

SRI LANKA
Renewable Energy for Rural Economic Development

Project Appraisal Document

South Asia Regional Office
SASEI

Date: April 12, 2002		Team Leader: Subramaniam V. Iyer						
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Project ID: P076702		Sector(s): PY - Other Power & Energy Conversion						
Lending Instrument: Specific Investment Loan (SIL)		Theme(s): Environment; Rural Development; Energy						
		Poverty Targeted Intervention: N						
Global Supplemental ID: P077761		Team Leader: Subramaniam V. Iyer						
Focal Area: G		Sector Manager/Director:						
Supplement Fully Blended? Yes		Sector(s): PY - Other Power & Energy Conversion						
Project Financing Data								
<input type="checkbox"/> Loan <input checked="" type="checkbox"/> Credit <input type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:								
For Loans/Credits/Others:								
Amount (US\$m): \$ 133.8								
Proposed Terms (IDA): Standard Credit								
Financing Plan (US\$m):								
	Source	Local	Foreign	Total				
BORROWER		0.80	0.00	0.80				
IDA		29.00	46.00	75.00				
BORROWING COUNTRY'S FIN. INTERMEDIARY/IES		5.60	12.30	17.90				
SUB-BORROWER(S)		11.30	14.50	25.80				
FOREIGN PRIVATE COMMERCIAL SOURCES (UNIDENTIFIED)		1.80	4.50	6.30				
GLOBAL ENVIRONMENT FACILITY		2.90	5.10	8.00				
Total:		51.40	82.40	133.80				
Borrower/Recipient: GOVERNMENT OF SRI LANKA								
Responsible agency: GOVERNMENT OF SRI LANKA								
Ministry of Finance								
Address: Treasury Building, Colombo 01, Sri Lanka								
Contact Person: Mr. Faiz Mohideen, Director General, Department of External Resources								
Tel: 94-1 434-876 Fax: 84-1 447-633 Email:								
Estimated Disbursements (Bank FY/US\$m):								
FY	2003	2004	2005	2006	2007	2008		
Annual	7.50	15.00	15.00	15.00	11.25	11.25		
Cumulative	7.50	22.50	37.50	52.50	63.75	75.00		
Project implementation period: 5 years								
Expected effectiveness date: 09/15/2002 Expected closing date: 03/15/2008								

A. Project Development Objective

1. Project development objective: (see Annex 1)

This project's objectives are to (i) Improve the rural quality of life by providing electricity access to remote communities through off-grid renewable energy technologies and (ii) Promote private sector power generation for the main grid from renewable energy resources.

These objectives are consistent with Sri Lanka's vision of extending electricity access to at least 75 percent of its population by 2007; and help develop initiatives for productive use of electricity to increase rural household incomes and improve the delivery of rural social services, such as health and education. With the opening up of the Northern and Eastern parts of the country following recent peace initiatives in the country, the project is expected to play a significant role in enabling rapid electricity access for conflict-affected people living in those regions.

The project will emphasize utilization of renewable energy resources, based on: (i) least-cost principles; (ii) successful results achieved in the ongoing Energy Services Delivery (ESD) Project (scheduled closing date December 2002); (iii) mechanisms to enable access to poor households; (iv) promotion of productive uses of electricity; and (iii) Sri Lanka's desire to preserve its unique ecology and bio-diversity. As part of this emphasis, the project will formulate and implement the mechanisms that will enable Sri Lanka to sell, for the first time, its 'carbon emission reduction credits' in the global market that is now emerging under the auspices of the Clean Development Mechanism.

Additionally, the Project would assist the Government to strengthen sector reforms by: (i) supporting energy efficiency and conservation; (ii) integrating renewable energy into the overall national energy policy and decentralized governance framework; (iii) promoting greater private sector participation in generation and distribution of electricity; (iv) facilitating the growth of a vibrant energy industry based on commercial principles; and (v) enabling diversification of electricity production with emphasis on domestic resources.

Text Box 1
Rural Economic Development in the ESD Project
Solar Home Systems: Tale told by a user

I am Upali Bemchandra from Soraborawewa Mahiyangana in Uva Province. A year ago my little daughter was highly excited describing me that her friend in the class has got a Sun Panel over their roof and they have lights in the night. Her question was why can't we too have such a wonderful lighting system?

I was worried. I don't have that kind of money. I had some savings which may not be enough. If I get a loan from the local moneylender, he will charge me very high interest. Come what may! I thought I will at least find out the price of a lighting system from the Solar Company office in the town.

I was very lucky that day. A gentleman with some leaflets in hand came to my kiosk to buy some oranges. I asked for a leaflet and whether I could have a Sun panel system. He said No, you can't have a Solar Panel because this place is temporary. I said No, Sir, I need it for my children - I have a permanent house.

He visited my house a week later and gave me all the details. He could arrange a loan for me from "SEEDS" if I pay Rs. 7,500 (US\$ 85) as the first payment and continue to pay Rs. 1,200 per month regularly. I was asked to find two people to guarantee my loan to "SEEDS".

Every thing appeared to be going well – but my wife started grumbling: Rs. 33,000 (US\$ 370). It is a big sum for poor people like us. Our income will not be increased. We will develop the kiosk she said. My wife felt that we can improve sales if there are lights in the night. The only mode of light I had was a kerosene Lamp. During the windy season it was impossible to keep the lamp burning.

It was with my wife's persuasions that we decided to go and meet the "SEEDS" officers. I already knew that office at Sarvodaya building, not very far from the bus stand. We visited the SEEDS office - we were well received. Decision was postponed until a visit is made to my house and to my kiosk. Every thing went O.K. and I was given permission to fix the Solar panel on the roof of my kiosk in the bus stand. In my tiny little shed on the pavement.

That was the turning point of my life. My well illuminated kiosk caught the eyes of all commuters going out to Kandy, Siripura, Colombo, Bibile, Kalmunai in the night. My night income became higher than the day income. I have brisk sales on fruits and other grocery items. I keep the place open until mid night. During the festival season and on weekends. I even keep it open whole night - the lights are on all the time. What a comfort I have.

My income has gradually increased. You would not believe I have saved enough money to purchase a small truck, which I now use instead of my kiosk.



Mrs. Bemchandra stands by their mobile kiosk, which has a solar system to provide lights at night

Thanks to my daughter for making me think about Sun power. Thanks to SEEDS for giving me a loan. Thanks to the Solar Company for their good service. They even check whether I have any problems with the panel, I was told that my loan is from the Energy Services Delivery Project (ESD Project) of the World Bank. I'm ever thankful to them for providing this service.

2. Global objective: (see Annex 1)

The global objective of the project is to reduce atmospheric carbon emissions by removing barriers and reducing implementation costs for renewable energy, and removing barriers to energy efficiency.

3. Key performance indicators: (see Annex 1)

The key performance indicators are.

- **Output:** (i) additional 85 MW of grid-connected electricity power generation capacity installed, (ii) electricity access to 100,000 households and 1,000 rural small and medium enterprises and public institutions directly through off-grid systems (solar, community hydro and biomass); and
- **Impact:** (i) Measurable increases in incomes of households gaining access to electricity (to be assessed through periodic monitoring and evaluation), (ii) Strategies to use electricity towards improving delivery of rural services are in-place as part of government development plans and (iii) sustainability to the renewable energy businesses..

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: IDA/R98-190 **Date of latest CAS discussion:** January 19, 1999

The project is consistent with key CAS objectives. The project will establish a well-functioning rural renewable energy market with emphasis on private sector and community solutions, enabling increased energy access and higher productive consumption of electricity. This is consistent with strategies to invigorate the rural economy, empower and build assets of the poor and promote rural economic development and well-being. Further, by providing a wider range of electrification options, the project would also create alternatives to monopolistic, state-led electricity provision and contribute to sector efficiency and reform goals.

1a. Global Operational strategy/Program objective addressed by the project:

The project will address Operational Program 5 on *Removal of Barriers to Energy Efficiency and Energy Conservation* and Operational Program 6 *Promoting Renewable Energy by Removing Barriers and Reducing Implementation Costs*.

2. Main sector issues and Government strategy:

The Electricity Sector

The Government of Sri Lanka places high priority on rural electrification. It envisions rapid expansion of electricity access to enhance rural economic and social development. While remarkable progress in this regard has been made by conventional main grid extension, the success of the ongoing Bank-GEF financed ESD Project shows that off-grid systems - such as solar home systems and community-level independent grids - are frequently better suited to provide electricity services to remote, rural communities in a timely and economic manner. Thus, the likelihood of attaining Sri Lanka's vision of 75 percent electrification by 2007 will be increased by a rural electrification strategy that used both main grid and off-grid systems. Further, even for the main grid, Sri Lanka is in a position to add significant generation capacity in a least-cost manner through grid-connected hydro, wind, and biomass projects developed and financed by the private sector.

In order to be in a position to attract needed investment in generation, transmission and distribution over the next five years and facilitate the proliferation of rural energy systems to meet electrification goals, Sri Lanka's new Government has articulated a two pronged strategy: (i) creation of investor confidence by restructuring the electricity industry along commercial lines and establishing appropriate regulation critical to secure the scale of investments required; and (ii) establishment of a coherent and credible rural electrification and renewable energy policy to promote sustainable market-based provision of rural energy

services and reduce the need for larger grid investments.

Restructuring the Electricity Sector

Status: The sector is led by its main state-owned utility - the Ceylon Electricity Board (CEB) - which has functioned reasonably well on a technical basis in the past and compares favorably with other similarly structured utilities in the region. A large part of its generation capacity (nearly 70 percent) is low cost hydro, it has well-developed transmission and distribution networks and its operational parameters such as system losses of about 20 percent appear reasonable by South Asian standards, but need improvement. CEB and a smaller, Colombo-based distribution company, the Lanka Electricity Company (LECO) have technically competent staff, who understand the business of generating and delivering electricity efficiently. Despite these obvious strengths, the sector faces a financial crisis, there are significant power cuts, electricity prices are perceived to be high and services poor. There is an overall unfavorable view of the sector, and it is generally blamed for being a critical impediment to the country's development. Under the changed political circumstances in Sri Lanka there is an expectation that much needed reforms in the sector will be undertaken soon.

The principal reasons behind the current status of the sector are: (i) an inability to meet demand due to lack of timely investments in least cost generation plants. Hydro resources are nearly fully utilized and thermal plants, such as the proposed large coal plant, have not been initiated; (ii) low availability of installed plant which stems from poor operations and maintenance; (iii) weak governance and a high degree of government involvement in day-to-day sector management; (iv) financial losses going hand in hand with an inability to invest, prevent system expansion and provision of good service; (v) constrained private investment due to CEB being a statutory, state owned monopoly; and (vi) an excessive government involvement resulting in low degree of autonomy for all types of management, procurement, financial and operational decisions. The contrast is clearly visible in LECO, which is set up as a separate company under the Companies Act and not as a statutory entity like CEB, and hence less susceptible to government rules and interference. LECO has performed well in reducing power losses, maintaining good service and making positive returns on capital.

Strategy: The Government acknowledges that sector reforms would bring high economic gains, and considers these critical to the sector's revival. A reform process has been initiated. The strategy is to restructure the sector along the lines of a modern, commercial electricity industry with competition and private investment in generation and distribution, providing a confidence-building regulation mechanism and facilitating private sector investment. There is a recognition that this is a politically difficult process, but high-level policy makers and political leaders appear committed to implement the process quickly. The World Bank, ADB and other donors are supporting the Government in this effort.

Rural Electricity Access and Rural Economic Development

Status: Sri Lanka has made impressive gains in promoting energy efficiency and renewable energy development under the ongoing Bank-GEF financed ESD Project (scheduled closing date December 2002). All indications are that the ESD Project will meet or exceed, *prior to the project closing date*, its revised targets for Solar Home Systems (revised downwards from 30,000 units to 15,000 units at mid-term, because of a slow start) and the original key targets for all other components, .

While the foundations have been laid for sustainable growth of the renewable energy industry in Sri Lanka, certain critical barriers still need to be addressed: development objectives to be realized. The main issues are:

- Market size needs to be increased to reap further economies of scale, target poor households and serve productive and service sectors.
- Ensuring level-playing field for electricity provision by private sector and utility operators in terms of market entry, pricing and financing.
- Expanding participants and stakeholders, as well as capacity building initiatives to achieve greater outreach and proliferation of renewable energy technologies/applications.
- Integrating renewable energy into Government's policy and strategy, including those for rural development, reforms and decentralized governance.
- Enhancing quantum and quality of micro-financing for renewables such as Solar Home Systems through participation of more financial institutions and expansion of long term credit liquidity sources.
- Establishing a sustainable and transparent basis for subsidies for rural electrification, with an appropriate exit policy.

In addition to the above general barriers, there are certain specific barriers in the respective components – solar, hydro, wind and biomass energy segments (see Annex 15).

Strategy: Presently, renewable energy and its importance to rural access do not find formal acknowledgement in Government's development strategy. In order to promote rural electrification in general and renewables in particular, the Government has indicated that a Rural Electrification Policy would be announced soon. The policy would enable harmonious growth of grid and non-grid electrification based on rational economic principles. Both modes of electricity provision are needed to accelerate economic development opportunities for rural households. **The Ministry expects to formally announce the policy by May 1, 2002.** Based on discussions with the Minister and Secretary (Ministry of Power and Energy) on the subject, the expected salient features of the policy are summarized in the following box.

Text Box 2
Key Features of Draft Rural Electrification Policy

The policy document is expected to be a statement of intentions to address key issues related to rural electrification such as expansion of access, promotion of decentralized systems and renewable energies. The policy will greatly help in making the government's vision and resolve explicit. It will be given effect in two ways. Firstly, by specific provisions in the proposed Power Sector Reform Act which is now under formulation; and secondly, by implementing other policy provisions under the RERED support, such as establishing a transparent and criteria based rural electrification subsidy mechanism.

(a) *Level playing field in the sector so that:* (i) private sector and communities can enter to supply electricity – generation, transmission, distribution/retailing – from the interconnected grid system, as well as stand-alone, independent mini-grid systems; and (ii) fair competition occurs among all energy suppliers, including CEB and its successors. CEB should not have an unfair advantage over potential private sector participants in competing for distribution/retailing of electricity purchased in bulk from the CEB-operated grid system or offer lower (non-transparent) prices to generators in comparison to other generators or its own plant.

(b) *An enabling regulatory framework that:* (i) provides clear separation of responsibilities between policy and operational aspects. The new electricity reform act is expected to do this by assigning distinct responsibilities for policy, licensing, regulation and compliance, and dispute resolution; (ii) sets a "Light-handed regulation" regime for small, stand-alone systems. The regulator should allow for simplified regulatory procedures and decentralized administration for small, stand-alone power systems which are technology neutral; i.e. the same for mini-hydro systems, as for wind, diesel and biomass based mini-grids. The new electricity reform act can provide for exemption from licensing for small systems,

while retaining necessary safeguards on standards and oversight for technical specs and safety, suitably scaled for small rural loads such as the Gal Oya standards.

(c) *Culture of cost recovery and cost-based tariffs:* making it possible for multiple operators such as private and local community initiatives to provide electricity services. This will imply that consumers in different parts of the country will pay different retail tariffs, and that the tariffs for some consumers will be significantly different from that for others, even after some subsidies have been provided for (see also para d). In particular, the Government will permit/establish: (i) regionally differentiated retail tariffs, for all suppliers, including CEB and its successors, which vary according to the cost of service delivery; (ii) bulk-supply tariffs based upon the cost of supply at the delivery point in the main grid system; and (iii) non-discriminatory wheeling tariff (and access) to facilitate power transactions between distribution concessionaires and third-party generators.

(d) *A mechanism for subsidies that is:* transparent and based on economic criteria to buy-down capital costs for rural electrification systems, both grid and off-grid, with due regard to regional considerations, efficiency and sustainability. In particular, subsidy schemes and allocation procedures would use pre-established, clear and explicit rules. These rules would: (i) be transparent, i.e., avoid implicit (and operating) subsidies that frequently lead to waste and non-accountability; (ii) link subsidy to results, i.e. maintain the focus on expanding access by subsidizing the initial cost of investment rather than the cost of operation; (iii) provide strong cost-minimization incentives, i.e., retain the commercial orientation to reduce costs even though subsidies are being provided; and (iv) ensure good governance, i.e., the institutional responsibility for policy and rule setting will be clearly separated from the administration of the subsidy mechanism (such as, an independent entity being responsible for requisite checks and balances, monitoring performance, and ensuring compliance.)

Reform related issues relevant to Rural Electrification: Some of the key legal and regulatory issues relevant to Rural Electrification are to be given effect through the new power sector reform legislation and regulations, which are now under preparation. The current status is that a draft electricity reforms act is under Cabinet's consideration and is expected to come up for legislative action by June 2002. These are:

- electricity pricing for grid-connected renewables to be placed under the purview of the regulator (Government is contemplating a 3-year fixed tariff in the interim, to avoid tariff uncertainties. The General Manager of the CEB has indicated his agreement with this approach);
- exemptions from licensing to be provided for small generation and distribution systems or mini-grids, whilst retaining a 'light handed' regime for ensuring appropriate technical and safety standards. Establishment of mini-grids in rural areas that can produce and distribute electricity on a smaller scale and allowing mini-grids to buy and distribute bulk power from the network and/or sell to distribution points by accessing the grid. These measures would help reduce the need for large investments in generation and distribution. This will also be consistent with extending access to more people in rural areas and promoting renewable energy; and
- enabling third party sales (via wheeling of power through the network where necessary for smaller systems.

The Act therefore needs to enable these activities by stating that: (i) systems up to a certain size (e.g. 10 MW) would be exempt from licensing for generation and distribution; and (ii) third party access to the network will be available. These provisions can be qualified by saying that the Regulator can give effect to them at an appropriate time.

3. Sector issues to be addressed by the project and strategic choices:

In the context of the sector issues discussed above, the Project had two options to increase access. One was to support the grid expansion strategy of the Government and the second was to commercialize rural energy grid and off-grid options with an emphasis on renewables. The *first* strategic choice is to adopt the latter approach, for the following reasons: (i) to build on the foundation laid by the ESD project and the market demand created for renewable energy services; (ii) to establish a sustainable market for renewable energy applications; (iii) selectivity on the basis of proposed programs of support to grid electrification by ADB and JBIC; (iv) comparative advantage of the Bank and GEF in providing knowledge resources and global learning for renewable energy and rural transformation; and (iv) substantial private sector development and community focus in implementation of the proposed project.

The *second* strategic choice is to develop a large-scale project with ambitious targets, in response to: (i) the Government's vision of accelerated rural electricity access; (ii) the foundations laid by the ESD Project; and (iii) the cost reduction benefits arising from economies of scale. Success in meeting these targets will bring development benefits and cost reduction not only in Sri Lanka but also in other countries that are now in the process of developing their renewable energy resources in a manner similar to Sri Lanka. One implication of this scale is the need for relatively large amounts of IDA funds – which are expected to be absorbed relatively easily, given the existing pipeline of projects waiting to be financed. At the same time, the need for GEF grant resources has been kept relatively low by a system of declining GEF grants as well as the possibility of future trade in 'carbon emission reduction' credits.

A *third* choice is to focus not only on renewable energy and the associated environmental benefits, but also on rural economic development that renewable energy can stimulate and support. It is expected that the greater benefits flowing to the rural areas as a result of this choice would increase the rural communities' interest in and support for renewable energy. Consistent with this, a deliberate choice has been made to reduce and eliminate the GEF grants on larger size Solar Home Systems in order to provide an incentive for dealers to shift their marketing strategies in favor of smaller size, lower cost systems; at the same time, support for larger institutional systems that would be used in remote health clinics or educational facilities has been retained. This would make it easier for poorer households to be served by renewable energy, either directly from smaller home systems, or indirectly from improved quality of service in public facilities. The results of this strategy will be closely monitored and changes made if the desired outcomes do not materialize.

Finally, at the request of the Government of Sri Lanka, this project has been prepared in an expedited manner in order to ensure that there is no break in the flow of IDA and GEF funds to the private sector and community participants. An implication of this choice is that some of the preparation activities that would have been executed during the course of normal project preparation are being undertaken during the first phase of project implementation, funded by TA.

C. Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

The project will support provision of electricity and socio-economic improvements in rural areas through: (i) renewable energy technologies in grid-connected and off-grid hydro, wind and biomass; (ii) financing and grant mechanisms for solar home systems and other solar energy applications in rural areas through private companies, NGOs and MFIs; (iii) technical assistance for income generation and social service delivery improvements based on access of villages to electricity; and (v) technical assistance for promotion of household energy efficiency, development of carbon trading mechanisms and integration of renewables

into government policy, provincial council development strategies and sector reform initiatives.

The key components of the project are (see Annex 2 for details):

- (a) **Grid-Connected Renewable Energy Power Generation.** This component will enable continuation on a larger scale of the refinancing support for mini-hydro projects provided under the ESD Project, as well as extend support to two other commercially available renewable energy sources - wind and biomass. As a result, grid-connected small-scale renewable energy will provide more than 5 percent of all of Sri Lanka's main grid capacity, a figure that would be higher than for most other countries. All grid connected renewables will come under the purview standardized small power agreement and tariff developed under ESD. However, the agreement may need some changes in order to accommodate wind and biomass and this will be addressed during project implementation.

Mini Hydro Projects: A pipeline of eight projects, totaling 39 MW, is in an advanced stage of development. It is conservatively estimated that an additional 20-25 MW of hydro projects could come under the credit program during the second half of the RERED Project. However, the refinancing for these projects is being reduced to 65 percent from 80 percent under ESD since commercial banks have already gained some familiarity with these projects. The risks are better understood, and the banks are willing to explore other local long term financing sources to supplement the refinance and long term liquidity requirements.

Wind Projects: After the successful implementation of a CEB 3MW pilot wind farm under the ESD project, some regional wind resource measurement supported by UNDP/GEF and specific evaluations of sites by a commercial company, there is now a favorable regime in Sri Lanka for the private sector to develop and implement these projects. The RERED project will support commercialization and up-scaling of wind development including exploring the possibility of off-shore development. The newly-opened areas of the North and East have high potential for wind projects. The project will support technical assistance for business development, feasibility studies, and off-shore resource assessment. It will also provide long term financing for project developers. A private sector developed wind-farm of 22.5 MW that is in an advanced stage of development and is being also considered for Carbon Trade Financing opportunities.

Biomass: Ad-hoc and small biomass (research) projects have provided limited experience with grid connected biomass projects. The project will support the market initiation of viable grid connected biomass projects and will focus initially on two areas: small scale co-generation/gasification projects in the tea-industry, and larger scale dendro projects with potential biomass plantations. Technical assistance will be provided for business development, feasibility studies, and regional trade shows, as well as longer term financing for the developers through the Participating Credit Institutions. Additional support for pilot biomass gasification investments will be needed. This will be determined and implemented during the life of the project. A conservative estimate for grid connected biomass energy development is about 12-15 MW.

- (b) **Solar PV Investments.** The installation of solar systems is expanding rapidly and a successful market has been created under the ESD Project. This component will continue to provide refinancing and grant support for solar PV investments for household, commercial, and institutional use. In particular, the project will provide refinance, grant, and TA support to seek to solidify the existing middle-range solar home system market and expand service to other applications such as: (i) smaller systems accessible to a poorer market segment; (ii) community applications for health clinics, schools, street lighting, etc.; and (iii) commercial systems for water pumping, telecom, and other

applications. In this way, the project will both build economies of scale to solidify the market and increase outreach and awareness building to cater to access for poorer families. Further capacity building in respect of micro-finance institutions and other household financing organizations serving limited communities is also necessary to expand credit access for remote communities. The indicative targets are 85,000 household systems – a target higher than in any other Bank-GEF (or any other agency) project.

- (c) **Independent Grid Systems.** This component would again build on experience through ESD and other donor-funded activities, and would support further commercialization of village hydro and other community-based independent grid systems through: (i) refinancing and grant support for investments; (ii) project preparation support; and (iii) TA to address such issues as: (a) use of electricity in daytime - when there is little household demand - for income generation activities; and (b) stranded cost, etc. The status of independent grids within the sector reform agenda also will be emphasized in the broader sector technical assistance. The indicative target is access for 5,000 new households through independent grids – village hydros, as well as projects based on biomass and other technologies.
- (d) **Energy Efficiency and Demand Side Management (DSM).** The project intends to provide technical assistance for further development of energy efficiency service delivery in the private sector and development of a framework for sustainable implementation of energy efficiency programs under a reforms scenario. It is envisioned that responsibility of policy and regulatory issues related to DSM, as well as the implementation of public policy type DSM programs will rest with the government, regulator, or utility, while private sector enterprises such as Energy Service Companies (ESCOs) will implement commercially viable energy efficiency projects.
- (e) **Cross-sectoral Energy Applications.** This component would help catalyze energy’s role in providing direct and indirect rural economic benefits by providing electricity to remote, rural public service institutions and small commercial/industrial users. For public institutions, technical assistance will be provided for development of energy and standardized energy packages, awareness creation, etc. In addition, cofinancing support will be provided for investments in selected areas. Commercial/institutional support will include TA aimed at mainstreaming productive applications in off-grid systems. The Project seeks to connect at least 1,000 institutional/commercial systems. These type of interventions are critically important in restoring economic development in the country's northern and eastern areas.
- (f) **Technical Assistance.** In addition to the component-specific technical assistance described above, technical assistance under the Project is being envisaged for the following categories:
 - Project administration/promotion;
 - Subproject promotion/development support;
 - Technology/market introduction/promotion/capacity building;
 - Cross-sectoral links;
 - Sustainability; and
 - Monitoring and Evaluation

Project Costs and Financing

	Indicative		Bank	% of	GEF	% of
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Component	Sector	Costs (US\$M)	% of Total	financing (US\$M)	Bank financing	financing (US\$M)	GEF financing
Grid-Connected Hydro, Wind and Biomass		90.30	67.5	49.20	65.6	0.00	0.0
Solar PV Investments		28.30	21.2	18.80	25.1	3.90	48.8
Community Investments (hydro, biomass, wind)		4.40	3.3	3.60	4.8	0.00	0.0
Energy Efficiency and DSM		1.00	0.7	0.60	0.8	0.00	0.0
Cross-sectoral Energy Applications		4.60	3.4	2.30	3.1	0.75	9.4
Technical Assistance		5.10	3.8	0.50	0.7	3.35	41.9
Total Project Costs		133.70	100.0	75.00	100.0	8.00	100.0
		0.00	0.0	0.00	0.0	0.00	0.0
Total Financing Required		133.70	100.0	75.00	100.0	8.00	100.0

2. Key policy and institutional reforms supported by the project:

The project will support a move towards firmly embedding key issues into the power sector reform agenda. These include incorporation of renewable energy and energy efficiency, and greater emphasis on policies aimed at economic development, especially in rural areas. The project will also support activities of the Government to comply with international regulations to access carbon funds including ratification of Kyoto Protocol by the Parliament. The main policy and institutional reforms that underpin the project are:

- (a) **Comprehensive Rural Electrification Policy:** The Government has taken a decision to announce a Rural Electrification Policy. This document will be a statement of intentions to address key issues related to rural electrification such as expansion of access, promotion of decentralized systems and renewable energies. The policy will greatly help in making the government's vision and resolve explicit. It will be given effect in two ways. Firstly, by specific provisions in the proposed Power Sector Reform Act which is now under formulation; and secondly, by implementing other policy provisions under the Project, such as establishing a transparent and criteria based rural electrification subsidy mechanism. **(Announcement of Policy is condition for negotiations)**
- (b) **Reform related issues:** Some of the key legal and regulatory issues articulated under the new policy which would be addressed through the new power sector reform legislation and regulations are: (i) electricity pricing for grid-connected renewables will be under the purview of the regulator; (ii) exemptions from licensing to be provided for small generation and distribution systems or mini-grids, whilst retaining a 'light handed' regime for ensuring appropriate technical and safety standards; and (iii) enabling third party sales (via wheeling of power through the network where necessary for smaller systems).
- (c) **Leveraging domestic financing:** This is a critical issue for maintaining the viability of renewable energy projects, especially the grid connected projects. The financial sector in Sri Lanka suffers from a lack of long term liquidity which constrains debt financing of sufficient volume and tenors to infrastructure projects. Mechanisms are therefore needed to increase availability of funding for long term financing of energy projects as well as micro-credit for small consumers. In this context the participating credit institutions are exploring local investment funds like the Employers Provident Trust Fund.
- (d) **Energy Efficiency Strategy:** The Government has indicated that it would present a strategy paper on the future of energy efficiency, conservation and demand side management activities in the power

sector. The paper views the longer term evolution to be guided by the two institutions – Energy Conservation Fund and the DSM and Energy Efficiency Branch being established as a division within the proposed Electricity Regulatory Commission (or ERC). **(Issuing the Strategy Paper is condition for negotiations)**

3. Benefits and target population:

The benefits of the project are:

- For *rural households*, there will be direct and indirect benefits of increased access to adequate and reliable supplies of electricity from off-grid supply or solar photovoltaic systems, which will improve the quality of their lives and expand income producing opportunities. Direct benefits include improved convenience, safety, and quality of lighting, enhanced ability to operate small appliances, and improvements in indoor air quality resulting from displacement of kerosene smoke. The indirect benefits would arise from the improved service provided by rural public institutions - health, education and water - deriving from their increased access to electricity;
- For *rural enterprises*, the benefits of increased productivity and income arising from electricity access;
- For *utility customers*, greater access and reliability of electricity service due to increases in generating capacity, and the mitigation of tariff increases due to increased energy efficiency investments;
- For *financial institutions* who can expand their services with long term financing;
- For *medium to large scale local investors* who can invest in proven renewable energy business opportunities;
- Greater leveraging of Government financial resources for capacity addition and rural electrification; and
- Direct and indirect reductions in greenhouse gases, resulting in global environmental benefits.

Text Box 3

Rural Economic Development From Village Hydro Schemes

The project will build upon the successful experience of the ESD project in stimulating rural economic development *via* village hydro schemes. For example, ESD project developers report that in more than half the village hydro investments the local carpenter has converted from hand tools to power tools – usually with a “combination tool” which can be used as a table saw, planer, drill, and router. This versatile electric woodworking tool reduces production time from a matter of weeks, to a few days for typical products such as doors, windows, chairs, tables, and cabinets. The increased output allows the carpenter to serve customers in a wider area, enhancing the village’s economic base.

Other productive applications are also developing spontaneously in connection with village hydro systems. These include charging of automotive batteries for use by nearby un-electrified households, incubators for poultry farming, drying of food products such as spices or fruit for commercial sale, community refrigeration services, and lighting for shops and restaurants.

Monitoring and Evaluation arrangements:

The project includes detailed evaluation of impacts to establish its effectiveness in meeting its access and related economic development objectives. There will be two parts to the M&E program:

- M&E of the program's *physical outputs* to assess the progress in reaching the renewable energy targets; and
- M&E of the program's *impacts* to assess the rural economic development attributable to the provision of renewable energy services and the sustainability of the renewable energy industry.

The elements to be monitored include: (i) rural electrification physical progress through all methods including grid extension, village grid, and solar; (ii) impact of rural electrification on rural economic development including quality of life enhancement, rural employment, and change in income and (iii) sustainability of the renewable energy industry including: business profitability, cost declines, sales break-even points, structure of system size distributions over time, institutional and financial viability of small hydro cooperatives, etc. Panel surveys, focus groups, and other relevant techniques will be used to establish rigorous monitoring protocols. Annual evaluation of progress will be undertaken and provided as input for relevant reports by the Ministry of Energy. Evaluations also will be used to guide revisions of RERED Project design if needed. Additional surveys or market analyses which may be needed throughout the RERED Project period to assess specific areas such as assessment of a biomass gasification market, village grid productive use assessment, etc. are also to be covered.

