexible and resilient as a credit risk management tool.

Availability Period. The portfolios need to be closed end, so a period of time (“Availability Period”) during which new loans can be added to the portfolio will be defined and the portfolio closed after that deadline or when the portfolio of target size is reached. This deadline could be extended, or a new portfolio started. If the portfolio is closed at a size smaller than targeted and budgeted, then uncommitted reserve funds can be distributed back to the donor or redeployed for a subsequent portfolio.

Definition of Loss. The amount of loss is typically defined as outstanding principal only. It could include past due interest, also, but this amount is typically limited, e.g., to a maximum two months accrued interest, so that the guarantee liability can be calculated and capped. Loss is also *net* loss, after deducting for the collateral value of the equipment that is realized through a Vendor buyback guarantee, as applicable.

Definition of “event of loss” which triggers guarantee claims payments (or disbursements from a loss reserve) is a key component of a guarantee design. For a guarantee to be effective, the lender must know that the guarantee claim payment will be made by a date certain. If the guarantee

claims payment is made only after all recovery remedies are exhausted, then the timeframe for the lender to receive the guarantee payment can be extended and uncertain, especially in markets where the legal processes are cumbersome and lengthy.

The typical definition of “event of loss” in a guarantee is when a loan is accelerated (called) by the lender and certain recovery action is taken, e.g., the system is repossessed, or other legal filings are made. This definition needs to be unambiguous, and worked out according to the given legal circumstances and lender requirements and practices of the given market. Evidence of Vendor payment under its buyback commitment combined with full reporting on outstanding principal of the defaulted loan can constitute complete and acceptable evidence of event of loss. In general, for SSRE equipment, given the small loan sizes, the claims process needs to be quick and reliable and the transactions costs associated with collecting guarantee claims kept low.

Claims payment system & collections timetable. The FRMI guarantee design must be integrated with this collections process and timetable. A typical collections timetable for SSRE equipment finance to small borrowers is below.

Collections Timetable	# days past
Loan Collections Action	pmt due date
Normal grace period from payment due date	10 days
Late payment penalty imposed	25 days
Default declared	30 or 45 days
Notice of loan acceleration given	60 days
Equipment repossessed	60-90 days

This timetable can be modified as applicable, allowing for less or more time, depending on the business and cultural circumstances. To cover the risks associated with late payments, defaults and costs of repossession, the financing terms can include security deposits from the customers. Late payments are often associated with particular events in a borrower’s life, e.g., a storm, crop loss, extraordinary household expenditure for health or other reasons, or simply bad financial planning. Such deposits can help prudently bridge the time and loss associated with an extended timetable, giving more time for cures to be worked, e.g., loan restructuring. The lender or other responsible party must make a judgment whether a particular borrower is suffering from a temporary cash flow shortage which can be remedied with additional grace period or loan restructuring or whether it faces imminent default and repossession which should just be accelerated. When MFIs are lenders, peer pressure and other community support can help find solutions.

Responsibility for Recoveries. Responsibility for recovery processes have to be assigned in the guarantee design. These can be assumed by the FI, its local agents or the Vendor. In the Indonesia programme, the Vendor provided full recourse to the lender and assumed all repossession and recovery responsibilities. The costs associated with recovery actions must be weighed against the prospects of recovery. In general, given the small size of SSRE loans and the nature of the borrowers, a certain level of losses is planned for in the credit structure of the portfolio and finance pricing. In event of default, repossession action is taken to recover collateral and no further collections actions taken against defaulted borrowers.

Portfolio monitoring, tracking & reporting. All loans covered under the guarantee or loss sharing scheme must be tracked and scheduled to guarantee or escrow agreement and are typically given a unique identification number. A report form is typically agreed to perform this function, typically monthly. Data the report would track includes: new loans added to the portfolio during the applicable reporting period and their principal amount and terms, cumulative portfolio data and outstanding loan principal, payment receivables aging on the portfolio, defaulted loans during the period, net loss claims payments due for the reporting period, and balances in the loss reserve (or remaining guarantee commitment). A sample form Monthly Report is included as Annex A to the sample Loss Reserve Fund Escrow Agreement.

Guarantee fees. Fees for the guarantee or the loss reserve coverage can be charged in the implementing agreements. Both the FI and the Vendor can pay fees. To encourage market development and utilization of the FRMI, these fees are typically set at a concessional pricing level. Loss reserves and first loss guarantees assume high risk. In effect, they act like additional loss provisioning for the FI, almost like equity, but for a targeted purpose. Thus, a market price would be very high.

The credit enhancement provided or supported by the donor programme can act as a direct substitute for an FI’s normal loss provisioning. Guarantees from IFIs with “Aaa” credit ratings, e.g., IFC and ADB, are recognized by the Bank of International Settlements, and by most country central banks and bank regulators, as providing strong reliable loss coverage with a risk weight of zero, and the FI which is the guarantee beneficiary can reduce their statutory loss provisioning in direct proportion to the risk assumed by the Aaa-rated guarantor. Loss reserves in the form of cash collateral (e.g., on reserve pursuant to an escrow agreement) should act similarly. These risk sharing instruments can also help a bank meet its capital adequacy requirements. In cases where an FI is equity constrained in terms of building new loan assets, these credit enhancements can function like bank equity, and the interest earnings on loans supported by the credit enhancement can result in a boost to their return on equity. Thus, a bank may not need to pass on all guarantee fees to their borrowers. The relevant bank regulations vary country to country and need to be researched as part of any specific programme design.

Assignment. The FI which benefits from the FRMI coverage can be allowed to assign guarantee or loss reserve claims payments, with approval. Such assignment could support the FI in seeking and securing wholesale lending for the SSRE loan programme, a process which should be encouraged and supported as needed.

2.4.4. Programme Sizing Example. A sample loss reserve scheme is illustrated in Table 2.1. Both the risk sharing formula and the programme sizing are described.

Table 2.1: SSRE Consumer Finance Guarantee Programme – Sample Risk Sharing Formula & Programme Sizing Calculations

Risk Sharing Formula		
1	Planned Loss, % original portfolio principal	20.00%
2	Equipment collateral value, realized	50.00%
3	Net Planned Loss, % original portfolio principal	10.00%

per Vendor
Agreement

Party	Distribution of Losses up to Planned Loss %	First Loss liability as % original principal
4 Donor share	80.00%	8.00%
5 Vendor share	0.00%	0.00%
6 FI share	20.00%	2.00%
Guarantee Programme Sizing		
7 Donor funds for Loss Reserve, maximum liability	\$1,000,000	
8 First Loss Liability as% original principal	8.00%	
9 Maximum portfolio that can be supported	\$12,500,000	
10 Average loan size	\$500	
11 Total number of loans in portfolio	25,000	
12 customer down payment, % project cost	20.00%	
13 Subsidies, as % project cost	0.00%	
14 Total SSRE equipment investment	\$15,625,000	

In this example, a planned loss percentage is set at 20% (line 1). In other words, the loss reserve will be sized to make the FI fully whole if losses on the whole portfolio are less than or equal to 20% of the total original loan principal in the portfolio. This rate is very high, and could likely be lower. Perhaps such a high rate would be needed to recruit an FI to pioneer a new market; the appropriate percentage must be determined through market research and FI negotiations. A portion of losses would be covered through buyback commitments from the Vendor. This value is set at 50% of each loss (line 2). This would be appropriate, for example, in the case of solar PV home systems, but the willingness of vendors to provide such a commitment would have to be tested and negotiated. Further, some backing for the buyback commitment would have to be determined. Thus, the planned net loss percentage would be 10% of the original loan portfolio principal (line 3). The planned risk sharing formula for these losses would be 80% by the donor, via the loss reserve, and 20% by the FI; the vendor is assumed to share 0%, but rather provide its recourse via the buyback guarantee (lines 4-6). If the full planned loss rate were to materialize, these shares of the net losses can also be expressed as a maximum % of the original loan principal (also lines 4-6, second column) and these values can be used to size the overall programme. If the donor can contribute \$1,000,000 to a loss reserve (line 7) then the maximum loan portfolio (original principal) can be calculated (line 9) at \$12.5 million. If the average loan size is \$500, then the programme could support up to 25,000 loans (lines 10-11). If the customer provides an average down payment of 20% of total project cost, and assuming 0 subsidies, then a total investment in SSRE equipment of \$15.625 million can be supported.

All of these values are examples only and have to be geared and negotiated according to the needs and capacities of specific parties and their commercial market circumstances. Donors could consider phasing a programme, for example, allocating a portion of available funds to a first tranche or portfolio, then gearing the risk sharing formula for subsequent portfolios according to experience gained.

2.4.5. Implementing Documents and Agreements for Consumer Finance FRMIs. Implementing the FRMI and finance programme will require developing and concluding agreements between the key parties. Such agreements can include:

- Vendor Finance Programme Agreement
- Loan product term sheet

- Request for Proposal (RFP) or other guide to qualify and select Vendors
- Escrow Agreement & Term Sheet for a Loss Reserve Fund

Samples of these types of documents are provided in the resource materials. Banker training materials for an SHS finance program, developed by Winrock India, is also included.

2.5. Consumer Finance Programme Examples

This section provides several leading examples of consumer finance programmes which incorporate financial risk instruments and illustrate the mechanisms described above. These examples do not cover the field, which is expanding rapidly. They do, however, provide instructive experience and their methodologies are worthy of study for adaptation to new applications. In some cases, more detailed case studies can be found in the bibliography and implementing documents and agreements are included in the resource materials. The examples are:

- SELCO India,
- UNEP India Solar Loan Programme,
- UNDP Palawan, Philippines Solar Home Systems Finance Programme,
- Indonesia Solar Development Fund SHS Consumer Finance Programme,
- Tunisia PROSOL Solar Water Heating Equipment Finance Programme.

2.5.1. SELCO India.⁹ SELCO India started operations in 1995 and is one of the world's most successful rural SSRE enterprises. Its experiences, focused in several states of Southern India (Karnataka, Kerala and Andhra Pradesh), demonstrate the importance and effectiveness of consumer finance programmes to reach high levels of market penetration. Financing is a key part of SELCO's business and strategy. SELCO does not provide financing directly but has set up financing arrangements with several FIs and MFI. India has a strong rural banking network, a legacy from initiatives begun in the early 1970's during the prime ministry of Indira Gandhi which required commercial banks to establish a rural service presence as a condition of financial regulation and licensing and target a portion of their loan portfolio to priority sectors including agriculture. As a result, large commercial banks, such as Canara Bank, Syndicate Bank and others, have extensive rural branch office systems and affiliate rural banking networks. With considerable effort and innovation, SELCO has effectively engaged more than one dozen FIs, including MFIs, to provide financing for its products, mainly solar PV systems for home and micro-enterprise use and related end-use equipment (lighting, radio, televisions, sewing machines, soldering irons, etc.). SHSs are generally <100 kW and typically 35 kW systems. All the components of the PV systems are manufactured in India. SELCO has established company-owned service centres which do sales, installation and after-sale services and has developed a large network of agents and dealers to sell systems. As of fiscal year end March 31, 2005, SELCO had annual turnover of almost \$3 million and has installed over 50,000 SHS units.

SELCO is on a growth trajectory to install over 235,000 units by 2010 and is growing its business by expanding into new areas, adding new technologies, such as cook stoves, bio-gas systems and other household SSRE products, and applying innovative new business approaches, e.g., a street-vendor light rental programme, and collaborations with MFIs.

See the ⁹ Navigant Report, op. cit., page 50ff, for an excellent and complete case study of the SELCO experience. For more information: www.selco-india.com

It is key to note that over 90% of SELCO sales use credit from an FI partner. SELCO has pioneered and employed several methods to engage local FIs:

- FIs make loans are made on four to five year terms. Customer's monthly payments are typically close to the level of household's prior energy expenditures of 300 to 400 rupees (\$6 to \$9) per month.
- Using its own funds and in some cases grant funding, SELCO has paid banks a small closing fee for each loan closed; this helped address high transaction costs and keep loan pricing attractive for borrowers. Further, SELCO also provided a small security deposit to the banks equal to two months loan payments; these funds were deposited with the lending FI and applied the borrower's last monthly payments. The deposit therefore performs two functions: added security for the lender and also an incentive to the borrower to complete their monthly payments so as to earn the discount represented by these funds. This method was further applied and elaborated by UNEP India Solar loan Programme, (see below).
- SELCO also provides buyback guarantee to the FI to repurchase the SHS systems from defaulted borrowers. This is a contingent liability, not on the SELCO's balance sheet.

SELCO reports loan defaults in the range of 7% defaults, often related to drought or flood or poor financial planning on part of borrower (e.g., a wedding dowry uses all available cash), but ultimate losses to the lender have been very low to lender due first to loan restructurings and second to SELCO's buyback scheme. Over 10 years, SELCO reports that approximately 150 systems have ultimately been repossessed and that, generally, SELCO has recovered its buyback costs through the resale of the systems.¹⁰

2.5.2. UNEP India Solar Loan Programme. Starting in late 2003, the UNEP, with funding from the United Nations Foundation and Shell Foundation, has implemented its India Solar Loan Programme (ISLP) to engage and support local banks to offer household consumer credit for financing SHSs in the Southern India states of Karnataka and Kerala.¹¹ The ISLP's main components are: (i) loan subsidies for borrowers, distributed through participating FIs; (ii) transaction cost support in the form of fees to FIs paid per closed loan; (iii) qualification of SHS vendors and development of relationships between them and the FIs; and, (iv) training and other forms of institutional capacity building. Simplified loan terms and documentation and a rapid credit approval processes are used. Loans to households are on five year terms and down payment requirements are a minimum 15% of SHS cost, making the SHS loans more affordable.

ISLP has been very successful stimulating commercially-based SHS financing. It is worthy of close study as an exemplary programme. As of June 30, 2006, 17,127 SHS loans had been originated with ISLP support, through 2,076 bank branches. ISLP's methods are being replicated in other regions and by other FIs in India. The total ISLP budget was \$1,000,000: \$900,000 for

¹⁰ Personal report of Harish Hande, SELCO President.

¹¹ Please see "Indian Solar Loan Programme: Programme Overview and Performance Report", prepared by Crestar Capital, Mumbai, August, 2006, for a full summary; prepared for and available from UNEP. See also <http://www.unep.fr/energy/islp>

subsidies and \$100,000 for TA programmes and marketing support, including the transaction cost support.

Subsidy Structure. The loan subsidies have been characterized by UNEP as an interest rate subsidy, but in fact, the subsidy did not buy down the interest rate on the loan directly. The amount of the subsidy was calculated as an amount equivalent to buy down the loan interest rate, e.g., from 12% to 6%, over the term of the loan. This amount usually represented two to as much as six monthly loan payments on a five year loan. Then, this entire subsidy is passed on to the borrower on a back-end basis, at the end of the loan term. The loan payments were still calculated based on the prevailing commercial rate, e.g., 12%. The subsidy amount was then placed on deposit with the lending bank and applied to offset the customer's *last* several loan payments. Thus, the customer would only get the subsidy after successfully repaying the loan. This structure provided extra incentive for good loan payment performance. Further, the lender gets some added security as the subsidy amount is held by the lender in event of loan default. This method was developed by SELCO and replicated and expanded by the UNEP ISLP.

This structure provided benefits to all key parties: FI, vendor and customer. The subsidy was delivered by and through participating FIs. The FI marketed the loan product as having a below market interest rate, which was useful to stimulate the market. The subsidy stimulated sales as customers felt they were getting a good deal, both on the loan and the equipment. FIs have used the subsidy as a marketing tool. This design has some elements of a financial risk management instrument, as the back-end subsidy, held by the lender as a security deposit, provides additional security for the lender. Over the four year term of the Programme, the subsidy has been progressively phased out. The ISLP also provided lenders with a small transaction fee of approximately \$2.50/loan, paid in arrears based on the number of closed loans. Both of these subsidies have been phased out over the four year course of the Programme.

Vendor Finance Programme & Vendor Qualification. ISLP is in part a vendor centred programme. The ISLP included a system to qualify vendors. A request for proposal (RFP) process was used. Selected vendors then enter into Vendor Finance Programme Agreements with participating banks. Vendors are required to meet minimum technical specifications, provide long-term warranties on their systems, and have capacities to provide after-sales service. Vendors market the bank's financing at the point of sale and help with certain loan origination and loan application processing functions. Vendors also provide various forms of assistance or recourse to lenders in loan default events to buyback repossessed SHSs. The RFP document and the Vendor Finance Programme Agreement are included in the resource materials.

Engaging & Supporting Banks. Canara Bank and Syndicate Bank have participated. Both banks have strong rural bank branch networks and an affiliated "Grameen" or village bank branch system. The subsidy scheme was instrumental in engaging banks as it gave them a marketing tool to quickly ramp up their business. The ISLP also assure a flow of demand for the SHS loan product by establishing the vendor finance relationships with qualified vendors. Further, training to staff of bank branches was provided.¹² ISLP provided business planning assistance to participating FIs to define the methods and plans to market and roll out the SHS loan product, estimate loan volumes, and plan TA needs. And, the vendor roles in loan marketing

¹² Bank training programme materials for SHS lending developed by Winrock International are included in the Resource Materials.

and origination and the per loan transaction fee helped defray the relatively high transaction costs. UNEP reports that Canara and Syndicate are expanding their SHS loan operations in other states and that the Bank of Maharashtra, Vijaya Bank, State Bank of Mysore, Karnataka Bank, SEWA (Self Employed Womens' Association, an MFI) and others are launching SHS loan programmes.

2.5.3. Palawan, Philippines Solar Home Systems Finance Programme. The UNDP, with a small grant from the GEF, designed and has been operating a solar home systems financing programme in Palawan, Philippines starting in late 2004 as part of an effort to promote use of renewable energy and livelihoods support in rural areas. Palawan is an island province in the southwest region of the Philippines. Because of the island geography, more than 60% of all villages or baranguays lack grid power. Some have isolated mini-grids, but many households, even those living in baranguays will grid power, must rely solely on stand-alone household energy systems because of their far-flung locations. Solar PV home systems have a good application there for providing basic energy services. Shell Solar Philippines Corp. (SSPC or Vendor) has been active marketing and selling SHSs in several Palawan communities but sales momentum was hard to achieve due to lack of available consumer financing. Other vendors had not yet entered the market also for lack of consumer demand, inhibited by lack of financing.

UNDP, with their programme executing agency, the Centre for Renewable Resources and Energy Efficiency (CRREE), an NGO, set up a vendor finance programme involving SSPC and the Cooperative Bank of Palawan (CBP or Bank), a small local rural bank with total assets of approximately USD\$2 million equivalent. CBP had experience lending mainly working capital loans to farmers and fishers in many but not all regions of Palawan, but had not yet been in the business of providing term loans to households for consumer equipment.

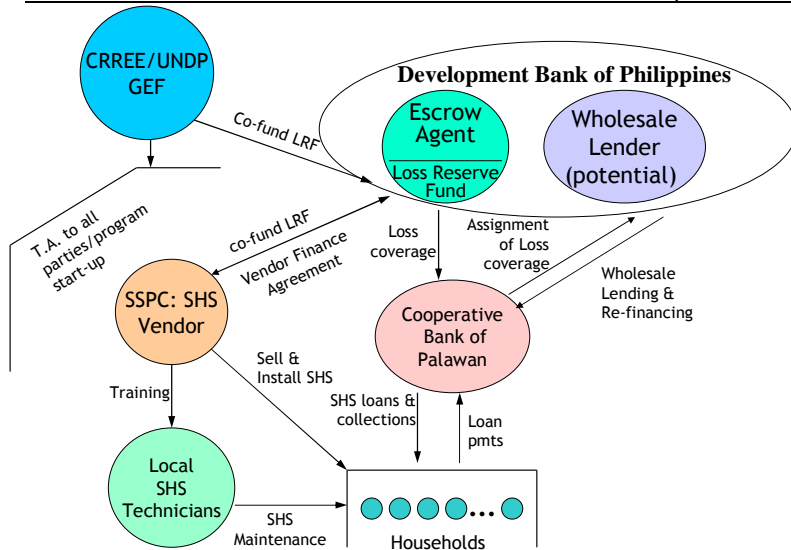
The programme design utilizes a loss reserve fund (LRF), co-funded by UNDP with GEF monies, to provide credit enhancement backing loans to households to acquire the SHSs. The vendor, SSPC, committed to a buyback scheme to repurchase any SHS's repossessed from defaulting borrowers for a price that was matched to value of the PV panel alone and would equal at least 50% of the remaining principal balance of the loan at any point in time. The LRF was sized to cover all the net losses (net of the proceeds from SSPC's buyback of the PV panel) for all defaulted loans up to a default rate of 20% of total loans, a high default rate, greater than the level expected. The LRF was majority (70%) funded by UNDP with the balance contributed by both the Vendor and the Bank. The typical loan term is four years. Customer down payments as small as but a minimum of 10% are required, plus a security deposit of two month's payments. On these terms, and given prevailing interest rates and SHS prices, the household's monthly payments for a 50 Wp SHS would be in the range of \$8-9 equivalent in pesos, generally considered to be an affordable price. SSPC provides system warranties to customers and train and set up a series of local technicians to provide after sale services.