4. Institutional and implementation arrangements:

Implementation period. The project will be implemented over a five-year period (2003-2007)

Executing agencies: Ministry of Finance and Planning

Project coordination: Project implementation for all the components will be through one common agency, the Administrative Unit (AU) in the DFCC Bank – which is well staffed and professionally managed under the leadership of a Senior Vice President of the DFCC Bank. The unit has established an excellent track record in project implementation and earned the respect of all stakeholders. Institutions such as the Solar Industries Association, the Grid Connected Small Power Developers Association, the Provincial Council Governments, SEEDS and other Participating Credit Institutions and a number of NGO, non-profit and for-profit renewable energy firms and advisers are expected to participate in project implementation.

The AU would be responsible for: (i) administration of the Credit Program and the GEF grants; (ii) guiding the cross-sectoral activities, and (iii) technical assistance. The technical assistance intended for other project entities such as the CEB, cross-sectoral ministries, and the various industry associations will be administered by the AU, but the task of supervising the work and reporting will be that of the concerned recipient institution. Detailed operating policy guidelines and proposed on-lending arrangements for the ESD Credit Program are in place and have been demonstrated to work well with adequate safeguards for accountability purposes. These have been enhanced and strengthened as necessary. These guidelines define the on-lending mechanism, including the onlending rate, the terms and conditions, the responsibility of the Administrative Unit, procurement procedures, disbursement procedures, and audit requirements. Eligibility criteria for PCIs, including commercial banks, development finance institutions (DFIs), merchant banks, and leasing companies have been reviewed and made more appropriate to the enhanced scope of onlending and energy applications.

The AU would administer GEF grant funds to: (i) support off-grid subproject preparation activities; (ii) cofinance off-grid subprojects; and (iii) provide off-grid project support through promotional activities, provision of grant funding for verification of solar home systems, biomass and wind energy projects and consumer education and protection.

Project oversight (policy guidance, etc.): Policy guidance for the incorporation of renewable energy and

energy efficiency into the power sector reform process will be provided through the Ministry of Power and Energy.

Accounting, Financial Reporting and Auditing arrangements: Project administration will be carried out by the AU, which also has a significantly enlarged role compared to the ongoing ESD project because of the increased scope of the proposed project. Actual implementation will be carried out by the PCIs/MFIs and project beneficiaries. The financial management assessment did not cover the PCIs/MFIs. The SASFP unit carries out annual assessments of PCIs/MFIs compliance with the eligibility criteria. Further, the Banking Supervision Department of the Central Bank of Sri Lanka closely reviews the financial soundness of the PCIs.

Funds Flow: Project will be budgeted for in the national budget of the GOSL. Counterpart funds are to be provided by the PCIs and MFIs for the first three components and GOSL for the technical assistance components. Two special dollar accounts (SDAs) will be opened at the Central Bank of Sri Lanka to deposit the proceeds of IDA credit and GEF grant. AU will have the right to operate the SDAs and withdraw funds for reimbursement to the PCIs and MFIs. PCIs will be responsible for approving the loans to ultimate project beneficiaries following their own loan screening procedure. Once the loan has been approved, PCIs will forward a Loan Refinance Application form to the AU requesting commitment for 70 percent or 80 percent of the approved loan amount. As and when the PCI disburses funds against the approved loan amount, a disbursement request form will be forwarded by the PCI (with appropriate supporting documents) to the AU for obtaining 70 percent or 80 percent of the amount disbursed to the beneficiary. Specific funds flow arrangements for each component and further details on the required supporting documentation for reimbursements are given in the Operations Manual (ESD Operations Manual to be adopted for the RERED project, after some minor modifications) and Operating Guidelines (Annex 14 of PAD). Also refer the funds flow diagram in Annex 1 to the FM assessment report.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

Alternative instruments to the SIL were considered. These were: (i) an APL, which was rejected because the pace and extent of power sector reform is not yet sufficient to reasonably establish the need for, and scope of a longer-term, multi-project program; (ii) a LIL, which was rejected because the size of the proposed operation exceeded the LIL threshold; and (iii) a SAL, which was rejected because structural adjustment was not viewed as the key issue to address at this stage.

An alternative considered was to decentralize the operation of the AU to provincial level and possible match of the grant provisions offered by the provincial authorities. It was decided that even though initial steps have been promising (Uva province) it is too premature to pursue this option as: (i) funds flow from the province to the businesses have not been steady; and (iii) management capacity at provincial level is limited.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			

Private sector delivery of energy Services	Sri Lanka Energy Services Delivery Project (P010498)	S	S
Commercialization of Renewable Energy	India Renewable Resources Development Project (P02449)	S	S
Rural Access through Renewable Energy	Laos Southern Province Rural Energy (P044973)	S	U
Renewable Energy –Dealer Model	Indonesia Solar Home Systems (P035544)	S	S
Renewable Energy –grid connected	China Renewable Energy Development Project (P046829)	S	S
Rural Transformation	Uganda Energy for Rural Transformation (P069996) - To be effective May 2002		
Renewable Energy- off-grid concessions	Argentina Renewable Energy for Rural Markets (P045048)	S	S
PROJECTS UNDER PREPARATION			
Renewable Energy- Micro credit as well as pay for service channels	Bangladesh Rural and Renewable Energy Development Project		
Renewable Energy-community based hydro	Nepal Power Sector Development		
Other development agencies			

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

The Project takes into account a rich menu of knowledge acquired from similar projects and reviews. These include the *Sri Lanka Energy Services Delivery Project*, as well as, *Rural Electrification: A Hard Look at Costs and Benefits; OED Précis, May 1995; Rural Energy and Development (World Bank Development in Practice, September, 1996; India Renewable Resources Development, Indonesia Solar Home Systems, Indonesia Renewable Energy Small Power and Energy, Poverty and Gender in Indonesia and Sri Lanka, May 2001, and Uganda Energy for Rural Transformation Project*. The guiding principles for success that emerge from these studies are: providing consumer choice, ensuring cost reflective pricing, overcoming high first cost barrier, encouraging local participation, and implementing sound sector policies.

The Energy Services Delivery Project in particular offers many useful lessons for RERED Project design. General lessons include:

- Project design should be flexibility with each supervision mission being viewed as an opportunity to address problems, issues, and changing circumstances;
- The Sri Lankan private sector and NGO community can be relied upon to develop innovative solutions for difficult issues (see Box 1 in Annex 2 for a description of the innovation solicitation process);
- Simple grant design and delivery models with competent oversight and administration, contribute to stable and attractive environment for private sector operations;
- Private management contract for Credit Line proved to be a highly satisfactory administration arrangement; and

- Industry associations are effective for advocacy, experience sharing, and providing new ideas for industry growth.

Technology-specific lessons learned are given below:

Grid-based renewables

- Long term financing, which matches nature of grid connected energy projects of high initial investment cost and relatively small periodic revenue stream, is required for private sector entry;
- Standardized agreement between producer and purchaser is a critical factor in reducing transaction cost, providing confidence to developers and financiers, and to provide developers with information to assess viability of potential projects;
- Stability of power purchase tariff strongly affects confidence of investors, lenders, and project sponsors. (The annual update of the power purchase tariff proved to be less predictable than expected, and one extremely low year considerably undermined industry confidence);
- Practice of monopsony purchaser (CEB) also setting power purchase tariff creates grounds for controversy. It is preferable that a third party – e.g. a sector regulator – approve tariff levels.
- Pilot wind farm, coupled with UNDP/GEF sponsored wind resource measurements and the extensive wind experience in India, has generated private sector interest in wind power development, but carbon emission reduction credits will likely be needed to attain financial viability;
- Private sector mini-hydro experience has opened the door for biomass power generation; and

Village Electricity Systems

Key lessons learned from the implementation of the village hydro component under the ESD project are:

- Participation of the whole community is essential for long-term sustainability;
- There are several hundred remaining villages which have potential for village hydro, and many more could potentially utilize biomass gasification for electrification;
- While village hydros remain the least-cost electrification solution for some isolated rural communities, development and investment costs remain too high for the communities to fully bear. Increased productive uses of the system, energy conservation, and streamlining of project development can reduce costs, but there is a continuing need for subsidies;
- Commercial banks incur high transaction costs in financing and supervising small-scale rural projects and the costs to villages of accessing special credit/grants are also high. Increasing the role of rural credit institutions could ease this constraint;
- Technical capacity to operate and maintain such projects is easily built within the existing infrastructure of village technicians/fabricators.
- It is important to facilitate village hydro development within an appropriate legal framework to bolster their legal status; and
- There is a need to mitigate the stranded costs risks in the event of grid reaching a village hydro system. Currently village hydros do not have a clear legal status.

A recent best practices study for sustainable development of micro (or village) hydro power in developing countries offers the following additional lessons:

- It is easier to make a commercial run village hydro project more social than *vice versa*; and
- Light-handed regulation is appropriate for small systems in remote, rural areas.

Solar PV

A recent review *World Bank Solar Home Systems Projects: Experiences and Lessons Learned 1993-2000* of the Bank's experience with solar home systems projects derives some lessons from the early implementation experience.

- The initial pace of implementation is likely to be slow, as it takes time to develop and fine tune effective business models (operations, servicing and financing) for operating a solar pv business in rural areas;
- Adequate after-sales service, including consumer education in proper maintenance and operating procedures, is important for consumer satisfaction, minimizing maintenance costs and enhancing overall system reliability;
- While marketing campaigns are important, in order to enlarge the market, consumer awareness must be combined with other factors such as affordability, demonstrations, opinions of neighbors, and service presence; and
- Consumer credit is key to expanding the market beyond cash sales; dealer-provided credit schemes are unlikely to be effective as few dealers have the ability.

Additional solar industry lessons from the ESD Project include:

- Broad industry scale-up with a private sector delivery model requires large firms whose business plans feature sales of thousands of systems per month, rather than the tens or hundreds per month;
- Large firms are attracted by a stable operating environment - i.e. stable ground rules such as the SHS specifications and transparent grant release procedures over a long period - *and* the prospects for attractive returns on investment;
- In order to promote market growth, more micro-credit/consumer finance institutions are needed; and
- Rural customers understand and utilize the quality of life and income producing potential of solar systems (see text box 1).

Energy efficiency and conservation

Key lessons learned from the implementation of Bank-supported energy efficiency projects within the Bank in Thailand, India, Sri Lanka and China are:

- High tariffs are a strong incentive to promote energy efficiency and DSM but are not by themselves sufficient to expand the market. Other barriers including awareness and lack of private sector service provision channels are important;
- Financial packaging of energy efficiency projects are important as such projects often need innovative financing and security structures; and
- Energy Services Companies (ESCOs) are excellent private sector vehicles for implementing energy efficiency projects, but the industry needs to be nurtured through technical assistance.
- Depending on the country context, public policy DSM/EE programs bring valuable economic and social benefits, a case in point being CEBs energy efficient lighting program that brought down energy expenditures for participating rural customers while expanding the market for efficient lighting to about million CFLs and achieving peak demand savings of 40 MW which is about 15% of the evening peak..

Cross-sectoral Energy Applications

There is little operational experience yet with this component. However, the lessons learned during the preparation of the *Uganda Energy for Rural Transformation* Project have been incorporated in the design of this project. The key lessons are:

- Cross-sectoral applications can stimulate demand for electricity services, making it more attractive for private sector participation in rural electrification schemes.
- Cross-sectoral links are welcomed by all stakeholders, however, given the lack of precedents, it would take time to develop operational models.

4. Indications of borrower and recipient commitment and ownership:

The Government of Sri Lanka has prepared a Rural Electrification Policy that articulates its vision and intentions to create enabling conditions for: (i) promoting rural access to electricity; (ii) integrating renewables in the overall electrification strategy; and (iii) facilitating spread and adoption of renewables through a variety of implementation modes. This is a strong indication of the Government's commitment towards renewable energy solutions and a preference for proliferating these technologies through private sector and community-based organizations. These intentions and actions are consistent with this Project.

The new government has confirmed that it is moving on a fast track to reform the power sector. In the process, several of the policy intentions on renewables are being addressed under the Power Sector Reform Act, now under Cabinet's consideration. The Government has also recently enacted a legislation to establish the Energy Supply Committee (ESC). The committee's mandate covers both short and long term solutions to the country's energy problems.

Various private sector participants, NGOs and community based organizations are committed to participate and scale up their efforts under this project. These commitments have been obtained in separate meetings with the concerned stakeholder organizations such as the Village Hydro Developers' Groups/Association, Solar Industry Association, Biomass Energy Association, the Energy Forum, Ceylon Electricity Board, the Small Power Projects Developers Association etc. The current five participating credit institutions under the ESD project have also confirmed their participation and appetite for scaling up credit provisions under this project.

5. Value added of Bank and Global support in this project:

The Bank is recognized and accepted in Sri Lanka as a key catalyst, in partnership with other donors such as UNDP, for renewable energy development and energy efficiency. Apart from the being the source of IDA funds and a channel for GEF funds, a key value-added stems from the Bank's ability to promote a policy framework that can facilitate both grid and off-grid solutions. With respect to the former, the Bank's involvement will help Government establish a competitive and efficient sector that can attract and sustain private investment in all segments of the business; with respect to the latter, the Bank's involvement will help promote appropriate policy and implementation regime for renewables, integrating initiatives by the private sector and community based organizations in delivering access to the rural poor and increasing productive use of electricity.

Further, it is recognized that the Bank brings to bear a vast repertoire of world-wide knowledge and practical experience, based on related projects being undertaken in Asian as well as African and Latin American countries. In other words, the Bank is able to bring to and adapt for Sri Lanka, established international best practice as well as emerging concepts that are being developed in the context of other countries. In particular, the RERED project team brings together professionals with a range of expertise and experience with renewable energy projects in Uganda, Cambodia, Indonesia, Bangladesh, South Africa, Argentina, and India, besides Sri Lanka.

IDA/GEF support of this proposed project will offer a unique opportunity to build on the success of the ESD Project. In the same way that the ESD Project is today viewed as a rich source of ideas and lessons for others seeking to design and implement a rural/renewable energy program, this project will offer a model of how to develop and implement a second generation operation.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

- Cost benefit NPV=US\$ million; ERR = % (see Annex 4)
- Cost effectiveness
- Incremental Cost
- Other (specify)

Anecdotal evidence points to large improvements in quality of life benefits through renewable energy electrification in rural Sri Lanka. At present, there is however, an absence of significant experience with the benefits of rural electrification in Sri Lanka, and none whatsoever with that of cross-sectoral links. It is therefore difficult to estimate at this time the two key elements of economic benefits – the consumer surplus and the indirect benefits. These tasks will be undertaken as part of the monitoring and evaluation of the project.

Economic Comparison of Grid and off-grid alternatives

Grid electricity provides a different and higher level of service to the consumer and has a much higher impact on economic development and social well-being than the electricity made available from off-grid services, especially solar. The latter supports a very basic level of service, mainly lighting. However, a large majority of rural households are low-intensity consumers, using less than 50 kwh (or units) per month, mainly for lighting purposes. This level of service is consistent with the power available from pv/hydro off-grid systems, when used in conjunction with compact fluorescent lamps (CFLs). Also, this project is looking at strategies to increase the economic development and social wellness impact of renewable electricity sources, and therefore to a limited extent, it could also produce the economic and social benefits generally associated with grid-supplied electricity.

Solar: The analytical approach for solar home systems considers the replacement of kerosene lamps by solar lighting. As part of the incremental cost analysis, the incremental cost for solar is about US\$ 2.3 per Wp. The economic analysis would yield the same result as incremental cost calculations as the latter assumed (i) incremental cost to be subsidized; and (ii) a discount rate of 12 percent for computing the levelized costs. As such, a separate EIRR calculation for solar has not been presented here.

Mini-Hydro: The economic analysis for a recent mini-hydro project in Sri Lanka was carried out and the results show 24 percent EIRR under standard assumptions. The details are provided in the Annex 4.

Village Hydro: An incremental cost analysis for off grid village hydro has been made. A representative project implemented under ESD was used for this analysis. The approach yields an incremental cost of about US\$ 11400 for a 11 kW system as compared to the levelized cost of kerosene and battery use by the beneficiary households. An economic analysis would yield a 12 percent EIRR since the incremental cost calculations assumed that: (i) incremental costs are to be subsidized; and (ii) a discount rate of 12 percent would apply for computing the levelized costs. As such, a separate EIRR calculation for village hydro has not been presented here.

2. Financial (see Annex 4 and Annex 5):

NPV=US\$ million; FRR = % (see Annex 4)

There are two major financial issues. *One*, commercial debt finance for renewable energy developers (grid-connected and off-grid) and consumers (solar pv) is still constrained, even though progress has been made in this regard under the ESD Project. Part of this problem arises from the general limited level of development of Sri Lanka's financial sector, and part of it arises from the lenders' perspective that the risks associated with these activities are high. The project team will work with banks as well as micro-finance institutions to determine what actions could be undertaken to increase the availability of commercial debt finance on terms that meet the needs of the renewable energy industry.

Second, it is important to ensure that the need of private sector enterprises for grant funds declines over time, and this has been built into the project design. The grid-based micro-hydro developers have not received investment grants under the ESD Project, and none will be provided in this project; GEF grants for solar PV investments are expected to decline steadily to zero by the end of this project. Grants for village off-grid hydro systems are expected to decline over time, but they are unlikely to be phased out completely at the end of this project, as this form of rural electrification is still not well-established.

Financial analysis of alternatives:

Solar: From householder's perspective the financial rate of return for investments in solar home system at current prices and prevalent micro-finance lending rates in Sri Lanka is 9.5 percent. This is half a percentage point higher than the maximum rate that a rural household can expect to receive from a savings bank for deposits. Even with the high rate of interest charged by the MFIs to HHs on solar loans (24 percent), the investment yields a positive NPV for the household.

Mini-hydro: The financial analysis of a typical mini-hydro project (1.5 MW, already implemented) yields a FIRR of 21 percent to the developer. The return is fairly robust with regard to changes in power purchase tariff.

Village Hydro: The typical project used for analysis is a 11kw village hydro project. The financial analysis indicates a positive NPV from the developer's perspective and yields a 10 percent FIRR and NPV is positive with a discount rate of 9 percent (cost of funds of the developer).

Fiscal Impact:

From the government's point of view, the off-grid provision of electricity has the additional advantage of requiring no public sector funding; the entire US\$ 39.5 million is financed by private and commercial sources.

3. Technical:

Biomass cogeneration projects - grid-connected as well as off-grid - are technical interventions new to Sri Lanka. While the technology utilized has a proven track record in other countries and as such poses no major technical issues, it will be utilized for the first time in Sri Lankan conditions.

As the main grid expands, it is likely to encompass some village hydro systems, raising the issue of how to ensure that the Village Electricity Society (VES) remains financially whole. This "stranded asset" issue has been flagged and will be addressed in the context of the Rural Electrification Policy as well as the new Electricity Act and Regulations. One solution being considered is for the main grid operator to make a buy-out offer to the VES at least sufficient to cover any outstanding loan balance. The VES could also have the option of retaining some or all of its systems, and act as a retail intermediary. The project has provided for technical assistance to evaluate these options and assist the Government to reach a feasible alternative.

4. Institutional:

There are no major institutional issues; the institutional arrangements under the ESD Project have worked well and will be continued in the RERED Project.

One issue to be directly addressed by the project is the current shortage of microfinance organizations (MFIs) supporting off-grid investments such as solar and village hydro. The inability of the single participating microfinance organization, SEEDS, to keep pace with solar sales has created a critical constraint on market growth. The AU will facilitate efforts to bring both MFIs and consumer credit institutions into the program by sponsoring an innovation solicitation process (see Annex 2 Text Box 1).

4.1 Executing agencies:

The execution of the project will be by the DFCC Bank through the Administrative Unit, which is currently operating the ESD Credit Program. This has been working very smoothly, and all indications are that their excellent performance will continue.

4.2 Project management:

See 4.1 above. Project management is also by the DFCC Bank Administrative Unit. No issues.

4.3 Procurement issues:

RERED is a follow-on project to the ongoing Energy Services Delivery Project and the RERED Credit Program is based heavily on the ESD Credit Program. The ESD Project is being implemented satisfactorily and the procurement arrangements for the Credit Program have worked well and will be continued in RERED.

4.4 Financial management issues:

The implementing entity, DFCC Bank, has a proven track record of good financial management and sound project operating guidelines under the ongoing Energy Services Delivery Project. DFCC Bank has demonstrated capacity in submitting project audit reports and informative quarterly project management reports to the Bank on a timely basis.

A significant risk is the substantially increased scale of the RERED project. The DFCC Bank has agreed to take risk mitigation measures such as: (i) expanding the scope of project audit to cover independent physical verification of assets and procurement/accounting practices of the beneficiaries; (ii) engaging the services of consultants for verifying satisfactory installation of the Solar PV systems (the most dispersed and transaction intensive project component); and (iii) computerizing the project accounting system at the DFCC Bank.

The RERED project will follow the report based disbursements and will produce an agreed set of Financial Monitoring Reports (FMRs) on a quarterly basis. Two special dollar accounts will be opened, one for IDA credit and the other for GEF grant funds.

5. Environmental:

Environmental Category: F (Financial Intermediary Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

The project has been classified as category 'FI' under the Bank's Environmental and Social guidelines. Overall, the project has substantial positive environmental and social effects, with potential negative impacts limited to small scale mini-hydro, biomass and wind energy plants. The existing environment and social assessment and mitigation framework established and operated under the ESD project has been reviewed and enhanced to cater to safeguards necessary for the enhanced scope. Monitoring safeguards

would be effected both through country-based enforcement and project-based community oversight mechanisms.

The use of renewable energy technologies will yield net positive environmental impacts. SHS and village hydro projects will result in the replacement of kerosene and other fuels that are currently used for lighting, resulting in corresponding reductions in indoor air pollution. The expansion of grid connected mini hydro schemes and the introduction of wind power and biomass energy systems would likewise reduce the need for fossil fuel based power generation. Overall, the use of photovoltaics for electricity generation is benign from an environmental point of view, with the the only potential environmental concern being the proper disposal of lead acid or nickel-cadmium batteries. Since the grid connected mini hydro as well as village hydro projects will be run-of-the river schemes with virtually no water storage, the long term environmental impacts are considered to be minor. Commercial wind farms could have minor environmental problems, particularly with regard to interference in migration patterns of birds and noise caused by the aerodynamic interaction between the wind and turbine blades. The use of biomass for power generation poses the risk of deforestation for supply of fuelwood. GOSL has decided that only dedicated fuelwood plantations grown on agriculturally marginal lands will be used to supply fuelwood to the biomass energy plants. Sri Lanka has a stringent permitting system for transport of any type of locally grown timber. This permit system, which has been reasonably successful in controlling illegal timber felling, will be used to control illegal deforestation. While biomass energy systems pose a significant risk of reasonably high levels of air pollution, it is anticipated that the emissions will be less polluting than fossil fuel plants, considering the poor quality of petroleum fuels in Sri Lanka. The guidelines stipulated under the Pollution Prevention Handbook will be used to control emissions from biomass energy plants.

As specific subprojects and sites are yet to be identified, project specific environmental issues cannot be identified at this stage. The information given above identifies generic environmental issues associated with typical renewable energy systems, proposed under this project. GOSL has prepared an Environmental and Social Assessment Framework based on which project specific EAs will be conducted once sub-projects have been identified. The Bank reviewed and commented on the first draft of the Framework and GOSL has submitted a revised version, which was placed for public disclosure on February 26, 2002, both in the Public Information Center and in country. GOSL has completed public disclosure and consultation on the proposed Framework as required by the National Environmental Act and IDA guidelines. No significant issues have been raised.

The sub-project proponent will be responsible for conducting the EA based on Terms of Reference developed by the Central Environmental Authority (CEA), according to the Framework agreed with IDA. The composite GOSL environmental clearance process is consistent with World Bank environmental and public disclosure requirements. Although the CEA's regulated EA procedure is less than a decade old, substantial progress has been made by the CEA in evaluation of EIAs. Institutional strengthening of the CEA has been supported by projects financed by USAID, NORAD, the Government of the Netherlands, ADB and the World Bank. The Bank is satisfied that the CEA has the basic technical capacity to undertake the environmental review process

5.2 What are the main features of the EMP and are they adequate?

Based on the Environmental and Social Framework to be developed, project specific EAs will be conducted once sub-projects are identified. Considering the simplicity and small scale of the proposed sub-projects, it is unlikely that any major or irreversible environmental impacts will be encountered. Therefore, the most important aspect of the EA will be the EMP. The EMPs should be prepared and finalized by the project proponent (for each sub-project), taking into consideration comments from the Central Environmental Authority (CEA) during its review and clearance process. The responsibility of monitoring the EMP rests with the CEA, as mandated by the National Environmental Act of Sri Lanka.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft:

N.A.

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

The Environmental and Social Assessment Framework has been subject to national consultations for a period of 45 days, which is more than the mandated 30 day requirement under the National Environmental Act. The public comments received have been considered in revising the Framework. Project specific EAs will be subject to local consultations where all stakeholders of the sub-project are provided with an opportunity to comment on the EAs, prior to environmental clearance by the CEA.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

Further community level disclosure and community based monitoring mechanisms will be developed during project preparation for those sub-projects that are found to have significant environmental and social impacts. Indicators in this regard are likely to be sub-project and area specific, and hence would be developed on a case-by-case basis.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

The project will include specific measures to enhance rural development with an emphasis on low income rural households. In particular, the solar industry will be encouraged to target lower income brackets directly through provision of lower cost, smaller solar home systems, and indirectly through the provision of institutional systems to public institutions. This incentive is embodied in the SHS subsidy design, which will include a progressively lower cap on SHS system size (see Annex 2 Solar Component for a description of the subsidy mechanism). Benefits to households switching from kerosene to solar lighting include greater convenience, improved safety, and improved indoor air quality. These benefits accrue disproportionately on women and children, who spend the most time in the house. The targeting of lower income households will allow them to enjoy these benefits as well.

The Project also includes technical assistance aimed at encouraging small and micro businesses to improve their operations through the use of electricity. In addition, TA to cross sectoral ministries such as Health will provide benefits to the general population.

6.2 Participatory Approach: How are key stakeholders participating in the project?

The RERED Project preparation has been, and will continue to be highly participatory in nature. The project is being prepared in close collaboration with the key stakeholder industry and NGO groups. In particular, the AU has coordinated inputs from private sector and NGO groups listed below. Participation in RERED preparation has followed the pattern established during ESD preparation and implementation of holding participatory, multi-stakeholder meetings to discuss project design and implementation issues. Specifically, the AU held several meetings among the key stakeholder groups to elicit ideas and concerns regarding design of the RERED Project. Discussions on project design between the mission and project stakeholders also were begun during earlier ESD preparation missions as well as during RERED preparation. These include one-on-one and group discussions with the following organizations:

Government:

- Ministry of Power and Energy
- Ministry of Finance
- Ministry of Health
- Ministry of Education
- Ministry of Environment and Natural Resources
- Samurdhi Authority
- University of Moratuwa
- Provincial Councils:
 - Southern Province
 - Uva Province
 - Sabaragamuwa Province
 - North Western Province
 - North Central Province

Private Sector:

- All active solar dealers
- All ESD Participating Credit Institutions
- Most active mini-hydro developers
- Most consulting firms/NGOs active in Renewable Energy and Social Mobilization

Non-Governmental Organizations

- Energy Forum
- Intermediate Technology Development Group
- Sarvodaya Economic Enterprises Development Services (SEEDS)
- Small Power Producers Association
- Sri Lanka Solar Industries Association

Bilateral and Multilateral

- Asian Development Bank
- Embassies of Norway, Sweden, United Kingdom, Denmark and Japan

At the village level, the best example of the participatory nature of the ongoing and proposed project is in the development of village hydro projects. These village electricity grids are community developed with support from a team of consultants with expertise in business development, technical design, and social organization and development. Thus they follow a sector-specific Community Driven Development approach. In particular, participation and consultation are in-built in the manner by which communities decide to participate in the off-grid component. All decisions with regard to electricity design, financing, tariffs, maintenance of the systems and amount of electricity to be used by each household are decided in a participatory manner by the community. Households purchasing solar systems are mainly involved through normal commercial practices by being able to choose a particular system, company or financing arrangement. Overall satisfaction of the end-users is being monitored by market assessment conducted by the AU and the Participating Credit institutions. These practices will be continued and strengthened in RERED, perhaps by facilitating the establishment of a consumer organization for renewable energy system users.

The solar and hydro business communities have established Associations – the Solar Industry Association and Small Power Producers Association - to advocate the industries' interest. These associations have provided significant inputs on project design. Also project design ideas have been generated in the regular stakeholder consultative meetings conducted by the AU under the ESD project. In addition to the ESD Project, the RERED Project builds on projects and activities supported through other donor and Government-funded channels. In particular, the UNDP/GEF-supported Renewable Energy and Rural

Electrification Capacity Building (RERECB) Project has made important contributions to the foundations on which RERED builds. For example, the wind resource monitoring supported under the RERECB Project has proven to be a critical factor in attracting private interest in wind power development and focusing that attention on the very promising Puttalam coastal region. Capacity building in renewable energy and energy efficiency, including training of energy managers in key private industries and development of university level educational material, have also added to the renewable energy and energy efficiency momentum in the country.

The ESD Project also has followed a collaborative approach with Provincial Councils such as with Uva Province, as well as with Ministries such as the Ministry of Estate Infrastructure. In particular, the AU has facilitated delivery of additional targeted support and incentives for solar PV investments in a manner fully consistent with ESD Project objectives and procedures. This has had the result of providing Government grant support in a competitive, transparent environment which encourages commercial behavior. RERED will both continue and expand on this precedent-setting approach.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

For general project design, see 6.2 above.

The Environmental and Social Assessment Framework has identified the consultation process to be followed in developing project specific EA's. The project would seek to document the consultation and communication process, pointing out what works and where it needs to be supplemented. In addition to the strong participatory nature of the rural electrification program outlined above, the involvement of community based organizations and NGOs would facilitate improving the productive use of electricity and promote greater grass root level participation in formulating rural energy development options.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The project has been designed with a significant social mobilization component whereby the initiative for developing and implementing community off-grid renewable energy projects comes from the village. Partner organizations like SEEDS, NGOs and socially active consulting and facilitating organizations such as SLBDC and CAPS are at the forefront of community mobilization and project development.

6.5 How will the project monitor performance in terms of social development outcomes?

Under the Project's cross sectoral energy applications component, specific indicators will be developed to assess the socio-economic impact of electricity on rural households and beneficiaries. The baseline for such indicators would be established through pre-project implementation surveys and impact assessed from results of periodic post-implementation surveys.

7. Safeguard Policies:

7.1 Do any of the following safeguard policies apply to the project?

Policy	Applicability
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No

Involuntary Resettlement (OP/BP 4.12)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

It has been agreed with GOSL that no sub-projects located in protected areas such as forest reserves, national parks or sanctuaries, will be eligible for financing under the project. Therefore it is not likely that the Natural Habitats Safeguard Policy (OP/BP/GP 4.04) will be triggered. While the Government has determined that all biomass projects will be harvested from designated fuel-wood plantations located in agriculturally marginal lands, the Forestry Safeguard Policy (OP/GP 4.36) has been identified as applicable to this project largely as a precautionary measure. Based on the experience of the ESD project it is unlikely that there will be any resettlement under the project. In the unlikely event that there is land acquisition and/or resettlement in a sub-project, the Government has agreed inform the Bank and follow the requirements of the Involuntary Resettlement Safeguard Policy (OP/BP 4.30). In any case, such sub-projects are required to follow Sri Lanka's National Policy on Involuntary Resettlement, which is similar to the Bank Guidelines under OP/BP 4.30. The project will finance only run-of-the-river small hydro power projects of less than 10MW capacity. Therefore, dam safety is not expected to be an issue. Regardless, the Safety of Dams Safeguard Policy (OP/BP 4.37) has been identified to be applicable as a precautionary measure. The EA Safeguard Policy (OP/BP 4.01) will be triggered under the project and will be fully addressed under the Environmental and Social Assessment Framework.