The programme was implemented on a pilot scale with an initial deposit by UNDP of \$35,000, which, based on the leverage and gearing of the programme, could support financing of over \$400,000 in SHS systems, approximately 1200 SHSs. The LRF was deposited with Development Bank of the Philippines (DBP) which served as escrow agent. A "Solar Home Systems Finance Programme Loss Reserve Fund Escrow Agreement" was executed between UNDP, CBP and DBP. DBP is also considering providing wholesale loan funds to CBP to expand its lending resources for this programme. The design of this programme is depicted in Figure ___.

As of late 2006, CBP had financing almost 1000 SHSs. Further expansion of this system is possible with additional UNDP funds, and from a successor programme. Loan defaults have been low, less than 4% of total loans to date. Successor programmes can therefore use a smaller planned default rate to size the LRF and therefore achieve greater leverage of donor funds.

Figure __: Palawan, Philippines SHS Finance Scheme

UNDP/GEF SHS Direct Sales Finance Scheme, Palawan



Expanding this Scheme via Local Cooperatives. CBP does not offer financial services throughout Palawan. Therefore, UNDP designed, but did not implement, a programme to recruit agricultural cooperatives from barangays not served by CBP to participate in this programme as local lenders. Many such cooperatives already are in the business of providing short term working capital loans to their members and they file financial statements with the Provincial Government of Palawan Office of Cooperative Development. Interested cooperatives could be identified, assessed and qualified with this information. The local coop would provide community marketing and education, borrow wholesale funds from DBP or Landbank, another state-owned FI in Philippines serving rural communities, on-lend these funds to households acquiring the SHSs, and then perform loan administration and collections services. The LRF would help cover both (a) the credit risk of households assumed by the coops making the loans, and (b) the credit risk of the coops assumed by the wholesale lender. A TA programme to assist coops to set up, market and administer this new financial product was also envisioned. The Philippines, as in many countries, has a strong local base and network of cooperatives; these capacities can be tapped to deliver SSRE finance using this type of programme design.

2.5.4. Indonesia Solar Development Fund SHS Consumer Finance Programme. A pilot programme for financing SHSs was also developed and implemented by the Solar Development Fund (SDF) in 2003-4 and engaged Bank Rakyat Indonesia (BRI) a leading commercial bank with an established rural branch network. This programme had very low levels of use, primarily because the lack of a sufficiently strong SHS vendor base resulted in low effective demand for financing. BRI and other banks in Indonesia are highly risk adverse, especially following the 1997/98 financial crisis, and end-borrower credit risk constitutes a major barrier to expanded lending. This programme used a guarantee mechanism built around a vendor guarantee;

effectively the SHS loans to the end-users were fully guaranteed by the vendor. The vendor had to provide significant cash collateral backing this guarantee commitment. SDF provided loans to the vendors to be used as cash collateral; these funds were placed on deposit at BRI and had to be maintained at a minimum percentage (15% in this case) of the outstanding SHS loans which BRI made to that particular vendor's customers. The goal of the programme design was to have a simple structure which the banks would understand with a clear means for banks to recover principal in event of borrower loan default. In this programme, vendors provided full recourse for all SHS loans and would pay the bank for all loan defaults and then recover as much of their loss as possible through repossession and resale of the SHS. This was the selected guarantee mechanism in the Indonesia context, where banks are highly risk adverse. The programme had difficulty qualifying and attracting sufficient numbers of vendors with sufficient marketing and sales capability and financial strength to participate effectively. So, the question must be asked whether full recourse to vendors represents a reasonable and effective allocation of risk amongst the parties. Perhaps it was necessary to induce banks to lend, but this method can create barriers for vendors to participate and also balance sheet limits to the ability of qualified vendors to take on the guarantee, thus limited potential programme finance volume. The Indonesia market is evolving rapidly and new programmes by UNEP are under design consideration.

2.5.5. Tunisia PROSOL Solar Water Heating Equipment Finance Programme.¹³ UNEP is implementing an effective and innovative programme, PROSOL, for financing domestic solar water heater (SWH) equipment in Tunisia as part of its Mediterranean Renewable Energies Programme (MEDREP). Even with strong consumer confidence in the reliability of solar water heater (SWH) technology, the high initial cost of SWHs was still a substantial market barrier when compared to cheaper water heating alternatives such as gas water heaters. To address this barrier, PROSOL introduced a credit mechanism in 2005 and has resulted in greatly increased sales; domestic SWH sales reached a record 23,000 m² over the period April-December 2005.

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, including:

- A credit mechanism for SWH buyers, with loans provided, via the SWH suppliers, of up to a 5-year term and collection of principal and interest via the customer's electricity bill.
- A subsidy for each SWH purchase, provided by the Tunisian government, representing 20% of the cost of the system (up to 100 dinars or 62 euros per m²).
- Discounted interest rates on SWH loans for the year 2005-2006 with funds from MEDREP¹⁴.

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

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

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 the PROSOL financing up to market rates. The overall impact of this reduction was minimal as loan repayments only increased by about 2 Tunisian dinars per month.

supplier receives the subsidy payment from ANME of 200 dinars for the 200 litre solar water heater (2 m²) or 400 dinars for the 300 litre water heater (equivalent to 4 m²). The supplier also receives 750 dinars for the 200-litre water heater or 950 dinars for the 300-litre water heater directly from the bank. This sum represents a credit granted indirectly to the buyers of the solar water heater, via the SWH suppliers, and 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 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 programme is included, paid in part by MEDREP. The PROSOL slogan is: "Buy cheaper ...Pay easier."

PROSOL creates three decisive advantages. First, SWH subsidies and loans have led to a substantial increase in solar water heater sales. Second, credit recovery through STEG electricity bills lowers collections 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 has been effectively engaged in financing SWHs and has the necessary resources and abilities for granting loans and scaling up the programme. Three banks along with 11 suppliers are participating. This structure has potential to create a long-term commercially sustainable that can deliver credit even when the subsidies end.

UNEP's assessment is that the credit repayment through the STEG electricity bill is the decisive factor in the revitalisation of this market, offering credit security and making it easier for banks to participate as they trust STEG as a collections agent. Further, the contribution by UNEP-MEDREP and the low-risk involvement of STEG convinced the banks to accept a relatively low interest rate of seven percent. By comparison, the consumer credit alternative - the option initially recommended with interest rates of 12-13 percent - would have restricted the SWH market by increasing the borrowing cost. The Tunisian government closely follows the number of m² installed. As of November, 2006, over 23,000 m² have been installed for a total investment cost of approximately \$8 million and total lending of \$5.7 million. Sales forecasts for the next few years are as follows:

Year	2006	2007	2009	Total
Forecast number of m ²	55,000	80,000	100,000	258,000

The programme has ambitious growth targets and can also expand to financing SHWs for multi-family housing, commercial building and hotel applications.

Programme Limitations and Potential Improvements. Banks are fundamental to PROSOL, providing the financing needed to develop the market. From the bank's perspective, PROSOL is an "unusual" arrangement, as they have no direct contact with the end beneficiaries of the loans. To date, in order to offer the loans, the banks have required that the suppliers bear direct responsibility for repayment. The banks grant the loans to the solar water heater suppliers,

who then repay these loans over the 5-year period, with collections by the utility. With this system, the banks enjoy double security: the loans are officially granted to the solar water heater suppliers, who are responsible for repayments, and the banks benefit from the loan payment collections via the STEG bill.

This arrangement however is significantly limiting the scale up potential of the programme; the suppliers in effect take on debt on behalf of their customers but they have limited ability to take loans on their balance sheets. UNEP is assessing various options to eliminate this constraint that could seriously hinder market growth and prevent the government's highly ambitious targets from being reached. Resolving this constraint represents a potential application of a loss reserve fund credit enhancement mechanism and other commercial finance methods such as forfeiting.

2.6. Mobilizing MFIs for SSRE Equipment Consumer Financing

2.6.1. Background & Potential. An axiom for developmental work is to build on existing capacities. Micro-finance institutions (MFIs) have developed tremendous capacities and networks to deliver small scale and micro-finance. These can potentially be tapped to deliver SSRE systems and finance. Mobilizing MFIs for energy systems finance has been called “a convergence waiting to happen”. This is an operating thesis, which some organizations are exploring. Testing and developing this thesis further as a programmatic initiative is one recommendation of this Report.

The background and main bases for this recommendation are these.

- MFIs are a delivery mechanism. They are looking for new lines of business and financial products. SSRE equipment/systems are an excellent area to explore in this regard. Because energy access has such positive developmental and poverty alleviation benefits, an SSRE financial product is aligned with MFI missions. Participants in MFI networks generally have high interest to discussing and pursuing this topic.
- MFIs can offer SSRE loan products to household and micro-small enterprise end-users and also to the micro-small enterprises involved in delivering energy systems & services. SSRE systems can be linked to livelihoods readily via MFI networks, as MFIs mainly focus on working capital lending for productive micro-enterprises.
- Several organizations are looking at how capacities of MFIs can be harnessed to deliver financing and sales of SSRE equipment, and what types of support are needed. Global Energy Village Partnership has a study underway with Citibank funding. The Small Enterprise Education and Promotion (SEEP) Network has been studying this topic. Both these studies are undertaking considerable field research to document current practices. [Note: Will further describe these research scopes.]
- A number of successful and important examples of MFIs being involved in SSRE finance exist. Grameen Bank's Grameen Shakti division (Bangladesh) is both financing SSRE systems (mainly solar PV home and also bio-gas systems) and is deeply involved in the equipment marketing and delivery mechanisms as well. SEEDS (Sri Lanka) has provided consumer finance to its members for SHSs and is doing a reported 2000 such loans per month now. Self-Employed Women's Association (SEWA, India) is an MFI now involved in SSRE equipment, connected

with livelihoods, due to business innovation efforts of SELCO. These examples and others demonstrate the market and provide important experience. Several examples are described in Section 2.7, below.

- Despite these examples, the level of penetration of SSRE finance within the MFI industry remains low and *far* below its potential.

- Wholesale MFI finance as a field has made major strides in the last two to three years, gaining access to commercial capital markets, both for equity and debt, for MFI networks. For example, Developing World Markets (DWM), MicroVest, ResponseAbility. Their experience indicates successful pathways for MFIs to access wholesale capital resources. For example, DWM has structured and closed a \$60 million seven year term note offering the proceeds of which will be on-lent to several MFI networks, provide a stable relatively long-term base of debt capital, on interest rates that allow sufficient margin for the MFIs to both earn a spread and reduce their lending rates to their customers, and a \$20 million pooled equity offering has closed also, proceeds of which will be used for equity investments in several MFI networks. The investment bank Morgan Stanley and the MFI asset manager Blue Orchard Finance in Geneva have recently announced a \$108 million securitization of MFI loans; a portfolio of MFI loans from several MFI networks are assigned to a new company, which then issues bonds, called “collateralized loan obligations” or CLOs, which are backed and serviced by the loan repayments. The CLOs are divided into three layers of risk, or priority for debt servicing, to create several classes of securities: a \$42 million portion achieved an “AA” rating from Standard & Poor's, a second tranche of \$16 million a “BBB” rating, and the remaining \$50 million balance was unrated. The volume of such micro-finance transactions is expected to grow from \$15 billion per year now to over \$250 billion per year over the next decade, according to Morgan Stanley.¹⁵ International and national development banks are also active providing wholesale loans to MFI networks.

- Overall, wholesale finance and related wholesale lenders and investment bankers may be effective entry points for organizing financial products and engaging MFIs. With the right kinds of tools and support, these organizations could potentially provide a channel to work with MFI networks, as a node of communication with several MFI networks and as a conduit for developing and marketing a new SSRE financial product, and delivering programmatic TA and wholesale capital, potentially supported by a new FRMI. This is a relatively new opportunity and represents a potential scale-up strategy.

2.6.2. MFI Initiative Concept. A new MFI initiative would need to build on and help coalesce existing efforts in this field. Its first goal would be to develop SSRE financial product(s) and other related business lines which would be attractive for MFIs to undertake, which meet a market demand. Research and development is needed to develop such a product package, including not only financial product design but also defining the technology and equipment solutions, product/service delivery mechanisms and plans to build these delivery capacities, that can be promoted and financed via MFI networks. This work would be conducted in concert with practitioners, including MFI networks, development agencies and NGOs which support them, and also MFI wholesale lenders and investors.

¹⁵ “Rating opens door to altruistic microfinancing”, Financial Times, May 10, 2007. “Morgan Stanley plans foray in microfinance”, International Herald Tribune, May 9, 2007.

Its second goal would be to undertake a series of investments. FRMIs can be useful to help pioneer new markets, e.g., guarantees to support MFIs to test new financial products and help extend loan tenors, and to provide risk cover for wholesale lending. Any such initiative and investment would include a TA programme, to marketing services, provide training for MFIs, and also an associated business development programme to create SSRE equipment and service delivery capacities.

MFIs need various types of finance, so concessional/grant support programmes should have flexibility to be used in several ways and not just focus on debt.

A central question in moving this concept forward: is there sufficient capital demand for such a programme? Phrased as a programme design matter, the question is how to demonstrate and develop the capital demand for SSRE systems & equipment, which, in aggregate, makes it an attractive area for MFI networks and wholesale investors.

Some market regions may be ready now with effective demand. Grameen Shakti, for example, estimates needs for new wholesale loan facilities for their SSRE equipment loan programme approximately 2008. Identification of ready MFI networks is a topic for research.

Other regions which have strong MFIs, which are not yet in active SSRE equipment markets, will face a classic "chicken & egg" developmental problem. A successful answer would appear practical. The demand for energy services is latent, strong and connected with livelihoods. The pathway to development includes an energy component. There are sufficient examples of successful delivery mechanisms to demonstrate the market. SSRE systems provide value; these technologies are economic from the end-user's viewpoint for various applications and regions/locales.¹⁶ Affordability remains an issue in many markets and market segments. Making SSRE affordable may require subsidies and subsidies may be justified in many cases to fulfil the energy access agenda. Given the poverty alleviation benefits, the social cost/benefit analysis for subsidies is likely highly positive. Given the interest in development and clean energy, such subsidies are likely to be available. They must be intelligently utilized to work with market actors. Thus, though these markets need to be developed, there is a fundamental demand, delivery of energy promotes ability to pay in a virtuous cycle, and the resources to develop the market can likely be organized.

Because of their existing capacities, MFI networks are well-positioned to address some parts of the market development challenge. To do this, they will need R&D, start-up, training, and other support. Credit enhancements could be part of this package. Many of the risks and issues associated with the MFI Initiative concept concern how to create the demand for financing SSRE equipment, and the capacities to market and deliver SSRE equipment and services. Therefore, an associated SSRE business development programme is needed as part of this initiative.

There are constructive roles for UNEP in convening, and developing and support implementation of such an initiative.

¹⁶ These may be integrated with fossil, e.g., LPG or diesel power systems in some cases.

2.6.3. Issues with Using MFIs for SSRE Equipment Finance. Several issues arise in considering adapting MFI lending capacities to this market as there may be some mismatches between MFI practices and SSRE equipment finance needs.

Urban vs. Rural. Many MFI networks are primarily urban. SSRE equipment demand exists in urban areas, e.g., for solar domestic hot water heaters. But, the primary market of concern for this initiative is in rural areas which have lower population densities, different socio-economic and cultural factors and higher transaction and collections costs.

Productive use vs. household consumption loans. MFIs focus a large portion of their lending on short-term working capital loans to micro-enterprises for productive use, whereas energy equipment may be considered consumer equipment. Provision of energy services can make household and micro-enterprise borrowers more productive and can often create direct associated income gains, which improves borrower ability to pay.

Loan tenors. Working capital loans may have tenors of days, weeks or a few months. SSRE equipment finance requires longer tenors. Two year tenors can often work; three to five years are best. Longer tenors help make the monthly loan payments more affordable and can increase the market size. MFIs must get comfortable with lending for longer tenors to adapt to this market.

Security. Peer group lending methods may be less applicable for consumer equipment loans. SSRE equipment can often offer greater direct collateral in the equipment itself.

Conclusion. MFIs can offer loan products to four types of SSRE markets:

- household consumers,
- micro- and small- enterprise end-users acquiring SSRE equipment as end-users
- community institutions (schools, community centre, clinics) and other larger end-users
- SSRE enterprises, which need micro- and small-enterprise loans for their SSRE business.

All of these markets are potentially relevant. Depending on the size of the loans and varying credit characteristics and available security associated with each market, all of these can be potentially be treated by MFIs, provided they can adapt and create financial products that can meet both their lending criteria and the needs in the SSRE markets. Financial risk management instruments can assist MFIs to implement new financial products, providing risk cover as new experience is gained.

2.6.4. Two-Tiered Credit Enhancement Mechanism to Support MFI Lending for SSRE Equipment. There are two levels of credit risk that can be addressed by an FRMI targeting SSRE lending by MFIs: (i) end-borrower credit risk which the MFI assumes when making equipment loans and (ii) MFI credit and other risks which a wholesale lender assumes providing wholesale funds to MFIs for on-lending as SSRE equipment loans. Both these types of risks are potentially important to address.

End-borrower Credit Risk. MFIs generally have excellent borrower payment track records. However, when they enter a new market and pioneer new loan products, their perception of risk may be high, and some credit enhancement can be helpful. The potential mismatches discussed above between normal MFI lending practices versus loan terms needed for SSRE

equipment lending -- e.g., as regards tenor, use of proceeds, security, etc. -- may arise and will need to be addressed. With some form of credit enhancement, an MFI may be willing to test a new product and market.

Wholesale Lender Risks. While a few MFIs are considering or gradually becoming deposit taking institutions, the regulatory framework for this evolution is nascent or does not yet exist in most countries and most MFIs rely on and need to borrow wholesale funds. An FRMI to treat the risks which wholesale lenders face when lending to MFIs could significantly aid in mobilizing wholesale loan funds for MFIs to on-lend as SSRE equipment loans.

Several mechanisms using concessional funding for credit enhancements could function to address these risks. Some options are discussed here. The right structure must be worked out with the participating wholesale lender and MFIs.

Wholesale lenders typically lend to MFIs on a full recourse basis, so the credit risk of concern is the MFIs credit risk itself. The financial condition, management, underwriting and credit practices, business outlook, competition, risk profile and other factors concerning of the MFI will have to be appraised as part of the wholesale loan underwriting process. While an MFI provides full recourse on any wholesale loan, the MFI's ability to pay on the wholesale facility will be directly is affected by the payment performance on the new SSRE sub-loans which the whole facility will support. Plus, the willingness of the MFI to take on a new loan product will be affected by its perception of risk associated with that product. Thus, the recommended credit enhancement structure would combine FRMIs to treat both levels of risk. The consumer finance FRMI structures discussed above, namely first loss portfolio guarantees and loss reserve schemes, can be directly applied to treat the MFIs end-borrower credit risk exposure.

Resources devoted to treat end-borrower credit risk will also benefit the wholesale lender, because they will enhance the financial strength of the MFI and its ability to repay. With proper structuring, the MFI can assign claims payments from a first loss portfolio guarantee or loss reserve scheme to the wholesale lender as additional security for the wholesale loan. Perhaps, the wholesale lender could be the fiduciary which manages the loss reserve funds.

The structure of the wholesale facility should be designed to match the SSRE loan product which the MFI will offer. One starting principle for structuring the wholesale facility is to achieve as close as possible a direct asset/liability match between the MFI's SSRE sub-loan assets and the wholesale loan liability, especially as to tenor and disbursement provisions. This will not be entirely possible but to the extent it can be achieved, this will reduce the MFI's risk. One structure is to have the wholesale loan be disbursed monthly or quarterly to provide take out financing for SSRE equipment loans originated during the period, but subject to a minimum disbursement requirement.

Security for the wholesale lender can also include the SSRE equipment sub-loans, any related collateral such as security deposits, Vendor buyback commitments and equipment liens, and any FRMI loss reserves. To perfect this security, the wholesale lender may consider having the MFI channel all sub-loan repayments to a dedicated bank account for repayment of the wholesale loan. The MFI could assign its receivables and related security on all the sub-loans. Whether this option is realistic or too cumbersome legally, must be determined case by case.