All sub-projects will be subject to the Environmental Assessment process as outlined in the Environmental and Social Assessment Framework. Each project specific EA will undergo the EA appraisal process as outlined in the National Environmental Act. The Central Environmental Authority's environmental clearance for each subproject is a pre-requisite for disbursements to that sub-project under the Credit Line. Based on the environmental clearance experience of sub-projects in the IDA financed ESD Project and the on-going institutional strengthening of the CEA under the IDA financed Environmental Action 1 Project, the project will depend on procedures set out under the NEA for environmental clearance. EAs of all subprojects that include resettlement, land acquisition, biomass energy and/or mini hydro plants that exceed 5 MW will be reviewed and cleared by IDA as well.

F. Sustainability and Risks

1. Sustainability:

- **Grid-connected renewable energy power generation.** The 2002 SPPA represented a major breakthrough for renewable energy, and has been demonstrated to form the basis for sustainable mini-hydro *investments* for several reasons including: (i) existing SPPA includes a floor price for the tariff-the developer is guaranteed to receive 90% of the first year SPPA tariff during the contract lifetime. This has to a large extent addressed the tariff risk faced by project developers; (ii) the short-term volatility of the market is addressed in the current tariff regime by providing for a tariff which is an average of the past 3 year annual tariffs. Thus a single year spike or valley is now significantly mitigated. Further, the new tariff regime is expected to include support to the regulator to ensure that the new tariff regime provides appropriate incentives and security for economically viable mini-hydro investment to continue while still ensuring that the investments are consistent with a least cost generation expansion plan. It should be noted that there is a need for some refinements to the SPPA to ensure sustainability of continued mini-hydro *development* and that the SPPA is accommodated with technical assistance in the power sector reform process. Also, the availability of long-term financing to the developers is key to sustainability. RERED will seek to leverage available sources of long-term financing, such as Government pension and insurance funds. This would provide a next step in reducing the necessity of long-term financing to commercial banks from IDA for energy projects.
- **Off-grid village hydro systems.** The experience shows that the system of village ownership and operation is working well so far in Sri Lanka, which implies sustainable operations of these systems. At the same time, it will be necessary to closely monitor their functioning to detect any problems that may arise, and take timely corrective action. The financial sustainability of the supported systems arises from the fact that operational costs are relatively low and can be covered from revenues, once capital costs and largely the development cost have been partly subsidized with GEF funds. While the need for GEF capital cost subsidies for additional schemes is expected to decline over time, it is unlikely that the need for capital cost subsidies for future schemes will be eliminated at the end of the RERED project. The emphasis on productive uses is expected to help boost financial sustainability even as the GEF grant declines. At the same time, other sources of targeted subsidies will be sought. The latter could for example come from provincial councils or a Government supported rural electrification funding mechanism.
- **Solar PV systems.** At present, three large companies have made significant investments (more than US\$ 1.0 million each) developing their distribution networks – an achievement seen in few other Bank client countries. A fourth company has not made significant investments yet, and is still considering its options. Also, credit for solar system purchases to the end-user has become available through one of the largest Micro Finance Institutions (SEEDS). Together, this lays the foundations for sustainable development, but there still remains a need for GEF subsidies – at a lower scale than in the ESD project – in order for these companies to develop and grow into commercially viable ventures. It is recognized that it is essential to have an exit policy for GEF from the solar PV market development; at the same time, it is also clear that the private sector, particularly foreign companies whose perception of local risks may be high, would prefer continuation of GEF support not only in the RERED project but also after that. An exit policy for GEF funding for solar home systems is to be developed in consultation with the stakeholders in the course of project preparation. While complete phase-out of grants for SHS during the RERED Project’s lifetime is expected, grant support for second-generation uses – for productive purposes and delivery of services – may need to

continue. Also, two risk mitigation measures against GEF dependence are adopted in the SHS co-financing scheme: (i) if the total industry revenue for smaller systems (10 to 19 Wp) accounts for more than 30% of the total SHS industry revenue the US\$40/unit will be reduced to US\$20/unit, and (ii) if for any product range a company gains more than 85% of the total market the company will not receive any more co-financing grants from GEF.

- **Cross-sectoral Energy Applications.** Given the lack of precedent and experience with cross-sectoral links, sustainability will require close monitoring, and some adjustments may have to be made during the course of implementation.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
Macroeconomic problems reduce demand for and increase cost of renewable energy services	M	Risk is external to project
Lenders perceive that renewable energy investments carry unacceptably high risks	M	Current ESD track record has provided reasonable confidence, additional measures, such as capacity building to generate confidence contemplated
Long term lending constraint of PCIs continues	H	Complement lending resources through local long term funding sources
Deficiencies in Small Power Tariff setting recur	S	Establishment of regulatory mechanism now contemplated under sector reform process
Village off-grid hydro development costs do not reduce over time	M	Incorporate village hydro more programmatically into energy planning and provincial programs
From Components to Outputs		
Institutional market for solar PV fails to materialize and market for smaller systems fails to develop.	M	Assist cross-sectoral ministries in designing appropriate energy guidelines and packages for their service and institutional applications and design of grant regime to develop smaller systems. Opening up of north and east as potential markets
Barriers to community wind and biomass projects are not overcome.	S	Build on social mobilization experience of community hydro, capacity building and technical assistance.
Framework for wind and biomass projects is attractive to the private sector.	M	Ensure that initial projects are soundly structured and demonstrate commercial viability
Volume of business for ESCOs sufficient for commercial viability	M	Technical assistance to PCIs and ESCOs to develop sound project pipeline
Rural development ministries, provinces and private sector show interest in renewable energy projects	H	Provision of technical assistance for dialog and program development
Overall Risk Rating	S	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

3. Possible Controversial Aspects:

The only controversial issues are the size of the project in relation to the overall Sri Lanka portfolio and whether this degree of support to renewables is justified. The project should not be viewed only as a "renewable energy project" - it is largely private sector and community led in implementation and touches upon several key socio-economic aspects critical to economic development, such as productive use of energy resources, diversification of and reliance on indigenous energy resources, improvement of social services delivery in rural areas, community mobilization and asset creation etc. Furthermore, the size of the project in relation to the number of households being enabled energy access – nearly 100,000 households is reasonable. There is no Government funding contribution required to provide electricity access investments to 100,000 households. The entire non-IDA and non-GEF cost is being borne by the private sector, communities and households and commercial banks in local rupee financing. The project is therefore leveraging a very high level of investment and participation, and the resulting multiplier and economic development effects are much higher than that from the average Government-implemented IDA project. Furthermore, the project will play a critical role in providing resources for energy access to the Northern and Eastern parts of the country, where peace has been recently restored and the rural infrastructure, including electricity, is badly in need of rehabilitation.

G. Main Loan Conditions

1. Effectiveness Condition

Satisfactory legal opinion from the Attorney General on all relevant Legal Agreements entered into by Government of Sri Lanka under the project.

2. Other [classify according to covenant types used in the Legal Agreements.]

- (i) Issue of Rural Electrification Policy acceptable to the Bank by May 1, 2002 (Government has sent a draft on April 10th for Bank's review), and
- (ii) Energy Efficiency, Conservation and DSM Strategy paper to be sent for Bank's review by May 1, 2002.

Financial Covenants

1. The AU will ensure that throughout the project period a satisfactory financial management system, capable of producing accurate and timely FMRs, is maintained.
2. Submit to the IDA audited annual financial statements of the project, no later than June 30 of the following fiscal year.
3. Prepare FMRs and submit to the IDA no later than 45 days following the end of the reporting quarter.
4. AU will carry out annual review of the PCIs and other eligible participants under the credit and grant program to ensure that they continue to satisfy the eligibility criteria and share the results of this assessment with IDA

Legal Covenant

1. Disbursements to sub-projects will be made only after ensuring that the sub-projects have

received the environmental clearance according to the provisions of the National Environmental Act of Sri Lanka.

H. Readiness for Implementation

- 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
- 1. b) Not applicable.
- 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- 4. The following items are lacking and are discussed under loan conditions (Section G):

Project is ready for implementation. The retroactive financing of credits extended to eligible sub-projects by PCIs to the extent of \$7 million of IDA funds is to be approved.

I. Compliance with Bank Policies

- 1. This project complies with all applicable Bank policies.
- 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Subramaniam V. Iyer
Team Leader

Vincent Gouarne
Sector Manager/Director

Mariana Todorova
Country Manager/Director

Annex 1: Project Design Summary

SRI LANKA: Renewable Energy for Rural Economic Development

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p>Sector-related CAS Goal: Invigorate rural economy, empower and build assets for the poor, promote rural economic development and well being.</p> <p>Pomote establishment of a competitive electricity industry with significant private sector participation.</p>	<p>Sector Indicators: Improved living conditions, rise of rural income and enhanced economic and social activity.</p> <p>Progress on sector reforms</p> <p>Increased private investments in various parts of the sector</p>	<p>Sector/ country reports: National Poverty Assessments.</p> <p>Public expenditure review .</p> <p>Government reports, including Central Bank annual reports.</p> <p>Dialogue with GOSL, donors, and other relevant stakeholders.</p> <p>Sector reports and dialogue.</p> <p>Review of investment data.</p>	<p>(from Goal to Bank Mission) Government maintains a commitment to rural poverty reduction</p> <p>Private sector continues to invest in rural areas</p> <p>Macroeconomic stability maintained</p> <p>Government maintains commitment to undertake meaningful sector reforms and invite private sector participation.</p>
<p>GEF Operational Program: Promote adoption of renewable energy by removing market barriers and reducing implementation costs.</p> <p>Reduce greenhouse gas emissions</p>	<p>Proportion of electricity capacity being derived from renewables.</p> <p>Number of rural consumers served by renewable energy systems.</p> <p>Quantity of CO2 avoided.</p>	<p>Project implementation reports and sector statistics.</p> <p>Customer surveys.</p> <p>Household surveys.</p> <p>Project implementation reports and sector statistics</p>	<p>Project interventions will enable barrier removal</p> <p>Rural households prefer to connect to renewable energy sources rather than wait for grid connections.</p> <p>Addition of incremental capacity in Sri Lanka is based on fossil fuels</p>
<p>Project Development Objective: Expand commercial provision and use of renewable energy to foster rural economic development and improve quality of life.</p>	<p>Outcome / Impact Indicators: Number of rural households served by renewable energy systems.</p> <p>Number of public service institutions served by renewable energy systems.</p> <p>Number of rural industrial and commercial enterprises served by renewable energy systems.</p>	<p>Project reports: Quarterly progress reports.</p> <p>Baseline survey and periodic updates supported by project.</p> <p>Project supervision reports.</p> <p>Specific socioeconomic monitoring under the project.</p>	<p>(from Objective to Goal) Continued expansion of solar and village hydro markets.</p> <p>Sector reform provides clear mandate and support for rural operation of grid and off-grid rural networks.</p> <p>Rural businesses embrace renewable energy as financially viable.</p> <p>Commercial financing for</p>

	Socio-economic benefits accrued to households and villages due to increased use of electricity.		renewable energy is facilitated. Provision of electricity access leads to higher economic and social well-being.
<p>Output from each Component:</p> <p>Off-grid solar PV household systems and other independent grid systems.</p> <p>Public service institutions and rural industrial, commercial enterprises served by renewable energy systems.</p> <p>Grid-connected hydro, wind, Biomass.</p> <p>Global environment benefits.</p> <p>Energy efficiency and DSM.</p> <p>Technical assistance.</p>	<p>Output Indicators:</p> <p>100,000 SHS and off-grid households connected.</p> <p>1,000 institutions and enterprises.</p> <p>85 MW grid connected renewable energy plants.</p> <p>1.25 million tons of carbon avoided.</p> <p>three-four private energy service companies in operation.</p> <p>Project development opportunities identified and developed, market barriers reduced and energy planning for other sectors systematically introduced.</p>	<p>Project reports:</p> <p>Quarterly Progress Reports.</p> <p>Project Supervision Reports.</p>	<p>(from Outputs to Objective)</p> <p>Macroeconomic problems reduce demand and increase cost of renewable energy services.</p> <p>Lenders perceive that renewable energy investments are high risk.</p> <p>Long-term lending constraint of PCIs continues.</p> <p>Deficiencies in Small Power Tariff setting recur.</p> <p>Village off-grid hydro development costs do not reduce over time.</p>
Project Components /	Inputs: (budget for each	Project reports:	(from Components to

Sub-components:	component)		Outputs)
Solar PV Investments	US\$ 28.3.0 IDA; \$3.9 GEF	Quarterly Progress Reports	<p>Institutional market for solar PV materializes and market for smaller systems develops. Barriers to community wind and biomass projects are overcome.</p> <p>Framework for wind and biomass projects is attractive to the private sector.</p> <p>Volume of business for ESCOs sufficient for commercial viability</p> <p>Rural development ministries, provinces and private sector show interest in renewable energy projects</p>
Community investments - hydro, wind, biomass	US\$ 4.4 IDA	Project Supervision Reports	
Grid Connected Hydro, Wind, Biomass	US\$ 49.2 IDA		
Energy Efficiency and DSM	US\$ 0.6 IDA,		
Cross-sectoral Energy Applications	US\$ 2.3 IDA; US\$ 0.75 GEF		
Technical Assistance	US\$ 0.5 IDA, US\$ 3.35 GEF		

Annex 2: Detailed Project Description

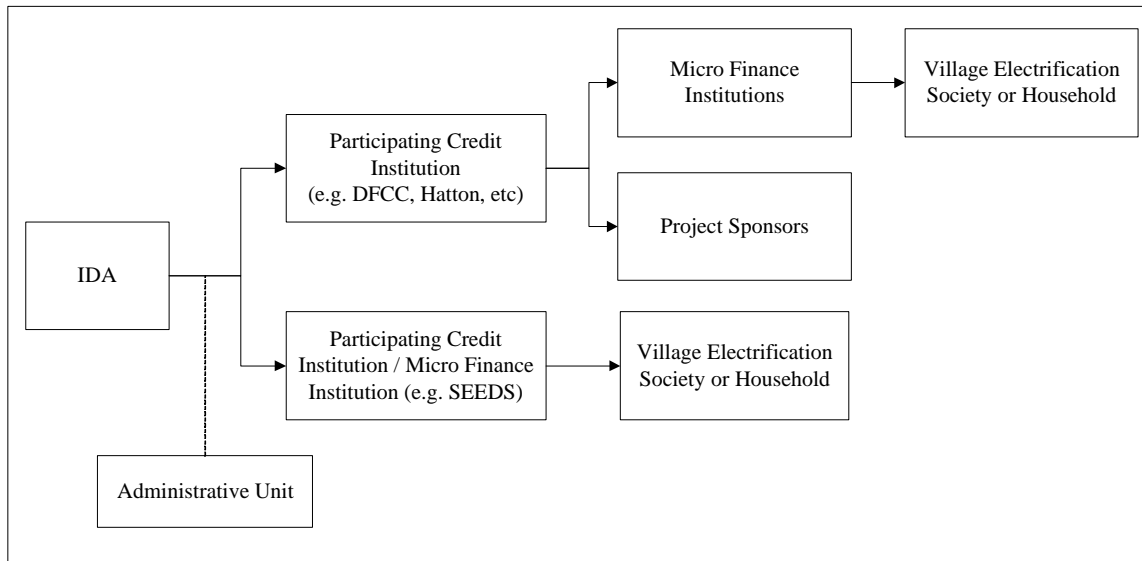
SRI LANKA: Renewable Energy for Rural Economic Development

Overview

The RERED project will finance Renewable Energy Investments and Technical Assistance. Investments will be supported by: (i) an IDA Credit Program; and (ii) a GEF Co-financing grant Program. Technical Assistance will be supported by both IDA and GEF.

The IDA Credit Program will be open to any commercially viable renewable energy technology or energy efficiency investment. In addition to the mini-hydro, village hydro, and solar investments supported through ESD, the program is expected to include biomass, wind, and energy efficiency investments as well. Participating Credit Institutions (PCIs) will appraise and approve projects using their standard procedures and apply for refinancing of a portion of the loan for eligible subprojects in accordance with the Operating Guidelines (see Annex 13). PCIs currently include Development Banks, Commercial Banks, and one Microfinance Institution. New PCIs will be encouraged to enter the program based on eligibility criteria given in Annex 5. The RERED Credit Program will utilize the same structure as the ESD Credit Program, which has been highly satisfactory (see Figure A.1).

Figure A.1 RERED Credit Program Structure



The GEF Co-financing grant Program will be open for off-grid renewable energy technologies. In addition to the solar home systems and village hydro projects investments supported under ESD, the program is expected to include off-grid biomass and wind projects. Co-financing is offered to projects that have been appraised by the PCIs using standard procedures.

Technical assistance will be offered under two schemes: (i) cost-shared; and (ii) full-cost. The cost-shared scheme will support existing renewable energy organizations if the proposed projects directly contribute towards the objectives set for the different technologies (see below). It will not include support for hardware and will be offered to a company not more than two times during the implementation of the project. Activities endorsed by majority of key stakeholders in the different technological areas could be supported based on endorsement from the regular stakeholders meetings chaired by the AU. The AU - with

support of technical independent expertise if required – will approve the activities up to US\$ 75,000. Applications for more than US\$ 75,000 need no-objection approval from the World Bank. The TA projects would be appraised in accordance with the Operating Guidelines (see Annex 13).

The primary implementing agency will be the AU acting on behalf of the Ministry of Finance on the basis of an Administration Agreement. The Administrative Unit has the role of administering the refinance procedures, facilitating the TA, providing quarterly reports on project progress, and representing the project within and outside Sri Lanka.

The project has components as indicated in the table below. For each of these components detailed descriptions are provided in the text underneath.

Components	Indicative Costs (US\$M)	% of Total	IDA (US\$M)	GEF (US\$M)	Other (US\$M)
1. Grid-Connected hydro, wind and biomass	90.3	68	49.2	-	41.1
2. Solar PV	28.3	21	18.8	3.9	5.6
3. Community based hydro, and biomass	4.4	3	3.6	-	0.9
4. Energy Efficiency and DSM	1.0	1	0.6	-	0.4
5. Cross-sectoral Links	4.6	3	2.3	0.8	0.5
6. Technical Assistance	5.1	4	0.5	3.4	2.2
Total	133.7	100	75.0	8.0	50.6

All renewable energy components have technologies of emphasis. It, however does not mean that other renewable energy systems are excluded. The overall objective of the project is to create a sustainable market for renewable energy systems. It therefore will accommodate systems and technologies which, during project implementation will prove to be or become commercially viable to the AU, PCIs and IDA. For each of these technologies, specifications will be adopted and be adhered to by the project sponsors to reduce the risk of consumer dissatisfaction.

By Component:

Project Component 1 - US\$90.30 million

Grid-connected hydro, wind and biomass

Baseline: At the start of the ESD project in 1997, there was limited experience with private investments in mini hydro projects. Only a few companies had managed to negotiate power purchase contracts with CEB and it required substantial time and effort committment from both parties. However, the potential for commercially viable mini hydro projects was acknowledged by CEB and the developers and more than two dozen Letters of Interest were signed for promising hydro locations. Financing of the projects was difficult as longer term funds were not available in the country. Typically loan terms did not extend further than a few years while the mini hydro projects - with their high investment cost up-front and revenue stream over a relatively long period - needed financing closer to ten years. With the substantial number of large hydro systems available in the country, technical expertise for the mini hydro projects was available. Similarly, at the start of the ESD project, there was little experience with wind energy in Sri Lanka. A limited number of initiatives had been implemented mainly with the support of donors. One NGO had been developing

small household/village scale wind systems suitable for the Sri Lankan market. No biomass projects have been supported under the ESD project. However several key elements have been adopted – long term financing and SPPA – to progress the development under RERED.

The ESD Intervention: (a) *Small hydro*- The ESD project targeted to reduce the transaction cost of the individually negotiated power purchase agreements with the CEB, which was time consuming, costly, and not clear in terms of tariff setting. The project supported the development of a Standardized Power Purchase Agreement that included a formula based Tariff calculation following avoided cost principles and was up-dated and published annually. Furthermore, the project supported the Participating Credit Institutions with long term financing in particular to support these mini hydro investments. (b) *Wind* - The ESD project demonstrated the technical and economic viability of large scale wind operations, and to attract initial private sector involvement through a transparent and open bidding process.

Progress made during ESD: (a) *Small-hydro* - Spurred by the announcement by CEB of a Standard Power Purchase Agreement, as well as the availability of long-term credit through the ESD Project, mini-hydro installed capacity rose from about 1 MW in 1997, to nearly 30 MW at the end of 2001. The private developers implementing these projects have quickly established the necessary technical and managerial skills for these investments. To further strengthen their position in the market and with CEB, the investors in the projects established a Small Power Association. At the same time, PCIs has acquired sufficient experience to adequately appraise mini-hydro investments, and to better understand the investment risks involved. (b) *Wind* - A 3 MW demonstration plant supported by GEF was commissioned in March 1999 and has been operating successfully. The plant consists of five 46-meter towers with 600 kW turbines designed to supply a total annual capacity of about 4.5 GWh. After international competitive bidding, total project cost came to about US\$ 1,200/kW, which is reasonable. Total energy generated from the month April 1999 to January 2002 was about 11 GWh which is sufficient to provide electricity to about 12,000 households on an annual basis. Average capacity factor over the two years of operation was about 14 percent and is slightly lower than the projected value. The wind farm has successfully interconnected into the CEB grid.

Business environment for RERED project: (a) *Small-hydro* - The investment climate for mini hydro projects continues to be favorable. More than seven private developers have actual operations running and signed agreements with CEB for 15 projects at the end of 2001. The tariff formula for the standard power purchase agreement has been strengthened by the Government introducing a floor price for the tariff equivalent to 90% of the first year's tariff. In addition to the provision of tariffs being determined as an average of the past 3 year values, this new measure provides added confidence and certainty to developers. Under these conditions, a quadrupling of the current installed capacity of 30 MW is attainable in the next 5 years. Approximately 40 MW of additional capacity is under active consideration by PCIs, and the mini-hydro industry anticipates developing as much as 100 MW in the coming five years, given that the eligible size has been increased to 10 MW from 5 MW under ESD. CEB's continued creditworthiness is a risk that could undermine the program. The fact that the Government is undertaking a reform program in the power sector provides mitigation against this risk. (b) *Wind* - New wind power projects have been proposed by CEB at Hambantota, Bundala, Kirinda, and Palatupana, all in southern Sri Lanka, as well as in the north-western part of the country at Putalam. On February 27, 2002, the Government of Sri Lanka posted a request for interest for wind power development for the Puttlam and Hambantota areas to augment the country's power generation and mitigate the severe power shortage in the country. Opening up of the north and east also introduces the potential for projects there. On the currently evaluated sites, 116 MW of capacity addition is possible in the long term, against which the project envisages support for 22.5 MW. A standardized small power purchase agreement and tariff setting has been adopted by CEB for projects smaller than 10 MW reducing the risk and overhead for investors and CEB. CEB is familiar with the

interconnection requirements. (c) *Biomass* - The total potential for biomass electricity is estimated to be around 1,800 MW as a result of currently available biomass resources, and the large areas of marginal lands appropriate for biomass energy plantations. There is 0.5 million hectares of scrub and hena lands in Sri Lanka that could provide in a sustainable manner 10 million tonnes of fuel wood on an annual basis. This is enough to fuel 1,700 MW of small to medium biomass based power stations at a plant factor of 67 percent throughout the country. In addition, there are about 635 operational tea factories in Sri Lanka of which nearly 300 factories have a good potential for modernization, including the introduction of modern co-generation technologies. The total potential for the tea sector is anticipated to be in the range of 80-100 MWe. Although considerably smaller also biomass based electricity generation activities in the sugar, coconut, rice and wood industry are envisaged.

RERED vision: (i) *Mini-Hydro*: The mini hydro industry will continue to expand its operations on a profitable basis while at the same time providing least cost power to the national grid. Bundling of facilities will allow the developers to guarantee a solid capacity year-round thereby not only providing least cost power but also strengthening the base load capacity in the country. Wheeling and banking will be allowed to match production profiles with loads. Local long-term funds would be available to support mini-hydro development. (ii) *Wind*: The wind industry will be led by the private sector and will enjoy active government support and effective national policy and regulations including transparent tariff setting. Through effective strategies, the market will be developed as integral part of the country's generation expansion plan for grid connected systems. The Carbon Mechanisms offered on the international market will have been tapped and Sri Lanka will be one of the lead countries in accessing these funds. (iii) *Biomass*: Tapping into its large potential of locally available resources, biomass-based electricity generation will augment the country's electricity supply. Biomass based generation will promote rural development by adding value to the rural economy through usage of biomass supply contracts.

RERED objectives and targets: (i) *Mini-Hydro*: The objective of the project is to continue support to mini-hydro developers so that at least 50MW of new capacity can be added within the next five years (ii) *Wind*: Expanding on the demonstration wind farm supported under the ESD project, the wind component will aim to commercialize grid connected wind energy plants achieving about 22.5 MW of capacity additions (iii) *Biomass*: The main objectives are the commercial introduction and market development for gasification, co-generation and biomass based steam cycle technologies for captive use as well as grid-connected projects. About 12 MW of Biomass-based generation will be added during the course of the RERED project.

Barriers to achieve supported objectives. (i) *Mini-Hydro*: Even though the growth of the mini hydro activities has been substantial, barriers to be overcome for long term sustainability include: (a) lack of local long-term financing; and (b) no or limited reform of the power sector prohibiting a transparent and independent pricing mechanism for the SPPA. (ii) *Wind*: Certain critical barriers need to be addressed to reach full commercialization such as (a) regulation including tariff setting for commercial development of larger than 10 MW wind projects are not available; (b) weak transmission grid in certain areas of the country; and (c) limited private sector players and capacity in Sri Lanka. (iii) *Biomass*: A number of profound barriers exist such as (a) limited experience with the technology in Sri Lanka; (b) underdeveloped biomass supply chain (c) lack of experience with financing biomass projects; and (v) limited awareness and experience among by stakeholders.

RERED strategy for intervention:

Investments: This component will continue support for grid-connected and captive renewable energy investments through the PCIs by providing long term financing, similar to what was supported under the

ESD project. Mini-hydro development will continue to be led by the private sector on the strength of the Small Power Purchase Agreement and tariff from CEB. At least 20% of the needed long-term financing will be made available by the PCIs. The AU will process refinance applications and facilitate funds flow as needed.

Co-financing and Technical Assistance: No co-financing will be provided to the grid-connected renewable energy component. *Technical Assistance* for grid connected wind will be offered under two earlier mentioned schemes: (i) cost-shared, and (ii) full-cost. In all cases the TA will directly support the main objective of commercializing grid connected wind systems. Emphasis is on the cost-shared activities and full cost activities will only be provided on an exceptional basis and should prove to have an added value for the wind industry as a whole. The AU will facilitate the technical assistance and derive decisions in accordance with the Operational Guidelines (see Annex 13).

- The cost-shared scheme - ranging from 20 to 80 percent company contribution - will support existing renewable energy developers if the activities contribute towards reaching the above mentioned objective. It will not include support for hardware and will only be offered not more than two times to a company during the implementation of the project. Activities that could be supported under this window are: (a) *Wind*: training of technicians and management, resource analysis, and peak load/supply studies; and (b) *Biomass*: detailed feasibility studies for tea factories energy, audits combined with pre-feasibility studies for tea factories, and detailed feasibility studies for up to four dendro projects
- The full-cost scheme- Activities endorsed by the key stakeholders in the sector could be supported in full, based on decisions reached at the regular stakeholders meetings chaired by the AU. Activities that could be supported under this window are: (a) *Wind*: development of technical specifications and/or macro level wind mapping. New companies in the sector could receive an one-off preparation grant for business plan development up till the amount of US\$ 9,000. The project will support a maximum of three business plans. (b) *Biomass*: (i) tariff adjustment, especially issues related to installed capacity payment; (ii) standard biomass fuel supply contracts; (iii) training, human and institutional capacity building on both supply and generation sides; (iv) awareness (e.g. study tours) and information generation and dissemination; (v) regulatory issues (third party sales, banking and wheeling); and (vi) policy issues (including biomass based electricity in energy policy/plan). New companies in the sector could receive an one-off preparation grant for business plan development up till the amount of US\$ 9,000. The project will support a maximum of three business plans.

Transparent, rule based, professional administration, enforcement and facilitation. The project will continue, on an enhanced and reinforced basis, the transparent implementation and compliance framework managed by the AU under the ESD project. This would include: (i) development of the working arrangements with the industry; (ii) facilitation and management of the technical assistance in close coordination with main stakeholders; (iii) arrangements for independent verifications; and (iv) data gathering and reporting, and implementation monitoring roles.

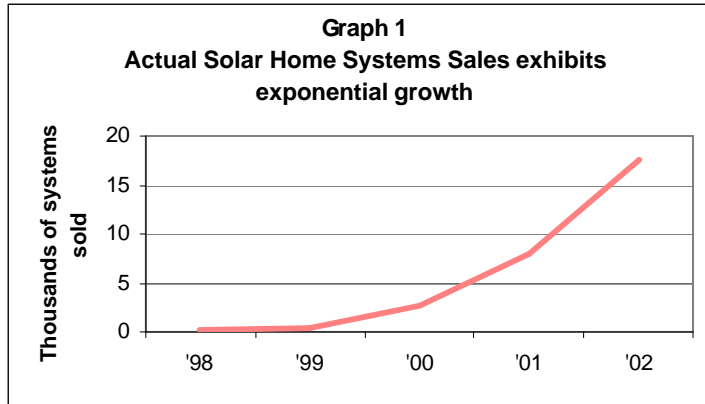
Monitoring and Evaluation: Component progress will be monitored by the AU and included in the quarterly progress reports. Particular emphasis will be on monitoring the growth of the biomass industry utilizing indicators such as (a) physical progress in the biomass energy supply chain; (b) physical progress in the design and implementation of biomass based co-generation systems in the agricultural (tea) sector; (c) physical progress in the design and implementation of on-grid biomass/dendro power projects; (d)

growth in number of consultants, NGO's involved in project development; (e) growth in the number of companies involved in project investment; and (f) policies and plans by the central and provincial government bodies promoting biomass-based electricity generation.

Project Component 2 - US\$28.30 million

Baseline: At the start of the ESD project in 1997, there was little private investment in the solar PV sector in Sri Lanka. One company in particular had been making efforts for close to 10 years to develop its PV business, but its sales were negligible, the company was not growing, and there were no established sales and service outlets in rural areas. Several NGOs had been pursuing pilot, demonstration type efforts, but these had not led to follow on commercial development. Unit prices were high, and none of the financial institutions were providing credit for consumer purchases of SHS. There were no widely applied technical standards that could serve as the basis of a consumer protection arrangement. There was awareness among professional circles, NGOs concerned with rural development, and a few firms, including one of which had been experimenting with solar pumping for drip irrigation, of the technical potential of PV, but there was no substantial commercial interest in developing the SHS market. Meanwhile, there was an shortfall in generation in the power and politicians continued to offer constituents of unconnected villages, promises of the grid being extended to their areas.