A portion of the FRMI resources can also be devoted solely to cover the wholesale lender's risks. An MFI's ability to repay on the wholesale loan is likely not binary, that is, it is not an "either/or" function, but rather a matter of degree, because the proceeds of the wholesale loan are on-lent to a portfolio of many small sub-loans. So, an extra loss reserve backing the MFI's repayment obligation could be quite useful, even one that is sized in the range of 10% of the total wholesale loan amount. This reserve could provide liquidity support, helping the MFI meet wholesale loan payments in event of cash shortfall. Again, this structure needs to be worked out with

If wholesale lending resources are sourced in hard currencies, then foreign exchange risk needs to be covered; this could potentially be the subject for an FRMI, although it should generally be preferred for the MFI to source local currency funds.

Overall, the thesis of this programme concept is to develop two products that are integrated with each other: 1) a wholesale loan offered to MFIs and 2) SSRE end-user loan which the MFIs offer to end-borrowers. A combined loss reserve, a portion of which covers the MFI end-borrower credit risk (which reserve also covers wholesale lender risk), and the balance of which is reserved solely for the wholesale lender's credit risk,

A sample form term sheet for a Master Loan Agreement between a wholesale FI and an MFI is included in the resource materials.

2.7. Examples of MFIs Involved in SSRE Equipment Finance

2.7.1. SEWA Bank. Self-Employed Women's Association (SEWA) Bank is a micro-finance institution in India that provides financial services to "poor women workers engaged in the unorganized sector." It was founded in 1974 by poor, self-employed women workers and has emerged as a model lending institution in India. SEWA Bank is just one arm of SEWA; it provides customers with loans, savings, insurance and other services. In late 2004, SEWA Bank began providing energy loans to customers, including PV lighting for street vendors by teaming with SELCO (Solar Electric Lighting Company) to design an appropriate package that would provide the SELCO product to customers with basic financing from SEWA Bank. Not only does this model provide SELCO customers access to finance and a linkage to a leading microfinance institution, it also increases the customer base and range of SEWA Bank. SEWA finances entrepreneur loans to vendors who purchase SELCO light-rental sets (including one to two PV modules, a controller, batteries, lights and fixtures). The vendors in turn rent out the lights and fixtures along with a battery to their colleagues who use the lights in their street stalls. At the end of each day, the battery is returned to the entrepreneur for charging. The financing terms are as follows: the solar lighting systems are offered with doorstep financing; low interest rates are offered as an incentive for timely repayments; the financing terms are designed to keep the street vendor cash flow situation in mind; and the loan covers a battery replacement to ensure long-term usage of the system. The average loan size is Rs 10,000 (US\$222) and has a 100% repayment; customers save approximately Rs 15 (US\$.33) a day. The programme has been very successful as vendors now spend much less on lighting and have a more reliable and clean source of energy than the traditional diesel fuel.¹⁷

¹⁷ Sources: 1) John Rogers, *Innovation in Rural Energy Delivery*, Navigant Consulting/Soluz, 2006; 2) <http://www.sewa.org>; data pulled October 27, 2006; 3) Ellen Morris, Ph.D., *Challenges of Microfinance*

2.7.2. Grameen Shakti, Bangladesh. Grameen Shakti (GS), an affiliate of Grameen Bank, has been selling and financing SSRE systems since 1996 and mainly deals with solar PV home systems and is also moving rapidly into household cook stoves and bio-gas systems. GS has over 70,000 SHS installed and is adding 2000 per month now on average. It has 450 bio-gas systems installed to date and estimates a nationwide potential of 4 million bio-gas systems. A high quality organic fertilizer can be made from solid by-products of the bio-gas systems; GS is developing this market. Bio-gas systems have a simple payback period of three years based on revenues from the fertilizer by-product alone.

GS has 1100 staff; Grameen Bank has over 20,000. GS uses Grameen Bank's network and collections mechanisms to support its SHS financing programme. GS acts as both vendor, servicer, and financier of the systems. 95% of its customers use credit to acquire systems. GS offers several different financing plans. A three year loan term is typical; after-sale service is provided during this period; thereafter, an extended warranty can be purchased. The 50 Wp size system is most popular and costs \$350 with a deep cycle marine battery. Further, GS has access to a 38 Euro per system grant from European donors which is used to buy down the costs of systems to customers, so the net price is approximately \$300. Interest rates to customers are 12%. GS takes security deposits typically equal to 2-3 months payments. The repayment record is very good, 98%+. Sometimes flood or fire causes default. In default situations, repossession has occurred. GS can help the customer sell to a neighbour or relatives. GS can also buyback systems as they have good collateral value.

GS has a loan facility now via the World Bank at 6% so it makes only a 6% margin on the financing but it can make profit in the SHS as well. GS needs to begin planning and arranging further liquidity to provide resources when the World Bank loan facility is fully used, estimated late 2007 or early 2008. GS could use guarantees to access finance from more commercial wholesale sources. The GS case illustrates need for MFIs to access wholesale lending from international capital markets or local financial markets and institutions, and the possible application of credit enhancements to support wholesale could be explored.

Shortage of PV panels is now a big problem and GS is keenly interested to install a PV panel manufacturing facility.

2.7.3. Sarvodaya Economic Enterprise Development Services (SEEDS). SEEDS is a micro-finance institution that finances the installation of solar home systems (SHS) in rural areas of Sri Lanka. To date, they have helped finance about 52,000 systems. SEEDS is the micro-finance arm of the Sarvodaya Group, the largest development NGO in Sri Lanka. The main aim of SEEDS is to eradicate poverty by promoting economic opportunities through SHS systems. The main role of SEEDS is to provide viable finance packages for customers interested in SHS; they work with an installation company to identify potential customers for the systems. If a customer is interested, SEEDS goes through their finances, payment capability, and income capability, to figure out the best loan package. One of the crucial variables in obtaining a loan is the customer's financial reputation in the community. The system down payment is 15% of the entire cost and once that is paid, the SHS supplier immediately installs the SHS. The supplier is

paid by SEEDS, who then takes over the loan (a one to four year loan at a 10% interest rate). A field representative of SEEDS collects payments each month and confirms that the system is working correctly. Field representatives are trained to do minor repair and upkeep work; if the system requires more work, the supplier is responsible. With this model, only 1 – 2% of customers have defaulted on their loans and with restructuring of payment plans, many of those were to stay in the programme. SEEDS also has programmes to connect low income individuals to grid power as well as some micro/village hydro systems that are built, owned, and operated by the villagers. SEEDS has been a very successful programme: It is a participating credit institution (PCI) of the World Bank sponsored Energy Services Delivery (ESD) Project, has received a grant from the GEF, received funding from the Sri Lankan Government, and won an Ashden Award in 2006.¹⁸

2.7.4. FINCA. FINCA International's mission is to provide financial services to the world's lowest-income entrepreneurs so they can create jobs, build assets, and improve their standard of living. FINCA achieves this through providing loans at market rates of interest by village banks. These loans are mainly for low-income micro-enterprises to start up or expand a business. FINCA's branch office in Uganda, FINCA Uganda, has been very active in providing loans, savings, and banking services to small entrepreneurs (often women entrepreneurs) for renewable energy initiatives. Working with a partnership including renewable energy suppliers, a large international development bank (Triodos), and an information sharing network (the PLP programme run by SEEP), FINCA Uganda is able to reduce its risk in offering loans. The partnership works with FINCA Uganda performing credit analysis and providing a basic technical analysis for the customer and the renewable energy supplier. The energy supplier/service provider then does final pricing and sizing. FINCA Uganda prepares the loan and the purchase order for the energy system. The energy supplier installs the system and trains the entrepreneur on equipment usage and maintenance. Triodos can provide larger loans to FINCA Uganda for smaller disbursements, and the PLP is hoping to replicate successes for use in other areas of Africa where FINCA, or an organization like FINCA, works.¹⁹

2.8. Appropriate Use of Guarantees for SSRE Consumer Finance

A number of questions arise about the appropriate use of guarantees as an instrument to expand market-based delivery of SSRE equipment, services and financing.

- Which is more important, development of financing or development of the SSRE market demand and business capacities?
- Is end-user/borrower credit risk really the primary barrier to expanded delivery of SSRE equipment financing, or are there other more important barriers, such as transaction costs and affordability?

¹⁸ Sources: 1) Dr Anne Wheldon and Jeremy Rawlings, Ashden Awards: Technical summary: 2006 Finalist: SEEDS, Sri Lanka, from: http://www.ashdenawards.org/technical_summary06_sri_lanka, June 2006; 2) Indrani Hettiarachchy, *Example of Micro Finance for Consumer Purchases*, Presentation, from http://www.gvep.org/files/8437_Consumer_Finance.pdf, 2004; and 3) SEEDS, *Funding for Alternative Energy Sources*, March 2006.

¹⁹ Sources: 1) Shafi Nambobi, *Energy, Gender and Microfinance: FINCA Uganda*, presented at the Global Village Energy Partnership First Partner Assembly, October 2005; 2) Microlinks Website: http://www.microlinks.org/ev_en.php?ID=1215_201&ID2=DO_TOPIC; 3) Email with Jennifer Hansel from the SEEP Network, September 2006; 4) FINCA International Website: www.villagebanking.org

- Where should guarantees be used, as opposed to other instruments, as the primary means to mobilize local financing? Do guarantees represent the best use of donor funds, compared to other possible uses?
- In what market conditions do guarantees work and make a critical difference to mobilize local financing? In what market conditions are guarantees best applied?

Importance of financing. Finance is necessary but not sufficient for expanded delivery of SSRE energy services. Before financing can be applied, there must be demand for financing on the part of consumers and capable SSRE vendors to deliver equipment and services. These enterprises are usually the market drivers, also, selling systems. So, market development must reach a level to generate sufficient consistent demand to attract FIs. Development of the market and SSRE business capacities can be the focus of complementary programmes. All elements are needed.

It must be noted that most successful SSRE equipment markets have high levels of sales on credit. SSRE companies in India, e.g., SELCO, have 90+% of their sales made with consumer financing. The availability of finance can help drive development of the market, and give the SSRE businesses a critical tool to expand their sales. However, in many markets that are early in their development, donor programmes may be better to focus on SSRE business and market development, rather than or as a main complement to financing. There are cases, such as the first generation Indonesia solar loan guarantee programme, where the guarantee instrument was judged by all to be well-designed, but there was insufficient loan demand due to the early stage development of the SSRE industry.

End-user Credit Risk versus Other Barriers. Guarantees are one tool to mobilize local financing and address borrower credit risk. The types of guarantees proposed cover all events of borrower default. If the lender is pioneering a new market, then, due to lack of experience, perceived risk may be greater than real risk; this is the thesis on which guarantees are based and gap which fill. In some countries with developed rural finance systems, as in India, FIs have sufficient experience lending to households for consumer equipment, and guarantees may not be necessary. Guarantees can help FIs extend tenors, making systems more affordable. Further, in cases where SSRE businesses which have succeeded selling to relatively affluent populations, a guarantee could be used to support consumer finance to lower income markets.

FIs will generally respond and deliver services to a target borrower market which represents a creditworthy, substantial and organized/consistent demand for financing that can be met profitably. Security is a primary criterion, which guarantees address. If FIs do not perceive end-user credit risk and have confidence in the creditworthiness of target borrowers then no guarantee is needed. This need must be evaluated case by case. However, other barriers -- small transaction size, high transaction costs, lack of demand for financing, lack capable SSRE enterprises marketing and generating the demand -- could be equally or more important. In these cases, other instruments -- such as marketing support, various kinds of capital or loan subsidies, establishment of vendor finance programmes, transaction cost support, and training -- can be more effective, as with the UNEP India Solar Loan Programme. These can be complementary and are not mutually exclusive with guarantees.

Financial market conditions where guarantees are applicable. Guarantees mobilize local financing and are appropriate to be applied when a financial system has sufficient liquidity

available. This is the case in many countries. Guarantees typically support local currency loans, so borrowers need not face any foreign exchange risk and the macro-economy of the country can avoid foreign debt. Most SSRE consumers do not have foreign exchange income, so this is a critical issue. Guarantees do not reduce necessarily interest rates; interest rates must be reasonably attractive for borrowers.

New guarantee programmes supporting SSRE equipment finance are under design, e.g., in Uganda, Tanzania and Indonesia. Other markets such as in Africa have vastly less developed rural finance systems compared to India. In these markets, guarantees may be instrumental to mobilize local financing. End-user credit risk may be a key barrier and limiting factor to address a new borrower market and to offer new financial products, e.g., with longer tenors, and to reach down market. So, when recruiting FIs and MFIs to this market, guarantees may still have application if the FI perceives extra or unknown risks associated with testing new financial product. Also, as FIs reach further down the pyramid, end-user credit risk is more of an issue.

There are market conditions where guarantees will be premature. Guarantees must be applied in partnership with institutions that have existing and or with reasonable levels of assistance can readily implement rural finance delivery capacities. Guarantees and the financing they support must be married with SSRE equipment and service delivery capacities. Guarantees represent a platform for a programme of TA services. The guarantee provides an important basis for relationship between the donor programme and commercial parties and via this relationship TA services can be delivered to address other market barriers.

In a recent (2006) and comprehensive report entitled “Innovation in Rural Energy Delivery: Accelerating Energy Access through SMEs” (Navigant Report), guarantees are cited prominently as a key strategy. This report elaborates on four key elements required for successful SSRE market development: enabling environments, consumer finance, enterprise finance and innovation funding (which includes capacity building and also forms of enterprise finance focused on developing new markets and delivery mechanisms). The report documents numerous case studies of successful SSRE businesses. It lays out a realistic long-term target for SME-led energy services delivery to 100-150 million new customers, and a near-term goal of 5-10 million new customers as the next base target, to demonstrate scalable delivery and finance mechanisms, and build capacities for industry take-off. The report concludes that:

“To reach 10 million new customers, SMEs and their customers will need to mobilize \$2 billion to \$5 billion in customer payments and financing, largely through...local financial institutions. Interventions through *loan guarantees* [emphasis added] and targeted investments could play a role at the level of \$200 million to \$400 million.”²⁰

The programme designer must understand how FIs assess credit risks in the target markets. FIs must perceive end-user credit risk for the targeted borrower markets as a main barrier to lending for guarantees to have a good application.

²⁰ Navigant Report, op. cit., page 5

3. BUSINESS FINANCE PROGRAMMES

A successful SSRE equipment delivery and finance programme needs all elements: FIs who can deliver financing; SSRE businesses who can market, deliver, provide equipment and services that attractive and affordable to the target customers; and enabling business environments. Financing programmes without local capacities to market and deliver SSRE equipment and services are premature and will not work. FRMIs supporting consumer finance, via commercial and micro finance institutions, can create effective demand for SSRE equipment and service businesses and significantly increase sales. In many markets, development of consumer finance programmes will be premature if not preceded or accompanied by SSRE business development programmes. Further, as enterprises succeed, even greater business finance is needed to fund their growth. Debt, equity and innovative grant funding all are required, for working capital, investment in plant and equipment, dealer and end-user finance, and for developing new the innovative business methods which are still needed to open and pioneer new customer markets. This section reports on several methods of SSRE enterprise development and innovation finance currently practiced, and outlines the structure of a SSRE business finance loan guarantee programme.

3.1. Enterprise & Innovation Financing Methods

3.1.1. *SSRE Enterprise Development Funds.* E&Co has a wealth of experience in SSRE enterprise development and finance. It has operated various SSRE business enterprise development funds over the last 12+ years and has made over 120 enterprise investments. E&Co, in general, has achieved 7-8% real return on its investments, net of losses. This calculation does not include either (a) E&Co's costs of delivering business development TA services, or (b) E&Co's own programme operating costs. These two categories together can be on the order of 40% of total investment amounts. As a rule of thumb, for every \$1.00 invested in an enterprise, E&Co. counts on spending \$0.25 on services and \$0.15 on programme operating costs. These costs have been covered in general by grant and donor funding.

Enterprise investments are usually structured as debt instruments. Loan security is taken, as much as circumstances allow, in typical instruments such as mortgages on real property and personal guarantees, but the main underwriting approach is to make investment/lending decisions based on the enterprise management quality, business plans and future estimated cash flows, not on available collateral. Transactions are kept as simple as possible so as not to overwhelm the enterprise, which is easy to do, and an emphasis is placed on speed of transaction. E&Co. is prepared to accept risk as needed and manages risk by making smaller initial disbursements, even as small as \$10,000, and typically for working capital loans to start. Intensive business planning setting out the business infrastructure expansion needs is done up-front. Because working capital needs grow as business grows, a firm needs more credit not less as it expands. E&Co's working capital loans will often grow and extend in tenor to provide a solid capital base. Firms moving through this process can become good candidates for commercial bank loans backed with a partial credit guarantee. E&Co. in general has not had good experience engaging mainstream FIs in providing business loans. Guarantees can help, but they do not serve to reduce the relatively high transaction costs; these must be addressed through TA programmes. Complementary business development services and seed capital financing are really needed to get firms positioned to take advantage of mainstream FI funding.

E&Co will be managing a new Sustainable Energy Facility (SEF) targeting EE and RE enterprises. SEF is the successor to the IFC/GEF Renewable Energy and Energy Efficiency Fund with \$14 million available for enterprise investment and \$4.7 million for programme operations and TA services. SEF will typically make investments of less than \$100,000 in seed capital and provide TA services. 25% of the SEF funding is available for seed capital investments. A second tier of growth investment, with an estimated average investment size of \$350,000 will become available for qualifying firms; 75% of SEF funds are earmarked for this type of investment. E&Co has investment decision, but IFC retains veto on no objections basis; this arrangement is intended to streamline transaction decisions.

E&Co sees this approach as scaleable. Enterprise investing is very hands-on and professional labour intensive. Certain target market niches can develop over time that can then be replicated, e.g., in small scale grid connected renewables in certain country markets. As these niches are identified and developed, then dedicated investment funds can be “spun off” to address follow on investment replicating successful methods. Also, as more private equity enters this market, E&Co is focused on advising these firms as a means to expand investment in this area.

Shell Foundation also has considerable experience investing in SSRE SMEs. Their strategy has shifted recently and they now focus on SMEs broadly, and clean energy firms also in this context. Energy by itself proved too restrictive and their developmental goals were broader. Like E&Co, emphasis is placed on business development services and integrated with finance and mentoring, supporting the key ingredients which are a committed entrepreneur with a good business plan. Shell Foundation funds use a range of investment instruments, some similar to Islamic finance, that is, debt with equity “kickers”, with the kicker defined on a performance basis, like a bonus, typically tied to achieving turnover or profit targets. Equity investments can be difficult to exit. Shell Foundation has managed to recruit local commercial banks to participate in their transactions, often as investors.

Multi-lateral development banks (MDBs) and international development agencies have considerable experience offering enterprise and innovation finance. These institutions often have lengthy processes; the transaction cost load for the investee can be very high and timeframes for securing funding so long that the investees can suffer.²¹ Methods to streamline processes for the enterprise have to be developed. To be most responsive and ready, standardized underwriting criteria should be used that allow for quick disbursements even of relatively small amounts, e.g., \$50,000. Thereafter, disbursements can be gradually increased as financial performance and other targets are demonstrated. Enterprises can be identified and screened via SSRE industry networks such as the REDCO Alliance.

Further, fund management arrangements deserve special attention. One lesson learned is that fund management agreements must incentivize the manager to close transactions, and not simply promise compensation without producing closed deals. Other funds sponsored by MDBs involve multiple institutions as investors, sometimes with various and at-odds views on the investment mission of a fund, which can slow decisions. Up-front attention is required to create streamlined decision making processes that also provide adequate protections for investors.

²¹ See cases, for example, in the Navigant Report, 2006, *Innovation in Rural Energy Delivery*.

3.1.2. *Seed Capital Assistance Fund.* A large volume of new private equity capital has been organized in the last two years for clean energy investment. Some of this can potentially be made available for investment in SSRE businesses. UNEP is organizing the Seed Capital Assistance Fund (SCAF) as one means to engage private equity capital in SSRE and related types of businesses. SCAF will offer seed capital funding, TA, transaction cost support and “incentives to “buy up” investment returns to seed capital investors. SCAF resources and activities would be linked to private equity firms who can invest in subsequent growth stages. Through the seed capital investment process, prospective investees for growth capital investment can be prepared. The objective is to lower the risks and transaction costs for private equity investors who enter at the growth investment stage.

3.1.3. *Contingent Grant Methods.* “Contingent grants” are a common way for donors to structure project preparation funding. Funding is provided to SSRE enterprises to prepare projects for investment. Eligible uses of funds could include engineering, legal, financial advisory fees, and other expenses required to get a project to close of construction financing. This type of funding substitutes for the SSRE enterprise working capital and also addresses relatively high risks and transactions costs associated with project development.