The ESD intervention: The ESD project targeted the interlocking barriers of high unit costs and prices (low affordability) and low sales volumes. The main interventions were to increase affordability by providing an output based subsidy to reduce the consumer's first cost and a refinance facility to support consumer financing. Support was also provided for technical assistance for promotion and business development and for the transparent administration of the rules for technical standards and subsidy payments. The aim was to provide a framework that would attract private investments in rural distribution of SHS, catalyzing a circle of increasing sales volumes – falling unit costs and prices – increasing affordability, that would lead to commercial sustainability. This led to the following key features of the project interventions: (i) grant subsidies are channeled to the companies based on their sales performance, and are not linked to costs or retail prices; (ii) the forex risk is partially mitigated by the GEF grant arrangement which is denominated in dollars, and is now on the order of 50 - 55 percent of the direct foreign exchange costs of the companies payments to their suppliers of system components; (iii) the technical specifications and verification arrangements provide a world class consumer protection framework that also encourages fair competition; (iv) transparent, rules- based, professional administration of grant payments and enforcement of technical and other requirements reinforces commercial discipline; and (v) the design is flexible, with changes being introduced in response to implementation experience, based on reports and information brought together by the AU and the findings of Bank supervision missions. The most critical change introduced during ESD implementation was the modification of eligibility criteria to permit a non-bank microfinance organization to be a PCI.



Progress made during ESD: A lot has been achieved during the implementation of the ESD project - sales, professional dealers, investments and sales outlets, consumer financing, quality products, price trends, consumer awareness, and a provincial government as market enabler - have evolved to a platform for growth of a sustainable, commercial market for SHS:

Sales over the last years have followed a nearly exponential projection (see graph 1), from less than 30 systems per month in 1998 to about 1,300 systems in December of 2001, with an accumulated number of systems installed at the end of 2001 of more than 15,000. At the end of 2001, the three main companies each report monthly sales in the range of 400 – 800 systems. The fourth company has sales on the order of 100 – 120 systems per month. It is expected that during 2002, this growth trend will continue and that industry wide an additional 20 to 30,000 systems will be installed. The original ESD target was 30,000 solar home systems during the project period.

Dealers are, as of the second half of 2001, operating on a profitable basis, with high gross margins generating funds for continued development and attractive returns to equity (27 to 57 percent). Though, no company has as yet been operating at this level of sales for a full year. Prior to early 2001, the operating profits of two of the large companies would have been negligible, at best, as they were moving up the learning curve, while sales were being constrained by the lack of adequate consumer financing. The third large company entered the market in mid-2001, and with its own capacity to finance consumers and the availability of the supplementary Uva province subsidy, it is positioned to move quickly to operating on a profitable basis. The fourth company is clearly profitable, as it has operated mainly on a trading basis, incurring only limited expense of extending distribution capabilities. The attractive gross margins of the companies are somewhat offset by cash flow issues. During the third quarter 2001 sales surge, the cash needs of the businesses for working capital have risen sharply. With sales in Uva province accounting for an estimated 44 percent of the increase, cash flow issues became of major concern as the provincial government delayed in making its subsidy payments.

Investments in SHS distribution from foreign and local companies have been significant. Three of the companies have each made investments estimated to be in the range of US\$ 1.0 – 1.5 million. These investments have developed the systems, physical infrastructure and human resources for a commercial distribution network of 50 sales and service outlets with motivated sales forces, trained technicians, and good product and brand awareness.

Consumer credit through a microfinance organization with wide coverage across Sri Lanka now provides credits for an estimated 500 - 600 SHS customers per month with an average value of US\$ 400 for three years. One of the pv companies reports offering its SHS customers a choice of credit from the company or

from the Bank of Ceylon. The MFI interest in SHS lending was spurred by availability of refinance on attractive terms after it became a PCI. The terms include: (i) a repayment period of up to 15 years, including five years grace, (ii) an 80 percent refinance rate (increased from an original 60 percent); and (iii) interest equivalent to the average weighted deposit rate (currently 11.6 percent). The experience of the MFI encouraged one of the other main sellers to provide direct credits, and for tentative plans being developed by some of the companies for arrangements with finance or leasing companies.

Technical standards followed by the companies are world class, with the project's technical specifications being widely accepted. The project also benefits from acceptance of equipment certified for World Bank/GEF supported projects in Indonesia and China.

Price discounting has taken place over the last quarters signaling that competition is increasing. It is estimated that the total sales revenue (retail price plus GEF grant of about US\$ 100) has declined by nearly 20 percent from US\$ 14/Wp for a 32 Wp system in 1999 to US\$ 11.5/Wp for the 40 Wp system today. Competitive forces may be increasing price pressures. Apparently spurred by the availability of a limited amount of supplementary grants of Rs 10,000 per unit within a time limited program (3,000 units in 2001, 5,000 units in 2002) in Uva Province, one company has recently introduced 15 percent price discounting and its own consumer finance, seeking to capture market share, an indicator that competitive pressures are increasing. Otherwise, the companies offer similar prices for their systems.

One provincial government has adopted a competitive, market enhancing framework to supplement SHS subsidy for 8,000 units over 2001-02. At least one government agency, the Ministry of Estate Infrastructure and Livestock Development, is considering a similar arrangement, initially for 500 systems. The introduction of a limited amount of supplementary subsidies with a time limit caused a second surge in sales. Sales also jumped in mid-2001 in response to the implementation of a supplementary subsidy by Uva province. Some 44 percent of the increase in sales over July – October 2001 was in Uva. The subsidy of Rs 10,000 per unit was offered on a time limited, amount limited basis - 3,000 systems in 2001 and 5,000 systems in 2002.

Business environment for the RERED project: There is a relatively encouraging business environment for investment. There is a supportive framework for development of SHS based businesses. Specifically, (i) there is a functioning legal and judicial framework for investment and contract enforcement, with supporting professional accounting and other services. This framework enabled the two foreign companies to enter the market; (ii) there is a functioning commercial infrastructure for importing, banking and trading; and (iii) there is no generalized practice of rent seeking, as might be evidenced in unofficial fees or levies, exacting taxes on commercial businesses operating in private markets.

Several business environment aspects have been favorable specifically for rural SHS market development: (i) the existing base of commercial experience, including a number of respected, professional individuals in the private and NGO sectors, facilitated new investor entry and provided the springboard for development. New entrants were able to build on some ten years of pioneering efforts; (ii) there have been no significant government or donor programs for pilot or demonstration SHS projects, which can distract the attention of the pv companies from commercially based development; (iii) rural consumer expectations of grid connections have weakened over recent years. The power sector crisis, with 8 – 10 percent annual increases in demand outpacing generation and transmission investments, and frequent power cuts, has come to be appreciated as having no short term solution, in spite of incentives to small producers introduced in 1996. One result has been lower consumer confidence in political promises of grid connections; and (iv) prices of diesel and kerosene, have been at competitive levels for solar.

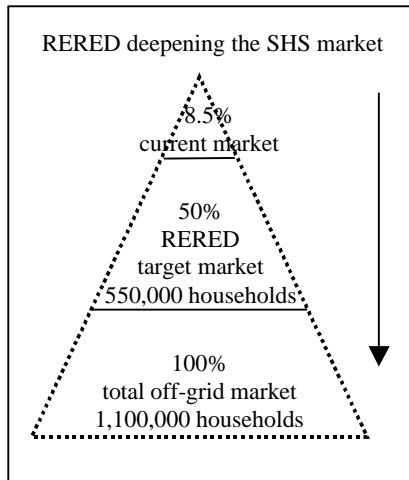


Figure 1 Deepening the Solar Home System market under RERED

The potential household market for SHS in Sri Lanka remains largely untapped. Market assessments indicate that the number of households that will not receive electricity from the CEB grid will be around 1.1 million households by 2007. Assuming the same solar system and price, out of these 1.1 million households around 150,000 household (8.5 percent) could afford the service (see figure 1). With a continued growth of sales from around 1,300 systems per month in 2002 to 3,000 per month in 2006, an additional 100,000 systems could be installed. This would represent a sustained sales growth of some 20 percent per year. It would be based on a 50 percent reinvestment of company profits to support the continued sales growth and a parallel growth in the available consumer finance. In addition, there is a broader market for pv, for institutional and community sales for schools, clinics and other public goods type applications.

RERED vision: The vision of the Sri Lankan solar industry is that it will become a model for the development of solar PV systems worldwide. It will enjoy active government support with effective national policy and regulations. Through effective strategies, the market will be developed and rural poor are fully aware of solar energy. The success of the solar industry will in turn attract more donor's assistant in a coordinated way as well as lead the trading of carbon credits on the international market. The active partnership between the public and private sectors will create a favorable environment for market and investment opportunities for solar energy. And, the private solar sector will become one of the lead suppliers and service providers of local, reliable, clean and competitively priced electricity in the newly unbundled power sector. Solar energy will contribute greatly to the electrification of the rural areas, fulfilling the social and economic needs of the community and resulting in significant improvement of the living standard of the Sri Lankan people as well as improving and sustaining the integrity of the natural world.

RERED objectives and targets: Expanding on the successful market creation supported by the ESD project, the solar component will seek to: (i) sustain the existing solar home system market; (ii) deepen market penetration to poorer households by offering smaller solar home systems; and (iii) expand service to other applications.

In this way, the project will both build economies of scale to solidify the market and increase outreach and awareness building to cater to access for poorer families. It will increase affordability by: achieving lower prices, expanding the participation of public sector subsidies in a market enhancing way, and increasing the

availability of consumer finance. Further capacity building in respect of household financing organizations serving limited communities. The project seeks to prove off-grid services to nearly 100,000 new customers, of which solar is expected to provide about 90 percent.

Barriers to achieve supported objectives: While the foundations have been laid for sustainable growth of the solar energy industry, certain critical barriers still need to be addressed for such growth to be realized. These are: (i) market scale is still small and fragile with only one solar product (30 – 50 Wp solar home system) offered; (ii) infant and small dealer and rural distribution network; (iii) lack of outreach for poorer households and for non-home applications are lacking; (iv) limited availability of microfinance; and (v) limited and un-coordinated involvement of provincial governments.

RERED strategy for intervention: The RERED project builds on the successful key elements of the ESD project adjusted for the lessons learned and to incentivize the stakeholders to achieve the above outlined objectives.

Investments: Credit Program to Participating Credit Institutions (PCIs) for consumer financing and working capital. The RERED project builds on the successful credit program established under the ESD project. The RERED Credit Program would continue to make funds available to PCIs for refinancing of working capital to solar dealers, as well as to qualified Micro Finance Institutions (MFIs) for customer financing of households solar purchases. The project will provide refinance to the PCIs on the terms provided under ESD, including refinance at an 80 percent level with compound maturities.

Co-financing grant: The project will offer output based subsidies on an incentive basis to solidify and deepen the solar home system market. The subsidies would be aimed at supporting additional investment and will only be disbursed after confirmation of installation. The mechanism will follow the same implementation arrangements as adopted under the ESD project, however, on a declining support basis per system. The subsidies will be US\$ 2.3/Wp for a reducing capacity rating (Wp) per system over time. During the first year of operations co-financing will be provided for systems ranging from 10-60 Wp and have a cap of 30,000 systems in the 40 to 60 Wp range, during second and third year of operations, subsidy will be provided for systems up to 10-40 Wp, and during the last two years of operation subsidy will be provided for systems ranging from 10-20 Wp (Table 1).

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
40 – 60 Wp systems	70	0	0	0	0
20 – 39 Wp systems	70	70	70	0	0
10 – 19 Wp systems	40	40	40	40	40

This mechanism will support the further strengthening of the current (~ 42 Wp) SHS product line during the initial phase of implementation. After this, the incentive scheme is shifted to encourage market penetration of the smaller, more affordable systems for the lower income group in rural areas. The subsidy regime indicated above is subject to modification in later years depending on the results of periodic evaluation to check whether the scale is consistent with project objectives.

Two risk mitigation measures are adopted in the SHS co-financing scheme: (i) if the total industry revenue for smaller systems (10 to 19 Wp) accounts for more than 30 percent of the total SHS industry revenue the

US\$40/W_p will be reduced to US\$20/W_p, and (ii) if for any product range a company gains more than 85 percent of the total market the company will not receive any more co-financing grants from GEF.

Technical assistance for solar systems will be offered under two earlier mentioned windows: (i) cost-shared, and (ii) full-cost. In all cases the TA will directly support the three main objectives of: (i) sustain the existing solar home system market; (ii) deepen market penetration to poorer households by offering smaller solar home systems; and (iii) expand service to other applications. Emphasis is on the cost-shared activities and full cost activities will only be provided on an exceptional basis and should prove to have an added value for the solar industry as a whole. The AU will facilitate the technical assistance and derive decisions in accordance with the Operational Guidelines (see Annex 12).

- The cost-shared window - ranging from 20 to 80 percent company contribution - will support existing companies if the activities contribute towards reaching the above mentioned objectives. It will not include support for hardware and will only be offered a maximum of two times during the implementation of the project to a company. Activities that could be supported under this window are: market testing of an improved SHS system, adaptation of an innovative MIS system that will reduce company cost, and the design of a barter-based solar program currently operating in Nepal; and
- The full-cost window. Activities endorsed by the key stakeholders in the sector could be supported in full. Regular stakeholders meetings chaired by the AU would provide the decision forum for this. Activities that could be supported under this window are: detailed market analysis, general awareness and promotional campaigns, and/or innovative provisions for MFIs to enter the solar market, and a survey of solar impact on the quality of life for rural households and businesses. New companies in the sector could receive an one-off preparation grant for business plan development up till the amount of US\$ 9,000. This would particular focus on companies entering the market for water pumps, health centers, schools, and telecom. Also, new entrances with innovative arrangements to deepen the SHS like fee-for-service or leasing will be supported the same way in their business planning. The project will support a maximum of five business plans.

Technical specifications to ensure consumer satisfaction of the systems offered. The project will continue to use the industry accepted technical specifications as established under the ESD project. The specification will be reviewed to accommodate smaller systems. For institutional systems no specifications will be required for the complete system. Only the module will need to comply with the specifications as established for the solar home systems.

Transparent, rule based, professional administration, enforcement and facilitation. The project will continue, on an enhanced and reinforced basis, the current transparent implementation and compliance framework managed by the AU under the ESD project. This would include: (i) development of the working arrangements, (ii) development and management of the technical assistance in close coordination with the SIA, (iii) service technical specifications and performance for the wider applications sales; (iv) continue the AU's arrangements for independent verifications and transparent grant payments; and (v) continue the AU's data gathering and reporting, and implementation monitoring roles.

The interventions will require deft management, and likely continual fine tuning in line with market development experience, to be effective. There is confidence in the DFCC/AU's capacity to implement this and other interventions professionally. It is expected that the AU would sub-contract to professionals or other organizations on a task basis, on terms acceptable to the Bank, much of the support, including technology related reviews. Also, the AU would seek ways in which its internal processes can be

streamlined, possibly to include pushing some of the data entry work on sales currently done by the AU to the Solar Industry Association and its members.

Flexible design of the program. The project has been designed to facilitate market innovations and developments to reach the ultimate goal of achieving a sustainable renewable energy market in Sri Lanka. Decision making on how to utilize Technical Assistance has been given maximum leverage to the stakeholders under the facilitation by the AU.

Monitoring and evaluation. Component progress will be monitored by the AU and included in the quarterly progress reports.

Project Component 3 - US\$ 4.40 million Community based hydro and biomass

The community based component builds on the successful implementation of the village hydro projects under the ESD and further expands its attention to other renewable energy technologies including biomass and possible wind.

Baseline: (i) *Village Hydro:* Prior to ESDP, village hydro development in Sri Lanka was pioneered by Intermediate Technology Development Group. These village hydro projects, which were developed with technical and social assistance from this NGO, and financing based on sweat equity coupled with donor grant funding, effectively proved the technical and social viability of the village hydro concepts. Market assessments carried out indicated a large potential market size. Through a survey carried out in seven districts of Sri Lanka, 853 suitable sites for construction of village hydro systems have been identified. Of these, 444 sites were found technically viable with a potential installed capacity of about 18 MW; (ii) *Community Biomass:* With support from several donor organizations, research and Government organizations have designed pilot projects and are in the process of establishing their testing sites. The Ministry of Science and Technology, Alternative Energy Division, has ordered a 35 kWe gasification system to generate electricity in single fuel mode (100 percent producer gas) with a spark ignition engine. The commissioning of this pilot project, funded with internal funds of the Ministry, is scheduled for March 2002. Results from a study carried out by the Energy Forum (implementation of a WB/GEF PDF A) showed that at community level there is great interest in electricity supply based on biomass energy; i.e. gasification systems running diesel gen-sets in dual fuel mode.

The ESD intervention: (i) *Village Hydro:* The ESD project aimed to commercialize the development of village hydro projects allowing the projects it to become less depending on grant funds. Funding under ESDP was a blend of commercial funds, co-financing grants, project preparation grants, supervision grants, and TA for innovations.

Progress made during ESD: Substantial progress was made during the ESD project. About 28 village mini-grids ranging from 4 - 45 kW serving about 1,400 households are under implementation with credit and grant support from the ESD project. This blend of financing has led to a reduction in grant funds per project of nearly 50 percent or serving twice as many households with the same amount of grant funds. Following the initial gains in pipeline development, the progress slowed. Concerns about this leveling off gave rise to the “innovation solicitation” process described in Text Box x1. Reinvigorated by this solicitation, the village hydro project preparation grants became a strong incentive for steep growth in the village hydro component performance.

Over the project life, there has been a small decrease in the costs with the average for projects under

implementation at US\$ 1550/kW and those under consideration at US\$ 1425/kW. This drop is attributable to drop in costs of equipment such as turbines and PVC pipes as well as higher currency devaluation compared to product cost inflations. The average costs for connecting households was found to be in the range of US\$ 300-500/household.

Business environment for RERED project: (i) *Village Hydro*: The environment for developing village hydro projects is favorable. Villagers have lost their confidence that the national utility will extend the grid in the near time and are willing to invest in power systems themselves. With more than 130 village hydro projects in the country most areas with hydro potential are familiar with the technologies allowing potential villages to contact the developers for support often triggered by word of mouth. The Government is working on a policy change to allow the projects to sell electricity to CEB if the grid is extended to their village. However, it is clear that projects will continue to require co-financing grant support to prepare and implement new projects, requiring the government to establish alternative funding mechanisms for after the RERED project ends. Risks involved are: (a) the interest of NGOs/Consultants in developing new projects may decrease because of the decrease in levels of grant under the RERED; (b) PCIs have indicated that the main business opportunity in providing support for village hydros is for building a people friendly image. This rationale by itself may not be adequate to sustain their interest in village mini-grid projects; and (c) While preparing new projects, developers take into account CEBs grid extension program. Any uncoordinated grid expansion in one of the provinces rich in village hydro potential could seriously impact the program.

RERED vision: (i) *Village Hydro*: The vision for the village hydro projects is that no more international grant support is needed to further develop projects. The local and national government will have established a transparent mechanisms through a rural electrification fund to allocate and disburse funds along performance based principles as adopted under the ESD project. A large portion of the village hydro electricity will be used for income generating allowing the villagers to further support the develop. Project developers will have optimized the preparation activities through further standardized and bundling of projects. The village hydro electrification model will be used for other technologies as well, including biomass. Some of the developers will continue to support village hydro programs in other countries. (ii) *Biomass* : Biomass-based electricity generation has a large potential to contribute to a sustainable electricity supply for off-grid situations. Use will be made of local available resources, thereby adding value to the rural Sri Lankan economic development in the biomass energy supply chain and reducing imports of fossil fuels. Off-grid applications are not dependent on the availability of hydro resources as is the case for village hydro power and thus large areas of the country without hydro resources can become part of the process of providing them with basic infrastructure for economic development

RERED objective and targets: (i) *Village Hydro*: The main objective of this sub-component is to accelerate village hydro development in Sri Lanka through further commercialization by better usage of income generation activities, declining international grants and augmenting the international grants with well structured local funds. A significant expansion of the village hydro pipeline is planned under the RERED, with the target set at 100 village systems and 5000 households, of which about 90 percent is expected to be provided by hydro systems. (ii) *Biomass*: The main objectives are the commercial introduction and market development for biomass gasification for off-grid systems. This to be supplemented with major efforts geared towards putting in place the necessary biomass energy supply chain conditions. The indicative target is 25 village power systems of an average 40 kWe each.

Barriers to achieve supported objectives: (i) *Village-Hydro*: Even though substantial progress has been made during implementation of the ESD project, several barriers remain for accelerated up-scaling of the number of village hydro projects. Key barriers identified are: (a) total project costs remain too high; (b)

commercial banks continue to be cautious in viewing the sector as commercially viable; (c) limited active involvement of Micro Finance Institutions (MFIs); (d) no purchase policy that copes with stranded asset if national grid is extended to the village; and (e) only initial steps towards promoting productive uses. (ii) *Biomass*: Barriers to development of community biomass projects include (a) lack of biomass supply chain-dedicated biomass energy plantations need to be put in place (b) Financial barriers include lack of access to investment and working capital for biomass plantations and affordability of rural villagers (c) There is a lack of awareness and limited availability of information.

RERED strategy for intervention: This sub-component under the RERD Credit Program will be implemented largely by Village Cooperative Societies with help from consultants, NGOs and contractors. Building on experience through ESD and other donor-funded activities, this component would support further commercialization of village hydro and other community-based independent grid systems through: (i) investments; (ii) co-financing grants; and (iii) technical assistance which will include project preparation grants and supervision grants. It is expected that the GEF grant support will be scaled down over the life of the RERD project. After project closure, it is expected that the scaled down level of support could be provided for in the context of the comprehensive rural electrification policy that would include creation of a Rural Electrification Fund (RE Fund) or other Central/provincial government sources.

Investments. The RERED project builds on the successful ESD Credit Program to Participating Credit Institutions (PCIs) for financing of sub-projects. The RERED Credit Program would continue to make funds available to PCIs as well as to qualified Micro Finance Institutions (MFIs) for refinancing of sub-projects. The project will provide refinance to the PCIs on the terms provided under ESD, including refinance at an 80 percent level with compound maturities

Co-financing grant. Grant co-financing would be made available through PCIs to developers of mini-grid village hydro. Grant financing will be limited to US\$ 400 per kW of installed capacity, up to US\$ 20,000 per installation. The AU will release grant funds to the PCI upon verification of eligibility and certification by a Chartered Engineer as indicated in the Operational Guidelines (see Annex 13).

Technical Assistance for village hydro and community based biomass projects will be offered under two earlier mentioned schemes: (i) cost-shared; and (ii) full-cost. In all cases the TA will directly support the main objectives of accelerating village hydro development in Sri Lanka through further commercialization by better usage of income generation activities and declining subsidies. Emphasis is on the cost-shared activities and full cost activities will only be provided on an exceptional basis and should prove to have an added value for the village hydro industry as a whole. The AU will facilitated the technical assistance and derive decisions in accordance with the Operational Guidelines (see Annex 13).

- The cost-shared window - ranging from 20 to 80 percent company contribution - will support existing organizations if the activities contribute towards reaching the above mentioned objectives. It will not include support for hardware and will only be offered a maximum of two times during the implementation of the project to a company. Activities that could be supported under this window are: (i) *Village Hydro* - (a) technical training for VHDA members, including low-head turbine technology, and (b) capacity building for establishment of VHDA office; (ii) *Biomass* –(a) feasibility studies and the writing of project preparation documents, including on-the-job training for project development; and (b) training for operation and maintenance of the village power gasification system
- The full-cost window. Activities endorsed by the key stakeholders in the sector could be supported

in full. Regular stakeholders meetings chaired by the AU would provide the decision forum for this. Activities that could be supported under this window are: (i) *Village Hydro*-- (a) support for VHD Association to facilitate exchange of ideas and be a common platform for collective action, (b) assistance to studies/pilots to better integrate income generation application within project development, (c) consultant assistance to help address policy/regulatory issues such as stranded assets, legal status of ECS, (d) encourage further business development, (e) support for follow-up training programs with already identified partner organizations; and (f) support for consultants/VHDA to work with local government bodies such as PCS and DSs to encouraging provincial Councils to use their own funds for grant support using a more formalized mechanism (e.g. a Rural Electrification Fund), allowing the GEF grant fraction to be reduced.(ii) *Biomass* (a) organizing and developing the supply of fuel wood; and (b) assessment of technology and appropriate technology transfer mechanisms for small-scale gasification systems (dual fuel mode). The first batch of TA will be organized by means of bidding out these activities through 'innovation solicitations' for the first 5 fuel supply projects combined with five feasibility studies for these sites.

Project preparation grant will be available to developers to help prepare feasibility studies and PCI loan documentation. During year one of RERED project implementation, the preparation grant will be US\$ 8,500 per project, during year two, US\$ 8,000 per project, and during year three, US\$ 7,500 per project. At mid-term evaluation effectiveness of the grant will be re-assessed and adjusted if found to be necessary. The preparation grants cover only independent consulting services directly attributable to sub project preparation. Reimbursement would require developers to submit the following documentation to the AU through their PCI: (i) PCI approval of the subproject on the basis of a completed feasibility study/bank loan application package, (ii) presentation of eligible expenses, and (iii) a disbursement request equal to or exceeding the grant amount.

Supervision grants of US\$ 1,000 per approved loan will be made available to the PCIs following the similar procedures as under the ESD project (see Operational Guidelines Annex xxx)

Technical Specifications and Certification. (i) *Village Hydro*: The technical specifications for village hydro systems and the associated village mini-grid system were developed under the ESD project. The same specifications will be in use for the RERD project in so far as the village hydro projects are concerned. The specifications for village systems involving biomass gasification technology will be developed before project effectiveness. The AU will release the grant co-financing of the mini-grid schemes subject to certification by a Chartered Engineer that the facility is complete, operational and in compliance with IDA approved specifications. (ii) *Biomass*: The technical specifications for village biomass systems and the associated village mini-grid system will be developed before project effectiveness of the RERED project based on the village hydro specifications. The AU will release the grant co-financing of the mini-grid schemes subject to certification by a Chartered Engineer that the facility is complete, operational and in compliance with IDA approved specifications.

Monitoring and evaluation: The Administrative Unit (AU) will be responsible for monitoring of this sub-component. The indicators monitored will be: (i) Physical progress in the implementation of village hydro systems and biomass systems; (ii) Growth in the number of NGOs/Consultants involved in project development; and (iii) Policies/plans of provincial governments with regard to promotion of village hydro systems. As a specific area of focus, the RERD will promote income generation end-uses through village

hydro systems and biomass systems. Apart from the technical monitoring required to be completed, the AU will also establish a system of measuring the income generation impacts of the village mini-grid based projects.

Project Component 4 - US\$1.00 million Energy Efficiency and Conservation

Baseline

In view of the limited availability of energy resources and rapidly growing demand, the Government has placed emphasis to promote efficient utilization and conservation of electricity. GOSL took key steps during the 1990s to promote energy efficiency/DSM such as preparation of a Demand Side Management (DSM) action plan, establishment of a DSM branch within the utility and the enactment of the Energy Conservation Fund act. The DSM branch initiated an audit program and a lighting program soon after its establishment but its capacity to design and implement projects remained limited. Assistance was provided under the ESD project to support Government's efforts in the area of EE/DSM through technical assistance to the CEB's DSM branch.

The ESD Intervention

Progress made during ESD: The ESD project helped build capacity within the DSM branch at CEB. As result of the ESD TA, one of the best load research capabilities in the region has been built in Sri Lanka and CEB is better placed to implement and evaluate existing DSM programs and design new programs. Support was also provided to develop Energy Efficiency Building Codes but the implementation has been limited to the acceptance of codes for CEB's own buildings.

An unintended outcome of the project was the help provided by consultants to set-up the first private sector energy services company (ESCO), Lanka Transformers Limited (LTL). This company offers comprehensive services for implementation of EE projects to private sector has been quite completed implementation of about 20 projects and has had an annual turnover of about SLR 30 million during the last two years. Fifteen of the completed projects are in the tea industry and other projects have been spread out in various types of industries including garment and printing. The typical project size is SLR 1-2 million and are attractive projects with 2-2.5 year simple paybacks. The total market size in the Industrial sector alone is estimated to be in the order of US\$ 160 million and could result in savings of upto 960 GWh annually.

Business environment for RERED project

RERED Vision

Objective: The focus of this sub-component will be on accelerating the private sector delivery of energy efficiency services in Sri Lanka. Technical assistance interventions will be targeted at building capacity within the fledgling ESCO industry, encouraging new ESCOs to enter the market through training and awareness programs, and building capacity within commercial banks to appraise energy efficiency projects. In addition, the component will also fund technical assistance activities at the CEB DSM branch that support their ongoing appliance labeling program, DSM program design and evaluation efforts and demonstration projects for encouraging voluntary implementation of Energy Efficiency Building Codes (EEBC).

Barriers to achieve supported objectives: Substantial progress has been made during ESD for further expansion of these activities during RERED the following barriers have been identified: (i) lack of capacity, specifically in M&V protocol, legal agreements; (ii) lack of knowledge and capacity within commercial Banks on EE technologies, EE project appraisal; (iii) insufficient awareness/promotional efforts and training to bring in new entrants in the ESCO market; (iv) limited acceptance of the Energy Efficiency Building Codes (EEBC); and (v) appliance labeling program has not been implemented yet due to lack of test facilities.

RERED strategy for interventions

Investments. Support for ESCO Development: The project will support awareness and training programs to encourage local groups to enter into ESCO business. One-on-one assistance will be provided for business plan development, developing legal agreements and purchase of audit equipment.

Co-financing. No co-financing grant is offered under this component.

Technical Assistance

- EEBC: Support will be provided for two buildings through a RFP process. GEF support will be provided for meeting the part costs of some of the energy efficient equipment;
- Industrial Benchmarking: Support will be provided for the DSM branch to develop energy efficiency benchmarking standards for the various sectors such as textiles, tea etc.;
- Energy Labelling Program: Support will be provided for the setting-up of a refrigerator testing laboratory that will help in the implementation of a appliance labeling program in Sri Lanka;
- Monitoring and Verification protocol: Support development of generic monitoring and verification protocols and build local capacity to customize protocols to the needs of specific sectors and projects;
- Capacity Building for Commercial Banks: Consultant assistance will be provided to commercial banks to build their knowledgebase on EE technologies and their costs, develop sound appraisal templates for EE projects and structuring options to mitigate credit risks; and
- Access to Credit for ESCOs/end-users: In addition to renewable energy technologies, the RERED credit program will also be open for ESCOs and end-users interested in implementing EE projects.

Monitoring and evaluation. Component progress will be monitored by the AU and included in the quarterly progress reports.

Project Component 5 - US\$4.60 million

Cross-sectoral Links

Baseline: At present, there is little activity targeted at the energy needs of **public service institutions** such as health, education, and water. In some cases, donors have undertaken small demonstration activities, however, follow-up has been weak. No explicit guidelines for consideration of energy equipment and services exist beyond CEB connection. Therefore, in virtually all cases, CEB is seen as the only alternative for electricity supply. This leaves the 40 percent unelectrified population without electricity service for their public service institutions. There are also large geographical disparities in coverage. In particular, there are very large gaps in the North and East where there is a vast need for rehabilitation and rebuilding. This activity was not included in the ESD Project.

Commercial use of renewable energy systems has received some attention for selected applications in Sri Lanka. In particular, remote telecommunications facilities currently use solar PV where appropriate. Also, a small number of commercial establishments use solar “home” systems and village hydro for their activities. In addition, cottage industries are making limited, ad-hoc use of nighttime lighting from solar and village hydro. There also are limited productive activities in connection with village hydros such as refrigeration, carpentry, battery charging, etc.

Business Environment for RERED Project: There is limited experience both on the part of suppliers and ministries with designing, procuring, installing, and maintaining electricity solutions beyond CEB service. With respect to institutions already receiving CEB service, energy costs can be a significant portion of the total operating budget. Still, there is little attention paid to energy conservation. Also, the current energy situation results in power outages putting greater reliance on backup systems which in many cases have been neglected for years.

Similarly, there is limited supplier and customer experience with commercial/industrial systems. However, there is a strong potential for expansion in this area given the entrepreneurial spirit in the rural population and the evidence of development in grid connected areas.

RERED Vision: Project interventions seek to improve public services delivery through access to energy services. For example, lighting, refrigeration, telecommunications will be available for health service delivery in unelectrified rural areas. The majority of health facilities, down to the primary health facilities (remote health clinics) will have at least reliable lighting and refrigeration. Similarly, education facilities will have adequate lighting and the necessary power for laboratories, computer and/or telecommunications facilities. Sufficient energy will be available for pumping of community water systems.

In general, policy level energy guidelines will be in place and well understood by stakeholders including both energy supply and conservation. Energy conservation practices are regularized in larger institutions. Cross-sectoral ministries understand the impact and benefit of access to energy.

Similarly, the project seeks to ensure that sufficient energy is available and used for productive purposes even in off-grid areas. This includes income generating activities such as agricultural processing, carpentry, light industry and services.

Objectives and targets: The Project will seek to ensure that policy level energy guidelines are in place and in use in at least two ministries and standard energy packages are developed and deployed. At least 500 rural institutions will be connected during the Project period. At this point it is expected that the majority of these will be in the North and East. Also, energy conservation arrangements in place in two-four large institutions. A Monitoring and Evaluation scheme will be in place to assess the impact of the intervention.

For **commercial** institutions, the Project aims to establish a broad based understanding of productive potential with off-grid systems and the mainstreaming of productive uses with off-grid systems. For existing village hydro schemes, the project will support the adoption of more commercial practices which encourage productive uses and appropriate tariff structures. It is expected that at least 500 commercial/industrial off-grid connections will be achieved during the course of the project.

Barriers to Achieve Supported Objectives: The Project must address a number of barriers including the following for **public institutions**:

- A lack of established contracting mechanisms for institutional systems
- limited knowledge in cross-sectoral ministries of energy alternatives when CEB power not available
- absence of guidelines and procedures for design, specification and use of energy equipment
- sparse knowledge of energy conservation options and implementation mechanisms
- limited availability of cross-sectoral funds for energy equipment
- uncertain legal framework (sale of electricity disallowed) and for **commercial systems**
- lack of knowledge of possible productive applications
- uncertain legal framework (sale of electricity disallowed)
- poorly established microfinance channels
- limited generation capacity of village hydro systems

RERED Strategy for Interventions: To address these barriers, the project will work with stakeholder ministries to apply energy solutions appropriate for their sectoral strategies and goals. In particular, for **public institutions**, the Project will provide:

- A Technical Assistance package which will include: (i) awareness creation regarding energy alternatives (supply, conservation, and backup) within the ministries and provincial councils; (ii) assessment of the impacts and benefits of access to energy; (iii) development of policy level energy guidelines; and (iv) specification of standard energy packages; and
- Cofinancing support for implementation of selected investments

The near-term focus will be on the North and East where there is a strong need for this support as well as a political imperative. In the longer term, the lessons from implementation in the North and East can be applied in other parts of the country as appropriate. In parallel, the innovation solicitation approach will be applied to seek broader participation and new ideas.

To address the barriers for **commercial systems**, the project will work with rural communities, businesses, and service providers toward the Project objectives. In particular, the Project will provide technical assistance in the areas of:

- awareness creation,
- assistance for “electrifying” businesses
- Support for existing off-grid users to make better use of available energy
- Development of an incentive framework for incorporating productive uses in new subprojects
- Clarification of the legal/policy framework
- Incorporation specific focus on productive uses into village mini-grid users groups

Monitoring and Evaluation

Monitoring and evaluation of these activities will be included in the overall M&E effort by the Administrative Unit. Where possible, this will be directly linked with M&E activities of the concerned ministries.

Table xx summarizes the main issues and proposed actions under the RERED Project in the key public service areas (i.e. health, education, water). During project implementation participation in other cross-sectoral areas will be actively pursued.

Sector	General Situation	Energy Situation	Barriers	Actions under RERED
Health	<p>Currently working on a master plan for the health sector development where there will be a re-classification of the facilities including upgrading to a specific service level for some facilities.</p> <p>The indicative number for the new classification are as follows: 10 Provincial General Hospitals 10 District General Hospitals 30 Base Hospitals 300 Divisional Hospitals 600 Primary Care Units</p>	<p>Fairly good coverage of energy for their facilities from Rural hospitals and upwards.</p> <p>The need would mainly be in primary health care units (especially in North and East).</p> <p>No guidelines exist on energy supply or back up requirements.</p> <p>New classification would require all Primary care units to provide vaccination service and therefore energy will be critical (around half or more do not have).</p>	<p>Lack of knowledge about possible and alternative energy solutions.</p> <p>Limited awareness of the impact on service delivery that access to energy gives</p> <p>No expertise within energy - and guidance is needed.</p> <p>Provincial councils often only consider connecting to CEB.</p> <p>Lack of funds is mentioned as a constraint.</p>	<p>Awareness raising about alternative energy supply and possibilities other than CEB.</p> <p>Define the impacts energy would have on the health care service and link it with the upcoming master plan.</p> <p>Develop appropriate energy guidelines/energy efficiency measure/back-up systems for each level of facilities.</p> <p>Develop standard energy packages (including specifications).</p> <p>Energy conservation at larger hospitals from Base hospital and upwards.</p>
Education	<p>There are a very good coverage of schools with around 10.000 (primary/secondary)schools countrywide.</p> <p>The main responsibility for schools comes under the provincial councils. However, 300 is under the central Government.</p>	<p>Around 50 percent do not have access to energy.</p> <p>Energy access only through CEB.</p> <p>Service like computers, electrical laboratory equipment and so can only be provided where energy already exist (thus in CEB areas). This means an increase in the bias of rural/urban schools.</p> <p>No guidelines exist on energy supply for schools, rather the planning is done assuming there are access to energy.</p>	<p>Lack of knowledge about possible and alternative energy solutions.</p> <p>Limited awareness of the impact on service delivery that access to energy gives schools.</p> <p>No expertise within energy - and lack of guidance is needed</p> <p>Provincial councils often only consider connecting to CEB</p> <p>Lack of funds is mentioned as a constraint.</p>	<p>Awareness raising about alternative energy supply and possibilities other than CEB</p> <p>Define the impact of access to energy in schools and how it links up with the sector strategy.</p> <p>Develop appropriate energy guidelines/energy efficiency measure/back-up systems for different school levels.</p> <p>Develop standard energy packages (including specifications).</p>
Drinking Water	<p>The goal is access to clean water for all in 2010. Currently 55 percent of the population have access to clean water.</p> <p>Future focus in the sector will be on private supply of water with ownership including payment of operation and maintenance by communities.</p> <p>Both WB and ADB will have community water projects coming up in the next years.</p>	<p>Energy for pumping is a great need in the sector and a stated problem.</p> <p>CEB often is not where the water is needed and cost for extension too high.</p> <p>The Water board have a rule that energy expenses cannot exceed more than 40 percent of total cost, which extension of the grid often do.</p>	<p>They have looked for alternative energy solutions but lacked the experience and guidance.</p> <p>Have had initial discussions with private sector energy suppliers (PV), but lacked the internal knowledge to verify the solutions presented.</p> <p>Lack of guidelines on specific energy solutions for different water supply scheme.</p>	<p>Awareness raising about alternative energy supply and possibilities other than CEB</p> <p>Develop appropriate energy guidelines for the different water supply schemes.</p> <p>Integrate the energy guidelines in the community water supply schemes.</p>

Project Component 6 - US\$5.10 million

Technical assistance

Non-component specific technical assistance will be described here. Procurement of these technical assistance packages will be done by the AU following the World Bank guidelines. The TA packages are divided into the following categories:

1. Project administration/promotion
2. Subproject promotion/development support
3. Technology/market introduction/promotion/capacity building
4. Rural development
5. Sustainability
6. Monitoring and Evaluation

Package 1 – Project administration/promotion

Objective: Ensure smooth operation of the RERED Project, emphasizing simplicity, efficiency, and speed consistent with the need for fiduciary and safeguard compliance.

Description: The RERED Project will be implemented largely through private sector actors with the support and facilitation of an Administrative Unit (AU) housed in the DFCC Bank. This AU has already demonstrated its ability to efficiently and effectively implement the ESD Project. RERED will build and expand on this experience. In particular, the AU will continue to administer the RERED Credit Program which will be quite similar to the ESD Credit Program. The AU will also continue and expand its role in technical assistance by acting as a facilitator of the activities described in this section. In particular, with regard to the Cross-sectoral Links, the AU will retain a consultant to facilitate the process including: (i) liaising with the cross sectoral ministries, donors, relevant sectoral Bank staff, and civil society; (ii) conducting consultant procurements in collaboration with the cross sectoral ministries; (iii) assist in implementation of cross-sectoral investments; and (iv) conducting the innovation solicitations around rural development. In addition, the AU will continue to undertake and support representation and promotion of the RERED Project both domestically and internationally. This will include convening of local meetings, seminars, and workshops, presentations at selected conferences, as well as hosting of international groups seeking to learn from Sri Lankan renewable energy experience.

Implementation: The Ministry of Finance will enter into a contract with DFCC Bank to carry out the AU services. The AU will undertake its work in accordance with a set of Operating Guidelines (see Annex 5) which are based heavily on the ESD Guidelines.

Monitoring and Evaluation: The AU will continue to provide quarterly reports for RERED along the ESD format, which emphasizes physical progress of the project. In addition, the reports will be enhanced to include progress on rural development indicators. Monitoring and evaluation of AU performance will be conducted by the Ministry of Finance and the World Bank Task Team in the course of project supervision.

Package 2 - Subproject Promotion/Development

Objective: Promote and develop renewable energy-based village grids with increasing efficiency and integration in overall national and provincial programs and plans.

Description: This activity will follow the successful experience of ESD village hydro subproject development, (see Text Box x2) expanding the scope to other commercially viable renewable energy village grid systems such as biomass. In particular, the process will seek both to encourage rapid development of additional village grid systems and at the same time, reduce the development cost. Development cost reduction will be sought through the tender process described below. Reduction in GEF contribution to project development will be sought through the increased participation of Provincial Councils and possibly with the Rural Electrification Fund to be established under the project.

Implementation: Since there are now in place several private and NGO entities with village hydro development experience the process will seek to establish the “market clearing rate” for village grid project promotion through a tender process. Periodically, the AU will issue a call for proposals to develop a block of, for example, 10 village grid systems. The three lowest cost proposals will be accepted, and these bids will be used to establish the fee rate available for other village grid promoters. By this means, village grid promotion will continue, with all current actors and any other interested parties able to maintain access to the program. A new tender can be issued by the AU at any time if it is determined that the current rate is no longer valid.

Monitoring and Evaluation: The AU will monitor financial physical progress of village grids as under ESD. In addition, the AU will on a periodic basis evaluate village grid development costs and assess the need for a new tendering round.

Package 3 - Technology/Market Introduction/Promotion/Capacity Building

Objective: Introduce and promote renewable energy technologies which are commercially established in other countries, but not yet commercial in Sri Lanka, and integrate new stakeholders into the project.

Description: Technology introduction, promotion, and capacity building will be undertaken primarily in the context of the relevant components. The major areas of emphasis will be: (i) grid connected wind, where a modest amount of additional support is required to reach closure on the first private wind farm; (ii) off-grid wind, including support for promotion of wind water pumping in wind-rich areas; (iii) grid and off-grid biomass electricity development, including stand-alone and cogeneration plants and village scale gasification schemes; and (iv) introduction of solar applications beyond the current solar home systems including small-scale systems targeted at low income households, and new applications in agriculture, health, and education. In addition, RERED will support the introduction of a barter-based system for poor households which is now being successfully piloted in Nepal. Through NGOs, poor households will be taught handicraft skills. These households also will be given solar home systems, and the handicraft products will be accepted by the NGO in payment. The NGO will sell the products through national/international outlets.

Text Box x1
Tapping Into an Innovative Community

Under the ESD Project, an “Innovation Solicitation” process was undertaken with a goal of soliciting new ideas on how to un-stick the stalled village hydro project pipeline. The solicitation invited bids addressing four general areas of concern in village hydro: technical issues, sustainable financing, legal and regulatory aspects, and capacity building. X proposals were submitted. Each of the Y accepted proposals included analytical work and, with the exception of the legal/regulatory category, also included measurable output indicators in the form of village hydro proposals developed at the community level and submitted for financing. As a result, the village hydro pipeline jumped from about 12 pending projects to nearly 60. The analytical work also is being incorporated into RERED design. An additional bonus was the entry of several new firms and NGOs as village hydro project promoters, as well as an enhanced awareness of the village hydro potential. For example, the newly named Treasury Secretary was a key actor among these village hydro contractors.

See the relevant component descriptions for more detailed descriptions of technology introduction, promotion, and capacity building activities.

Integration of new stakeholders, such as microfinance institutions, consumer finance organizations, rural retail companies, and provincial councils will be facilitated by the AU on an as-needed basis. In particular, the AU will seek to alleviate the current microfinance pinch by sponsoring an innovation solicitation aimed at bringing new micro finance and consumer finance organizations into the program. These organizations may or may not wish to access the Credit Program, but may still benefit from technical assistance under the program. Off-grid systems which meet technical eligibility requirements will be eligible for the GEF grant even if IDA Credit funds are not used.

Implementation: To the maximum extent possible, the activities will be refined and executed by relevant Sri Lankan institutions such as the Energy Forum, Village Hydro Associations, Solar Industries Association, etc. This activity will be administered by the AU, which will conduct/facilitate the necessary tenders.

Monitoring and Evaluation: Each activity will include monitorable indicators for measuring its contribution to the project objective. In addition, progress in these activities will be included within the overall monitoring and evaluation program.

Package 4 - Rural Development

Text Box x3

Technology Introduction/Promotion Under ESD

Prior to the ESD Project, the potential for commercial wind power was identified through a wind monitoring program supported by the Netherlands Government. Based on this identified resource, ESD supported the installation by CEB of a pilot 3 MW wind farm in Hambantota Province, which has operated successfully for more than 2 years. At the same time, through the UNDP/GEF supported Renewable Energy and Energy Efficiency Capacity Building Project, CEB was supported in developing additional wind resource assessments at selected sites. One of these, in Puttalam Province, appears to hold even higher potential than the Hambantota site, and is the subject of serious consideration by private sector developers. Thus through the coordination of the World Bank/GEF supported 3 MW pilot site and the UNDP/GEF supported resource measurements, private wind power development in Sri Lanka is close to fruition.

Another important ESD-Supported technology promotion effort is in the area of load research. Prior to ESD, there was no systematic load research capability within the country. Through ESD technical assistance, including hardware, software, and consultant support, the CEB now has one of the best load research capabilities in South Asia. The detailed customer load profiles and appliance use patterns are now available and this information is being applied to more effectively target Demand Side Management (DSM) programs. It also has important potential in transmission planning and tariff setting. Finally this capability will increasingly open the door for consultant assistance to other South Asian countries such as Bangladesh.

Objective: The objective of this activity is to identify and promote opportunities where provision of energy services such as electricity, modern sources of thermal energy, and energy conservation, will have a significant impact on rural economic development. This includes but is not limited to business development, provision of institutional services (e.g health, education, etc.), and monitorable enhancement in quality of life. A secondary objective is to raise the awareness among the broadest possible cross section of Sri Lankan society of the importance of energy in development, potential applications which can be brought to bear, and the need to use energy resources wisely

Activity Description: This TA area will utilize a highly successful approach for soliciting innovations from the Sri Lankan community (see text box x1). In particular, the initial TOR specifies the broad areas of emphasis, the need for monitorable indicators of project success, as well as the evaluation criteria. This TOR will be used for the first solicitation round, and modified as appropriate for subsequent rounds. There already are several rural development initiatives active in Sri Lanka supported by Government, NGOs, and Donors. These include Government activities at the national and provincial level, the Samurdhi Program, initiatives by Sarvodaya, Sanasa, and other NGOs, and donor sponsored activities such as ??????. Proposals which feature integration of the energy emphasis into these ongoing activities will be encouraged. Evaluation criteria will include cost sharing.

As a separate activity, support will be provided to “cross sectoral” ministries – such as those responsible for health, education, water, etc. – to: (i) create awareness regarding energy alternatives within the ministries and provincial councils; (ii) assess the impacts and benefits of access to energy; (iii) develop policy level energy guidelines; (iv) specify standard energy packages; and (v) implement selected investments. Monitoring of the impact of these investments will also be supported. Ministry of Health also has requested energy audits for their larger hospitals, for which energy is a major cost.

Implementation Arrangements: For the “innovation solicitations” the AU will guide a series of the solicitations under this activity. Advertisement for the solicitation will be issued in a local newspaper, and

also distributed to key industry stakeholders and previous village hydro solicitation participants. For purposes of evaluation, the AU will convene a three person evaluation committee comprised of a member of the AU, a nominee from the Energy Forum, and a nominee from the Ministry of Energy. There will be several rounds of solicitations, each building on the previous history. Each proposal will be evaluated on its own merit with respect to the evaluation criteria. Multiple awards are expected within each round.

Cross sectoral support will be implemented by the relevant ministry, with procurement facilitation and support from the AU as needed.

Monitoring and Evaluation: Each proposal under this activity will include its own monitorable indicators. However, there is a need to ensure that the overall activity is demonstrably contributing toward the Project objective. To this end, monitoring and evaluation of this activity will be incorporated into the Project Monitoring and Evaluation, described below.

Package 5 - Post RERED Sustainability

Objective: Develop and implement plans for the sustainable continuation and expansion of the renewable energy industry including sustainability of funding, regulatory support, capacity building, etc., and ensuring that renewable energy continues to make a significant contribution to rural development.

Description: This activity is primarily aimed at setting in place the post RERED scenario to ensure continued development of financially and economically viable renewable energy, and a continued contribution to rural development. Activity subcomponents include:

Preparation of an Integrated Rural Electrification Strategy and Plan by the Ministry of Power and Energy. This subtask will include consultant support as needed to develop a plan consistent with international best practices as relevant for Sri Lanka. This will also include assistance for consultative fora to ensure public participation in the process. This strategy and plan must be fully consistent with the sector reform and privatization initiatives currently in process by the Government.

Design and Start-up of a National Rural Electrification Fund which will act as the key national level subsidy mechanism for supporting private provision of rural electrification per the new sector structure. The fund will include transparent criteria and procedures and will be operated by a body such as the Regulator which has a high degree of independence while still being accountable to Parliament.

Assistance to Regulatory Body to assist with issues such as: (i) determining pricing for the small power purchase tariff; (ii) regulations regarding the treatment of stranded assets created when the national electricity grid reaches a village grid system; and (iii) third party power sales with wheeling of power through the national transmission network.. If a formal regulatory body is not in place when the need for this assistance arises, the Ministry of Power and Energy will sponsor the work instead taking appropriate action on study recommendations.

Easing Long Term Liquidity for Commercial Banks and MFIs to ensure continuity in availability of finance for small power producers. This task will explore options such as tapping pension funds and other sources of long-term liquidity, the securitizing of a portfolio of small power loans, etc. Pilot activities will be initiated as soon as practical with a view to establishing alternative long-term liquidity mechanisms well before the RERED closes.

Support for Implementation of the Clean Development Mechanism (CDM) in Sri Lanka. As the CDM

focal point in the country, the Ministry of Environment will continue to take the lead in developing CDM policies and projects. This activity will provide limited support to the Government for development of an interim CDM policy and initial CDM transactions.

Implementation: To the maximum extent possible, implementation of these activities will be with relevant agencies and stakeholders, facilitated by the AU.

Monitoring and Evaluation: Each proposal under this activity will include its own monitorable indicators. However, there is a need to ensure that the overall activity is demonstrably contributing toward the Project objective. To this end, monitoring and evaluation of this activity will be incorporated into the Project Monitoring and Evaluation, described in Section 10 below.

Package 6 - Monitoring and Evaluation/ Surveys

Objective: Monitor program and sector physical progress as well as contribution to Government rural development goals.

Description: This activity will establish and implement a comprehensive monitoring program to track for the RERED project in particular and the sector as a whole: (i) rural electrification physical progress through all methods including grid extension, village grid, and solar; (ii) impact of rural electrification on rural economic development including quality of life enhancement, rural employment, and change in income. Panel surveys, focus groups, and other relevant techniques will be used to establish rigorous monitoring protocols. Annual evaluation of progress will be undertaken and provided as input for relevant reports by the Ministry of Energy. Evaluations also will be used to guide revisions of RERED Project design if needed.

This activity also covers additional surveys or market analyses which may be needed throughout the RERED Project period to assess specific areas such as assessment of a biomass gasification market, village grid productive use assessment, etc.

Implementation: This activity will be implemented through a competitively tendered contract issued by the AU.

Annex 3: Estimated Project Costs
SRI LANKA: Renewable Energy for Rural Economic Development

Table 1. Estimated Project Costs (including contingencies)
 In US\$ million

Components	Local	Foreign	Total
Grid Connected Investments	34.5	55.8	90.3
Solar PV Investments	10.2	18.1	28.3
Community Investments (hydro, biomass)	1.6	2.8	4.4
Energy Efficiency and DSM	0.4	0.6	1.0
Cross Sectoral Energy Applications	2.7	1.9	4.6
Technical Assistance	2.0	3.1	5.1
Total Project Cost	51.4	82.3	133.7

**Table 2. Financing Plan for Investment Components
In US\$ million**

Components	IDA	GEF	PCI	Private Equity	Carbon Trade Fin
Grid Connected Investments					
Mini-hydro	28.5		7.1	11.1	0.8
Biomass	10.8		2.7	2.6	1.9
Wind	9.9		2.5	8.8	3.5
Sub-total	49.2	-	12.3	22.5	6.2
Solar PV Investments					
Home Systems Financing	18.8	3.9	4.2	1.4	--
Sub-total	18.8	3.9	4.2	1.4	-
Community Investments					
village hydro	3.0	-	0.5	0.1	-
village biomass	0.6	-	0.1	0.1	-
Sub-total	3.6	-	0.7	0.2	-
Energy Efficiency and DSM					
ESCO Investment	0.6	-	0.2	0.3	-
Sub-total	0.6	-	0.2	0.3	-
Cross Sectoral Applications					
Institutional/Commercial Solar	2.0	-	0.5	0.8	
Sub-total	2.0	-	0.5	0.8	-
Technical Assistance					
Energy Efficiency	0.2	0.7	-	-	-
Project Administration/Promotion Operation Expenses	-	0.1	-	0.0	-
Project Administration/Promotion Activities incl. CDM	0.0	0.1	-	-	-
Sub project promotion/development (village and biomass)	-	0.6	-	0.2	-
Technology introduction/promotion/capacity building	-	1.1	-	0.4	-
Sustainability (outphasing support)	0.0	0.1	-	-	-
Cross sectoral applications TA	0.3	0.7			
Market Surveys, Monitoring and Evaluation	0.2	0.8	-	-	-
Sub-total	0.8	4.1	-	0.6	-
Total Project Cost	75.0	8.0	17.9	25.8	6.2

Table 3. Total Project Financing Plan by Source of Funds
(in US\$ million)

	Investments (MUS\$)	TA (MUS\$)	Total (MUS\$)	% of Total
Private	25.2	0.6	25.8	20
PCI	17.9	-	17.9	14
IDA	74.2	1.0	75.2	58
GEF	3.9	3.9	7.8	3
Carbon Trade Fin.	6.3	-	6.3	5
Government		0.8	0.8	-
Total	127.4	6.3	133.7	

Annex 4 Economic and Financial Analysis

SRI LANKA: Renewable Energy for Rural Economic Development

General Approach

This annex summarizes the economic and financial analysis of the subprojects such as: (i) mini-hydro projects; (ii) solar home systems; (iii) community-based village hydro project; (iv) wind energy projects; and (v) biomass projects, proposed to be financed under this project.

Mini Hydro Project

The economic analysis for a typical mini hydro project indicates economically robust results and net economic benefits both to the project developers and to the country. The analysis is based on the following assumptions derived from actual data of sub-projects financed under the Energy Services Delivery Project:

- A mini hydro plant of 1,500 kW capacity is considered with 46 percent plant factor. Annual generation of the plant is around 6 GWh.
- Project cost is assumed to be US\$ 800 per kW. Thus, the total project cost is around US\$ 1.2 million with US\$ 150,000 as tax;
- Operation and maintenance cost is assumed to be 5 percent of the capital cost per annum;
- The Standard Conversion Factor for Sri Lanka is taken as 0.90. This factor was used to adjust the Operation and maintenance cost of local goods, works, and services to derive economic values;
- Tariff charged by mini hydro developers to CEB is assumed to be US¢ 5.2 per kWh. This tariff is based on marginal energy production cost of CEB and thus is considered as the tariff for both economic and financial analysis;
- For the economic analysis and financial analysis 12 percent discount rate has been used;
- Exchange rate is assumed to be 92 SLR per US\$.

Under these assumptions the economic analysis shows an economic net present value of around US\$ 900,000. The financial analysis shows a financial net present value of around US\$ 700,000.

Valuation of Costs

All costs are expressed in terms of constant 2001 SLR. The foreign costs were converted to SLR cost at border price level. The local costs are obtained at market level and then converted to economic cost based on a Standard Conversion Factor (SCF) of 0.90. This was used to convert the local cost of the project to get the economic input cost.

For financial analysis total project cost is considered. For the economic analysis tax portion was excluded from the project cost to calculate the border price of the project.

Valuation of Benefits

To promote the mini hydro projects and due to the immense shortfall of power generation the CEB has agreed to set tariff for the mini hydro energy generation at the avoided cost of power generation. Thus the tariff of US¢ 5.2 per kWh can be used as the economic and financial tariff for this project. Using this tariff level for the life of the project is also justified from the point of view of certainty. As per the latest announcement of the government, mini-hydro developers are assured of receiving at a minimum 90 percent of the tariff paid during the first commissioned year of the project. Hence, even if the avoided cost of power generation reduces sharply, the developer is protected from the downside. Since the retail tariffs are higher than this level (nearly US¢ 8.0 per kWh), using the retail tariff as a proxy for the economic benefit to consumers will result in much higher EIRR.

Results

These projects have very short construction period, usually around 10 to 15 months. For the analysis the construction period is assumed to be around a year. From the second year the project starts to earn revenue. Under the assumption of constant price and no escalation of variable cost and benefits over the years the project generates a positive return of constant \$ over its life, which is of 20 years.

In the economic analysis of the project, the economic costs of the input are netted out from the economic benefits to calculate the net benefit of the project. The benefits were then discounted using 12 percent discount rate to calculate the NPV. The economic NPV of the project stands at around US\$ 900,000. The EIRR of the project is 24 percent. The economic analysis of the project is shown below:

Table 1: Economic Analysis of a Mini Hydro Project
(Figures are in US\$)

Fiscal Year	Investment Cost Excluding Tax	O&M Cost	Total Cost	Revenue	Net Flow
2002	(1,050,000)		(1,050,000)		(1,050,000)
2003		(54,000)	(54,000)	314,309	260,309
2004		(54,000)	(54,000)	314,309	260,309
2005		(54,000)	(54,000)	314,309	260,309
2006		(54,000)	(54,000)	314,309	260,309
2007		(54,000)	(54,000)	314,309	260,309
2008		(54,000)	(54,000)	314,309	260,309
2009		(54,000)	(54,000)	314,309	260,309
2010		(54,000)	(54,000)	314,309	260,309
2011		(54,000)	(54,000)	314,309	260,309
2012		(54,000)	(54,000)	314,309	260,309
2013		(54,000)	(54,000)	314,309	260,309
2014		(54,000)	(54,000)	314,309	260,309
2015		(54,000)	(54,000)	314,309	260,309
2016		(54,000)	(54,000)	314,309	260,309
2017		(54,000)	(54,000)	314,309	260,309
2018		(54,000)	(54,000)	314,309	260,309
2019		(54,000)	(54,000)	314,309	260,309
2020		(54,000)	(54,000)	314,309	260,309
2021		(54,000)	(54,000)	314,309	260,309
2022		(54,000)	(54,000)	314,309	260,309

Net Present Value of the Project is US\$ 894,362

EIRR of the Project 24%

In the financial analysis of the project, the financial costs of the input are netted out from the revenue of the project to calculate the net cash flow of the project. The cash flows were then discounted using 12 percent discount rate to calculate the NPV. The financial NPV of the project stands at around US\$ 700,000. The FIRR of the project is 21 percent. The financial analysis of the project is shown below:

Table 2: Financial Analysis of a Mini Hydro Project
(Figures are in US\$)

Fiscal Year	Total Investment Cost	Operating Cost	Total Cost	Revenue	Net Flow
2002	(1,200,000)		(1,200,000)		(1,200,000)
2003		(60,000)	(60,000)	314,309	254,309
2004		(60,000)	(60,000)	314,309	254,309
2005		(60,000)	(60,000)	314,309	254,309
2006		(60,000)	(60,000)	314,309	254,309
2007		(60,000)	(60,000)	314,309	254,309
2008		(60,000)	(60,000)	314,309	254,309
2009		(60,000)	(60,000)	314,309	254,309
2010		(60,000)	(60,000)	314,309	254,309
2011		(60,000)	(60,000)	314,309	254,309
2012		(60,000)	(60,000)	314,309	254,309
2013		(60,000)	(60,000)	314,309	254,309
2014		(60,000)	(60,000)	314,309	254,309
2015		(60,000)	(60,000)	314,309	254,309
2016		(60,000)	(60,000)	314,309	254,309
2017		(60,000)	(60,000)	314,309	254,309
2018		(60,000)	(60,000)	314,309	254,309
2019		(60,000)	(60,000)	314,309	254,309
2020		(60,000)	(60,000)	314,309	254,309
2021		(60,000)	(60,000)	314,309	254,309
2022		(60,000)	(60,000)	314,309	254,309

Net Present Value of the Project is US\$ 699,545

FIRR of the Project 21%

Conclusion

The economic and financial assessment of the project indicates that the project will deliver net economic benefits for the country and would deliver financial benefits to the implementing agency. These projects also enable Sri Lanka to tap renewable hydro resources of the country mitigating to some extent need for imported fuel to meet energy needs. Furthermore, they create economic benefits like job creation and use of local construction materials in remote areas of the country, where such projects are usually located.

Solar Home System

The cost of off-grid solar PV compares favorably with the costs of grid expansion for remote areas. The solar component under this project would provide electricity to nearly 87,000 households at a total investment cost of about US\$ 35.1 million, i.e. US\$ 400 per household. The marginal cost of providing peak energy to the rural consumer is about US\$ 500 per kW and the cost of extending the grid to the marginal rural consumer in Sri Lanka is about US\$ 300 per consumer as per CEB's informal estimates. Thus the total capital cost of connecting and supplying a rural consumer is more than US\$ 800. This is much higher than the cost of supplying the same consumer through solar home system. It needs to be pointed out though that the grid electricity provides a different and higher level of service to the consumer and has a much higher impact on economic development and social well-being than the electricity made available from solar home systems. The latter supports a very basic level of service, mainly lighting.

However, a large majority of rural households are low-intensity consumers, using less than 40 kWh (or units) per month, mainly for lighting purposes. This level of service is consistent with that available from solar home systems, when used in conjunction with compact fluorescent lamps (CFLs).