Two schools of thought have been pursued in structuring these transactions.

e. The contingent grant (all or part) becomes a loan and must be repaid *if the project succeeds*, as determined by close of construction financing or other milestone, thus allowing the donor to replenish its funds and support further projects. If the project fails to proceed to implementation and financial closing, then the funding becomes a grant and does not have to be repaid.

f. The grant becomes loan and must be repaid *if project fails* but the grant is kept by the recipient if the project proceeds to implementation. This approach is designed to give the enterprise strong incentives for success.

Method (a) addresses the transaction costs and risks the SSRE business faces, but has been criticized for lack of business discipline and creating disincentives for success by forgiving the funding in event of failure. Questions for method (b) include: where will the project sponsor get funds for repayment if the project fails? and, does not the sponsor have sufficient incentive already to succeed with project development?

Some public goods are created in these investments in terms of information; arrangements should be made as part of the grant arrangement for this information to be shared and made publicly available in an appropriate format.

3.1.4. *Output-Based Funding Mechanisms for Business Innovation.* An interesting case of business innovation comes from SELCO, which has been financing efficient cook stoves for poorer households. The women householders buying the stoves reduce their wood consumption, reduce time requirements for wood collections and hence have more free time. Working with its lending bank, SELCO identified a hospital that needed bed sheets and helped organize local women to sew the bed sheets for sale to the hospital, creating new business linkages. The income earned was used to pledge for loans for further SSRE equipment, including PV systems supplied by SELCO for the sewing machines. In general, SELCO has learned to provide enterprise

development assistance for his micro-enterprise customers, which ultimately enable his customers to acquire his equipment. Further, SELCO has made a practice of examining the portfolio clients of the bank branches who are his consumer finance partners to see how and where the SSRE systems can be sold to those clients. Another present need for enterprise development funding is to expand dealer finance. SELCO provides its small dealers with working capital loans to acquire SHS systems for resale and needs a bank facility or other innovation funding mechanism to support expansion of this programme. The financing would be supported by the SHS equipment inventory, and operated like a micro-enterprise character loan, i.e., a short-term revolving working capital loan.

Transaction costs for facilitating transactions such as these are high and innovation grant funding could be very useful to expand this type of activity with qualified enterprises. The innovation funding could even be delivered on a performance or output basis, where once a proposal was approved, SELCO would undertake the programme *with its own resources*, and receive funding *only* upon achievement of certain results. The funding then provided would replenish SELCO's internal fund to repeat the process. SSRE businesses need grant support to cover programme and transaction costs associated with this type of business innovation. Reimbursing the enterprise on an output performance basis, following receipt and approval of the innovation funding proposal, could help assure results. Over time, the various business innovations can be catalogued and shared amongst the similar businesses.

3.2. Business Finance: SSRE SME Loan Guarantee Programme

3.2.1. SSRE SME Loan Guarantee Programme Concept. Loan guarantee programmes are one main method to deliver finance to small and medium enterprises (SMEs), usually as debt and quasi-debt instruments. Many countries have both commercial and state-owned SME loan guarantee agencies, sometimes as independent agencies or as units or programmes within their national development banks. SSRE SME loan guarantee programmes can be delivered by agencies already involved in the broader agendas of micro- and SME development & finance. These agencies represent existing capacities that can potentially be recruited and mobilized, with the right support, to deliver loan guarantees to SSRE businesses. For example, the Small Scale Industries Development Bank of India (SIDBI) operates SME loan guarantee programmes which can be readily adapted to SSRE business finance; and, China National Investment & Guarantee Company Ltd. (I&G) operates SME guarantee programmes and has expressed interest in PV business loan guarantee programmes.²² Other prospective guarantors include bi-lateral and international development banks, international development agencies (e.g., US Development Credit Authority) and, in some applications, export credit agencies. Improving access to finance for SMEs is a widespread and common economic development challenge and many programmes exist to address it; programmes targeting SSRE SMEs can “piggyback” on these programmes.

Some segments of the business/enterprise finance market may be treated in the context of a consumer finance programme, when the borrower is a micro- or small enterprise, when the loan sizes are sufficiently small, e.g., less than \$10,000 and perhaps as high as \$20-50,000. Larger loans however will likely have to be treated as a separate loan product and programme.

²² A PV business finance programme was advanced in negotiations with I&G in the context of the World Bank China RE Development Programme (2005).

An SSRE business finance loan guarantee programme would support and mobilize local commercial bank debt for qualified SSRE companies with two tools: (i) a partial credit guarantee, and (ii) financial and business advisory services. Use of loan proceeds by the SSRE companies would include: working capital, expansion of dealer and sales networks, capital investment for productive plant and equipment, and, potentially, on-lending as end-user finance.

SSRE companies face significant barriers in accessing needed loan financing including:

- inability to meet high fixed asset collateral requirements of lenders,
- unwillingness of lenders to accept materials/product inventory and receivables as collateral,
- poor quality of financial management by and financial information of SSRE companies,
- low levels of equity in SSRE companies,
- conservative bank lending practices coupled with perceived high risk for SSRE companies as small and medium scale enterprises,
- need for SSRE companies to prepare finance-ready business plans and develop relationships with interested bankers.

The proposed guarantee and TA programme address these barriers. The guarantee is intended to support lenders to make and secure loans based more on the borrower's business cash flow and less on multiples of fixed asset collateral. The guarantee is not intended to support loans/businesses that are not viable but rather to will help those that *are* viable but do not qualify for loans under current lending practices. The proposed programme has the following main components.

- The donor agency would establish SSRE business finance loan guarantee programme in cooperation with a qualified guarantee company which specializes in SME loan guarantees. Recruitment of the guarantor is one key programme development task.
- Donor funds would be used guarantee reserves dedicated to backing guarantees made by the Guarantor on loans to qualified SSRE companies. The Guarantor would be requested to undertake guarantee liabilities as some multiple, e.g., 3:1, of guarantee reserves. The donor funds would typically be in a first loss position, but other formulas for sharing risk between donor and guarantor could be developed.
- A financial and business advisory services TA program for the several parties to assist in preparing the SSRE company loan transactions, build the capacities of lenders and the Guarantor to originate loans and guarantees in this sector, and build the SSRE companies' businesses. This TA programme would be managed and conducted by another organization, typically not the guarantor.
- Commercial bank lenders active in SME finance would be identified with an interest and capability in the SSRE business market. Lenders will need to be recruited to this SSRE business market and supported with the guarantee and the TA programme.
- SSRE companies would be qualified based on their current financial performance, management, and business and growth plans amongst other due diligence factors.

3.2.2. Context, Programme Manager & Pilot Strategy. Guarantee programmes by themselves are not sufficient to get SSRE business loans originated and closed. Complementary and active TA programmes are essential to market the programme, assess prospective borrowers, help prospective borrowers prepare business plans and loan proposals, recruit and educate lenders, structure and facilitate closing of transactions and provide other on-going business development services to participating firms. These TA activities would be central to the programme, even primary. The leading edge of this programme will be the business and financial advisory services offered to the SSRE companies; so, in effect, the business loan guarantee programme will follow. In general, it is recommended that these activities be managed by an active programme manager, which is not the Guarantor. The programme manager could be a consultant organization, an NGO, an SSRE industry and SME business development specialist, which has a strong knowledge base of the SSRE industry. Relying on the Guarantor and/or lenders to drive the programme is often ineffective. At the same time, the availability of finance, supported by the guarantee, can help drive development of good business loan proposals, so the guarantee programme can be readied as the delivery of business development services ramps up.

An SSRE SME guarantee could start as a transaction-oriented pilot scale programme, and then increased in size as loan demand develops and more qualified SSRE companies identified. To develop the pilot programme, to test its thesis and develop its methods in practice, the programme manager could move immediately to identify several SSRE companies which are good candidates, who need financing and credit support, and then conduct appraisals on them, in conjunction with the selected Guarantor and prospective lenders. A key aspect of this strategy is to make it easy for the Guarantor to participate, to have the SSRE SME guarantee programme “piggyback” on an existing SME guarantee programme. Thus, its start-up costs for the Guarantor would be minimal. Guarantee terms would be similar to those the guarantor offers for other types of SME lending.

The strongest SSRE companies will frequently have established networks of smaller SSRE equipment and service enterprises -- local franchises, dealers, collection agents, or service which help them cover an expanded geographic territory. Thus, the strong SSRE companies themselves are a platform for expansion, replication and scale up. The goal of this programme is to find and support these firms. Even if only a few firms are chosen, the impacts can be large if the firms can achieve their growth goals and potential.

Key risks in this type of programme concern: (i) finding qualified SSRE companies with sufficiently strong finances and management to qualify for loans; (ii) recruiting and reaching a satisfactory management arrangement with a guarantor; and (iii) finding lenders who are willing to engage on small transactions. Potential to address these should be addressed in market research leading to a programme design.

3.2.3. Legal Structure. The proposed business finance guarantee programme would require the following legal agreements to be implemented:

- Guarantee Agreements (between Guarantor and Lenders)
- Loan Agreements (between lenders and borrowers)
- Guarantee Programme Implementation Agreement (between donor and guarantor)
- Escrow Agreement governing use of the guarantee reserve funds, (potentially)

Typical terms for each of these, including sample underwriting criteria, are discussed in the Report. Criteria and procedures for selecting each key party -- Guarantor, lenders and SSRE companies -- are discussed in the Report and the following sample documents are included in the resource materials:

- Typical guarantee term sheet for an SSRE business finance loan guarantee program
- Sample Guarantee Facility Agreement, appropriate for an SSRE business loan guarantee program
- Typical business screening and loan underwriting criteria for a business finance loan guarantee program
- SSRE Company business finance needs assessment survey
- Term Sheet for Guarantee Program management Agreement between Donor and Guarantor for an SSRE Business Loan Guarantee program.

3.2.4. Loans to SSRE Companies. Use of proceeds for the loans includes both working capital as well as plant/equipment investments and, possibly, expansion of dealer networks and end-user finance. Distinct loan terms would be offered for each type of loan. Loan terms must address the full set of loan provisions including: loan amount, term, rate, pricing, use of proceeds, disbursement provisions and conditions precedent, security and collateral, financial covenants of the borrower, defaults and remedies, etc. Loan terms must be developed with participating banks and the guarantor.

Working Capital Loans. The most prominent need of SSRE companies is often for working capital loans. The loan structure for working capital loans would typically be revolving one year loan facilities. Disbursements would be for approved purposes, e.g., purchase of inventory. Loan sizes are anticipated to be in the range of \$100,000-500,000. The loan facility would be subject to repayment typically annually but could also be renewed depending on performance. Typical borrower covenants are expected in such loans including maintenance of working capital ratios (current and quick ratio) and debt/equity ratios.

To originate working capital loans, it will be essential to fully understand the working capital production cycle of the SSRE companies, from purchase of inventory, to sales and collections. Many SSRE companies deploy a dealer network to sell their products SSRE companies also sell direct to customers. Sales terms to their dealers and customers must be understood and the quality of these receivables assessed.

One strategy to explore to support working capital loans is for lending banks to use the SSRE company's inventory and receivables as part of the loan collateral. Lenders typically will not use inventory and receivables as part of the collateral because of difficulties in valuation and financial control/verification. If valuation and financial control methods can be developed, then overtime, perhaps lenders can come to rely on inventory and receivables at least in part for working capital loan security; this could be one point of TA. If the SSRE company is receiving any subsidies, e.g., per Wp grants in the case of PV systems, then perhaps these can be assigned as additional security.

Plant/Equipment Investment Loans. Term finance of 2-3 years, possibly longer, could be offered for capital investments in productive plant and equipment. Anticipated loans sizes will vary but would typically also be in the range of \$100-500,000.

End-User Finance Loans. End-user finance loans to SSRE companies can be considered if the SSRE company has an interest. In general, in this model of end-user finance, the SSRE company and/or its dealer is the lender to the end-user, and must match its loan terms to the end-user with the terms it receives from its bank. This type of financing can increase sales and be profitable for SSRE companies.

Loans to the SSRE company would be matched as closely as possible to loans the SSRE company would make to its dealers and end-users. Finance would be delivered by the SSRE company at the point of sale with the end-user. The SSRE company would have responsibilities for collections. The role of the SSRE company's dealers in sales, finance origination, collections and other functions remain to be determined. The end-user payments on the end-user loans would be used as the source of repayment and part of the collateral for the bank loan to the SSRE company. The SSRE company would be able to earn a spread on the end-user loan, to cover their costs and possibly earn some additional profits. By offering extended payment terms, the SSRE company could likely earn a higher price for the sale of the SSRE system.

3.2.5. Qualifying and Selecting SSRE Companies. SSRE companies would be qualified based on their current financial performance, management, and business and growth plans amongst other due diligence factors and selected for their (i) strength of management and growth potential, and (ii) need for working capital and fixed asset loans to support their growth. This programme requires working with an agency, NGO or consultant organization that has a strong knowledge base of the SSRE industry and their finances. The programme could seek alliances with existing SSRE business networks, e.g., the REDCO Alliance or their local equivalent, to assist in setting business qualification standards, marketing the programme and identifying, surveying and screening prospective SSRE firms. This approach is highly recommended to explore. These organizations can also be involved in delivering TA services to SSRE firms.

Decisions on lending to SSRE companies will be made by lenders in conjunction with the Guarantor. A key step will be assisting SSRE Companies to prepare business plans, including financial projections, supporting their loan applications and demonstrating ability to repay. Key issues to that will typically arise in structuring and delivering finance to SSRE companies include: (i) adequacy of equity investment in the SSRE companies, (ii) quality of financial information, and (iii) willingness of SSRE company management to address issues required to meet underwriting criteria of lenders and the Guarantor. TA support may be needed to help SSRE companies raise additional equity, if possible. Screening criteria must include management strength and willingness to meet requirements of lenders.

Underwriting criteria for lending to the SSRE companies would be developed in conjunction with lenders and the Guarantor. Criteria may include and address the following points:

- no negative credit history; current on outstanding debts;
- audited financial statements from acceptable qualified auditors
- current ratio of ____ [1.50] or greater (with loan proceeds)
- quick ratio of ____ [1.0] or greater (with loan proceeds)
- verifiable receivables
- debt/equity ratio no greater than ____ [2:1] (with loan proceeds)
- total annual sales of a minimum _____ [\$500,000]
- profitability (breakeven or greater) for last two years;

- economic feasibility study for proposed capital investments and acceptable business plan for working capital loans
- projected debt service coverage ratio (free cash flow to debt service) on term loans of a minimum ___ [1.75]
- own funds of a minimum ___% [20%] for capital investments

These criteria are offered here as indicative only and will need to be reviewed and refined with all participants. Further, they must be adjusted to be realistic and applicable under the market conditions of a given country.

One way to promote replication and sustainability is for the loan agreement to define borrower financial performance targets. If the borrower meets these financial targets, then the working capital loan could be renewed with a lower percentage guarantee. These provisions could be included in the loan agreement and the guarantee agreement.

3.2.6. Typical Guarantee Structure & Terms. The SME loan guarantee to be offered by the Guarantor to participating lenders will be structured based on review of the Guarantor's existing practices and negotiations with all parties. The loan guarantee documentation can consist of (i) a framework agreement between guarantor and participating lenders, plus (ii) loan guarantee agreements for specific guarantee transactions, or simply a loan guarantee agreement only for the specific guarantee transactions, with the Guarantor published rules concerning lenders' use of the guarantee facility. The guarantee agreements, between Guarantor and lender, would typically include the following key terms.

Eligible Borrowers: SSRE companies; approval rights of the programme manager (SSRE industry knowledge expert) could be included.

Eligible Use of Loan Proceeds: Working capital, plant and equipment capital projects, dealer finance, end-user finance, or other purposes as approved.

Risk Sharing and Guarantee %: The guarantee will typically be a pari passu partial credit guarantee, up to ___% [75%] of outstanding loan principal.

Maximum guarantee term, years: ___ [five] years.

Guarantee pricing: To be determined, typically in the range of 1.0 to 1.5% per annum of the guarantee liability.

Definitions of event of loss: Tied to definition of event of default in the underlying loan agreement and following lender's delivery of formal demand notice to borrower calling the loan.

Guarantee Claims Payments: Guarantor's proportional share of the loss would be paid within ___ [30] days following lender's delivery of formal demand notice to borrower calling the loan.

Loan monitoring: By lender with notice provisions to Guarantor.

Administration of loans in default and responsibility for collections/recoveries: To be determined these responsibilities will be performed either by lender or Guarantor.

Distribution of Recovered Monies: Recovered monies shall be distributed proportionately to Lender and Guarantor in proportion to each party's share of the loss for the applicable transaction net of the collecting parties' reasonable collections costs.

Assignment of Guarantee: Guarantee shall not be assignable by Lender without prior approval of Guarantor.

Maximum single transaction/borrower guarantee liability: To be determined, likely in the range of \$1 million.

Guarantee Facility Liability Limit: Maximum outstanding guarantee liabilities with one single lender, to be determined.

Availability Period: Period during which new guarantees can be issued, to be determined. Expected to be a minimum of two years.

Guarantee approval procedures: Lender will submit loan appraisal report to Guarantor requesting a loan guarantee for transactions which meet the eligibility criteria. Guarantor shall review such proposals and respond to the lender within __ [15] days FI indicating either: (i) its acceptance of the guarantee proposal, (ii) terms and conditions under which its acceptance could be provided, or, (ii) rejection of the proposal. In the event that such proposal is approved by Guarantor, the proposed transaction shall be deemed an Approved Transaction and the Lender shall proceed to close the transaction. By mutual agreement, and following the conclusion of the first two guarantees, streamlined procedures for approval on a rapid no objections basis may be developed for specific types of transactions. The form for guarantee applications will be included in the framework agreement or published by the Guarantor.

Information & Reporting: Requirements to be determined, to meet donor requirements.

3.2.7. Guarantor Selection, Management Functions & Programme Agreement. Principal guarantee programme operations and management programme functions to be performed by the Guarantor include: (i) originate guarantee transactions, working with lenders and SSRE companies and the programme manager; (ii) assist in preparation and development of SSRE business loans; (iii) assist in development and continue refinement of SSRE company loan credit analysis and underwriting guidelines and Loan Guarantee Agreements; (iv) assist in identifying and recruiting lenders to this market and cooperate in related TA activities including training and capacity building with participating banks; (v) administer the loan guarantees and monitor guaranteed loans for loan performance, respond to default events and manage workout and recovery processes, as required; and (vi) fulfill reporting requirements and work with participating lenders to fulfill the same.

Guarantor could have access to donor TA funding for these purposes. Programme marketing will be performed mainly by a programme manager, but the Guarantor may have some marketing functions particularly marketing to lenders.

Recruitment & Selection of Guarantor. To recruit the guarantor, it is important to make their participation and entry into this market easy and consistent with their current practices. Demand for loans needs to be demonstrated, so some market research, identifying prospective SSRE business borrowers and estimating loan and hence guarantee demand under the programme, should be conducted in advance. The programme offer to the guarantor can include: guarantee reserves, TA to identify and assess SSRE firms and prepare business plans and loan proposals, funding support for other TA services, and, potentially, operations cost support.

Main criteria for selecting a financial institution to serve as Guarantor include: (i) recognized and stable financial institution; (ii) mandate, experience and capacities to support lending and undertake guarantees for SMEs; (iii) strong interest in and commitment to the SSRE business development, clean energy and energy access agendas; (iv) ability to leverage donor funds by extending guarantees as a multiple of donor provided guarantee reserves; (v) ability to recruit lenders; and (vi) potential to develop the SSRE SME guarantee product into a commercially sustainable and viable operation that continues beyond the initial term of guarantee programme operations. Guarantor candidates will typically be national development banks or guarantee agencies.

Guarantee Programme Management Agreement. To undertake the guarantee programme, a Guarantee Programme Management Agreement (GPMA) will typically be needed between the donor agency and the Guarantor. Precedents for such documents exist in other WB, UNDP, and other GEF supported programmes. The GPMA would address: (i) Guarantor roles and responsibilities; (ii) donor responsibilities; (iii) guarantee reserves, including deposit and reinvestment, and disbursement; (iv) guarantee leverage ratio, i.e., total programme guarantee capacity and leverage commitment of Guarantor; (v) budget and compensation for Guarantor; (vi) guarantee structure, terms and conditions; (vii) loan and guarantee origination procedures, including definition of eligible borrowers and any donor approval rights on loan guarantee transactions; (viii) TA programme; (ix) performance indicators and targets; (x) governance and reporting requirements; and (xi) other typical agreement terms, i.e., term, closing date, termination, dispute resolution, default and remedies,, notice, representations and warranties, etc.