The approach for economic evaluation for the solar program considers the replacement of kerosene lamps by solar lighting. This approach is also used in evaluating the incremental cost for solar PV, which is found to be about US\$ 2.3 per Wp. The incremental cost calculation represents a financial valuation of the cost of eliminating barriers and making the solar system affordable. On this basis the IRR would be 12 percent since the incremental cost calculations use this discount rate for computing the levelized costs and benefits over a 20-year solar home system lifecycle. In this case there is little difference between a financial and economic computation. It can be safely assumed that the economic rate of return would be higher than 12 percent since the economic benefits are likely to be much higher than the mere replacement cost of kerosene. For example, the indirect benefits of replacing kerosene with solar lighting – better quality of lighting, higher safety and freedom from indoor pollution, are not captured in the financial benefit valuation. Given these factors and uncertainty about the valuation of actual benefits, a separate EIRR calculation for solar has not been presented here.

Assumptions

The financial analysis of this component considers the financial position of a household who adopts the scheme. The assumptions are derived from actual data with SHS in Sri Lanka under the Energy services Delivery Project.

- The scheme would be administered by the Administration Unit of the project through providing refinancing to PCIs to extend micro finance to households to buy SHS;
- A solar home system of 40 Wp is considered for the analysis. The total cost of the system is assumed to be US\$ 452 with a life of 20 years;
- Battery life is considered to be three years;
- At the end of third year, household would replace the battery at their own cost;
- Controller life is considered to be of seven years and would be replaced at owner's cost;
- Bulbs and other accessories usually have a short life and would be replaced at owner's cost;
- The incremental cost analysis shows that the incremental cost per Wp is equivalent to US\$ 2.3. However, to make the program sustainable without the grant at the end of this project it is decided to reduce the grant amount from the SHS over the years. For a system of 40 Wp though the grant should be around US\$ 92, it is kept US\$ 70 and also would be phased out after the third year of the project;
- The PCI would extend a loan to the households maximum of 75 percent of the total cost of the system to purchase SHS;
- IDA refinances 80 percent of the loan amount made by PCIs;
- The balance amount comes as the equity financing of the Households collected as a down-payment before installing the system;
- The loan terms are flexible in terms of repayment period. Usually the PCIs charge 24 percent reducing balance interest rate and the loan is to be repaid within four years. For this analysis a three-year repayment period is considered;
- Discount rate for this component is equated with the opportunity cost of fund of a rural household, which is around 9 percent.

Results

The cash inflows to the HH are the US\$ saved from not using kerosene lamps. Based on the above assumptions the chart for the cash flow of a household purchasing a SHS is provided below.

The initial cash outflow shown in the chart is due to the down-payment and DSL payments to the PCIs by the households. After they have repaid the loan they start deriving the benefits of the system. In every year the households would incur an operating and maintenance cost of replacing bulbs, battery fluids, electrician fees, etc. In every third and seventh year, the households would have to replace the battery and the controller respectively, which is considered as additional capital cost required by the households. This is reflected in the chart as the periodic decrease in household cash inflows. Based on the discount rate the NPV of the project to a household is around US\$ 4. Thus the project has a positive impact to the households and is affordable. The financial analysis of the project at the household level is shown below:

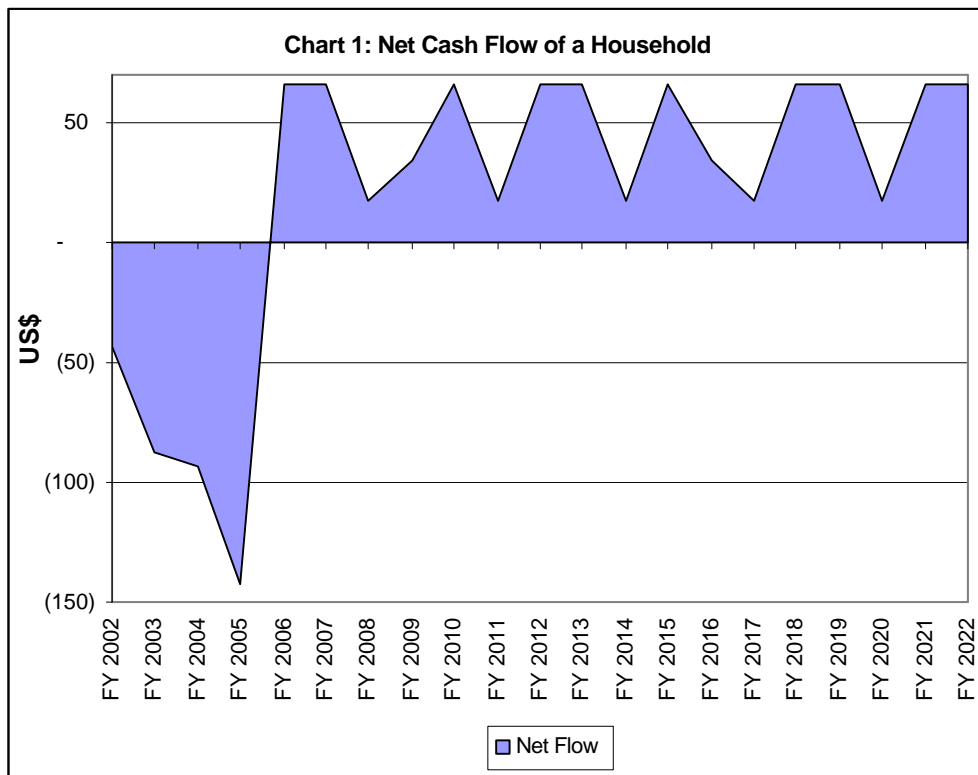


Table 3: Financial Analysis of a SHS at Household level
(Figures are in US\$)

Fiscal Year	Equity	DSL	Controller	Battery	Bulbs	Total Cost	Savings	Net Flow
2002	(43)					(43)		(43)
2003		(160)				(160)	72	(88)
2004		(160)			(6)	(165)	72	(94)
2005		(160)		(49)	(6)	(214)	72	(142)
2006					(6)	(6)	72	66
2007					(6)	(6)	72	66
2008				(49)	(6)	(55)	72	17
2009			(32)		(6)	(37)	72	34
2010					(6)	(6)	72	66
2011				(49)	(6)	(55)	72	17
2012					(6)	(6)	72	66
2013					(6)	(6)	72	66
2014				(49)	(6)	(55)	72	17
2015					(6)	(6)	72	66
2016			(32)		(6)	(37)	72	34
2017				(49)	(6)	(55)	72	17
2018					(6)	(6)	72	66
2019					(6)	(6)	72	66
2020				(49)	(6)	(55)	72	17
2021					(6)	(6)	72	66
2022					(6)	(6)	72	66

Net Present Value of the Project is US\$ 4

IRR of the Project is 9%

Village Hydro Projects

The analysis of the village hydro project is based on the following assumptions:

- A village hydro plant of 11 kW capacity is considered. The experience of the Energy Services Delivery Project also supports considering a project of this capacity. This size of a plant requires manageable project cost and meets the demand of a village with around 50 to 60 households;
- Total Project cost is assumed to be US\$ 1,300 to US\$ 1,400 per kW. The project cost of a 11 kW village hydro plant excluding the project design cost is found to be around US\$ 14,700 and with US\$ 7,000 as the project design cost the total project cost stands at around US\$ 21,700;
- The incremental cost analysis indicates grant requirement of US\$ 7,000 for financing the project development cost and US\$ 400 per kW support for barrier removal. Thus the barrier removal grant from GEF is considered to be US\$ 4,400 for this project;
- PCIs extends a loan of around 50 percent of the capital cost of the project to the village community. These loans are usually with a tenor of five years, with the interest rate having a spread of 5-6 percent over the AWDR. Seventy-five percent of this loan is refinanced to the PCIs by the IDA funds;
- The balance amount required for the project after getting the loan and GEF grant financing is met by equity contribution from the villagers;
- These plants incur O&M cost of around 8 percent of the fixed cost per annum;

- The community charges around SLR 400 to SLR 600 per household per month as tariff for using the electricity service;
- The project is assumed to have a 20-year life.

Results

The cash outflows for the village community in connection to this project are the equity contribution, DSL payment and O&M costs. The inflow is the revenue collected from the community members. The net cash flow is calculated by netting the outflows from the project inflows.

The financial analysis of the project shows that the net present value of the project to the village community is US\$ 488 and the project has a FIRR of about 10 percent. Thus the project has a positive impact to the village community. The financial analysis of the project at the village community level is shown below:

Table 4: Financial Analysis of a Village Hydro Project
(Figures are in US\$)

Fiscal Year	Equity	DSL	Operating Cost	Total Cost	Revenue	Net Flow
2002	(3,000)			(3,000)		(3,000)
2003		(2,362)	(1,220)	(3,582)	2,609	(974)
2004		(2,362)	(1,220)	(3,582)	2,609	(974)
2005		(2,362)	(1,220)	(3,582)	2,609	(974)
2006		(2,362)	(1,220)	(3,582)	2,609	(974)
2007		(2,362)	(1,220)	(3,582)	2,609	(974)
2008			(1,220)	(1,220)	2,609	1,389
2009			(1,220)	(1,220)	2,609	1,389
2010			(1,220)	(1,220)	2,609	1,389
2011			(1,220)	(1,220)	2,609	1,389
2012			(1,220)	(1,220)	2,609	1,389
2013			(1,220)	(1,220)	2,609	1,389
2014			(1,220)	(1,220)	2,609	1,389
2015			(1,220)	(1,220)	2,609	1,389
2016			(1,220)	(1,220)	2,609	1,389
2017			(1,220)	(1,220)	2,609	1,389
2018			(1,220)	(1,220)	2,609	1,389
2019			(1,220)	(1,220)	2,609	1,389
2020			(1,220)	(1,220)	2,609	1,389
2021			(1,220)	(1,220)	2,609	1,389
2022			(1,220)	(1,220)	2,609	1,389

Net Present Value of the Project is US\$ 488

FIRR of the Project is 10%

Annex 5: Financial Summary
SRI LANKA: Renewable Energy for Rural Economic Development

FINANCIAL SUMMARY

Part I of this Annex presents the eligibility criteria for participating credit institutions (PCIs). The second part of this Annex provides financial highlights of potential PCIs which are likely to meet the eligibility criteria. These PCIs are participants under the ESD project.

Part I: Eligibility Criteria for Participating Credit Institutions

A. For all Participating Credit Institutions (PCIs)

In order to become eligible to participate in the ESD Credit Program and to maintain their eligibility, credit institutions must be privately owned and controlled, and meet the following criteria.

- (a) IDA should receive a satisfactory statement approved by the Board of Directors of the institutions outlining:
 - (i) proposal as to how they would plan to utilize the credit facility, how they would get internally organized to market the ESD scheme, evaluate the subproject proposals and manage subsequent follow-up monitoring and loan recoveries;
 - (ii) name of the senior officer who will be in charge of ESD credit operation and key team staff;
 - (iii) Lending institutions which are not PCIs under ESD should submit the institution's business strategy and operating policies; and
 - (iv) details of their existing term lending programs and portfolio management scheme, if any.
- (b) Except as IDA shall otherwise agree, a profitable operation for at least two full years of operation preceding its application for participation, attested to by unqualified audit reports from independent private auditors acceptable to IDA.
- (c) A majority of the share capital of the PCI should be held by private sector
- (d) The PCI should furnish to IDA, a certificate from the external auditors within 90 days of the date of audited financial statement, that the financial performance of the PCI concerned is in conformity with the applicable financial criteria outlined below.
- (e) After fulfilling the eligibility criteria by PCI, the PCI shall continue to meet the eligibility criteria aforementioned, satisfactory to the GOSL and the Association, which shall monitor PCI's compliance therewith semiannually. If the PCI fails at any time to satisfy the above specified criteria the GOSL and IDA reserve the right to suspend sub-loan authorizations under the project until the PCI has taken specific steps to address its problems in a manner satisfactory to GOSL and IDA.

B. Eligibility Criteria under RERDP Project for Commercial Banks and DFIs

Compliance with Ministry of Finance and Planning/Central Bank guidelines on prudential regulations, capital adequacy, classification of risk assets, provisioning, single borrower exposure limit, sector exposure

limits, and disclosure and reporting requirements.

A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution met the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines:

- (a) a minimum total cash collection ratio of principal and interest on term loan portfolio calculated on a rolling twelve month basis of 80 percent;
- (b) a minimum total cash collection ratio of principal only on term loan portfolio calculated on a rolling twelve month basis of 80 percent;
- (c) a minimum after tax profit equivalent to 9 percent p.a. on average shareholders' funds;
- (d) a minimum debt service cover ratio of 1.25 times (only for DFIs and similar institutions);
- (e) a maximum portfolio infection rate of 20 percent;
- (f) a maximum debt equity ratio of 8:1;
- (g) minimum capital adequacy ratios of 4 percent and 8 percent for tier-1 and tier-2, respectively as required by Central Bank of Sri Lanka (CBSL) guidelines;
- (h) loans to one part or any one group of companies must not exceed 30 percent of PCI's total capital funds (Shareholder Funds); and
- (i) loans to any one sector, as defined in the UN Standard Classification of Economic Activities, must not exceed 30 percent of PCI's total loan portfolio.

C. For Merchant Banks and Leasing Companies

A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution meet the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines:

- (a) a minimum total cash collection ratio of principal and interest on lease/loan portfolio calculated on a rolling twelve month basis of 70 percent;
- (b) the value of non-performing leases/loans less cumulative provisions shall not at any time exceed 30 percent of the Shareholders Equity of the company;
- (c) a minimum after tax profit equivalent to 9 percent per annum. on average shareholders' funds;
- (d) a maximum debt equity ratio of 8:1;
- (e) minimum risk weighted capital adequacy ratios of 12 percent. The computation for this purpose shall be in accordance with measures prescribed by the Basle Committee on banking supervisory practices appointed by the Bank of International Settlements (BIS);
- (f) leases/loans to any one party or to any one group of companies should be restricted to and not exceed
 - (i) 15 percent of PCI's total rent receivables; and
 - (ii) 25 percent of the Shareholders Equity.
- (g) loans to any one sector, as defined in the UN Standard Classification of Economic Activities, must not exceed 30 percent of PCIs total loan portfolio; and
- (h) lease receivables at fixed interest rates which are financed by loans at variable interest rates shall not at any time exceed 50 percent of the Shareholders Equity of the company.

Compliance with pertinent laws and regulations regarding capital adequacy, classification of assets, non-accrual of interest and provisioning, exposure limits, etc.

In the absence of relevant regulatory framework, merchant banks or leasing companies that wish to participate in the Credit Program should adopt and comply with their own financial policies acceptable to IDA, which might be tighter than the eligibility requirements listed in paragraph (4) above. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution is in full compliance with its own financial policies. Any changes in financial policies of these institutions would be subject to prior review and approval by IDA.

D: For Micro Finance Institutions

A confirmation from External Auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the Micro Finance Institution meets the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines :

- (a) minimum loan collection ratio of 92 percent;
- (b) at least 100,000 borrowers with strong expansion potential.
- (c) at least Rs100 million in Accumulated Fund (including foreign grants).
- (d) maximum debt/accumulated fund ratio of 3.5 times.
- (e) minimum liquidity ratio (liquid assets to deposits) of 20 percent;
- (f) minimum current ratio of 1.5 times;
- (g) minimum capital adequacy ratio of 20 percent;.
- (h) minimum debt service cover ratio of 1.25 times; and
- (i) minimum rate of return on capital of 2 percent.

Five-year successful track record substantiated by written confirmation by external auditors acceptable to IDA of running a successful micro-credit program.

In the absence of relevant regulatory framework, Micro Finance Institutions that wish to participate in the Credit Program should adopt and comply with their own financial policies acceptable to IDA, which might be tighter than the eligibility requirements listed in paragraph (4) above. A Confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution is in full compliance with its own financial policies. Any changes in financial policies of these institutions would be subject to prior review and approval by IDA.

Part II: Financial Highlights of Potential PCIs

The financial highlights of the major commercial banks and the two major DFIs that took part in ESD program are shown in the table below. These PCIs have expressed an interest in participating in RERED as well. Additional PCIs which meet the eligibility criteria will also be invited to join the RERED Credit Program.

Financial Highlights of Potential PCIs per Section 25.3(11) of the Energy Services Delivery Project Participation Agreement

Subsection	Details	Actual for FY ending December 2000					
		Minimum	NDB	DFC*	HNB**	Sempath	Comm. Bank
a	Cash Collection Ratio - Principal and Interest (%)	80	84.08	86.02	N/a	84	96.71
b	Cash Collection Ratio - Principal only (%)	80	88.38	82.4	N/A	84	96.70
c	After Tax Profit on Average Shareholder's Funds (%)	9	9.19	11.43	15.6	17.60	18.50
d	Debt Service Cover Ratio (times)**	1.25	3.11	2.34	N/A	N/A	N/A
e	Portfolio Infection Rate (%)	20	12.03	11.77	6.19	13.10	9.36
f	Debt Equity Ratio	8:1	5.02:1	3:1	2.5:1	2:1	0.15:1
g	Capital Adequacy Ratio Tier 1 (%)	4	14.61	25.40	10.13	9.60	14.97
h	Tier 2 (%)	8	13.02	25.40	10.02	12.10	18.32
i	Single Party/Group Exposure (%)	30	3.5	1.55	2	N/A	N/A

*DFCC Bank FY ends 31 March 2000

**Only for DFIs and similar institutions

***HNB's largest sectoral exposure is to commercial sector as defined by Central Bank. Commercial sector consists of many sub sectors such as exports, imports, trading, consumption etc.

HNB is not in a position to provide the cash collection ratio due to a lack of a suitable MIS system.

Annex 6(A): Procurement Arrangements
SRI LANKA: Renewable Energy for Rural Economic Development

Procurement

A. Procurement Implementation Capacity

The RERED project is designed to on-lend funds through intermediaries (MFIs/ PCIs) to developers, promoters, households and rural enterprises to support renewable energy sub-projects and energy efficiency investments. There is provision for technical assistance for development and implementation of grid connected and off-grid renewable energy systems. Technical assistance is being funded both by IDA credit and GEF grants. Grid connected investments include mini-hydro, wind, and biomass projects. Off-grid investments include solar PV home systems as well as small independent grid networks powered by micro-hydro, biomass, and possibly wind generation systems. The fund flows vary somewhat between the grid-connected and the off-grid investments.

RERED is a follow-on project to the ongoing Energy Services Delivery Project and the RERED Credit Program is based heavily on the ESD Credit Program. The ESD Project is being implemented satisfactorily without there being any major issues or complaints regarding the process, and therefore similar arrangement will continue under RERED. The procurement arrangements for the Credit Program have worked well and will be continued in RERED. Therefore as in the past, established commercial practices would essentially form the main mode of procurement under the RERED Project. M/s. DFCC Bank would continue operation of the Administration Unit [AU] as their performance has been satisfactory in the ongoing project. The AU staff has gained sufficient experience in IDA procurement guidelines during the implementation of the ESD project and is well placed to monitor and guide stakeholders

Procurement oversight arrangements for RERED (based on ESD experience) are as under. These will equally apply to all procurement under GEF TA grants:

- The PCIs will be required to maintain details of the procurement methods used by sub-borrowers and to monitor the utilization of subloan funds for procurement through regular site supervision visits. Administrative Unit staff and IDA field supervision missions will continue to review implementation of these procedures; and
- To enhance the fiduciary review process, the following additional safeguards will be followed in the implementation of the RERED project:
 - (a) PCIs will be required to obtain from sub-borrowers, certificates that agreed procurement procedures have been followed for all cases where commercial practices have been adopted. An agreed format for this certification is included in the PIP;
 - (b) An external consultant will be hired by the Administrative Unit to carry out ex-post reviews and asset verification for 100percent of grid-connected projects and 50 percent of off-grid projects except for Solar Home Systems (SHS). In case of Solar Home Systems, random checks will be carried out on a regular basis for a limited number of systems; and
 - (c) The Bank will conduct sample ex-post audits on the consultant's review referred above.

Procurement methods (Table A)

B. Methods of Procurement

Procurement of Goods and works financed by IDA credit proceeds and GEF grant proceeds will follow the

Guidelines for "Procurement under IBRD Loans and IDA Credits" issued in January 1995, revised January and August 1996, September 1997, and January 1999. Selection of consultants will follow the "Guidelines for the Use of Consultants by World Bank Borrowers" issued in January 1997, revised September 1997 and January 1999. In general, the QCBS process will be used for consultant contracts above \$200,000 as shown in Table B below. Consultant contracts under \$25,000 would be procured using the Consultant Qualification method. The following thresholds will be used to determine the applicable procurement method.

RERED Credit Line Component:

- ICB for goods contracts in excess of \$2.0 million.
- ICB for works contracts in excess of \$3.0 million.
- ICB for turnkey contracts in excess of \$5.0 million.
- Established commercial practices will be utilized for all non-ICB contracts. Three quotes will be required to ensure competitive prices. An opinion from an independent expert acceptable to IDA on the reasonableness of quoted prices will be required for all contracts where 3 quotes are not received.

Technical Assistance Component:

Goods

- ICB for goods contracts in excess of US\$ 200,000.
- NCB for goods contracts between US\$ 25,000 and US\$ 200,000.
- Local/international shopping with a minimum of three quotations for goods and works contracts below US\$ 25,000.

Services

- QCBS for consulting service contracts above US\$ 200,000
- Selection based on Consultant Qualifications for consulting contracts below US\$ 25,000

Prior review:

- All subloan ICB contracts; and
- The letter of invitation to bid, terms of reference and short list for all consultant services contracts above US\$50,000 under the Technical Assistance component.

Table 1. Project Costs by Procurement Arrangements
(US\$ million equivalent)

Expenditure Category	ICB	NCB	Other	NBF	Total
1. Credit Program			96.6 (71.7)	33.7 (0)	127.4 (71.7)
2. Technical Assistance					
(a) Consultant Services and Training			(3.9) (0.8)	1.4 (0)	5.3 (0.8)
(b) Goods		0.7 (0)	0.3 (0)		1.0 (0)
Total		0.7 (0)	97.8 (72.5)	35.1 (0)	133.7 (72.5)

* Figures in parenthesis are the amounts to be financed by the IDA Credit only.

** Of the total IDA US\$75.0 million, US\$2.5 million is being passed through by Government as co-financing grants and will be following the same criteria as GEF grant. Hence the procurement from IDA is US\$ 72.5 million.

Note: ICB = International Competitive Bidding
Other = Includes Established Commercial Practices

Consultant Procurement

Technical assistance will be provided for consultant services in capacity building, and targeted studies, and also for training, awareness, and outreach activities as described in Annex 2. Estimated expenditures for consultants by selection arrangements are given below in Table A1.

Table A1: Consultant Selection Arrangements (optional)
(US\$ million equivalent)

Consultant Services Expenditure Category	Selection Method							Total Cost¹
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F.	
A. Firms	2.00 (0.40)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.40 (0.20)	0.00 (0.00)	0.60 (0.00)	4.00 (0.60)
B. Individuals	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.30 (0.20)	0.00 (0.00)	1.30 (0.20)
Total	2.00 (0.40)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.40 (0.20)	1.30 (0.20)	0.60 (0.00)	5.30 (0.80)

1\ Including contingencies

Note: QCBS = Quality- and Cost-Based Selection

QBS = Quality-based Selection

SFB = Selection under a Fixed Budget

LCS = Least-Cost Selection

CQ = Selection Based on Consultants' Qualifications

Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.

N.B.F. = Not Bank-financed

Figures in parenthesis are the amounts to be financed by the Bank Credit.

Prior review thresholds (Table B)

Table B: Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold (US\$)	Procurement Method	Contracts Subject to Prior Review
1. Sub Projects	Goods in excess of \$2,000,000 Works in excess of \$3,000,000 Turnkey in excess of \$5,000,000	(i) ICB (ii) Below these thresholds, standard commercial practices apply	(i) All ICB contracts (ii) Certification by Sub borrowers countersigned by PCIs
2. Consultant Services/Training (a) Consulting Firms (b) Individuals		(a) Quality and Cost Based Selection or Single Source Selection, or Consultant Qualifications (b) Consultant Qualifications	(a) (i) Contracts of value more than US\$100,000 - full prior review (a) (ii) Contracts of value between \$50,000 to \$100,000 - Only TOR and Shortlist to be reviewed. (b) Contracts of value more than US\$50,000
3. Goods	(i) Goods in excess of \$200,000 (ii) Goods between \$25,000 - \$200,000 (iii) Goods below \$25,000	(i) ICB (ii) NCB (iii) Shopping	(i) - (iii) First two contracts every year and all contracts of value more than US\$30,000

Annex 6(B) Financial Management and Disbursement Arrangements SRI LANKA: Renewable Energy for Rural Economic Development

Financial Management

1. Summary of the Financial Management Assessment

The implementing entity, DFCC Bank, has a proven track record of good financial management and sound project operating guidelines under the ongoing Energy Services Delivery Project. It has been operating a satisfactory financial management system and has demonstrated capacity in submitting project audit reports and informative quarterly project management reports to the Bank on a timely basis.

The RERED Project is being implemented at a substantially enhanced scale compared to the ESD. To manage the increased scope and scale of operations efficiently, the DFCC Bank has agreed to the following risk mitigation measures: (i) expanding the scope of project audit to cover independent physical verification of assets and procurement/accounting practices of the beneficiaries; (ii) engaging the services of a consultant for verifying satisfactory installation of the Solar PV systems (the most dispersed and transaction intensive project component); and (iii) computerizing the project accounting system at the DFCC Bank.

The RERED project will follow the report based disbursements and will produce an agreed set of Financial Monitoring Reports (FMRs) on a quarterly basis. Two special US Dollar accounts will be opened, one for IDA credit and the other for GEF grant funds.

Country Issues

As the AU will function within the operating framework of the DFCC, many country issues are not applicable for this project. One exception could be inadequate budget provision for credit and grant funds and slow release of counterpart funds for the two technical assistance components. The AU has discussed this issue with the Government and the latter has agreed to make adequate provision and timely release of counterpart funds for the proposed project. A counterpart fund Project Account is being proposed to ensure adequate and timely availability of counterpart funding, and is subject to agreement during negotiations.

Strengths and Weaknesses

The project has the following strengths:

- Satisfactory implementation of the ESD project, paving the way for a comprehensive, simple and clear set of operating guidelines that are well understood by all stakeholders concerned, particularly, PCIs and MFIs;
- Established systems, procedures, and practices for implementing the project;
- Efficient and competent staff at the AU in the DFCC; and
- Timely submission of disbursement claims and audit reports to the World Bank.

The project has the following weaknesses:

Significant weaknesses	Resolution
1. PCI/MFI compliance with the eligibility criteria were not confirmed in project audit	The TOR for the project auditor will be revised to cover this aspect and will be agreed at

under the ongoing ESD project.	negotiations.
2. Procurement and record keeping practices, and physical existence of assets of project sponsors and VES were not independently verified in project audit, though monitored by the PCIs.	Same as above.
3. Given the significantly enhanced size of the project, the AU's capacity in terms of staffing and computerized facilities might be inadequate.	The AU has agreed to computerize the accounting system.
4. Project auditors and consultants for verifying implementation of the Solar PV installation yet to be identified.	The AU has agreed to an action plan to appoint them.
5. AU to get accustomed to preparing Financial Monitoring Reports (FMRs) and forecasting project cash flow requirements on a quarterly basis.	The existing formats for the progress reports provides a good basis for preparing FMR reports. AU has a competent team of professionals who will be able to easily adopt FMRs.

Implementing Entity

Project administration will be carried out by the AU, which also has a significantly enlarged role compared to the ongoing ESD project because of the increased scope of the proposed project. Actual implementation will be carried out by the PCIs/MFIs and project beneficiaries.

The financial management assessment did not cover the PCIs/MFIs. The SASFP unit carries out annual assessments of PCIs/MFIs compliance with the eligibility criteria. Further, the Banking Supervision Department of the Central Bank of Sri Lanka closely reviews the financial soundness of the PCIs.

Funds Flow

The National budget of the GOSL will include a budget for the Project. Counterpart funds is to be provided by the PCIs and MFIs for the first three components and GOSL for the technical assistance components.

Two special dollar accounts (SDAs) will be opened at the Central Bank of Sri Lanka to deposit the proceeds of IDA credit and GEF grant. AU will have the right to operate the SDAs and withdraw funds for reimbursement to the PCIs and MFIs. PCIs will be responsible for approving the loans to ultimate project beneficiaries following their own loan screening procedure. Once the loan has been approved, PCIs will forward a Loan Refinance Application form to the AU requesting commitment for 70 percent or 80 percent of the approved loan amount. As and when the PCI disburses funds against the approved loan amount, a disbursement request form will be forwarded by the PCI (with appropriate supporting documents) to the AU for obtaining 70 percent or 80 percent of the amount disbursed to the beneficiary. Specific funds flow arrangements for each component and further details on the required supporting documentation for reimbursements are given in the Operations Manual (ESD Operations Manual to be adopted for the RERED project, after some minor modifications) and Operating Guidelines (Annex 14 of PAD). Also refer the funds flow diagram in Annex 1 to the FM assessment report.

Staffing

Financial management for the project will be overseen by the Project Accountant in the AU. He will be responsible for verifying the eligibility of the reimbursement claims forwarded by the PCIs, MFIs and solar dealers, maintaining supporting documents, recording project financial transactions, and preparing financial monitoring reports to the World Bank for withdrawal purposes. He will be assisted by another project officer who is to join the AU in March 2002.

Accounting Policies and Procedures

Currently, for the ongoing ESD project, the AU has a self-contained accounting system using Microsoft Excel spreadsheet. It is a double-entry accounting system on an accrual basis. AU's current practice of recording and accounting for project expenditure is sufficiently detailed and adequate for the purpose of generating reports by various types of expenditure classification, as specified in the Administration Agreement. However, for the proposed RERED project, the accounting system should be computerized given the high volume of financial transactions. Accounting policies and procedures of the ESD project can be adopted for the computerized system.

The AU's accounting practices are governed by the provisions in the Administration Agreement and the Operating Guidelines. However, there is no separate accounting guidelines for describing the accounting policies of the project. With the proposed computerization, project accounting policies will be clearly spelt out in the User Manual of the software.

Internal Audit

DFCC Bank has an internal audit department. Nonetheless, project activities have not been subject to internal audit by this department. Given the external audit, outsourced supervision arrangements for the solar PV systems, and the satisfactory state of AU's financial management arrangements, this is not considered to be a significant risk. The consultant for solar PV system verification will be appointed by November 30, 2002.

Reporting and Monitoring

The AU has in place a comprehensive reporting and monitoring system in accordance with the Project Administration Agreement for the ongoing ESD project. These reports are generated from the accounting system based on a Microsoft Excel spreadsheet. The reports are submitted to the Bank on a quarterly basis. Given the enhanced scale of the RERED, a computerized system will be developed.

Format of Financial Statements

As the RERED project will adopt the report based disbursement specific FMR formats will be developed for the project. Financial reporting will be on the basis of these agreed formats (see annex 4 for reporting formats). The FMRs will be the basis for the annual financial statements of the project.

Information Systems

The AU maintains all financial and physical data about the ongoing ESD project in a Microsoft Excel spreadsheet. Though this is satisfactory and is adequate for the purposes of the ongoing project, given the scale of the RERED project, the AU needs to develop a computerized information system. The AU has agreed to take necessary action to computerize the accounting system by March 31, 2003.

Given the scale of the Solar PV component, the AU intends to automate the process of verifying and

processing the claims under this component with the help of a tailor made software.