Management of Donor Guarantee Reserves. There are several options for management of donor guarantee reserves. One is for donor funds to be kept by the donor in a segregated account, available for disbursement as needed according to the terms of the GPMA and when/as guarantee claims payments are made. This option may not be satisfactory for the Guarantor who may be concerned about timing and procedures required to release guarantee reserve funds; if the Guarantor perceives risks in this regard, that perception could undermine the programme. Second is for donor funds to be deposited with the Guarantor, kept in a segregated account, and managed according to terms of the GPMA, ready for disbursement when/as guarantee claims are made. This option may be simplest, and should only be considered by donor only if the Guarantor is a sufficiently large and reliable financial institution. Appropriate financial accounting and controls will be needed. Third is to employ a fiduciary financial institution to serve as Escrow Agent and governed according to the terms of an Escrow Agreement, ready for disbursement to Guarantor or lenders when/as guarantee claims payments are made. This option is the surest, safest and most prudent method for both parties, but will require the addition of the Escrow Agreement and related expenses. Precedents for such agreements exist which can be drawn upon to readily prepare such an Escrow Agreement. Rules governing use of the funds are very explicit in the Escrow Agreement and

the Escrow Agent serves in a fiduciary capacity according to these rules. Escrow Agent fees could be paid from interest earnings, typically.

Whatever deposit method for the guarantee reserves is chosen, decision is needed also on use of the interest income on the guarantee reserves. This interest income belongs to the donor and should be used for programme purposes; potential uses include guarantee programme operations costs, TA activities, or addition to the guarantee reserves for use to make guarantee claims payments as needed. Permitted investments for the guarantee reserves must be defined and will typically be short-term government securities. Recovered monies would also be deposited back into the guarantee reserve account.

3.2.8. Selection of Lenders. Loans to SSRE companies would be made by commercial lenders and supported with the guarantee. Participating lenders can be identified by the Guarantor, from their existing base on participating SME lenders, by the programme manager, and by the SSRE companies themselves, from their existing bank relationships. A programme goal is to recruit lenders to this market and educate them about it. Interviews need to be conducted with potential lenders as part of programme development and design. A set of questions for SME lenders has been prepared as a guide for these interviews and is attached as Annex E. The best candidate banks are likely to come through the Guarantor and the SSRE companies themselves. Participating banks will benefit from prepared deal flow and TA. Banks which also are involved in consumer finance are also excellent candidates.

3.2.9. Programme Sizing Example & Leverage of Donor Funds. The programme would be highly selective, and the number of loans may be relatively few, e.g., 10-20 loans of \$200-500,000 each, with the possibility of larger loans. An illustration of programme sizing is provided below; all values are sample only.

Table: Illustrative Programme Sizing for SSRE Business Loan Guarantee Programme

	\$
1 Donor Guarantee Reserves	\$1,000,000
2 Leverage ratio	3
3 Total guarantee liability capacity	\$3,000,000
4 Guarantee percentage, average	75.00%
5 Total Debt that can be supported	\$4,000,000
6 Average size loan transaction	\$250,000
7 Number of loans that can be supported	16.00

The selected Guarantor should have stated ability and commitment to undertake total guarantee liabilities at a defined multiple of donor reserves; an initial target ratio of a minimum of 2:1 or 3:1 is recommended. This ratio can be increased prudently with experience.

SSRE SME business loans may already be eligible under a guarantor's existing SME guarantee programmes. Thus, they may be willing to add resources, share risks or undertake large loan guarantees as per the terms of these existing programmes.

One challenge with this type of programme is to gain maximum leverage of donor funds, and also to not leave donor funds under or unutilized. If possible, a guarantor which can work across

countries, to make as large a portfolio as possible, or another means to pool risks and reserves should be sought.

4. SMALL SCALE RENEWABLE ENERGY PROJECT FINANCE

4.1. SSRE Project Finance: Market Segments and Financing Challenges

Small scale renewable energy (SSRE) represents distinct markets and financing needs. This Report has covered (i) end-user finance, for household and micro-enterprise scale SSRE systems, and (ii) SSRE business finance. A third category defined in this Report is the SSRE project finance market, for projects typically several hundred KW up to 5-10 MW in size, for such technologies as small scale wind, mini/micro-hydro and bio-mass systems. Within this category are distinct segments and applications, including:

- grid-connected RE power systems,
- captive power, thermal and cogeneration systems serving small and medium scale industries, both urban and rural, and
- off-grid and rural community energy systems, including both RE energy supply as well as storage and distribution.

What is needed to mobilize debt financing for SSRE projects? How can these markets be made attractive to for investment by commercial lenders and investors? Lenders generally will respond to a sufficiently large, creditworthy and stable flow of demand for capital. The financing characteristics and challenges associated with SSRE project finance are well-known and concern principally size, transaction costs, security, and risk mitigation.

A large portion of RE resources derive from local, smaller projects that are widely distributed, e.g., run-of-the-river or low head mini- and micro-hydro, bio-mass cogeneration using local agricultural wastes collected within a 10-15 km radius, or small wind farms exploiting micro-climate resources and terrains. SSRE projects offer large potential in aggregate. Further, they can deliver needed energy services in rural and off-grid areas, where RE resources are often located, to meet the energy access agenda. But individual project sizes are still small, ranging, by this Reports definition, from several hundred thousand dollars to \$5-10 million, with the bulk of the market being under \$2-3 million in investment size. Project investment preparation and financing transaction costs are relatively high. Basic RE project finance risks -- construction, operations, system performance, resource availability risks, creditworthiness of off-takers and sponsors -- still apply and must be analyzed and planned for to create bankable transactions. Further, because the project sponsors are often small, SMEs, or community-based institutions and businesses, the underlying credits on SSRE project financings are often new, unknown and weak. Their relatively small sizes make SSRE projects generally unattractive to be treated singularly for lending, investment and project development. Still, the overall market potential is very large and more sophisticated project developers and investment methods are entering this market. Strategies to aggregate the market for project marketing, development and financing purposes are needed. In general, FIs must approach the SSRE project finance market in partnership with parties who can generate a series of similar projects. A key strategy for making the SSRE project finance market attractive for lenders is identifying and developing partnerships with parties who can act programmatically and act as market aggregators.

Given this context, this section will address methods and business models to structure project financings, mitigate risks, enhance credit worthiness, and create investment programmes that serve aggregate the market, all with a view to make these projects attractive and creditworthy so

as to mobilize senior debt financing. Roles and methods to use concessional financing to support, mobilize and leverage commercial finance are also addressed.

Adapted financing for SSRE projects must not only meet lender criteria; it must also be well matched to project economics and meet borrowers' needs. Chief amongst these are sufficiently long tenors, typically from seven to 10+ years. Additional borrower concerns are reasonable transaction costs and finance processing times, and, often, a need for relatively low project sponsor equity requirements. Financing structured with these criteria in mind can make the SSRE project and the energy services it provides more affordable for the borrower and end-users.

Adapted financing can also incorporate subsidies. Capital subsidies can buy down capital costs and provide a partial substitute for project sponsor equity. Operating subsidies can be applied so as to meet certain affordability pricing targets; these subsidies can be pledged and assigned as a source of security and repayment for project loans.

4.2. SSRE Project Finance Transaction Structures

4.2.1. Full recourse transactions. The simplest most direct financing structure for an SSRE project is a full recourse loan to a creditworthy party. Examples could include loans to a rice processing mill for a rice-husk cogeneration plant, a swine farm for an anaerobic digester system for generating bio-gas from pig manure and using it to generate power, or a new small wind farm providing power to an existing rural electric cooperative. In many cases of such projects, all power and thermal energy generated is used on site and there is no other off-taker except the project borrower. This is the "captive power" market segment; it has wide application and also reduces risks and transaction costs associated with arranging off-take contracts with other parties.

In these cases, the project sponsor is the borrower and the energy user and is an existing entity with historic financial performance and financial statements which can be analyzed to determine creditworthiness. This simplifies the financing structure and the loan appraisal and origination process for the lender. The project sponsor would typically be required to contribute a minimum of 20-30% of the project's capital cost. The project sponsor as borrower accepts all risks associated with the project: construction, operations, system performance, fuel supply and resource risks, etc. The project sponsor may contract with other parties -- construction contractors, equipment vendors, system operators, fuel suppliers -- to perform certain project functions. Through these contracts, the project sponsor would gain some risk protection for the contracting party. But, from the lender's point-of-view, the loan is full recourse to the borrower, and it is the borrower's responsibility to manage these risks.

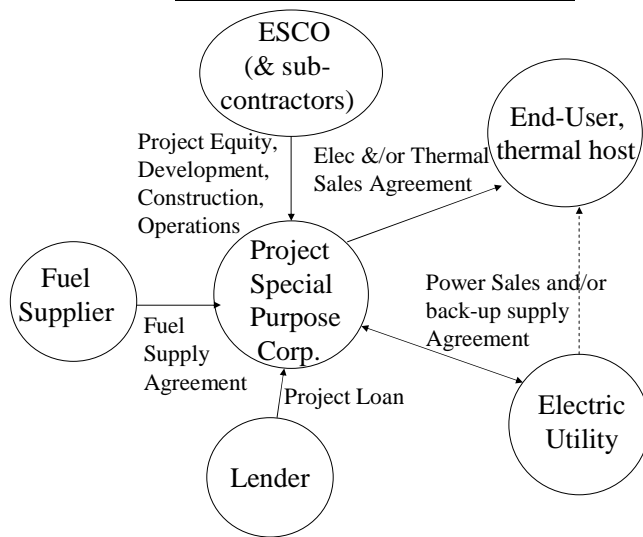
Even with a full recourse loan structure, however, the lender must be concerned with project finance type risks. Creditworthiness is a function of ability to pay and willingness to pay. Both of these factors will be heavily affected by the SSRE system's technical and financial performance, which will be affected by the same set of risk factors -- construction, operations, fuel or resource supply, system performance -- which the borrower must manage. Therefore, the prudent lender will at a minimum review these aspects of the project as part of its appraisal to confirm that the borrower's plans and the project design are technically and economically viable.

4.2.2. Limited and non-recourse project finance. A true “non-recourse project financing” means that the project assets and revenues themselves are the basis for the project loan credit structure and source of loan repayment, as opposed to lending or having full recourse to a single known creditworthy borrower. The term “limited recourse” project financing refers to a hybrid structure where some party provides direct but partial credit support for the project loan, or pledges its full financial capacities and balance sheet backing certain specific project commitments, e.g., construction, operations or fuel supply.

With a true project financing, the borrower is often a new special purpose company (SPC) formed solely for the project. Diagram 4-1 depicts a typical structure for a non-recourse project financing, in this case for a cogeneration project.

Diagram 4-1:

**Typical Non-Recourse Project Financing Structure
for Cogeneration Project**



In this case, the project is typically initiated by the project developer (referred to as an ESCO here), which markets the project to the end-user, which has thermal loads and can use the thermal energy generated by the project. The thermal end-user or “host” could be an industry, e.g., a sugar mill, a paper or wood products firm, or rice processing plant.

A project sponsor can also be the electric utility, which is seeking new power supply and offers standard and attractive power purchase agreements to promote development of new independent power projects. Utilities can research large industrial process thermal energy loads/users in their service area to identify good candidates for cogeneration projects. Because cogeneration plants recover waste heat from the power generation process, they can typically have efficiencies of 65-70%, whereas typical power plants, in the best case (large combined cycle plants) have efficiencies of 45-48% and more commonly efficiencies of 30-35%.

In this diagram,

- The new project SPC is the borrower of the project debt.
- The ESCO makes an equity investment in the SPC.

- The SPC has the contracts with the end-user for sale of thermal energy and/or electricity and with the utility for sale of electricity, as applicable.
- The ESCO provides turnkey construction of the project and long-term operations and maintenance of the project.
- The SPC buys fuel from the fuel supplier.

Because it is a new entity, the borrower of the project loan has no historic financial performance or statements to analyze.

The credit and lending appraisal and decision must be based entirely on the prospective estimates of project performance. The SPC's ability to meet debt service is a function of this network of contracts. Each contract plays a key role in the project structure; these, and the technical, financial and managerial abilities of each party to the project to perform its given responsibility, must be analyzed along with estimated project financial performance. This creates additional complexity and burdens on the lender.²³ Lending for true project financing involves considerable transaction costs and due diligence. For this reason, true project finance often requires minimum project sizes of \$25-50 million, and hence is generally not applied to the SSRE market. Lenders who specialize in SSRE project finance are less common but do exist, especially in more mature markets. A key is for the lender to undertake such financing in partnership with parties who can generate a series of similar projects, and to use multi-project financing facilities.

4.2.3. Community Energy Systems. A special case business model for SSRE projects, specifically designed to provide access to energy services in rural off-grid areas, are community and village power and energy systems and related independent power distribution systems. Grid extension is frequently not an economic option due to remote and island community geographies and long distances from existing grid service.

Successful community energy systems required sufficient energy loads and load densities, means to manage load profiles and load growth so as to operate efficiently and not overwhelm the system, and local institutional capacity to manage operations, maintenance, technical and administrative, financial and collections functions effectively. Energy services must be priced to recover costs and tariffs must be collected.

Many communities already have independent "mini-grids" distributing power. While many such systems experience high service costs due to low loads and load densities and low reliability exacerbated by investment and management inefficiencies, many also do operate effectively. Community energy systems can be sponsored by several types of entities. They are often founded and centered on an existing local industry which provides the system base load and necessary managerial and financial capacities. Other systems may be operated by local governments, or affiliates of rural electric cooperatives or other electric utilities which, while not connected via transmission or distribution lines, fulfill a mandate to serve by helping establish and supporting operations of community energy systems. Some systems may be sponsored by rural energy service companies (RESCOs), which may have concessions with local government or the applicable local utility.

²³ A typical due diligence checklist for appraising loans for cogeneration and biomass energy projects is included in the resource materials.

Grameen Shakti has implemented “micro-enterprise zones” which provide energy services from RE sources to a cluster of micro-enterprise firms, like an industrial park.²⁴ Concentrating enterprise energy loads in one area can result in economies in providing energy services, saving both capital and operating costs per unit of service. Loads can be more readily managed and coordinated to make cost-effective use of generation capacity. Energy services support income generating livelihoods which create ability to pay the energy tariffs in a virtuous cycle. Load growth and profiles can be more easily managed in the centralized systems. Over time, distribution lines can be built to serve adjacent buildings, households and facilities. Household loads can be controlled with current limiting devices. Load manage can also be achieved by using off-peak power for such uses as water pumping, battery charging, ice making which all represent forms of energy storage.

Diesel generation is the most common source of energy for community energy systems. They are a commonly available and proven technology and provide generation at relatively low upfront capital costs per unit capacity. However, they have high fuel and maintenance costs, and are subject to fuel supply price risks and supply interruptions, and high GHG emissions. RE systems generally have higher capital costs but low to no fuel costs. They have proved to be effective in terms of achieving economic, environmental and social objectives by the enhancement of security of energy supply, the reduction of greenhouse gases and other pollutants, and by providing opportunities for employment and increased economic activity, as in the case of bio-mass systems where fuel is generate locally.

RE systems can often be integrated into existing diesel based systems. Governments often subsidize diesel fuels and generation systems as a means to energize off-grid communities. These subsidies could be reoriented to support RE systems. Subsidies can be delivered as capital/up-front subsidies or as payments for delivered energy services (per kWh or per household per month defined for each system type/size). In a concession contract format, the subsidy from a government agency or utility can represent the difference between (a) agreed cost of service as defined in the concession contract, minus (b) end-user payments. Collections from end-users can be performed by the RESCO or by the utility.

The Philippines, for example, has over 100 rural electric cooperatives (RECs) serving many provinces and communities. These RECs have often sponsored Baranguay (read “village”) Power Associations (BAPAs) to operate community energy systems. The REC is the vehicle and contractor for providing capital subsidies and installing the local generation and distribution systems. The BAPA operates typically in a joint venture with the local government. A RESCO could also have the concession to operate the BAPA. The RESCO would provide technology, know how and financing (or co-financing) and the LGU or BAPA would provide local staffing and personnel and especially collections services.

4.2.4. SSRE Project Finance Risks: Analysis and Mitigation Strategies. SSRE project finance risks assessment must be conducted in the context of the applicable transaction structure.

²⁴ See Renewable Energy for Microenterprise, by April Allderdice and John Rogers, published by National Renewable Energy Laboratories, November, 2000.

Credit risks of borrower. Appraisal of full recourse loans begin with analysis of the credit of the borrower, ability to pay and free cashflow (including project revenues) available for debt service, willingness to pay, balance sheet and available collaterals. Typical means to secure loans include pledges and assignments of project revenues and other revenue sources, preferred drawing rights on the borrower's lead bank accounts, project-specific debt service reserves (usually sized to cover 3-6 months debt service) and other available liquid or real property assets that can be pledged, reserved or mortgaged. If the project receives any operating subsidies, these should be pledged, and the pledged perfected via assignment and payment to an appropriate escrow account held for the borrower on behalf of the lender.

Off-take purchase risks. When a project is selling energy outputs, the credit of the energy off-takers is a critical risk. These may be local small businesses and households as with a community energy system, a local industry buying thermal energy as with a cogeneration plant, or an electric utility as with a grid connected RE power project. The creditworthiness of the off-takers should be analyzed in the same way that the credit of a borrower is analyzed. This may not always be possible, as accurate financial information may be limited or unavailable. Primary economic analysis is therefore needed to assess financial viability and ability to pay of the off-takers. When the credit of an off-taker, e.g., an electric utility, is weak, third-party guarantees could be used to back the purchase commitments are sufficiently credible to make the project financeable. Regulatory and legal risks associated with power purchase agreements and obligations of a regulated utility also must be reviewed.

The contract sales terms also must be assessed. The tenor of the energy or power sales contract should beat least co-terminus with the senior debt and also include minimum take or capacity payment provisions so that the off-taker is obliged to pay for a minimum amount of energy even if it is not used so as to assure a base level sales and revenues to the project. The risk analysis should include assessment of expected energy load levels. The energy sales price must also be assessed vis-à-vis the costs of generation to assure that the pricing is adequate and that the price can rise as needed to cover future potential cost-of-service increases, such as increases in fuel costs.

Fuel supply and RE resource risks. Fuel supply and RE resource risks, e.g., future wind flows and rain falls, must be assessed with good resource studies. Several years of data, properly collected, are usually needed to assess a wind and hydro project. Bio-mass fuel supply risks can be studied with a resource assessment. The best risk mitigation in this case is to size the energy project conservatively with respect to readily and locally available and captive bio-mass supply resources.

Construction risks. Construction risks can typically be covered through turnkey construction contracts. The contractor would commit to complete a project on time, on budget and according to specifications, as per an agreed acceptance test and project commissioning protocol. Construction disbursements should be tied to milestones in construction completion with appropriate withholdings of final payments until passage of acceptance tests. Contingencies should be built into the construction budget.

Operations and system performance risks. These can best be managed through project design and project engineering, plus procurement of equipment from reputable vendors. Some equipment vendors can provide extended system warranties. Proper budgeting is needed to

estimate operating costs. Reserve funds should be set aside for emergency and periodic repairs. Other insurable risks -- such as fire and casualty -- should be the subject of standard insurance policies.

Risk mitigation for community energy systems. A successful community energy system requires sufficient energy loads, means to loads, local operations and management capacity, tariffs priced for full cost recovery (net of any available subsidies) including return to capital and appropriate reserves, a technically viable energy generation system and customers with willingness and ability to pay the tariff. These factors must be planned in advance.

4.3. Financing Mechanisms & Risk Sharing Instruments for SSRE Project Financing

4.3.1. Senior Debt Guarantees. The typical and most broadly applicable type of FRMI to support senior debt financing for SSRE projects is a senior debt partial credit guarantee (PCG). With a PCG, a guarantor can mobilize senior debt from a local FI by sharing in the credit risk of SSRE project and equipment loans which the FIs provide with their own resources. Guarantee structure options are described in Section 2.3.1, above; typical structures relevant for SSRE project finance are: (i) pari passu PCG, (ii) subordinated recovery PCG, (iii) portfolio first loss guarantees, and (iv) liquidity support guarantees.

Development finance institutions have often used concessional funds to support clean energy finance guarantee programmes. The concessional monies are used as reserves against guarantee liabilities and are placed in a first loss position. A pari passu PCG using concessional funds in this manner is described in Section 3.2 with respect to SME SSRE business loan guarantee programmes. An analogous structure could be used to support for SSRE project finance.

Key concerns for concessional funders include available resources and leverage: what amount of concessional funding is needed to have the target impacts, and what amount of SSRE project financing can be supported for a given amount of concession funds. A pari passu PCG will typically cover 50-75% of a loan's credit risk. To enter this market, guarantors may need concessional funds covering from 20-50% of their guarantee liabilities. Thus, the leverage ratio for concessional funders will be in the range of 3-10 to 1, with 5:1 being typical. Assuming a debt/equity ratio for projects of 70/30 and a 5:1 leverage ratio, the concessional funder would need to provide \$14 million in guarantee reserves for every \$100 million in SSRE projects financed. Better leverage might come from use of subordinated debt structures, as described below, Section 4.3.2.

Example: International Finance Corp. (IFC) Senior Loan Guarantee for SSRE Projects in Czech Republic. IFC, through its "Commercializing Energy Efficiency Finance" (CEEF) guarantee programme has supported financing of several grid-connected SSRE projects by Cseka Sportelna 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 PCG to CSB, pursuant to which the bank has financed many energy efficiency and several RE projects. One wind project (2 MW) 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 for its over all guarantee programme. IFC has approved undertaking guarantee liabilities 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 programme and the

related Hungary Energy Efficiency Co-Financing Programme, although the pari passu guarantee structure has been the main guarantee structure used for SSRE project financings. IFC also provides TA supporting 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 programme successful.

Example: West Nile, Uganda; Senior Loan Guarantee to Extend Loan Tenor.

Lengthening loan tenors can be an objective of an FRMI design. If the loan tenor can remain well-matched with the equipment asset life, then this approach can be prudent. This is the case for many types of RE power generation systems. Using this approach can be critical to create affordable energy services. By lengthening loan tenors, loan debt service per year is reduced. For example, in Uganda, the West Nile a 5 MW small hydro project implemented with support from a World Bank programme used concessional funds to allow a commercial lender, Barclays, to extend the loan tenor from seven to 14 years. This made the price per kWh from the system affordable. The World Bank provided a form of partial guarantee on the loan. The guarantee liability amount was sized and structured so as to fully repay the remaining principal balance on the loan after seven years. Given their lack of experience with this type of project and other financial market conditions, Barclays was willing undertake a maximum seven year loan term. By assuming all the loan exposure risk after seven years, the guarantee allowed a 14 year loan term to be used. In this case, 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, at the seven year point, 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 seven years, Barclays can simply extend its loan for the remaining second seven year term, and the WB guarantee can be retired.

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 in the range of 67% of the original loan principal. Depending on the effective yield on the zero-coupon bond, the purchase price of the bond will be in the range of 65% of the planned seventh year redemption value (based on a 6% yield. Therefore, the case required to purchase the bond will be on the order of 45% of the total loan amount. Thus, it would be costly in terms of concessional and development funds per to replicate on a large scale. If this type of instrument is to be replicated, a guarantee programme 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 a first loss reserve by the guarantor to support undertaking such liabilities, similar to the SME business loan guarantee programme described in Section 3.2. The parties would need to agree in advance that the redemption option is only available 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.

4.3.2. Subordinated Debt and Quasi-Equity Structures for SSRE Project Finance.

Subordinated debt and other forms of mezzanine finance can be a very useful structure for SSRE project finance. "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 before the project equity owners. Subordinated debt provides needed 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. Thus, use of subordinated debt is a type of FRMI and can help mobilize senior debt. By reducing risk for the senior lender, subordinated debt may also help extend loan tenors.

The subordinated lender may have principal payments deferred until after senior debt service is retired. The subordinated lender could take the long-term end of a project loan. This allows the senior lender to have a shorter loan tenor, also reducing the senior lender's risk time horizon. But, when combined together, the subordinated and senior debt as a package result in an overall longer loan tenor, so as to better match a project's debt service with its revenues and asset life.

Use of subordinated debt can also substitute for and reduce project sponsor equity requirements. For many project sponsors and developers of SSRE projects, a key limiting factor to project financing is lack of available equity for project investment. SSRE projects are often sponsored by poorly capitalized entrepreneurs who, having managed to bootstrap a project through development and early permitting stages, are hard pressed to provide further cash necessary to leverage a debt commitment for implementation. The project may be sound in other respects but sponsors are unable to arrange senior debt financing due to inability to provide needed equity. Subordinated debt can fill this gap, lowers a sponsor's equity requirement and also allows the project developer to preserve controlling ownership interests in their project or company.

Subordinated lenders earn a higher rate of return, commensurate with the higher risk, at the same time they have a discrete project, with assessable risks and assignable revenue streams. The extra yield for sub-debt is typically in the range of 400-600 basis points higher than the senior loan interest rate. Additionally, subordinated lenders can often gain additional returns or "upside" potential in the form of profit sharing, equity ownership shares, or perhaps through acquiring a project's certified emissions reductions, as applicable. In events of project failure or loan default, the subordinated lender can have effective and registered claims on a project's assets and revenues, but always junior to the senior lender. With an appropriate inter-creditor agreement, the subordinated lender can benefit from recovery actions instituted by senior lenders. As an alternative to subordinated debt, other legal structures can be used, such as convertible debt (which allows a loan to be converted to project or company ownership shares in certain conditions), or preferred shares (which are a class of equity, but get paid dividends prior to profit distribution to common stock shareholders). These other types of quasi-equity instruments which accomplish a similar objective: raising project financing that supports and strengthens senior debt, but gets repaid on a priority basis before the equity owners.

Sources of subordinated debt. SSRE subordinated loan facilities are appropriate for sponsorship and investment by international and national development banks and finance agencies. An example is the Central American Renewable Energy and Cleaner Production Facility (CAREC) recently established by E+Co to provide co-financing of small scale clean energy projects and companies, mainly using subordinated debt and other quasi-equity

investment structures, (see below). Subordinated debt is also a suitable instrument for use by specialized clean energy project investment funds.

Subordinated debt funds can be undertaken in partnership with senior lenders. The subordinated loan can be made alongside of senior loans, in which case the subordinated loan is made to the project or the investee company on a case-by-case basis. Alternatively, a subordinated credit facility can be provided to the commercial FI which acts as senior lender; the senior lender then on-lends to the project, blending together the subordinated debt together with its senior debt provided from its own resources. The borrower sees one single loan, but the senior lender applies loan payments to repay the senior debt component on a priority basis. If the project experiences payment performance problems, the senior debt component of the project loan would be repaid first, and payments on the subordinated debt component would be deferred, and perhaps rescheduled. This structure gives the senior lender an effective tool to prudently increase debt financing of SSRE projects 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.

International, national and sub-national (e.g., state or provincial) development financial institutions (DFIs) can structure subordinated debt facilities with commercial FIs. The subordinated lender builds off the loan origination capacities of the senior lender and relieves the DFI of direct project loan origination and transaction cost burdens. The commercial FI and senior lender in effect acts as manager of the subordinated loan funds and an aggregator of capital demand. By working with several commercial FIs, a facility approach could aggregate sufficient demand to make subordinated debt financing of SSRE projects attractive for DFIs. International Finance Corporation’s Financial Markets Department is assessing this type of facility structure presently.

Use of Concessional Funds to Support Subordinated Debt Facilities. These types of facilities could readily incorporate concessional and donor 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 concessional funder would be supporting and leveraging the subordinated debt which in turn supports and leverages the senior debt. This concept has been applied by the European Union’s Patient Capital initiative and the French agency ADEME. This type of structure can be used by UNEP and other donors to mobilize debt finance for SSRE projects. This approach is recommended for further consideration. The concessional funds provide the higher risk tier of funding within a sub-debt facility. This funding can also be combined with TA funding that can assist the sub-debt fund and/or its partner senior lenders to market and prepare projects for investment, including aggregated investment programmes.

Table 4.1: Subordinated Debt Facility with Concession Funds: Indicative Sizing and Leverage Calculations.

Sources of Funds for typical SSRE Project, with Sub-Debt:

Senior Debt	60.00%
Subordinated Debt	25.00%
Sponsor Equity	15.00%
<hr/>	
Total	100.00%

Subordinated Debt Facility with Concession Funds, Indicative Sizing:

Subordinated Debt Facility, Total Size	\$25,000,000	
Investor or DFI Funding	\$20,000,000	80.00%
Concessional Funding	\$5,000,000	20.00%

Subordinated Debt Facility with Concession Funds, Leverage Calculations:

Total Senior Debt that can be mobilized	\$60,000,000	
Total SSRE Project financing supported	\$100,000,000	
Ratio of total project financing to concessional funds	20	
Average size of individual SSRE projects	\$2,500,000	
Total # of projects financed by sub-debt facility	40	

Table 4.1 illustrates a subordinated debt facility with concessional funds. It begins with a source of funds schedule for a typical individual project. In this case, senior debt constitutes 60% of the total sources of funds. This is a fairly conservative level of funding, and can help reduce risks for and hence mobilize the senior debt. The project sponsor provides 15%²⁵ and the sub-debt facility 25%. The sub-debt facility would support financing of a series of projects. If a sub-debt facility were to have a total size of \$25 million, it could therefore support financing of \$100 million in SSRE projects, and help support \$60 million in senior debt. In this case, \$5 million of the sub-debt facility derives from a concessional or donor source. The ratio of concessional funding to the total amount of project financing is 20:1, which can be an attractive ratio. If the average size of each SSRE project were \$2.5 million, the facility would support financing of 40 projects.

The terms of the concessional funding can take various forms, in both returns and risk profile. The concessional funder could earn returns equivalent to the sub-debt, or it could earn a reduced return as a means to lower the pricing of the sub-debt facility for the benefit of the SSRE project sponsor and the communities they serve. If the sub-debt facility experienced losses, the concessional funder could absorb all losses first. This would benefit and help mobilize the sub-debt facility investor. A regional facility could be structured to broaden the pool to eligible projects and help assure sufficient demand for such a sub-debt fund.

Example: E+Co Central America RE Investment Fund Using Mezzanine Financing Instruments. E+Co has recently established a new 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 SSRE projects, < 5 MW typically, and mostly grid connected, but also including a range of clean energy enterprises. CAREC will be operated mainly from E+Co's San Jose, Costa Rica offices.

The CAREC facility will use mainly mezzanine-financing mechanisms such as subordinated debt, convertible debt, preferred shares and other quasi-equity structures. Use of 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 is providing flexible capital,

²⁵ It is important to account and attribute all of the project sponsor's project development costs toward this equity contribution, which will typically be in the range of 5% of total project costs.

like a strategic investor, that can help mobilize commercial and development bank debt from both local and international sources and thus helps to fill an important financing gap. E+Co Capital Latin America has secured a loan guarantee facility from USAID Development Credit Authority (DCA) to be used in support of private sector debt to the CAREC fund.²⁶

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). In addition to MIF, other CAREC's investors include the Central American Bank for Economic Integration (CABEI), The Belgian Investment Company for Developing Countries (BIO), Triodos Renewable Energy for Development Fund (TREFD) and the Finnish Fund for Industrial Cooperation, Ltd. (Finnfund). Also, with grant funding from MIF and the Netherlands Development Finance Company (FMO) the fund will have a TA facility to help cover investment preparation and project and business financial advisory services. Establishment of CAREC reflects E+Co.'s operating philosophy to be a strategic and patient investor, focused on SSRE projects and enterprises, combine their investment with hands-on TA to clients, use grant funding to cover the extra investment origination and advisory functions required, and to spin-off and create dedicated funds and investment management teams as good market niches are defined.

4.4. Recommendations on SSRE Project Finance Programmes

Senior loan guarantees and subordinated debt financing facilities are two key types of FRMIs for supporting financing of SSRE projects. They enhance the overall credit structure of the projects and help mobilize senior debt.²⁷ The subordinated debt facility offers greater promise as a structure to be supported by concessional funders seeking to promote SSRE project finance as it appears to offer greater leverage of concessional funds and also benefits for the project sponsor by reducing sponsor equity requirements. Any programme should be accompanied by TA to support preparation and planning for sound projects, in all their elements, and by strategies to aggregate the market.

4.4.1. Market aggregation and investment programmes. The most effective means to promote financing of SSRE projects is to develop aggregated SSRE project marketing and investment programmes, which package common and replicable solutions to main risk issues. A successful project relies on good business planning for each basic project element. Hence, SSRE project finance programmes should be accompanied by TA for this purpose. Whenever possible, investment programmes should be designed to address the needs of a series of projects, for example:

- standard power purchase agreements from the local electric utility for grid-connected RE projects that have been vetted and approved by lenders in advance;

²⁶ For more information, please see <http://eandco.org/>

²⁷ Targeted FRMIs supporting specific project risks -- such as construction, operations, fuel supply and off-taker purchase commitments -- are best structured with the commercial parties involved, i.e., through the construction, operations, fuel supply and off-take agreements themselves and the plans to fulfill them. The corporations entering these contracts with the project sponsor can provide additional backing for their contractual commitments as needed. In certain markets, third-party guarantees backing power purchase commitments of electric utilities are conceivable as an effective instrument to mitigate one key project finance risk, but are probably most feasible for larger grid-connected projects.

- systematic methods to qualify and procure capable system SSRE vendors to provide SSRE systems to a target market on standard terms and conditions;
- resource studies across a region or industry to assess available RE resources and size resource utilization and plants accordingly;
- TA programmes for building capacities for operations of community based power systems.

A key strategy for marketing full recourse loan products is to find creditworthy project sponsor firms first, and then seek to assess and develop SSRE project applications with this firm. For example, a range of industries (wood products, agriculture commodities processing, animal rearing) have a good balance of thermal and electric needs suitable for cogeneration and have readily available sources of bio-mass wastes suitable for energy generation. Also, financially sound rural electric cooperatives, or communities with existing viable independent mini-power grids served by diesel generation, can be good candidates to incorporate SSRE projects into their energy supply mix. How can these firms be identified? Associations (such as rural electric cooperative associations, or wood products industry associations) and government agencies (power ministries, economic development agencies, and agencies which monitor finances of agricultural cooperatives) which serve these types of industries can be a good source of information on which firms are creditworthy and have good management. The commercial and development FIs which serve these firms in existing banking relationships will also know which firms are most creditworthy. Once the quality firms are identified, then the potential application and feasibility of SSRE systems to serve their energy needs can be assessed.

Banks can have partnerships with SSRE system vendors and contractors in this type of endeavour, similar to vendor finance programmes as described in Section 2.2, above.

Development and financing of community energy systems can proceed similarly, through partnerships with entities that can work with capable local community energy system project sponsors. These entities can include: utilities and rural electric cooperatives, industry associations, associations of cooperative organizations, micro-finance institutions, associations of local governments, national and state/provincial government agencies such as ministries of health and education concerned with providing local energy services to clinics and schools. Incorporation of RE systems into existing diesel generation based community energy systems can also be a good strategy; it builds on the existing community energy system capacities and also means that the lender has an existing credit and operations to analyze in loan due diligence. RE can both substitute for and complement diesel generation in hybrid systems.

Development of an SSRE project investment programme should begin with knowledge of the market segment and its fundamental project economics, the legal and regulatory market framework, and the commercial parties who are active in the market. Market segments should be prioritized and targeted which have strong economics, suitable legal and regulatory and stable macro-economic environments, and existing delivery capacities for all elements of the project development and implementation cycle, most importantly engineering and equipment supply, installation and servicing, and debt financing. The investment and credit structure of individual projects must be designed that is bankable from a debt perspective and commercially attractive from an equity perspective, and which addresses the institutional and credit characteristics of the target market, and business objectives of all parties and is marketable to the end-customers. A risks and roles analysis of the transactions is needed for this purpose. The method for marketing

projects to individual customers and the steps for developing projects over the full project cycle need to be planned. Once the structure and pattern for individual projects is defined that meets these criteria, then, with the marketing partner, a plan to organize and aggregate the market, that is, to develop a series of projects systematically, can be developed. Thus, a successful SSRE investment programme combines: (i) knowledge of an attractive SSRE project market segment and its economics; (ii) a structure for individual transactions that, when grouped together, is financeable for lenders and investors, marketable to customers, and profitable for capable firms to deliver; (iii) partnership with a party or parties who can act programmatically and market projects to customers in the chosen market segment, and a marketing plan; and (iv) access to finance, both debt and equity.

Two types of market aggregation programmes are described in section 5.4 below for SSRE projects: one addresses bio-mass power and cogeneration in rural India; another the potential for upgrading existing small hydro plant and grain mills with expanded power generation capacity, working in collaboration with power short state electric utilities in India.

4.4.2. TA agenda and programme options. A TA programme for SSRE project finance could include:

- market preparation: policy, standards, customer awareness, promotion of best practices;
- capacity building & training: application engineering, installation, operations and maintenance and servicing;
- funding for project identification, resource assessments, economic feasibility, and project development;
- support for SSRE project development businesses, assistance in both business development & project development;
- assist in capturing carbon offset values through aggregation, verification and brokering;
- development of investment and market aggregation programmes, as described above;
- Development of a standard PPAs grid-connected SSRE projects; and, assistance to electric utilities to conduct procurements of SSRE independent power projects.

5. PROGRAMME RECOMMENDATION: ESTABLISHING AN SSRE FINANCING SUPPORT FACILITY

5.1. SSRE Financing Support Facility: Concept Proposal

This Report has described and detailed several SSRE financing mechanisms and programmes, for the three types of target SSRE markets: consumer finance, business finance, and project finance. To support further initiatives and applications in this field, establishment of an SSRE Financing Support Facility is proposed.

- The Facility would provide funding and TA to implement SSRE financing and risk sharing mechanisms.
- Applications would be identified in particular countries and markets. These could be identified by Facility staff, in cooperation with other organizations such as the REDCO Alliance and the Renewable Energy and Energy Efficiency Partnership (REEEP), and/or via a request for

proposals process designed to sources and qualify potential applications. Identification of many good applications will require active outreach and development work by the Facility.

- The Facility could be available to support projects for certain or for all UNEP-eligible countries and regions, to be determined.
- As specific country projects and applications are identified, qualified and selected, the Facility would have a menu of tools and funding readily available to be adapted and applied. The Facility could adapt and employ a flexible range of financing mechanisms, incentive methods and TA activities to support implementation.
- The Facility would collaborate with various in-country sponsors and project partners, principally FIs and SSRE businesses but also potentially energy utilities, end-user associations, cooperatives, governments, and international governmental and non governmental development agencies, NGOs and SSRE finance entrepreneurs.
- The Facility will be able to respond quickly to quality applications. By being quick and nimble, with tools at the ready, the time required to move from project concept through design and into implementation can be greatly reduced, compared to normal donor-supported processes. Thus, the Facility can be more market and commercially responsive and adaptive.
- The Facility operations group would become a knowledge centre on these financing and TA methods, compiling information, case studies and methods and sharing these for adaptation and replication. The Facility would provide on-going support to country-based project implementation teams and support development of in-country financial advisors with expertise in this field.

5.1.1. Precedents. UNEP has precedents for this type of facility. UNEP and UNDP have recently launched their “Solar Water Heating Market Transformation and Strengthening Initiative” (SWHI). Solar water heating is a proven, economic SSRE technology that is significantly under-deployed due to a range of market barriers, including high up-front costs and lack of adapted financing, and need to build SWH industry capacities. Some countries, such as Israel, Greece and Cypress, have adoption rates as high as 300-800 m² per 1000 people, while other countries, with similar climate regimes, solar potential and hot water loads have less than 10 m² per 1000 people, indicating large potential for expanded deployments. SWH systems commonly offset LPG, electric and natural gas water heating systems, so potential for GHG emissions reductions are equally large.²⁸ The SWHI defines a set of policies, fiscal incentives, financing programmes, industry and supply chain capacity building and marketing programmes that can address market barriers. It is open for deployment globally, on a country basis, with countries to be selected based on readiness of market conditions and supportive government policies.

A similar facility approach is taken by the UNEP Seed Capital Access Facility (SCAF), which starts operations in 2007 and provides funding and TA support to help SSRE entrepreneurs access enterprise development services and seed capital. SCAF will operate in multiple

²⁸ See the SWHI GEF Project Document, and IEA, Solar Heating Worldwide: Markets and Contribution to Energy Supply, 2003.

countries in Africa and Asia via implementing partnerships with African Development Bank and Asian Development Bank, respectively. It offers a more focused menu of financing and TA tools targeting SSRE enterprises, working through mainstream clean energy investors -- typically investment funds capitalized by private equity funds, development banks, local and regional commercial banks, and national investment authorities -- and support these investors to make small seed capital investments in and provide business development services to SSRE SMEs. By sharing the costs of preparing projects for investment and temporarily buying-up investment returns, SCAF will reduce risk and transaction costs for these investors to make seed capital stage investments in SSRE enterprises. Successful enterprises can then become candidates for growth capital investment; the investors' motivation to participate in SCAF is to prepare a pipeline of SSRE enterprise growth capital investments.