Impact of procurement arrangements

Procurement arrangements of the project require IDA prior review of sub loans which involve procurement of goods, works and turnkey contracts exceeding US\$ 2 million, US\$ 3 million, and US\$ 5 million respectively. Such contracts will follow the ICB procurement method. For contracts below these limits, PCIs, MFIs and AU will review the sub loan request, and monitor procurement, to ensure that the beneficiary follows standard commercial practice. Nonetheless, for disbursement purposes, all project payments for subloans will be claimed under the ‘subloans’ disbursement category, without drawing distinction between goods and works. This practice is similar to that of the ongoing ESD project.

To summarize, the following actions have been agreed by the dates indicated. These will be introduced as effectiveness conditions and dated covenants in the legal agreements as appropriate.

Action	Responsible Person	Completion
FMR formats to be agreed	AU and the Bank	By effectiveness
Additional project officer to be appointed	AU	By effectiveness
TOR for project auditor to be finalized	AU	By effectiveness
TOR for the solar PV systems audit to be finalized	AU	By effectiveness
Project Auditor to be appointed	AU	November 30, 2002
Solar PV System consultant to be appointed	AU	November 30, 2002
Computerized project accounting software to be operationalized	AU	March 31, 2003

Supervision Plans

From a financial management perspective, the project will need regular supervision. The focus during the supervision will be to review PCI and MFI compliance with the agreements, and verify beneficiaries’ procurement and accounting practices on a sample basis.

2. Audit Arrangements

Project accounts will be audited by an external auditor and audit reports submitted to the Bank within six-months of the end of the fiscal year. The fiscal year is January to December. Terms of Reference for the project audit is given in Annex 2. The auditor will be appointed by November 30, 2002.

Audit reports of the ongoing ESD project have been satisfactory. Audit reports were received on a timely basis and did not carry any major audit observations. Cost of external audit will be financed by the IDA.

Audit Reports

Following audit reports will be monitored in the ARCS:

Implementing Agency	Audit	Auditor
DFCC Bank	Project/SOE	To be appointed
DFCC Bank	Special Account	To be appointed

3. Disbursement Arrangements

The project will adopt the report-based disbursement procedure on the basis of FMRs to be agreed with the Bank at negotiations. Given the AU's demonstrated capacity under the ongoing ESD project, quarterly FMRs will not be difficult to produce. Two sets of FMRs financial reports will be produced, i.e. for IDA funds and GEF grant. FMRs will help simplify disbursements as well as to provide useful project information to the AU and the Bank. The formats for the FMRs will be agreed at credit negotiations.

FMR reporting quarters would be March 31, June 30, September 30, and December 31 of each year.

Allocation of credit proceeds (Table C)

Table B: IDA Loan Disbursement Arrangements

Expenditure Category	Amount in US\$ (millions)	Expenditures to be Financed
1. Credit Program Sub-loans	63.31	Upto 80% of subloan amount in respect of all grid connected and off-grid projects
2. Off-grid sub-grants	2.50	100% of expenditures
3. Consulting Services and Training	0.49	
4. Goods	--	
5. Unallocated	8.70	
Total	75.00	

Table C: GEF Grant Disbursement Arrangements

Expenditure Category	Amount in US\$ (millions)	Expenditures to be Financed
1. Credit Program Off-grid Subproject Grants		
(a) Subproject preparation grants	0.4	95% of village hydro feasibility study costs (maximum \$8,000) ; 90% of solar PV business plan preparation costs (maximum \$6,500)
(b) Subgrants	3.0	upto \$400 per kW for village hydro subprojects; upto \$70 per solar PV system
2. Consulting Services and Training	2.0	100% of expenditures
3. Goods	0.9	100% foreign expenditures; 100 percent of the ex-factory cost of local expenditures; 80% of local expenditures
4. Administrative Unit Off-Grid Project Support	0.2	100% of GEF project support activities
5. Unallocated	1.5	
Total	8.0	

Special account:

Annex 7: Project Processing Schedule
SRI LANKA: Renewable Energy for Rural Economic Development

Project Schedule	Planned	Actual
Time taken to prepare the project (months)	12	7
First Bank mission (identification)		
Appraisal mission departure		01/21/2002
Negotiations	05/06/2002	
Planned Date of Effectiveness	07/31/2002	

Prepared by:

DFCC Bank Administrative Unit and other stakeholder organizations, and the Government of Sri Lanka, External Resources Department.

Preparation assistance:

Bank staff who worked on the project included:

Name	Speciality
S. Vijay Iyer	Task Manager, Financial Analyst
Chandra Govindarajalu	Energy Efficiency and Renewable Energy Specialist
Malcom Cosgrove-Davis	Renewable Energy Specialist
Pradeep Perera	Policy and Project Dialogue
Johannes Exel	Renewable Energy Business Development
Sriyani Hulugalle	Financial Sector and Banking Specialist
Sumith Pilapitiya	Environmental and Social Specialist
Irene Julitta Rasiah	Financial Management Specialist
Santhanam Krishnan	Procurement Specialist
Trine Refsbaek	Rural Energy/Development Specialist
Vikram Raghavan	Legal Counsel
Subodh Mathur	Consultant
Jim Finucane	Consultant
Ad Dankers	Consultant
Anna Goodman	Program Assistant

Annex 8: Documents in the Project File*
SRI LANKA: Renewable Energy for Rural Economic Development

A. Project Implementation Plan

1. Project Implementation Plan edited by ESD Administrative Unit (DFCC Bank)
2. Sri Lanka Rural Electrification Policy (TBD)

B. Bank Staff Assessments

3. Financial Management Assessment
4. Solar Business Analysis

C. Other

1. ESD Solar Progress Review (James Finucane)
2. Village Hydro Potential Study - ITDG
3. Energy Poverty Gender (EnPoGen) Sri Lanka Case Study
4. Energy Services Delivery Project - Mid-Term Review
5. GEF Focal Point Endorsement

*Including electronic files

Annex 9: Statement of Loans and Credits
SRI LANKA: Renewable Energy for Rural Economic Development
02-Apr-2002

Project ID	FY	Purpose	Original Amount in US\$ Millions			Cancel.	Undisb.	Difference between expected and actual disbursements ^a	
			IBRD	IDA	GEF			Orig	Frm Rev'd
P050738	2001	LAND TIT. & REL.SERV (LIL)	0.00	5.00	0.00	0.00	4.76	0.36	0.00
P069784	2001	Distance Learning Initiative - LIL	0.00	2.00	0.00	0.00	1.30	-0.30	0.00
P071131	2001	LK Central Bank Strengthening	0.00	30.30	0.00	0.00	28.46	3.75	0.00
P044809	2000	LEGAL AND JUDICIAL REFORMS	0.00	18.20	0.00	0.00	13.71	-3.53	0.00
P058070	2000	North-East Irrigated Agriculture Project	0.00	27.00	0.00	0.00	21.35	5.40	0.00
P035828	1998	CONS OF MEDIC PLANTS	0.00	0.00	4.60	0.00	1.44	0.57	0.00
P034212	1998	MAHAWELI RESTRUCTURI	0.00	57.00	0.00	0.00	24.58	16.94	0.00
P010525	1998	GENERAL EDUCATION II	0.00	70.30	0.00	0.86	38.12	35.38	0.00
P039965	1997	ENERGY SERV.DLVY.	0.00	24.20	5.90	0.00	1.39	0.67	0.00
P010498	1997	ENERGY SERVICES DLVY	0.00	24.20	5.90	0.00	2.57	4.40	0.00
P010513	1997	ENVIRONMENTAL ACTION	0.00	14.80	0.00	0.00	4.59	5.54	0.00
P010526	1997	HEALTH SERVICES DEV	0.00	18.80	0.00	3.46	2.28	6.86	0.00
P042266	1996	TEACHER EDUCATION & TEACHER DEPLOYMENT	0.00	64.10	0.00	0.00	18.01	24.72	5.89
P010517	1996	PVT SECT INFRAS DEV	0.00	77.00	0.00	15.02	38.66	62.80	32.83
Total:			0.00	432.90	16.40	19.34	201.22	163.56	38.72

SRI LANKA
STATEMENT OF IFC's
Held and Disbursed Portfolio
Jan - 2002
In Millions US Dollars

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1999	Aitken Spence	0.00	2.73	0.00	0.00	0.00	2.73	0.00	0.00
1998	Apollo Lanka	0.00	1.11	0.00	0.00	0.00	1.11	0.00	0.00
1996/97	Asia Power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	Fitch Srilanka	0.00	0.09	0.00	0.00	0.00	0.09	0.00	0.00
1997	LOFAC	1.26	0.30	0.00	0.00	0.86	0.16	0.00	0.00
1981	Lanka Hotels	0.00	0.64	0.00	0.00	0.00	0.64	0.00	0.00
1996	Lanka Orix Lease	0.56	0.00	0.00	0.00	0.56	0.00	0.00	0.00
1998	MLL	0.75	0.00	0.00	0.00	0.75	0.00	0.00	0.00
2000	NDB Housing Corp	0.00	1.06	0.00	0.00	0.00	1.06	0.00	0.00
1999	Nations Trust	0.00	1.09	0.00	0.00	0.00	1.09	0.00	0.00
1997	Packages Lanka	0.00	1.11	0.00	0.00	0.00	1.11	0.00	0.00
1999	SAGT	35.00	7.30	0.00	0.00	12.00	3.62	0.00	0.00
2000	Suntel	0.00	7.50	0.00	0.00	0.00	7.50	0.00	0.00
1988/95	Union Assurance	0.00	0.50	0.00	0.00	0.00	0.50	0.00	0.00
	Total Portfolio:	37.57	23.43	0.00	0.00	14.17	19.61	0.00	0.00

FY Approval	Company	Approvals Pending Commitment			
		Loan	Equity	Quasi	Partic
	Total Pending Commitment:	0.00	0.00	0.00	0.00

Annex 10: Country at a Glance

SRI LANKA: Renewable Energy for Rural Economic Development

Getting the Country at a glance....

Additional Annex 11: GEF Incremental Cost Summary SRI LANKA: Renewable Energy for Rural Economic Development

Incremental Costs and Global Environmental Benefits

Introduction

The Government of Sri Lanka (GOSL) has requested the Bank to prepare a follow-on project to the Bank-GEF-financed Energy Services Delivery (ESD) Project, which has a closing date of December 2002. The Bank, GEF and GOSL are pleased with the progress that has been achieved under the ESD Project. After some initial delays, **all indications are that the ESD Project will meet or exceed its targets** prior to the project closing date (see Annex 13 for an ESD status report). As a result, GOSL and the Bank are keen to build on the ongoing momentum in the follow-on project.

Complementarity of GEF and IDA Project Objectives

Like the ESD Project, the RERED Project's objective features renewable energy prominently, and in this sense, the GEF and IDA objectives in both projects are closely aligned. Prior to ESD, a nascent renewable energy market existed in the country. Recognizing the strong potential of this subsector, the ESD Project objective focused on developing a sustainable renewable energy market in Sri Lanka. As ESD draws to a close, this market has reached the early stages of maturity, and could be characterized as in its adolescence.

The RERED project will pursue an objective which aligns GEF and IDA still more closely by supporting the Sri Lankan renewable energy market to full maturity (of greater interest to GEF), and at the same time focusing the renewable energy market more directly toward rural development (of greater interest to IDA).

Barriers to Renewable Energy and Energy Efficiency Development and Barrier Removal Strategy

The ESD Project has laid the foundations for sustainable growth of renewable energy industry in Sri Lanka, but certain critical barriers still need to be addressed to allow this remarkable growth to reach its full potential both in terms of global environmental benefits and in rural development impact. Though these barriers are different for different technologies there are some common themes:

- Market size needs to be increased in order to take advantage of economies of scale. One avenue for this is to target poorer households and other niche markets.
- Capacity building is still needed for achieving greater outreach and proliferating new renewable energy technologies/applications.
- Renewable energy needs to be integrated into general policies and strategies for the country's energy sector development, including power sector reforms.
- Availability of microfinance for off-grid (including solar PV) projects and long term finance for grid connected projects needs to be enhanced.
- Refinement is needed in pricing mechanisms for grid connected renewable energy projects.

Table 11-1 provides a technology-specific summary of ESD progress and remaining barriers.

Table 11-1: Achievements and Remaining Barriers for Renewable Energy

Renewable Energy Technology	Achievements	Remaining Barriers
Solar	<p>SHS technology well accepted and established.</p> <p>4-5 commercial suppliers with a network of over 50 sales and service centers</p> <p>Global technical and service quality standards in place</p> <p>Microfinance and private sector partnership model for market development and financing; commercial banks involved.</p> <p>Over 500 technicians and sales professional trained</p> <p>Adoption of Solar programs by vanguard provincial governments</p>	<p>Economies of scale to sustain business not achieved.</p> <p>Development has not progressed to non-SHS applications/productive uses.</p> <p>Outreach and awareness building for poorer households and for other applications are lacking</p> <p>Limited microfinance players and also limited availability to SHS.</p> <p>Only a few provincial governments have adopted the solar program, and even there, it has not been integrated into rural development strategy</p>
Village Hydro (off-grid)	<p>Community based projects have evolved to the point where total grant dependence has been eliminated.</p> <p>Capacity built in private sector to identify, develop and implement such projects through communities.</p> <p>8-10 capable players now involved in developing these projects, and actively sharing know-how.</p> <p>Potential village hydro resource study available</p> <p>Commercial banks are financing such projects</p>	<p>The business model still requires grant funding.</p> <p>The issues of stranded investments not addressed and legal/policy status of village hydro is unclear.</p> <p>Daytime productive use of electricity from such projects not realized.</p>
Mini-Hydro	<p>Substantial capacity built for feasibility study, design, construction, operation, maintenance, and financing of mini-hydro investments.</p>	<p>Need to ensure that mini-hydro is appropriately incorporated into restructured power sector</p> <p>Long-term financing still a constraint</p>

	<p>Small Power Purchase Agreement provides effective legal basis for electricity sale to CEB.</p>	<p>Transparent pricing mechanism needed for SPPA.</p>
Wind	<p>Technical and economic feasibility of projects established.</p> <p>Interconnection issues resolved.</p> <p>Capacity now exists within the utility and the indigenous engineering industry to oversee construction and operation of such projects.</p> <p>Private sector interest in wind projects becoming evident.</p> <p>Resource assessment completed (through GEF support, via UNDP)</p>	<p>High costs of wind energy pose problems for widespread applications.</p> <p>Framework for commercial development of wind projects not available.</p> <p>Incremental costs and power pricing for grid sales not established.</p> <p>Limited private sector players and capacity in Sri Lanka.</p> <p>Constrained availability of long term finance and limited appetite among lenders.</p>
Biomass	<p>Biomass widely used for domestic and commercial applications, but was not addressed under ESDP. However, indigenous entrepreneurs have proposed biomass gasification projects and there is interest and limited capacity to develop this resource.</p>	<p>While technical feasibility of biomass gasification has been established in other countries of the region, Sri Lanka has little experience and limited capacity/skills to develop such projects.</p> <p>Grid and off-grid markets assessments not available.</p> <p>Commercial awareness among private sector and financial institutions is limited.</p>
Capacity building in utility for energy efficiency/DSM and renewables	<p>Concept has been accepted and mainstreamed within utility</p> <p>Capacity to design and execute DSM programs in place</p> <p>Energy efficient building codes developed and in use.</p> <p>Partial Private Sector Energy Service Company established</p> <p>Framework for power purchase from grid-connected small hydros in place</p>	<p>Limited adoption of energy efficient practices by commercial builders and industries</p> <p>Limited ESCO development.</p> <p>Lack of framework for power purchase from wind and biomass projects.</p> <p>Limited expertise and capacity in private sector to implement energy efficiency projects.</p> <p>Uncertain future of DSM under reforms scenario and independent regulation.</p>

Training and awareness generation programs for renewables within utility staff
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The Baseline

The baseline scenario is that the ESD Project ends as scheduled in December 2002, without a follow-up project. In this scenario, further development of renewable energy in Sri Lanka would slow markedly, and the foundations laid in the ESD project would likely begin to deteriorate over time. In particular, the lack of a follow-on project is likely to be interpreted by many of the key stakeholders as a lack of commitment on the part of the Bank and GEF, without whose support, the private sector and NGOs would be less likely to invest further time and money in renewable energy. Government also would slowly lose its focus on renewable energy as an important contributor to a sound power sector policy.

The Alternative (The Project)

The project will support provision of electricity through: (i) financing and grant mechanisms for solar home systems and other solar energy applications in rural areas through private companies, NGOs and MFIs; (ii) developing and financing wind energy and biomass electricity projects; (iii) developing and financing small hydro projects, both grid connected and off-grid; (iv) promoting income generation and social service delivery improvements based on access of villages to electricity and (v) technical assistance for promotion of energy conservation, household energy efficiency, development of carbon trading mechanisms and integration of renewables into government policy, provincial council development strategies and sector reform initiatives. Co-financing would be sought for all five sub-components; in particular from GEF, which cofinanced the ESD project as well. The project also would finance complementary energy sector technical assistance related to renewable energy including: (i) energy efficiency and demand side management initiatives, especially in promoting private sector delivery of efficiency services and to facilitate faster implementation of EEBC; and (ii) technical assistance for sector reforms and addressing renewable energy issues as relevant to the sector reform and development strategy.

Incremental Cost Summary

The proposed RERED baseline and GEF alternative are described below by project component:

Grid-Connected Renewable Energy

Baseline – In general, the non-RERED baseline for grid connected renewable energy development in Sri Lanka would be continued development of grid-connected mini-hydro in the near term. In the longer term biomass plants could be expected to come on line, and possibly wind. The prospects for these latter two would be greatly enhanced by the introduction of a carbon trading market in Sri Lanka. The prospects for such a market developing are moderate in the medium term.

However, there are two serious concerns relevant to further grid connected renewable energy development:

- (i) disputes between small power producers and CEB over the SPPA and Tariff, which have arisen in the past, could resurface. In the absence of unbiased arbitration, the credibility of this legal framework could suffer, leading to lack of confidence, and a resultant lack of interest in further development; and

- (ii) the chronic lack of availability of long-term financing could choke further development.

The Government will continue its own efforts on power sector reform including staff and consultant work. The portion of Government's efforts directly relevant to renewable energy is estimated at \$100,000.

GEF Alternative - Limited GEF technical assistance support will be needed to assist the Government in: (i) resolving the Small Power tariff issues relevant to all small-scale grid connected renewables, (ii) ensuring that grid and off-grid renewables are properly incorporated into the Power Sector Strategy in general, and the Rural Electrification Strategy and Plan in particular, and (iii) formulating policies and options for possible participation in proposed international mechanisms and protocols, such as the Clean Development Mechanism (CDM). **The total cost of these activities will be \$300,000, for an estimated incremental cost of US\$ 200,000; no GEF support is sought for the investments to be undertaken under this component:**

- **Grid-Connected Mini-Hydro.** *Baseline* - Of all the renewable energy technologies now commercially present in Sri Lanka, grid connected mini-hydro would fare the best under the baseline scenario although the general concerns expressed above are relevant here. The industry is firmly based on the continued existence of the Small Power Purchase Agreement (SPPA) and Tariff, and as long as these remain in place, additional mini-hydro schemes could be expected to develop. *GEF Alternative* – The RERED Project will assist further mini-hydro development largely by means of the IDA-supported RERED Credit Program. This will ease the long-term financing constraint. There are no GEF incremental costs associated with this investment
- **Grid-Connected Wind.** *Baseline* - In the absence of RERED, wind development after ESD would have an uncertain future. The proposed limited RERED support in Sri Lanka's early CDM development would not occur, reducing the prospects for early development of a CDM transaction in support of Wind development. In addition, in the absence of RERED, a prospective wind power developer would have great difficulty in locating the long-term rupee financing, the preferred financing vehicle for local costs. It is likely that in the long term, a private wind farm would be established in Sri Lanka, however, without RERED the schedule for this development would be extended considerably. *GEF Alternative* – The project would support wind development through support in CDM development and access to long-term credit. There are no GEF incremental costs associated with this investment.
- **Grid-Connected Biomass.** *Baseline* - Biomass fuelled power generation is rarely used in Sri Lanka today. However, current industrial tariff levels are causing some industries to explore alternative power generation systems. This is especially true for industries such as tea and coconut processing with access to significant biomass fuel sources. In the absence of the RERED Project biomass power systems would still develop, although technology introduction would be on an ad hoc uncoordinated basis. Moreover, project developers would have difficulty in securing the necessary long-term financing needed for these investments. In addition, the strict environmental and social safeguards required for Bank projects would not be applied, leaving the more relaxed national standards in force. *GEF Alternative* – The project would support biomass development through support in CDM development and access to long-term credit. There are no GEF incremental costs associated with this investment. component beyond the Grid Connected Renewable Energy support described above and to some extent, the TA package described below.

Solar

Baseline - The rapid growth of the solar industry over the past 18 months, has created a broad-based rural

sales and service network supported by commercially viable and strongly committed companies. While this progress is extraordinary, the Sri Lankan solar industry is still in a vulnerable position today. One key area of vulnerability is the heavy reliance on a single microfinance institution (SEEDS) which is working hard to catch up with solar industry expansion, but the growth from 10 household solar loans per month two years ago to more than 1,000 per month is already straining its capacity. At present the delay between sales closure and SEEDS payment to the solar dealer is an unacceptable 120 days, placing serious cash flow constraints on the solar companies. There is an urgent need to develop new microfinance channels. However, the baseline scenario of IDA/GEF withdrawal would send a strong signal of lack of confidence and likely inhibit new market entrants.

Another point of vulnerability of the current solar industry is its limited ability to cope with the order of magnitude transition in sales volume. This is essentially the transition of moving from a small company setting, which can operate successfully on semi-formal rules and procedures, to a large company, which must rely far more heavily on efficient business procedures and approaches. Moreover, the industry is rapidly transforming its entire approach and in the near future can be expected to expand its business links to more established retail marketing companies already operating on the island. The existing rural dealerships will have to ride this wave of change. This is a tall order for an organization which has only recently commenced operation. The rapid transition of the industry, will require nimble, visionary management which also keeps a close eye on the bottom line. The “Tamil” peace process if it is successful, will open a vast new market for solar. This will require another major expansion effort, on top of the one already underway. While shocks and setbacks are likely, the baseline scenario of IDA/GEF withdrawal would be a major shock which would pose a serious challenge to the industry.

GEF Alternative – The Project would provide support to the solar industry by providing a co-financing grant for sale of solar systems on a \$/Wp basis, with a particular focus on reaching a larger market segment of smaller size systems. The focus on smaller size systems would also be consistent with the IDA poverty alleviation objectives. The grant will be scaled back gradually over project life with a view to fully phase-out GEF grant support before the end of the RERED project. In addition, technical assistance will be provided for: new entrants to the industry to build their capacity, awareness programs specifically targeted at poor households, and to encourage solar system usage for increased income generation.

Incremental Cost - Over the 20 year life of a solar system, an average household in the market for a solar home system spends about US\$ 536 over on kerosene and batteries which could be displaced by a 40 Wp SHS, or about US\$ 292 for similar services which could be displaced by a 20Wp SHS. The NPV of the respective solar systems are US\$ 615 and US\$ 246 respectively. Weighted average system sales during the project period result in an initial incremental cost of US\$ 2.3/Wp for the systems eligible for grant support. This means that the incremental cost begins in year one at US\$ 2.3/Wp. However in future years, as the ceiling for grant support reduces while sales of the larger systems continue to grow, the effective grant per Wp declines considerably during the course of the project to less than US\$ 0.5 /Wp in the final project year. A total of 85,000 systems would be eligible for grant support, at an average size of 29 Wp results in an incremental cost of US\$ 5.7 million. See Annex 2 for a description of the grant mechanism.

Village Hydro

Baseline - The ESD Project is now the major driver for village hydro development in Sri Lanka. In particular, the project promotion grants have attracted interest from a group of consultants and NGOs, which through ESD experience have built capacity in this area. In the baseline scenario, the project preparation grants would cease, and as a result, the interest in promoting village hydros would quickly wane. The reduction in financial viability resulting from the curtailment of the GEF cofinance grant would

stall virtually all of the current village hydro pipeline. Some Provincial Councils would provide support to selected village hydros, and Regional Rural Development Banks would possibly support some initial investments. However, the momentum gained in village hydro development would be almost completely lost, with few additional projects developed beyond the existing pipeline.

GEF Alternative – The RERED project will provide project preparation grants and cofinancing grants through the GEF assistance in support of village hydro development. The grant support will be scaled down over the project life to a level that could sustainably be funded through other resources. GEF technical assistance will be provided to communities and developers to increase the capacity to implement projects and encourage use of energy to enhance income generation opportunities.

Incremental Cost - The incremental cost calculation for a village based renewable energy system Calculations are based on the data collected from the village hydro projects financed by ESD project. At this time, no experience on off-grid biomass and wind system exists in Sri Lanka, and it is assumed that these cost would be similar to a village hydro. During project implementation actual costs will be collected and incremental cost will be adjusted accordingly. were based on a least cost comparison for a typical village of 50 households in Sri Lanka. The village uses for domestic purposes kerosene lamps, car batteries and dry cell batteries for its non cooking energy supply. Exceptionally, a small diesel system is used for water pumping, food processing or other productive activities. The kerosene lamps consumes about 12 liters of kerosene each month at an economic cost of Rs20/liter per household. An average fifty percent of the households use a car battery for radio, television and lighting, requiring recharging cost at least twice a month and capital cost annualized to about Rs100 per month per household. In addition, two to three dry cell batteries are used for lighting at a cost of Rs40 per month per household. The levelized cost of these expenditures compared with a village based renewable energy system shows an incremental cost of US\$ 400/kW.

(Calculations are based on the data collected from the village hydro projects financed by ESD project. At this time, no experience on off-grid biomass and wind system exists in Sri Lanka, and it is assumed that these cost would be similar to a village hydro. During project implementation actual costs will be collected and incremental cost will be adjusted accordingly.)

Small-Scale Wind

Baseline - Small scale wind systems are in use at scattered sites in Sri Lanka, but no coordinated promotional activities have been undertaken. In the absence of RERED, a very small number of new systems would be installed by innovative, enterprising individuals, but the potential environmental and development impact of these systems would remain undeveloped.

GEF Alternative – The project will provide technical assistance for promotion of the off-grid wind energy systems. In particular, support will be provided for demonstration of such systems and awareness building, targeted at increasing the number of installations and developing the market for such systems.

Biomass Village Grids

Baseline - Village grid systems powered by biomass systems are unknown in Sri Lanka. In the absence of the RERED Project, this situation would likely remain for the foreseeable future, leaving the environmental and development potential of this technology untapped.

GEF Alternative – The project will assist the setting up of the biomass supply chain for off-grid biomass

power generation. In addition a few number of demonstration projects on the (gasification) technology, including distribution and the organization of the rural power companies. Awareness creation and information dissemination on these demonstration projects completes the GEF assistance.

Energy Efficiency and DSM

Baseline

The ESD Project, through support to the DSM unit of the CEB, helped create a better environment for energy efficiency and DSM within Sri Lanka. Specifically, GEF support helped CEB in improving the implementation and evaluation of the audit program and the Compact Fluorescent Lighting (CFL) program. The training provided was also helpful in helping develop the ESCO industry. GEF assistance was also provided for developing energy efficiency building codes (EEBC). In absence of further GEF support, the appliance labeling program initiated by the CEB will not be implemented and the DSM program will be restricted to audits and CFLs. The Implementation of the EEBC will be limited in the absence of incentives and demonstration efforts. ESCO market development will be slow due to the lack of capacity building efforts and easy access to commercial Bank financing.

Alternative

The RERED project will provide GEF assistance to support CEB's labeling program, and to expand the range of DSM activities. Implementation of EEBC will take place in two buildings (one new and one retrofit) to demonstrate the benefits EEBC to consumers. Technical assistance will also be provided to promote ESCO development in Sri Lanka.

Incremental Cost Matrix

	Baseline	Alternative	Increment
Domestic Benefits	<p>Thermal (i.e. fossil-fuel) based power sector development continues with some ancillary renewable energy development, amounting to about 25 MW over the next five years. Local environmental degradation associated with fossil fuels accelerates. Sri Lanka's total absence of fossil fuel resources means that increased fossil fuel reliance translates directly to increased demand on foreign currency reserves.</p> <p>New solar and off-grid project investments slow considerably. Total of 20,000 solar systems installed (0.6 MWp) over next five years.</p>	<p>Renewable energy share of generation capacity increases fourfold over 5 year baseline scenario. Thermal expansion will continue, but at a somewhat reduced rate. Investments from largely local firms and generation based on indigenous energy sources reduces reliance on foreign currency reserves and allows profits to remain in Sri Lanka. Increased local employment. Reduction in local environmental degradation.</p>	<p>Mini-hydro, Solar, Village hydro industries reach maturity</p> <p>Wind, biomass technologies firmly established.</p> <p>Rural economic development results from investments in rural areas (employment)</p>

			and increased rural access to electricity.
Global Environmental Benefits	Carbon emission reductions from 25 MW of renewable energy generation, 20,000 SHS, and 10 village grid systems amounting to 450,000 tones of atmospheric carbon displaced.	Carbon emission reductions from installation of 100 MW grid-connected renewables, 80,000+ SHS, and 100 village grid systems (1,700,000 tonnes of carbon displaced)	1,250,000 tones of carbon emissions avoided
Cost by Component			(\$US Million)
Grid Connected Renewable Energy	<p><u>General</u> - Continued growth of known technologies likely although future development will be heavily influenced by small power purchase tariff as well as pace and direction of power sector reform. <i>Baseline expenditures on technical assistance and reform-related work directly relevant to grid-connected renewables: \$0.1 million</i></p> <p><u>Mini-hydro</u> – development of current pipeline as well as new investments will continue, pace and volume dependent on small power tariff</p> <p><u>Wind</u> – development will only proceed with carbon financing</p> <p><u>Biomass</u> – current high industrial electricity tariffs will impel rural industries to explore biomass power generation, but development will be uneven, uncoordinated, and slow</p>	<p><u>General</u> – Grid connected renewable energy would proceed far more quickly, by increasing stability and investor confidence in this subsector. New technologies (wind and biomass) would follow an accelerated development path in part through the operationalization of CDM. Development and operation of distribution concessions by small power producers strong possibility depending on sector reform progress. <i>Alternative expenditures on technical assistance and reform-related work directly relevant to grid-connected renewables: \$0.3 million</i></p> <p><u>Mini-hydro</u> - Development of new projects beyond existing pipeline would continue with greater confidence.</p> <p><u>Wind</u> - Development of first commercial wind farm. This experience could lead to additional private wind development.</p> <p><u>Biomass</u> – coordinated development leads to faster, broader introduction of commercially viable systems.</p>	<p>\$0.2</p> <p>-0-</p> <p>-0-</p> <p>-0-</p>
Solar PV Investments	Developers will continue marketing aggressively, but abrupt end of grant, and constraint of microfinance resources will cause serious upheaval in industry, likely resulting in departure of one or more key industry players. Sales would slump to a much lower volume, and grow gradually from there. <i>Baseline: \$36.4 million</i>	Solar market encouraged to mature and stabilize, allowing smooth transition to non-GEF operation. Solar also reaching poorer households. GEF Alternative \$42.1 million.	\$5.7
Community/off grid		Steeply expanded village hydro	\$0.5

Investments	Village hydro development momentum would be lost. New installations would steeply decline to about 2 per year. Without benefit of follow-up assistance, some existing village hydros would fall out of use before the end of their useful life. Potential for mini-grids based on other renewable energy technologies (e.g. biomass) would remain undeveloped for the foreseeable future. <i>Baseline per community: \$19,300</i>	development (80+ per year) at reduced preparation costs and with increasing contributions from Government. TA to solidify Village Hydro Users Group would offer key path to robust sustainability. Other renewable energy mini-grids developed and incorporated into Independent Village Grid program. GEF <i>Alternative per 11 kW community system: \$30,800 (increment = \$400/kW)</i>	\$0.7
Energy Efficiency			
Technical Assistance	<u>DSM</u> – Continued strong audit, load research, and lighting program, but weak progress on labeling program, and slow implementation of energy efficiency building code (EEBC). <i>Baseline expenses by CEB DSM Branch: \$0.1 million.</i>	<u>DSM</u> - Expanded DSM program (e.g. water supply, public lighting, etc.). Demonstrate EEBC in two buildings. Refrigerator testing & labeling program. <i>Alternative expenses on expanded DSM program: \$0.8 million.</i>	\$2.5
Monitoring & Evaluation	Small-scale, highly targeted initiatives by local and international agencies would continue. Lack of coordination of these efforts would seriously compromise their impact. <i>Baseline technical assistance expenses: \$0.25 million</i> Monitoring and evaluation of renewable energy progress and impacts not explicitly accounted for, but included in general power sector M&E activities. <i>Baseline M&E expenses: \$0</i>	Coordinated technical assistance and pilots support national strategy resulting in rapid uptake of commercially viable renewable energy systems. Alternative Technical Assistance expenses: \$2.75 million Quantitative monitoring and evaluation of renewable energy progress and impacts, especially impacts on rural development undertaken. <i>Alternative M&E expenses: \$0.7 million</i>	\$0.7
GEF Incremental Costs			\$10.3*

* Of this total amount, co-financing will cover US\$ 2.3 million. GEF will cover only US\$ 8.00 million

Financing Plan

Components	Indicative Costs (US\$M)	% of Total	IDA (US\$M)	GEF (US\$M)	Other (US\$M)
Grid-Connected Hydro, Wind and Biomass	90.3	67.5	49.2	-	41.1
Solar PV Investments	28.3	21.1	18.80	3.90	5.6
Community Investments (hydro, biomass)	4.4	3.3	3.60		0.8

Energy Efficiency and DSM	1.0	0.7	0.60	-	0.4
Cross-sectoral Energy Applications	4.60	3.5	2.30	0.70	1.6
Technical Assistance	5.1	3.8	0.5	3.40	1.2
Total	133.70	100%	75.0	8.0	50.7

Notes: Other includes US\$ 800,000 from GOSL for Monitoring and Evaluation

Sustainability

The Technical Assistance and cofinancing grant structures included in the RERED Project are specifically designed to enhance sustainability of the Project supported activities during and after the project period. In particular, there are several factors which will contribute to this sustainability goal:

- (i) a regime of declining GEF grants, with a transition to a more sustainable grant structure such as a Rural Electrification Fund
- (ii) explicit incorporation of renewable energy into power sector planning in general and rural electrification in particular
- (iii) a monitoring and evaluation program which is aimed at quantitatively assessing the contribution of energy to rural development thus providing a clear indication of its value to decision makers and civil society
- (iv) specific TA activities aimed at identifying potential barriers to sustainability and developing mitigation strategies

Monitoring & Evaluation and Information Dissemination

The program also includes a strong emphasis on monitoring and evaluation of progress toward Project objectives. The physical monitoring begun in the ESD Project will continue in an expanded way for RERED. In addition, monitoring of rural development impact will be assessed by means of a panel survey or other suitable program which uses repetitive visits to control and beneficiary villages to track changes over time. Professional evaluation of the results will provide rigorous, unbiased information on actual development impacts of the investments. This will be useful not only for Sri Lanka, but as an important case study in the international development of renewable energy.