5.1.2. Choice of Facility Focus. The three types of SSRE markets addressed herein -- consumer finance, enterprise finance and SSRE project finance -- may be sufficiently different to require separate facilities. At the same time, there are synergies between them, especially between consumer finance and enterprise finance, for example. SSRE power projects focusing on rural off-grid communities, such as the ICICI DESI programme described below, can also have synergies with consumer finance programmes designed to reach households in the same communities.

The typical loan size is a key parameter for design of a risk sharing facility. The SSRE project finance market does include many projects in the \$1-5 million range and even larger. Projects of this size, though still relatively small, may require a distinct credit enhancement facility structure, leveraging and sizing as compared to a consumer finance loss reserve fund structure, for example. Individual programme applications targeting SSRE project finance may therefore require relatively larger financial resources to implement, e.g., \$2-4 million rather than \$1,000,000 or less for consumer finance programmes. These three markets could be targeted by the same Facility if the Facility had sufficient resources; or, a Facility could target consumer and enterprise finance together; or, a Facility could also provide TA only to the SSRE project finance market, without undertaking the more resource intensive credit enhancement programmes for these types of loans.

A typical budget range for a new facility developed by UNEP is in the range of \$3-10 million. Therefore, it is recommended that UNEP focus on a Facility that would address a combination of consumer finance and micro- and small enterprise finance, and wholesale micro-finance for the same. A significant programme could be undertaken in the budget range of \$3-10 million. SSRE project finance would therefore be the subject of a separate facility.

5.2. Financing Instrument Menu

The Facility would have a menu of (a) financing and risk sharing mechanisms, and (b) TA services it could offer to FIs. It should retain flexibility to adapt and apply these in various combinations and also to adapt and create new variations of the basic methods. The financial and risk sharing mechanism menu includes:

For Consumer Finance

- Credit enhancement schemes such as the first loss portfolio guarantees and loss reserve funds, which address borrower credit risk

- Two-tiered credit enhancement schemes supporting and lowering the costs of wholesale loans to MFIs, and MFI loans to households acquiring equipment
- Vendor finance programmes
- Payroll deduction schemes
- Utility bill collections schemes
- Loan and interest rate subsidies
- Transaction fees and other performance-based bank incentive schemes, which help banks offer more attractive loan products to customers and make the lending more profitable for banks

For Business Finance

- SME loan guarantees
- Enterprise development funds
- Seed capital assistance funds
- Contingent grants for project preparation
- Output-based innovation funding grants

For SSRE Project Finance

- Project finance loan guarantees, supporting longer tenors
- Subordinated debt instruments

5.3. TA Menu for FIs

Key components of TA to support FIs include:

- Market research and marketing support
- Transaction structuring support and development of new financial products
- Staff training and business planning
- Establishing technical standards and engineering due diligence
- Carbon finance
- Market aggregation programmes

5.3.1. Market Research & Marketing Support. Thorough market studies can be valuable to FIs and useful to engage them. Market studies can assess demand for various SSRE financial products, understand equipment and project economics, identify active and qualified system vendors and SSRE businesses, identify and assess target markets and their credit characteristics, and assess perspectives and programmes of other key government, NGO, donor and policy actors which affect the market environment. Such studies can demonstrate to the FI the market and potential demand for SSRE financing.

Another quick way to demonstrate financing demand is to introduce FIs to credible SSRE businesses, vendors, project developers and utilities whose sales activity is creating demand for equipment and project finance. A TA programme can assist FIs in developing these relationships. Other marketing support can be in the form of general awareness raising, workshops, and events to educate the target customer base. For the consumer marketing and advertising campaigns can be effective.

5.3.2. Transaction Support & Development of New Financial Products. SSRE finance may be new prospective partner FIs. In these cases, TA is highly valued to structure initial transactions and then design and implement new SSRE financial products for those transaction structures that have strong replication potential. FIs can learn from international experience and best practices, and create new products that are adapted to their internal credit procedures and methods. Development of new products incorporates technical engineering to understand equipment and systems and their economics, with marketing plans and credit structure and lending procedures. A new financial product is a defined financing offer the FI can make to a target end-user sector for defined types of SSRE equipment. It is designed based on the transaction size, economics of the subject systems, and credit characteristics of the target borrowers. Key finance terms include tenor, rate, payment structure, downpayment requirements, security structure, and documentation requirements. The bank will also define its credit analysis procedure, underwriting guidelines, and loan origination, collections and administration procedures. An overall volume target for the loan portfolio for a given period, e.g., 1-2 years, can be set. A marketing plan must be defined, including SSRE vendors and other partners with whom the FI will work to market the financing product, and the terms of these relationships. A monitoring and evaluation plan for the new loan product should also be defined. New loan products discussed in this Report might be, for example: (i) vendor finance programmes with qualified vendors, (ii) payroll deduction scheme for SSRE consumer equipment and energy efficient appliances, (iii) utility-based finance programme, with loans co-marketed with a utility and collections on the utility bill, etc.

5.3.3. Training & Business Planning. SSRE finance training for FIs can cover SSRE technologies and applications, SSRE project economics, structuring SSRE equipment and project loans, special risk and credit features, case studies, marketing bank financial services, and 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, then branch staff can be trained on how to promote those specific products. A banker training programme focused on financing SHSs in India developed by Winrock International is included in the resource materials. Some FIs can use tailored assistance to prepare business and marketing plans for their implementation of their SSRE finance programmes.

5.3.4. Establish Technical Standards & Engineering Due Diligence. Banks will need to set technical standards for systems which they will finance. Banks have a material interest to make sure the equipment and systems are technically sound, durable, well-designed and installed, and backed by strong warranties and organized accessible after-sale service. Borrower willingness to repay is strongest if the equipment works properly and can weaken significantly if the equipment breaks or fails to perform as expected. Participating 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 programme can help establish the standards and support banks with technical knowledge, vendor criteria and selection. For SSRE project financings, a TA programme can also provide engineering due diligence on equipment and systems, and independent engineering reviews to confirm technical viability and economics of given projects. Post-project implementation performance reviews can also be valuable to FIs as a means of monitoring their loan portfolios.

5.3.5. TA for Financial Institutions on Carbon Finance. Most SSRE 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 SSRE projects and investment programmes more economic and financeable. This is especially true for projects which reduce methane emissions. 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 SSRE projects. A TA programme could help FIs develop this type of programme, working on specific investment programmes. FIs and MFIs financing projects are natural aggregators for small scale projects, a capable nodal agency which, as lender, will have a formal contractual relationship with a series of project sponsors.

Two examples of SSRE project investment programmes with strong CER potential are given below (Section 5.4.3) for scale-up of household and small commercial bio-gas systems and efficient cookstoves by the micro-finance institution Grameen Shakti in Bangladesh. The capital costs for the programmes are \$60 million and \$16 million, for 100,000 bio-gas systems and 3 million efficient cookstoves, respectively; each programme would be implemented over 10 years. Annual GHG emissions reduction by the end of the 10 year build-out period are 2.34 and 1.95 million tons per year CO₂ equivalent respectively for the two programmes. Capture and sale of CERs could therefore represent a very significant portion of the investment cost of the programme. Both of these projects have compelling economic, social and environmental benefits. If the CERs can be captured, a large portion of the CER sales proceeds could be used to buy down the capital costs of the systems to customers, passed on to the end customers to make the equipment more affordable, thus providing an effective subsidy, accelerating sales and supporting rapid scale-up of the programme. The market potential for each of these technologies is many-fold times the programme scale-up target. Other lenders active in SSRE equipment finance have expressed interest in being CER aggregators, e.g., Canara Bank (India) which financing solar domestic hot water heating systems that typically displace LPG or electricity use.

A small scale CDM methodology must be developed and approved for these technologies and investment programmes to capture the CER values. One small scale CDM project for household bio-gas systems (Bagepalli CDM Bio-gas Programme) has been registered with the UNFCCC²⁹. Development of new approved methodologies for small scale projects (less than 15 MW in size for RE projects) is evolving rapidly.³⁰

A TA programme could assist FIs in gaining approval for the CDM methodology. Further, it could assist the FIs to create CER purchase agreements and relationships with qualified buyers. The volume of CERs generated by the two Bangladesh programmes, for example, are large enough to attract investment interest. The carbon market is generally a sellers' market presently: the demand for CERs is greater than the supply. Carbon buyers need to offer value-added services to secure relationships with project sponsors implementing emissions reductions projects. Thus, carbon funds may also be willing to invest up-front in programme development costs as a means to secure rights to purchase CERs. Major carbon funds such as Climate Change Capital, Eco-Securities, NatSource, Blue Source and others are well advanced with this trend. Another trend is for carbon buyers to make advanced purchase payments for CERs for some

²⁹ See <http://cdm.unfccc.int/UserManagement/FileStorage/VCMNQ0S69WTHD75WFC5P4HSFE73TOO> on the CDM website for the Project Design Document.

³⁰ See http://cdm.unfccc.int/Panels/ssc_wg/. See also, Small-Scale Clean Development Mechanism Project handbook, Asian Development Bank, 2006.

prudent fraction of the estimated CERs a project will generate. This allows the project sponsor to include the proceeds from sale of CERs to be incorporated into a project's sources of fund schedule and applied to capital costs. Asian Development Bank (ADB), for example, has recently launched its Asia Pacific Carbon Fund (APCF) which is a trust fund established and managed by ADB on behalf of fund participants; the APCF will provide up-front funding against the purchase of an estimated 25%–50% of future carbon credits expected from projects.³¹ International Finance Corporation is developing a similar offer.

5.3.6. Market Aggregation Strategies. In pioneering new markets, it is essential also to have a market organizer. The Facility could serve this function, working with local partners. Market aggregation strategies are needed to scale up delivery of SSRE equipment and financing and approach markets programmatically. Investment programmes can be created with parties who can act programmatically to reach and market to a large number of project customers. Potential market aggregators and investment programme partners include: utilities, industry associations, associations of cooperative organizations, FIs and MFIs, equipment and system vendors, government agencies, ESCOs, RESCOs and project developers. Potential market aggregation strategies discussed herein include:

- concession contracts, via utilities or other agencies;
- vendor finance programmes;
- use of utility bill collections mechanisms, which aggregates demand for capital and provides a ready mechanism for delivering credit to a pool of small customers;
- building up “super” SSRE businesses which can expand through franchising and by spawning, supporting and financing further local enterprises;
- working through MFI networks to reach their existing customer base with new SSRE equipment, services and financial products;
- pooled finance programmes, to approach a given market programmatically, by aggregating many project opportunities into one programme.

Implementing such strategies can help aggregate demand for financing, and be beneficial to participating FIs.

5.4. Sample Facility Applications

This section provides several illustrations of how the finance mechanisms and related TA programmes could be applied. The descriptions are brief, preliminary and conceptual but are intended to show potential cases where the proposed credit enhancement mechanisms can be adapted and used in various settings. These finance programmes can be initiated by a range of sponsors: utilities, commercial FIs, micro-finance institutions, equipment suppliers and distributors, agricultural cooperatives, energy services businesses, large employers such as education and health ministries or agri-business processors, or any organization that can reach and sell to large numbers of the target market. These examples are:

³¹ In addition, ADB through its Carbon market Initiative can provide grant-based technical support for preparation and implementation of eligible projects as well as marketing support for additional carbon credits. At present, these services are available only to projects in which ADB is also a lender or investor.

- (i) agricultural cooperatives in the Philippines, which, with support of a wholesale loan facility, can add an SSRE consumer financing product to the services they offer their members;
- (ii) a payroll deduction scheme, whereby SSRE consumer financing is provided to farmers which sell their crops to large agri-business firms;
- (iii) scale up of household and micro-small enterprise bio-gas and cookstove marketing and finance programmes by an established micro-finance institution in Bangladesh;
- (iv) a new business model for developing, implementing rural bio-mass village power projects in India, led by a commercial bank lender; and,
- (v) a programme to aggregate development and financing of small hydro projects in India, in cooperation with several State Electricity Boards; and
- (vi) a loan guarantee programme in China, supporting loans to PV companies in China which provide off-grid SHS sales.

These applications are representative of the type which could be supported by a new SSRE Financing Support Facility. Numerous other potential applications exist. New SSRE consumer equipment finance programmes being designed for Uganda, Tanzania, Indonesia, and Papua New Guinea. A new bio-gas equipment fund is being designed for Nepal to expand on the success promoting that technology there. The UNEP Tunisia solar hot water finance programme is seeking new financing solutions to relieve participating vendors from the requirement of taking the consumer loans on their balance sheet; given the strong payment performance history in this programme, participating banks may be willing to forgo direct full recourse to the vendors and rely instead on the utility bill collections mechanism supplemented by a risk sharing facility or the types described herein. Related applications are also indicated in each example given below. Further study is required for development of each application. But, in general, these examples indicate a strong potential to find applications that could be supported by a Facility.

5.4.1. Agricultural Cooperatives in the Philippines as SSRE Consumer Equipment MFIs, Coupled with Wholesale Lending Facility

Application Opportunity. The Philippines has a large and strong set of cooperative institutions, organized to serve individual members in agriculture, fisheries, and rural communities which represent good markets for SSRE systems. These cooperatives are supported by Provincial and National government offices of cooperative development, national development banks, and many associations and NGOs with wholesale lending, TA and training, financial reporting and monitoring and other services. Many cooperatives already offer seasonal working capital loans to their members. Qualified and interested cooperatives could become a vehicle to deliver SSRE equipment finance to their members and communities. To do so, they would require (1) wholesale funding, matched in terms and tenor with SSRE equipment loans, and (2) TA to establish such a programme. A programme would recruit the wholesale lender, support the wholesale lender with a credit enhancement instrument, design, and deliver TA to participating cooperatives working with the appropriate cooperative support institutions (government, association and/or NGO). The general approach is to build on existing capacities,

to extend the ability of cooperatives to offer and deliver SSRE financing and related services to their members. SSRE equipment/system vendors would be part of the programme. In the Philippines, both Development Bank of Philippines and Landbank are potential wholesale lenders, which already offer wholesale loans to cooperatives.

Role of Cooperatives. The capacities of cooperatives could two key roles in a new SSRE equipment finance programme. First is community marketing and education, working with vendors and TA providers, to organize and educate their members and communities about the SSRE technology, benefits and finance offer. Second is lending and administering the equipment loans to households. The cooperative would enter into Loan Agreements with qualified participating households. Loan programme management includes: qualifying households for credit, executing Loan agreements, collecting loan payments, managing late pay, default and repossession cases, and financial record keeping. Summary benefits to the Cooperative to undertake this programme include: delivery of vital services -- energy systems -- to its members and community, development of a new line of business, building their business capacities, and income generation from the loan programme and related technical service business activity in the community. Loan pricing would be needed to make the operations profitable for the cooperative.

Wholesale Lending. To access wholesale funds for on-lending to households, the cooperative would enter into a Master Loan Agreement with the wholesale lender. Cooperatives would be qualified to participate by the wholesale lender, using information from government agencies, and assisted in identification and qualification of cooperatives by the TA provider. Selection criteria would include: (i) interest in the SSRE loan programme and vision for marketing it, (ii) good management and administrative capacities including existing loan billing and collections and track record in collections performance with their members, (iii) ability and willingness to enforce repossession remedies on loan default, and (iv) positive financial appraisal. Terms and disbursements of the wholesale loan would be matched to the underlying SSRE equipment loans as much as possible.

Facility Role. A loss reserve fund (LRF) or other credit enhancement instrument could be set up with the wholesale lender to cover the two levels of credit risk: the end-borrower credit risk which the cooperative assumes lending to households, and the cooperative credit risk the wholesale lender assumes lending to the cooperative. Sizing of the LRF would be based on the risk profile and analysis. The wholesale lender would benefit by adding a replicable new product it can offer to its cooperative clients, receiving a flow of demand for its loans from the cooperatives which are prepared to borrow by the TA programme, and from the risk mitigation of the loss reserve fund.

TA Programme. The TA provider would identify, recruit and qualify cooperatives to participate, recruit and qualify vendors, coordinate the programme with the wholesale lender, assist selected cooperatives to prepare their programme business plans and loan applications to the wholesale lender, provide operations systems, start-up support and on-going consultations to the cooperatives, and help the wholesale lender coordinate and manage the programme.

A further description of programme of this nature, including term sheets for the loan product, wholesale loan and LRF, is included in the resource materials.

Related Applications. Many countries have cooperative networks and also rural credit cooperatives which could apply their capacities to SSRE equipment finance. Another example is the GreenVillage Credit initiative in Yunnan Province, China, launched by UNEP in partnership with The Nature Conservancy (TNC) in 2005.³² GreenVillage Credit is a small pilot programme working through a rural credit cooperative (RCC) in China. TNC has provided a small amount of capital to the RCC, approximately \$500,000, in Lijiang to make small loans to villagers, for energy equipment, mainly solar water heating and bio-gas systems. Loans are up to \$1250 in principal for maximum tenors of 18 months and require co-signing by 5 member solidarity groups. This example is cited because the RCC network in China is extensive with large capacity to reach rural households and potential to scale up SSRE equipment loan programmes, if the right combination of incentives, wholesale funds and technical resources can be found to engage them.

A similar approach can be taken to engage micro-finance institutions in SSRE equipment finance: partnership with a wholesale lender, which has established relationships with MFI networks; provide that wholesale lender with a two-tiered risk sharing facility and with a programme of TA tools it can offer its MFI client(s) to support start-up and operations of an SSRE equipment finance programme. ICICI Bank has expressed interest in such a programme in India, working with the SEA MFI network.

5.4.2. Payroll Deduction Programme, Financing SHSs for Palm-Oil Farmers, Indonesia. A frequently used approach to financing consumer durable goods is via payroll deduction programmes. One application of this method is to work with larger firms which process agricultural commodities and buy from small producers. These firms can sponsor payroll deduction programmes to enable the farmers to purchase SSRE equipment. Loan payments would be deducted from the crop payments made by the agri-business firm to the farmers.

Application Opportunity. A good potential application is with palm oil farmers in Indonesia. Palm oil farmers tend to have stable market for their crops and hence stable income. Retail sales of SHSs among palm oil farmers have been demonstrated by SHS dealers such as PT Mambruk Energy International and Shell Solar Indonesia. Small holder farmers own over 30% of the palm oil plantations in the country, representing approximately 1.5 million hectares in cultivation. Assuming an average of 2 hectares per farm, there are over 700,000 palm oil farming households.³³ These households are often remote without grid access and typically use kerosene and diesel generators for energy services. Further market study is required to assess this market and determine the flow of funds in the palm oil crop trade. Processors could benefit by providing additional services to their suppliers as a means enhance supplier retention and loyalty.

An FI, together with vendors, could establish a programme with the palm oil processor. Loan payments would be deducted from the crop payments made by the agri-business firm to the farmers. Farmers could be qualified based on their history and sales/revenue volumes. The palm oil processors which purchase their crops can be a node of contact with these farmers and marketing for a programme. Once a programme is set up, the qualified farmers could access

³² “Engaging the Banks: Financing small-scale renewables in the developing world”, by Eric Usher and Myriem Touhami, *Renewable Energy World*, May-June, 2006

³³ “Indonesia Solar Lending programme: Market Potential”, unpublished report prepared for UNEP by Khaula Consulting, 2006, pp.13-14, citing *Estate Crops Statistics 2004*, Directorate General of Estate Crops Production Development, Indonesia Department of Agriculture

financing for equipment by authorizing the lender to deduct the loan payment directly from the employee's payroll. The employment relationship also provides a ready and economic means of loan payment collections on an aggregated basis and also a means for rapid analysis and scoring of an individual's credit.

Facility Role. The role of the Facility would be to organize the programme, offer TA support for start-up and operations to the several parties, qualify vendors, support marketing efforts, and provide a risk sharing facility or other incentives, as needed, to recruit the FI and help assure that the loan offer is attractive and affordable to the farmers. Once this market is established it can be a base from which to expand equipment sales to other households in their communities.

Related Applications. The World Bank is designing a new SHS finance programme for Papua New Guinea & the Pacific Islands. GEF funds may be used to extend loan tenors to five years to make the SHSs more affordable. Collaboration is being discussed with the Teachers & Savings Society so that teachers who are members can readily access loans via a payroll deduction programme. A credit enhancement programme supported by GEF funds is being considered. Similar payroll deduction schemes can commonly be used in urban areas for solar water heating systems, in concert with major employers; in rural areas, teachers and health workers are also good candidate market segments for applying payroll deduction schemes.

5.4.3. Household and Small Business Bio-gas and Efficient Cookstove Programmes, using MFI Capacities in Bangladesh.

Application Opportunity. The experience of Grameen Shakti (GS), the energy services affiliate of Grameen Bank in Bangladesh, in financing household energy systems, particularly SHSs, is discussed above, Section 2.7.2. With proper support, GS is well-positioned to build on its business to scale up its bio-gas systems and efficient cookstove product lines. This potential was studied in two reports prepared for Asian Development Bank (ADB) wherein to scale-up programmes are proposed.³⁴

Bio-Gas Scale-up Project. This project proposes to install 100,000 new small scale bio-gas installations over 10 years: 90,000 for households and 10,000 for commercial and institutional users. The household systems are bag type bio-gas plants which cost approximately \$325, receive 55 kg/day of cow dung and produce 2 m³ per day of bio-gas for domestic cooking use. Commercial/institutional systems are fixed dome systems which produce 20 m³ per day and cost \$3100 and process 550 kg/day of dung. Solid by-product can also be used and sold as a high-quality fertilizer. This use addresses one important problem: more and more dung is being combusted directly as fuel and not returned to the land, reducing soil fertility. The total capital investment over the 10 year programme is estimated at \$60 million. When fully built out, the 100,000 bio-gas systems would generate an estimated 2.34 million tons per year CO² equivalent GHG emissions reductions, mostly from reduced methane emissions. Total investment requirements to get this bio-gas operation scaled up to a self-sustaining business need to be

³⁴ Popularization of Bio-gas Plants: A Pre-feasibility Study Report, and Widespread Use of Efficient Stoves: : A Pre-feasibility Study Report, prepared for Asian Development Bank, by Bangladesh Center for Advanced Studies, August, 2006; available for download at <http://www.adb.org/Clean-Energy/prega-links.asp#05>

calculated based on further business planning but are estimated to be in the range of \$5 million. The programme would use and adapt GS's existing micro-finance offer.

Efficient Cookstove Scale-Up Programme. This project would promote efficient cookstoves, burning bio-mass, for the domestic and small commercial sectors. 70% of all households lack grid power in Bangladesh. Most of these households combust biomass -- wood, dung, agricultural wastes -- for cooking purposes. A modern cookstove can improve combustion efficiency by 50-65%, reduce cooking times and improve indoor air quality. A traditional domestic stove uses 1.88 tons per year of biomass; assuming a 50% efficiency gain with a modern stove, saved bio-mass equals 0.94 tons per year per stove. There are approximately 25 million household cookstoves nationwide. Nationwide adoption of efficient cookstoves could save bio-mass energy equal to 7.8 to 10.1 million tons of oil equivalent annually. Rampant use of all available bio-mass for cooking is degrading land and reducing soil fertility. Saved bio-mass could be used as fertilizer and feed. The project proposes to sell 300,000 stoves per year over 10 years. Each stove costs range from approximately \$2.50 to \$35, depending on size. Total investment requirement for 3 million cookstoves equals approximately \$16 million. GS would provide financing and servicing of the stoves to the customers. In 10th year GHG emissions reduction of 1.95 million tons per year CO₂ are estimated to be achieved. This project would be planned and calculated as a distinct self-sustaining micro-finance product line, within the GS business. Investment requirements to rapidly scale up and launch the business to revenue self-sustaining mode requires further business planning but is estimated at \$2-3 million.

Both of these projects have compelling economic, social and environmental benefits. If CERs can be captured, a large portion of the CER sales proceeds can be used to buy down the capital costs of the systems to customers. CERs can provide a subsidy to the bio-gas system and cookstove pricing and passed on to the end customers to make the equipment more affordable and supporting rapid scale-up of this business line. A small scale CDM methodology must be pioneered for this technology to capture the CER values. Capture of CER revenues will allow system prices to be kept more affordable and greatly accelerate sales.

Both projects are cast as 10 year programmes and must be approached as a business not a single project. GS will require both debt and equity for these programmes. The proposed Facility could support a wholesale credit facility that could revolve over the 10 year programme term, and could co-fund marketing and other business planning and TA to implement the programme. GS and Grameen Bank are highly reputable organizations. This project represents an immediate opportunity for application of creative Facility tools and methods. The optimum financing solution for GS would entail (i) a wholesale debt facility disbursed and matched according to sales volumes, and supported with Facility credit enhancement, (ii) some equity financing (perhaps using a venture debt type structure), (iii) CER aggregation and purchase, and (iv) some grant funding for TA and programme implementation. This type of programme likely has replication potential with other micro-finance institutions world wide, which are increasing rapidly in size, financial sophistication and access to capital markets.

Facility Role. The role of the Facility could be to support further development of the two programmes, provide a risk sharing facility supporting wholesale lenders to GS, provide financial advisory services for raising needed equity, and support detailed development and associated Project Design Document for the CER/CDM aspect of the programmes.

5.4.4. Small Scale Village Bio-Mass Power Projects for Rural India.

Application Opportunity. ICICI Bank, India, is considering developing a new financial product to finance small scale bio-mass power projects in rural areas. Such projects would to augment the supply and reliability of grid power and to electrify the estimated 18-20,000 villages which lack grid-based electricity. Bio-mass power can use available crop residues, food processing wastes and some available wood wastes. ICICI estimates such available biomass, excluding animal wastes, country wide to be over 405 million tons per year, sufficient to generate 17,000 GW. Positive economic development benefits result from employment in bio-mass waste collection and processing and project operations as well as economic activity facilitated by the reliable power.

ICICI's working name for this initiative is Decentralized Energy Systems Private Ltd. (DESI Power). ICICI is researching technologies, technology suppliers and business models for these village power projects. Two typical technologies are (a) small scale direct combustion producing steam for power generation, and (b) high-temperature oxygen starved gasification, feeding gas into a boiler for steam generation and power production. Plant sizes are 50-500 KW with a typical size of 250 KW and typical investment cost of up to 7-10 million Rs (\$150-225,000). Heat recovery is possible with both systems. ICICI has identified several working village biomass power projects in India which are producing power at a cost of approximately 6.0 Rs (about \$0.13) compared to diesel generation at almost twice that cost.

Business Model. The business model which ICICI is developing essentially "build, own, operate and transfer" (BOOT). The local partner and future transferee can be the village (Panchayat) government, a cooperative or an industry, and would also be an anchor power purchaser. The local partner would organize the power demand, manage the project administration locally and build capacities to operate and receive ownership of the project at the future transfer date. The ICICI DESI entity would provide training for these purposes. In many cases, the bio-mass projects would be substituting for existing diesel generation which provide local power to rural industries and villages. These existing industries and generation operators provide a natural customer market base for the DESI programme, and their existing business operations can be analyzed as a means to qualify them. DESI would also qualify a set of technology providers who could install systems on a turnkey basis, provide certain after-sale and operations services, and have similar reference plants with successful operating histories to demonstrate the technology. DESI would enter into programme relationships with qualified turnkey technology system vendors and operators.

Loan Product. The ICICI Bank would formulate a loan product to provide debt finance for the projects. Key underwriting criteria include: (i) available year round bio-mass in sufficient quantities, with a reserve supply; (ii) prospective purchasers (non-household) with stable operations such agricultural processing, small business/enterprise, local government and water pumping power purchasers; and (iii) a quality local sponsor, capable of also providing some additional security for the project loan. Debt/equity ratios would be conservative, in the range of 60/40 to 70/30. Loan terms could be up to 10 years, with one year grace. Equity can come from project sponsors, grant and government sources, and perhaps proceeds of carbon finance

transactions which DESI could help facilitate. Appropriate debt service reserve and repair and replacement reserve funds for the project would be established.³⁵

Facility Role. This type of programme would be appropriate for an SSRE project finance facility. The role of the facility could be to support this innovative initiative in its start-up pilot phase, provide TA to recruit new projects and project sponsors, and provide a credit enhancement or subordinated debt facility to support the project loans.

5.4.5. Market Aggregation and Investment Programme for Development & Financing of Small Hydro Projects in India.

Application Opportunity. Utilities can be effective partners to pursue SSRE project development and finance programmes, acting as market aggregators, project development partners and possibly as investors. For example, several State Electric Boards (SEBs) in India (e.g., Karnataka, Himachal Pradesh, Uttaranchal) have identified hundreds of small and mini-hydro sites (typically 1-5 MW) which are currently operating as hydro plants and/or grain mills with potential to be upgraded for greater power production. These projects would typically be connected to the power grid. Individual project sizes are small (typically 1-10 MW), but in aggregate they can provide significant power contribution to the grid (1-2 GW per State), provide power locally where it is needed and further provide utility system benefits in terms of peak power and avoided transmission and distribution (T&D) costs. Therefore, the SEBs are keen to license these projects and promote their development.

An integrated programme to develop, implement and finance these projects would work with the SEBs, FIs, system/equipment vendors, project developers and local project sponsors with site control. A programme could consist of: (i) a method for qualifying a set of turnkey hydro system suppliers and contractors who can implement projects on a turnkey basis, with extended warranties, and providing training for local operators; (ii) a standard power purchase agreement from the SEB that is quick and easy for projects to access and provides power purchase terms that create economically viable and bankable projects; (iii) a TA programme to support local bodies and enterprises which own the hydro sites to develop the projects and build capacities to operate them; and (iv) an adapted financing offer from local FI(s), like an ICICI and/or other institutions, and equity investors.

Facility Role. This type of programme would be appropriate for an SSRE project finance facility. The facility could provide TA for programme development and marketing, organizing all the programme elements outlined above, support this innovative initiative in its start-up pilot phase, including recruitment of new projects and project sponsors. This would include organizing lenders and equity investors, including, potentially, a subordinated debt SSRE project finance facility. By standardizing PPA terms and qualifying vendors, a series of bankable project transactions can be created, and, on this basis, contractors, lenders and investors could be recruited.

5.4.6. China PV Business Finance Programme.

³⁵ Based on personal communications with ICICI, Mr. Pradeep Chauhan, Chief Manager- Rural Infrastructure, ICICI Bank, Mumbai, India, October-December, 2006.

Application Opportunity. The World Bank/GEF China Renewable Energy Development Project (REDP) has implemented a successful programme (2002-2006) providing business development services and sales grants to PV companies in China which supply and sell SHSs in off-grid communities. Over 25 PV companies have been served. One need this programme has identified is to improve access to commercial bank business finance for the PV companies. Loans would be used for working capital, capital investment in productive plant and equipment, expansion of dealer and sales networks, and end-user finance. An SME loan guarantee programme, targeting these PV businesses could serve this need and support expansion of the off-grid SHS industry. REDP has a strong knowledge base of the PV industry which could be tapped to identify and assess prospective borrowers. A guarantor would be selected which is already active providing loan guarantees for SMEs. Funding could be provided to the guarantor that would act as reserves to support the guarantor to undertake guarantee liabilities with participating lenders, backing loans to the target PV businesses. Interest in this market and these small loans would have to be cultivated amongst the banks. The guarantor could recruit participating banks. Typical loan sizes would be \$50-500,000; businesses could graduate to larger loan sizes as they meet financial performance targets and covenants associated with the initial loans. Typical guarantee terms are discussed in section 3, above. The guarantor could earn interest on the reserve funds and guarantee fees. Additional funding support for the guarantor's programme operations costs may also be needed; this compensation could be paid on a performance basis, as loans are originated.

Facility Role. The role of the Facility could organize the programme, contribute guarantee reserve funding that would be leveraged up by the guarantor, and provide TA services through the loan origination cycle and to help target businesses prepare for the loans. Services could include identification and screening of PV companies as prospective borrowers, assistance to the PV companies to prepare loan requests and supporting business plan and financial projections, assistance in loan appraisal, and assistance in managing loan origination.

Related Applications. The guarantee programme could be open for all types of SSRE businesses serving, starting with the PV companies. For example, the UNEP's China Rural Energy Enterprise Development (CREED) programme, with support from the United Nations Foundation, is working with a series of SSRE enterprises in Yunnan Province and Western China

In Africa, UNEP via its affiliated AREED programme has been working since late 2001 to increase delivery of clean energy services to the rural poor in five West and East African countries by supporting development and growth of rural energy services enterprises. UNEP has provided business development services and seed capital financing to over 36 energy enterprises, spanning a range of technologies including solar home systems, efficient cook-stoves, bio-gas, LPG distribution, solar DHW, bio-mass fuel supply, wind irrigation, charcoal briquetting, and others. A key finding of the programme's mid-term evaluation conducted in 2006 concerns the need to develop risk sharing instruments to mobilize business and consumer equipment financing from local commercial and micro-finance institutions for the participating enterprises. A similar SSRE SME loan guarantee programme could serve the set of SSRE enterprises participating in AREED. The AREED management team, including the several NGOs which manage the programme in each country, could provide a ready network of management capacity and TA service delivery capacity to implement such a programme, in collaboration with local guarantor and FIs.

5.5. Subsidies

5.5.1. Rationale & Justification for Subsidies and General Principles for Design of Subsidy Programmes. Subsidies can distort markets and drive out or delay commercial players and practices from entering a market. Early donor driven SSRE projects have often focused on installing a targeted number of systems without regard for commercial sustainability or replication. In response, methods have been sought to catalyze private sector energy delivery in rural areas by investing in SSRE businesses. These types of projects have been premised on the concept that with the right start-up support and capital, market-based commercially viable rural RE businesses can be developed. SSRE businesses operating in rural areas face key challenges: credit is often unavailable, transactions costs are high, and demand is highly dispersed. SSRE businesses can often operate profitably on a small scale in concentrated areas with upper (relatively) income tier customers but challenges of administration, controls, management, physical delivery, accounting, collections and other business factors intensive with growth and often increase as markets are further penetrated to more rural areas, rural businesses can have low margins and high risks.³⁶

Many practitioners involved in SSRE business development and finance have returned to a view that subsidies are needed to meet the energy access agenda. This is a controversial point. The prospect of supporting and spawning commercially viable market based businesses has not diminished. But the standards of commercial viability have altered and the need for forms of on-going subsidies to achieve energy access is now being reassessed. Further innovation is needed to aggregate demand and establish administrative apparatus for scale up.

Energy services are a form of public good. Providing energy access creates tremendous social benefits and is worthy of social investment. Urban and industrial areas receive many forms of public investment for energy infrastructure. Rural areas are equally deserving but different technologies and methods must apply. Making SSRE systems affordable may require subsidies and subsidies may be justified in many cases to fulfill the energy access agenda. Given the poverty alleviation benefits, the social cost/benefit analysis for subsidies can be highly positive. How then to structure SSRE subsidies in smart ways, that work with and support development of commercial businesses, do not distort markets adversely or crowd out private capital and initiatives, and deliver the subsidy where needed and benefit the poor?

5.5.2. Design of Capital Subsidies. Some important considerations in designing a programme of capital cost subsidies include the following.

- The subsidy must result in an economically attractive offer to the customer. The subsidy must be delivered in a way that directly reduces the end-customers' costs to the point where the EE project offers compelling economics. Sales drive the market and end-user economics will drive sales. Thus, the amount of the capital cost subsidy should be determined with respect to end-user economics, adjusted for each type of application.
- For large scale subsidy and commercialization programmes, experience has shown that subsidies can be most powerful, measured by amount of subsidy in relation to reduction in end-

³⁶ See, for example, REN 21, Energy for Development: the potential role of renewable energy in meeting Millennium Development Goals, page 15, 2005; and, SDG evaluation report

user price, if they are delivered at the *manufacturers' level*, rather than directly to the end customer. As equipment is sold through the chain of distribution, it is marked up in price at each stage. This percentage mark-up at each stage is compounded at each subsequent stage. Capital cost subsidies can be delivered via aggregated orders to maximize their value to manufacturers and help them achieve production scale economies. A dollar in subsidy delivered at the manufacturer level can maximize the end retail value of the subsidy by reducing the original price basis of the equipment, as manufacturer prices are compounded through the equipment distribution chain. This principle appears to contradict the first principle, of assuring that the subsidy results in direct benefit to the customer. Good programme design must attend to both principles, assuring that a subsidy provided at the manufacturer level results in lower prices to the end-customer. This can be done by having the manufacturer subsidy be delivered in the context of commercial end-use applications, requiring the manufacturer to demonstrate that the full project delivery system and value chain is organized and show how it works economically. Competition can also be used; an end-user price point can be specified, and manufacturers then compete for the lowest subsidy required to meet that price point. In this way the subsidies can support the process of commercialization at the point where EE equipment is sold.

- Capital cost subsidies by themselves are not sufficient and must be coupled with development of commercial delivery and financing capacities. Capital cost buydowns deal with the distinct barrier of as yet uneconomic equipment. While capital cost subsidies can prime the market they can not by themselves overcome other commercial barriers. Therefore, they should be combined with other forms of financing support, and then phased out as prices fall, end-user project economics become more attractive and more commercial financing becomes available. Other elements of the programme must deal with building commercial delivery capacities, market aggregation, financing methods and customer education.
- Subsidies have a danger of distorting the market in many potential ways. End-users can come to expect subsidies and, when one subsidy programme ends, decide to delay purchase decisions until another subsidy programme appears. Subsidies can simply result in manufacturers increasing their prices, without meeting the target price points to the customer, causing delay in development of commercially priced systems. These dangers must be examined in the programme design. “Smart subsidy” strategies have been identified to help to avoid these risks including (i) having clear subsidy metrics, (ii) having effective marketing programmes and sending clear market signals to create urgency for end-user decisions; and (iii) combining subsidy with commercialization programmes.
- Subsidies can be used to prime the market, to accelerate sales. Subsidies can be used to create constructive urgency on the part of prospective customers by sending a message: "a temporary subsidy is available, first-come first-served, act now or the offer, limited in time or in total financing amount, will be gone". Management of customer and market signals and expectations is very important. Capital cost subsidies can be phased out over time. Decisions about how quickly to phase out the subsidies can be made in response to market results. Utility rebate programmes have been used in this fashion.
- Sales grants, direct capital cost buy downs of SSRE systems have been used. These are often delivered via SSRE vendors and service companies. In the case of solar home systems, these are delivered usually on a per Wp, up to a maximum total subsidy, or a per system basis. A per system allocation is recommended to assure that the subsidy is targeting smaller systems

serving the poorer populations. Many examples of effective sales grant programmes exist and include methods of control, accountability, fraud protection, tracking and auditing equipment through equipment serial numbers, tracking subsidies via sales receipt to confirm that it is passed to the customer, grant disbursement procedures, standards for and qualification of system vendors, and use of the subsidy to work with market actors in ways that encourage competition. The WB/GEF China Renewable Energy Development Programme has developed such methods.

- Various forms of FI incentives can be used such as were done in the UNEP India Solar Loan programme as means to engage banks. Transaction cost subsidies, such as loan closing fees paid to FIs, work on an “output” performance basis. Additional incentives can be offered to FIs to achieve loan volume targets, like a performance bonus, paid on success.

- Overall, the goal is to create a programme of “smart subsidies”, meaning: “explicit and transparent subsidies, with an appropriate exit strategy, that supports commercial processes, and that increase affordability/commercial viability while retaining cost-minimization incentives, with disbursements linked, to the extent feasible, to targeted outcomes/outputs, not inputs.”

List of Resource Materials

This Report references a set of resource materials: sample documents and agreements corresponding to several of the financing mechanisms and instruments described herein. These can be found on the UNEP website at <http://www.unep.fr/energy/finance/risk> and are available for download.

Consumer Finance

- A.1 Sample Vendor Finance Program Agreement, for energy efficiency equipment vendors
- A.2 Sample Vendor Participation Agreement, UNEP India Solar Loan Programme, SELCO India, specifically for solar home systems
- B. Sample Request for Proposal (RFP) or other guide to qualify and select Vendors for solar home systems, from UNEP India Solar Loan Programme
- C. Term Sheet for a Loss Reserve Fund
- D. Escrow Agreement for a Loss Reserve Fund
- E. Sample term sheet for a Master Loan Agreement between a Wholesale lender and a micro-financing institution for a SHS finance program
- F. Banker training materials for solar home systems finance program, from Winrock India

Business & Project Finance

- G. SSRE Business Finance Loan Guarantee Program, typical guarantee term sheet
- H. Sample Guarantee Facility Agreement, appropriate for an SSRE business loan guarantee program
- I. Typical business screening and loan underwriting criteria for business finance loan guarantee program
- J. SSRE Company business finance needs assessment survey
- K. Term Sheet for Guarantee Program management Agreement between Donor and Guarantor for an SSRE Business Loan Guarantee program
- L. Typical RE project finance due diligence checklist

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