Information dissemination of project progress will take two tracks. Within Sri Lanka, detailed project progress reports will be provided to MOPE and MOFP, and made available to other relevant public sector decision makers and key opinion leaders in civil society. Outside Sri Lanka, progress of and results both the ESD and RERED will be disseminated through contributions to technical journals, conference presentations, etc. The AU will facilitate this information dissemination program, and will also serve to facilitate visits to Sri Lanka from other countries wishing to learn from its renewable energy experience. Several such renewable energy study tour visits, from Laos, Cambodia, Bangladesh have already been hosted by Sri Lanka under the ESD Project. These have provided useful insights into the design and operation of a successful project, as well as a time-efficient means of observing a wide range of renewable

energy (e.g. solar, mini-hydro, village hydro, wind) technologies in appropriate field operation.

GEF STAP Review and Response

A review of the GEF Project Brief, undertaken by Dr. Daniel Kammen, of the GEF Scientific and Technical Advisory Panel, is attached. In general, the Task Team is in agreement with these comments, and has incorporated relevant revisions into the document as appropriate. The exception is the incorporation of conditions relating to opening of Pension Funds for renewable energy investments and the implementation of a rural electrification subsidy mechanism. While the team agrees in principle on these issues, we believe that conditionality is not the appropriate way to implement them. The Government has indicated a willingness to follow through on these issues, and has shown good progress in this regard.



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March 9, 2002

To: Mac Cosgrove-Davies, Subramaniam V. Iyer, Jon Exel
From: Daniel M. Kammen
Re: Review of: Sri Lanka Renewable Energy for Rural Economic Development Project (P076702)

Summary:

This is an important project, which builds on and expands a largely successful GEF project already in place in Sri Lanka. There is clearly a benefit to moving this extension/expansion phase into operation, there is a danger to magnify some of the problematic aspects of this project if this is done too quickly. I recommend that either an interim project be approved, or that the full-scale effort be initiated in conjunction with an outside review. The review would then need to be formally recognized so that the new project will have a clear timetable to evaluate and if appropriate act on the recommendations of the review at a stage still early on in the new Renewable Energy for Rural Economic Development Project.

In that context I recommend support for this project.

Major Comments:

The proposed RERED Project builds on the ongoing Energy Services Delivery (ESD) Project, which was originally scheduled to close in December 2002. Ideally, the RERED Project would incorporate the results of an ESD Project Completion Review. However, the ESD Project has gained considerable momentum over the last 18 months, and is now expected to be fully disbursed well before the scheduled closing date. Even with the proposed fast-track processing of RERED, this faster-than-expected project completion will result in a funding gap of several months for renewable energy industries which have just begun to reach sustainable business volumes. This funding gap will result in a severe shock, especially to the solar industry which is in a heavy expansion mode and therefore quite sensitive to such shocks. Increasing this gap by several months to provide time for conducting and incorporating a full completion review would be counter productive to the GEF/IDA objectives for both ESD and RERED. However, there is also a risk that problems existing in the ESD Project may be replicated – on a larger scale – in RERED. To address this issue while still maintaining the fast track approach, I have two recommendations:

- *Commission the Project Completion Report immediately to minimize delays in defining key lessons for RERED*
- *Build flexibility into RERED Project design to ensure there is room to incorporate lessons. In particular, flexibility should be included in the Credit Program Operating Guidelines, the Eligibility Criteria for the Participating Credit Institutions, and the overall Technical Assistance Package. The ability to modify project design details in these areas should permit sufficient flexibility to incorporate lessons identified in the Project Completion Report.*

Solar Market Development – The rapid growth of the Sri Lankan solar market over the past 18 months is one of the most interesting aspects of the Energy Services Delivery Project. This unprecedented market growth, and the prospects for long-term sustainability, warrant a detailed review by an independent expert with broad knowledge of international solar market experience. This will provide not only important lessons to apply to the RERED Project, but also to other projects now under preparation internationally.

- *The Project Completion Report should include a subtask which focuses on the experience and prospects for the Sri Lankan solar market.*

Microfinance – One key element of the recent solar market development is the introduction of microfinance to support household purchases. However, only one microfinance institution is currently providing this service, and its capabilities are not keeping pace with industry growth. The Project Appraisal Document (PAD) rightly identifies this as a critical issue for further market growth, and a potential point of vulnerability.

- *The RERED Project should include TA activities specifically focused on: i) upgrading the capabilities of the existing microfinance provider; and ii) rapidly inducting new microfinance providers into the program including traditional microfinance institutions as well as rural retail outlets which themselves provide credit and perhaps leasing companies.*

Grid Connected Renewable Energy Market Development – The RERED Project proposes to support a substantial expansion (100 MW, in addition to the ~30 MW installed under ESD) of grid connected renewable energy. This includes mini-hydro, for which the market was established under ESD, and also two new market areas: biomass and wind. It is clear that Sri Lanka has renewable resources in both of these new areas, but the financial viability of a Sri Lankan wind or biomass power market has not been proven. The project includes GEF support for private development in these areas in the form of cost-sharing of business plan development, but no GEF grant support for investments. Instead, GEF

support would assist in the initial development of a Clean Development Mechanism (CDM) carbon trading regime that could provide additional ‘climate change’ funding for these private investments. While I’m supportive of this overall approach, the PAD should more clearly explain the division of responsibility – and funding – between the GEF support and the future CDM support.

- *Clarify the division of responsibility and funding between GEF and CDM activities, and in particular, ensure a clear mechanism is in place to prevent commingling of GEF and CDM funds.*

Long-Term Sustainability – The case for GEF support as presented in the PAD is clear and compelling. However, it must also be clear that additional GEF support beyond RERED should not be expected. Similarly, Sri Lanka may graduate from IDA during the RERED Credit period. For these reasons, a follow-on project modeled after RERED is unlikely. The project design therefore rightly places emphasis on long-term, post-project sustainability. In particular:

- with regard to access to long-term funds, the task team should consider a condition requiring the Government to open pension funds or other available sources of long-term liquidity to Participating Credit Institutions
- a condition should also be considered linking progress on the rural electrification subsidy mechanism to the project processing schedule

Detailed Comments

Page 4, under “the Electricity Sector” – “This implies an investment of US\$ 1-1.2 billion dollars in generation, transmission and distribution if only the grid is extended to provide access; the greater utilization of renewable energy systems will reduce these costs”.

This calculation is unclear, and does not appear to be full documented in the appendices.

Page 5, under 2.3 Rural Electricity Access and Rural Economic Development - “All indications are that the ESD Project will meet or exceed its revised -targets for Solar Home Systems (***revised downwards from 30,000 units to 15,000 units at mid-term, because of a slow start***) and the original key targets for all other components prior to the project closing date.”

Italics mine: the reasons for this slow start should be described. Is this simply initial setup, or are there functional features of the project that should be addressed (i.e. see comment on page 1, para 2, above).

The PCD lists (pages 63 and 65) criteria for qualifying MFIs and PCIs. What are these based on?

Page 10 – under Solar PV investments – “In particular, the project will provide refinance, grant, and TA support to seek to solidify the existing middle-range solar home system market and expand service to other applications such as: i) smaller systems accessible to a poorer market segment; ii) community applications for health clinics, schools, street lighting, etc.; and iii) commercial systems for water pumping, telecom, and other applications.”

The expansion to school, clinic, and other markets is not straightforward (as was seen in the South African RAPS efforts). A more detailed plan, with market assessment and testing of usage/economic returns in this area is needed

Same para – “The indicative targets are 85,000 household systems and 2,000 community, commercial and institutional systems”. How are these targets determined?

Page 12 – “For *rural households*, there will be direct and indirect benefits of increased access to adequate and reliable supplies of electricity from off-grid supply or solar photovoltaic systems, which will improve the quality of their lives and *expand income producing opportunities.*”

This assessment needs to be done more carefully. Because Sri Lanka is such a small country, off-grid areas are never all that far from grid-connected areas. So all commercial activity is concentrated primarily in the grid-connected towns, and people from off-grid areas come into these towns for their business. The only off-grid commercial activity are a few shops, but this is really not all that frequent. SELCO has been trying to target this sector, but apparently they find this sector is marginal.

There are some areas where a market *could* develop, and appears promising. Sri Lanka has a very large garments export industry. One could provide loans for solar-powered sewing machines for women to use in off-grid areas.

Another opportunity is to develop housing in off-grid areas with a SHS built in to the house. Combine house loan + solar loan. This could also address war refugee issues.

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This notion, while excellent in theory, does not seem to fit with the ongoing project or the available resources. How specifically will this be implemented.

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Has there been an assessment to see if there are privately owned credit institutions who are interested in SHS, or micro-hydro systems?

The document should also address the means to support financing for technician training programs and the SLBDC awareness program.

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As stated on the page 2 comments, these limitations may largely be due to the cash flow issues facing SELCO.

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RESPONSE TO STAP REVIEW COMMENTS

General Comments

Overview Recommend that either an interim project be approved, or that the full-scale effort be initiated in conjunction with an outside review.

Res.: The outside review will be undertaken and completed by end June 2002. Extensive reviews by the Bank and outside entities of the ESD Project have not identified serious problems. It is anticipated that lessons from the outside review can be incorporated into the project through the flexibility described in the response to C1.2 below.

C1.1. Project Completion Review - Commission the Project Completion Report immediately to minimize delays in defining key lessons for RERED.

Res.: Agree. Furthermore, a lessons learned/best practice study will be conducted before closing of the ESD project.

C1.2. Project Completion Review - Build flexibility into RERED Project design to ensure there is room to incorporate lessons.

Res.: Agree. One of the main lessons learned during the implementation of the ESD project was that fine-tuning of the design as well as adaptation to the changing reality requires rural and renewable energy projects to be flexible. The multiple driving elements (commercial financing, public financing, NGOs, MFIs, commercial businesses, etc) that come together in any of these projects on a national, regional and local level should allow close monitoring and real time interference. This has been included as much as possible in the design of the RERED project.

C2. Solar Market Development – The Project Completion Report should include a subtask which focuses on the experience and prospects for the Sri Lankan solar market.

Res.: Agree. In addition, the assignment will document the experiences and lessons learned for replication purposes in other countries and programs.

C3. Microfinance – The RERED Project should include TA activities specifically focused on: i) upgrading the capabilities of the existing microfinance provider; and ii) rapidly inducting new microfinance providers into the program including traditional microfinance institutions as well as rural retail outlets which themselves provide credit and perhaps leasing companies.

Res.: Agree, this technical assistance has been included as one of the packages mentioned under component v of the RERED project.

C4. Grid Connected Renewable Energy Market Development – Clarify the division of responsibility and funding between GEF and CDM activities, and in particular, ensure a clear mechanism is in place to prevent commingling of GEF and CDM funds.

Res.: Agree. The Government with support of DFID has conducted a first activity to identify the key issues that need to be addressed for an effective operational mechanism for CDM activities. With support of the World Bank, the Ministry of Environment is embarking on National Strategy Studies which will include baseline studies and institutional arrangements. The RERED project will complement these activities to remove additional barriers for project sponsors to obtain the funds.

C5.1. Long-Term Sustainability – with regard to access to long-term funds, the task team should consider a condition requiring the Government to open pension funds or other available sources of long-term liquidity to Participating Credit Institutions

Res.: Agree in principle. However, condition is not necessary at this stage as Government has agreed on the approach and is actively pursuing the option through the Administrative Unit who is facilitating a dialogue between the national Pension Fund (EPF) and the Participating Credit Institutions to allow the EPF to purchase bonds at market rates.

C5.2. Long-Term Sustainability – a condition should also be considered linking progress on the rural electrification subsidy mechanism to the project processing schedule.

Res.: Agree in principle. However, the Government has agreed on the issue and is taking steps to address these. A first outcome is a draft Rural Energy Policy paper, which is a condition of project negotiation.

Detailed Comments

Comments	Responses
Page 4 , under “the Electricity Sector’ – “This implies an investment of US\$ 1-1.2 billion dollars in generation, transmission and distribution if only the grid is extended to provide access; the greater utilization of renewable energy systems will reduce these costs”. This calculation is unclear, and does not appear to be full documented in the appendices.	The calculation is part of the grid extension plans of CEB and the current cost of extending the grid by CEB. The cost per household of about US\$600 are within the international accepted parameters of US\$250 to US\$1,000 per household and found to be realistic.
Page 5, under 2.3 Rural Electricity Access and Rural Economic Development - “All indications are that the ESD Project will meet or exceed its revised -targets for Solar Home Systems (<i>revised downwards from 30,000 units to 15,000 units at mid-term, because of a slow start</i>) and the original key targets for all other components prior to the project closing date.” The reasons for this slow start should be described. Is this simply initial setup, or are there functional features of the project that should be addressed (i.e. see comment on page 1, para 2, above).	There was a slow start because of (i) the learning curve companies had to go through including the establishment of the rural infrastructure and (ii) the non participation of micro financing institutions. Major movement in the market started after one of the local solar companies was purchased by a large multinational solar company (Shell Solar) prompting all market players to significantly expand their market presence.
The PCD lists (pages 63 and 65) criteria for qualifying MFIs and PCIs. What are these based	Previous successful project experience in Sri Lanka (for the commercial and development

on?	banks, and Bangladesh (for the MFI). These were augmented by best practice experiences world wide.
<p>Page 10 – under Solar PV investments – “In particular, the project will provide refinance, grant, and TA support to seek to solidify the existing middle-range solar home system market and expand service to other applications such as: i) smaller systems accessible to a poorer market segment; ii) community applications for health clinics, schools, street lighting, etc.; and iii) commercial systems for water pumping, telecom, and other applications.” The expansion to school, clinic, and other markets is not straightforward (as was seen in the South African RAPS efforts). A more detailed plan, with market assessment and testing of usage/economic returns in this area is needed.</p>	<p>Agree that more work is needed, but to the extent possible, there will be a demand-driven approach to support. For expanding the solar market to smaller systems, the existing dealers are well placed to develop their own plans. TA will be provided to the cross-sectoral ministries to develop appropriate approaches for health, education, etc. The ‘innovation solicitation’ approach also will be used to bring forth approaches on a market basis.</p>
<p>Same para – “The indicative targets are 85,000 household systems and 2,000 community, commercial and institutional systems”. How are these targets determined?</p>	<p>The targets are based on business plans from solar dealers, village hydro facilitators, statistics from AU, PCIs, and business plan MFI. Current monthly sales for solar home systems for the industry is 1,300. In a conservative scenario with no further growth in monthly sales this would lead to 78,000 or about 50% of the real market.</p>
<p>page 12 – “For <i>rural households</i>, there will be direct and indirect benefits of increased access to adequate and reliable supplies of electricity from off-grid supply or solar photovoltaic systems, which will improve the quality of their lives and <i>expand income producing opportunities</i>.” This assessment needs to be done more carefully. Because Sri Lanka is such a small country, off-grid areas are never all that far from grid-connected areas. So all commercial activity is concentrated primarily in the grid-connected towns, and people from off-grid areas come into these towns for their business. The only off-grid commercial activity are a few shops, but this is really not all that frequent. SELCO has been trying to target this sector, but apparently they find this sector is marginal. There are some areas where a market <i>could</i> develop, and appears promising. Sri Lanka has a very large garments export industry. One could provide loans for solar-powered sewing machines for women to use in off-grid areas.</p>	<p>Other country experiences have taught us that a lot of productive opportunities with regard to electricity are available. With a focused productive uses program for example in Indonesia a substantial amount of new businesses emerged or existing businesses to a more efficient and lower cost electricity operation.</p> <p>One of the dealers had a promotional activity where they provided free sewing machines if a household purchased their solar system.</p>
<p>Another opportunity is to develop housing in</p>	<p>In keeping with the project approach of</p>

off-grid areas with a SHS built in to the house. Combine house loan + solar loan. This could also address war refugee issues.	encouraging market driven solutions, this suggestion could become a strategy of one of the solar dealers.
Middle of page 17 – “It is easier to make a commercial run village hydro project more social than the visa versa “ and “Adopt light-handed regulation for local, rural situation”. These statements, at minimum, need some documentation.	We have addressed this in the text.
Bottom of page 41 - “The design is flexible, with changes being introduced in response to implementation experience, based on reports and information brought together by the AU and the findings of Bank supervision missions. The most critical change introduced during ESD implementation was the modification of eligibility criteria to permit a non-bank microfinance organization to be a PCI.” Excellent and important point.	
Page 56 – “Through NGOs, poor households will be taught handicraft skills.” This notion, while excellent in theory, does not seem to fit with the ongoing project or the available resources. How specifically will this be implemented.	Several NGOs have experience in this area and will work with dealers, MFIs and NGOs to integrate as need be.
Page 66 – Do any of these banks currently lend for SHS purchases?	One commercial has given a few SHS and a development bank has on-lent to an MFI for SHS loans. However the reluctance of most of these banks to loan for SHS was the incentive for brining in the first MFI.
Page 75: A summary of the ZESD Solar Progress Solar review should be included.	Several of the results have been included in the detailed project description.
Page 79, table 11.1 – For SHS – “Global technical and service quality standards in place”. Current program does not do enough to emphasize service. This, again, is an important point that will be come increasingly central over time.	
Bottom of page 84 – The incremental cost calculations are sound..	
Page 93 - Criteria No. 2 – “In order to become eligible to participate in the ESD Credit Program and to maintain their eligibility, credit institutions must be privately owned and controlled, and meet the following criteria.”. Has there been an assessment to see if there are privately owned credit institutions who are interested in SHS, or micro-hydro systems?	Several of the PCIs have provided credit for village hydro and some also for SHS. However the RERED project will include a redoubled effort to bring in additional consumer finance institutions.
The document should also address the means to	This is part of the technical assistance

<p>support financing for technician training programs and the SLBDC awareness program.</p>	<p>package as mentioned under the solar component.</p>
<p>Page 83 – “Another point of vulnerability of the current solar industry is its limited ability to cope with the order of magnitude transition in sales volume. This is essentially the transition of moving from a small company setting, which can operate successfully on semi-formal rules and procedures, to a large company, which must rely far more heavily on efficient business procedures and approaches.”</p> <p>As stated on the page 2 comments, these limitations may largely be due to the cash flow issues facing SELCO.</p>	<p>In varying degrees, this issue is affecting all of the solar dealers.</p>

**Additional Annex 12: Operating Guidelines for the RERED Credit Program
SRI LANKA: Renewable Energy for Rural Economic Development**

Part 1. Credit and Grant Arrangements

Measure	Arrangement/Entity
1. Loan Amount and Financing Sources	Total: US\$133.8 million IDA: US\$75.0 million, GEF: US\$8.0 million and others US\$50.8 million
2. Borrower	Democratic Socialist Republic of Sri Lanka
3. Executing Agency	DFCC Bank / Administrative Unit (AU)
4. Estimated Commitment Period	Four years after Credit Effectiveness
Interest Rates	
5. Service Charge to Government of Sri Lanka (GOSL)	Standard Service Charge levied by the International Development Association (IDA)
6. Interest Rate to Participating Credit Institutions (PCIs)	<ul style="list-style-type: none"> ▪ Average Weighted Deposit Rate (AWDR) which is the weighted average of the interest rates paid to depositors by all commercial banks on interest-bearing term deposits, as issued weekly by the Central Bank, or another appropriate rate to be determined during project implementation by GOSL in consultation with IDA. ▪ Rate subject to revision (both new and existing loans) every 6 months.
7. Interest Rate from PCIs to Final Borrowers	To be determined by PCIs in agreement with their clients.
Maturity Structure of Credit and Subloans	
8. IDA to GOSL	Standard IDA terms with 40 years maturity.
9. PCIs to GOSL	Amortization based on an aggregate of individual subloans, repayable in 20 equal semi-annual installments immediately following the date of the fifth anniversary on which the PCI made the first withdrawal.
10. Subloans	Maximum 10 years, including maximum 2 year grace. Maximum maturity not to exceed useful economic life of equipment financed.
11. Applicant Eligibility Criteria	Any private enterprises, NGOs, cooperatives and individuals operating in Sri Lanka are potentially eligible, subject to PCIs' creditworthiness assessment.
12. Eligible Subprojects	<ul style="list-style-type: none"> ▪ Private investment proposals for: (a) grid-connected renewable energy power projects (with capacity not more than about 10MW); (b) off-grid village based renewable energy power projects; (c) solar home systems; (d) other renewable energy investments and (e) energy efficiency/demand side management (DSM) investments.

	<ul style="list-style-type: none"> ▪ Funds cannot be used for financing or acquisition of existing assets (including land) or refinancing of existing debts or accrued interest. However, refinancing of eligible subprojects approved by PCIs within 12 months of Credit Effectiveness will be eligible.
13. Maximum Amount of Refinancing	Maximum of US\$8.0 million for any one subproject, or single borrower exposure limit of concerned PCI, whichever is lower.
14. Portion of Subloan Refinanced	Maximum of 80% of PCI total loan amount for a specific subproject.
Other Measures	
15. Responsibility of Administrative Unit (AU)	<ul style="list-style-type: none"> ▪ Process disbursement requests for loans approved by PCIs under their 'free limit' and process disbursement requests for loans above PCIs free limit approved by IDA. Process disbursement requests for GEF grant co-financing. Free-limit for subloans (i) in respect of grid connected investments: US\$ 1.0 million; (ii) in respect of off-grid investments US\$ 100,000] ▪ With respect to subloans and GEF grant cofinancing, maintain disbursement records and accounts of each PCI, keep supporting disbursement documents, and keep bank accounts relating to disbursement. Maintain Project Accounts. ▪ Appoint independent auditors to continuously verify data entry by solar companies and perform systems reviews in respect of cofinancing grant disbursement requests made to the AU. ▪ Inform IDA from time to time regarding the progress of the Project, provide regular reports on the progress of the Project, and assist IDA and GEF supervision and/or evaluation missions. ▪ Maintain RERED credit program related statistical records. ▪ Monitor timely preparation and submission of subproject completion reports. ▪ Submit quarterly statistical reports on the RERED Project and other periodic reports (e.g., semi-annual collection performance report) as required by IDA and GEF. ▪ Perform project support including facilitating barrier removal with stakeholders, procurement of consultants, award of contracts, and monitoring of Technical Assistance assignments. ▪ Perform other tasks and functions as are necessary to achieve the objectives of the Project.
16. Loan Approval Procedures (if not previously satisfied under ESD Project)	The following are subject to approval by IDA: (i) the first two subloan proposals, irrespective of size, presented by each PCI, (ii) subloan proposals above the 'free limit', (iii) each PCI's first solar home systems subloan proposal, (iv) each subproject developer's first solar home systems subloan proposal, (v) each PCI's first grid-connected wind and biomass proposal and (vi) each PCI's first village based wind and biomass proposal.
17. Environmental/Social	In accordance with national standards and procedures.

Assessment Requirements	
18. Subloan Documentation Requirements	<p>Subloans involving refinancing below ‘free limit’: (a) PCI assessment of creditworthiness of subborrower; (b) description of project and procurement methods; (c) list of goods and services to be financed; (d) project costs and financing; (e) terms and conditions of subloans; (f) timetable for implementation; (g) evidence of environmental/social clearance (except solar projects); and (h) financial and/or economic justification for the project.</p> <p>Additional information for refinancing above the “free limit”. (a) Description and Appraisal of the project; (b) cash flow projections for subborrower and the project; (c) assessment of technical and commercial feasibility; and (d) financial and economic justification for the project.</p>
19. Procurement Procedures	<ul style="list-style-type: none"> ▪ Bid packages over US\$2.0 million for goods contracts, US\$3.0 million for works contracts and US\$5.0 million for turnkey contracts are subject to International Competitive Bidding requirements. ▪ All non-ICB contracts subject to established commercial practices (quotations from at least 3 suppliers in accordance with World Bank Guidelines). An opinion from an independent expert acceptable to IDA on the reasonableness of quoted prices is required if three quotations are not received. Import of second hand equipment subject to independent inspection as to its operational condition and the reasonableness of the price.
20. Disbursement Procedures	<ul style="list-style-type: none"> ▪ Eligibility of expenditures below prior review limits would be ascertained by AU and disbursements of expenditures for all subloans would be made on the basis of PCIs’ submission of full documentation. Detailed documentation evidencing expenditures to be kept by AU in respect of grid-connected subprojects and with PCIs in the case of off-grid subprojects, for external audits and for review by World Bank missions. For expenditures above the prior review limits, AU to submit reimbursement applications to IDA for review/approval. ▪ Reimbursement available for project-related expenditures made within 120 days prior to World Bank/AU receipt of subloan/subproject proposals together with corresponding subproject documentation (except for retroactively financed sub loans for which reimbursement will be made for expenditure with 120 days prior to PCI subloan closure). ▪ AU would have the authority to notify the Central Bank of Sri Lanka (CBSL) to make payments from the Special Account and would be responsible for keeping track of this Account.
21. Audit Requirements	<ul style="list-style-type: none"> ▪ Annual external audit required of Project Account and Special Account, and separate opinion on Statement of Expenditures (SOEs). ▪ Annual external audit required of PCIs’ financial statements and

	its compliance with the eligibility criteria.
22. Exchange Risk	GOSL would bear all foreign exchange risk.
23. Assessment of Compliance with Prudential Regulations by PCIs	Supervision Department of Central Bank of Sri Lanka or other relevant regulatory agencies would confirm that PCIs conform with prudential regulations, taking into account eligibility criteria for each PCI.
GEF Grant Arrangements	Off-grid village based hydro, wind, biomass systems & Off-grid household based solar, wind systems
24. Basis and Amount of GEF Grant Cofinancing	<i>Off-grid, non-solar sub-projects:</i> \$400 per kW installed, up to a maximum of \$20,000. <i>Off-grid solar:</i> Year1: 10 to < 20Wp (US\$40); 20 to < 40Wp (US\$70); 40 to 60Wp (US\$70); Years 2&3: 10 to < 20Wp (US\$40); 20 to 40Wp (US\$70); Years 4&5: 10 to 20Wp (US\$40).
25. Trigger for Release of Grant Cofinancing	<i>Off-grid village based systems:</i> Certification by a Chartered Engineer that system is complete, complies with specifications and is operational. <i>Off-grid household based solar:</i> Presentation of detailed schedules in read-only soft copy format of REREDP compliant SHS installed along with grant disbursement request. The solar company will also forward to AU a declaration confirming that the schedules exactly match the information given in the Customer Acceptance Receipts (CARs) and that the original CARs will be available for inspection by authorized personnel. <i>Household based wind:</i> Presentation of Acceptance Receipt(s) evidencing installation and confirmation of eligibility.
26. Grant Cofinancing Reservation Period after Commitment	One year, beginning on the date of subloan approval (and annual anniversary dates if applicable).
27. Project Preparation Grant Amount	Up to 95% of Preparation Costs subject to a maximum of \$6,000 plus, in the case of village based systems, an incentive of up to US\$ 2000 for demonstrated success in achieving economic benefit targets agreed to between the consultant and AU during sub-project preparation.
28. Preparation Grant Eligible Expenses	Fees of an independent consultant directly attributable to subproject preparation. Only expenses incurred after June 30, 2002 would be eligible. Each subproject developer would be eligible for only one grant.
29. Trigger for Project Preparation Grant Release	<i>Off-grid, non-solar subprojects:</i> On presentation of eligible expenses and submission of grant disbursement request (a) 50% of grant amount (subject to a maximum of US\$3000) will be released on approval of subloan by PCI or another lending institution acceptable to AU; (b) 35% of grant amount (subject to a maximum of US\$2000) will be

	<p>released on first disbursement of subloan; and (c) 15% (subject to a maximum of US\$1000) will be released six months after commissioning of subproject. In addition, the incentive payment of up to US\$ 2000 will be released against an independent verification that confirms that the economic benefits as per agreed project outcomes indicated by the consultant and confirmed in appraisal report have been created. This incentive has to be claimed within 12 months of installation verification.</p> <p><i>Off-grid solar subprojects:</i></p> <p>On presentation of eligible expenses and submission of grant disbursement request</p> <p>(a) 50% of grant amount released approval of final business plan report by AU; and (b) the balance 50% of grant amount released upon evidence of implementation acceptable to AU</p>
30. Renewable Energy Technical Assistance: where the industry as a whole is the beneficiary	<p>Stakeholder will prepare TOR as needed in consultation with AU, stakeholder groups and IDA. A TOR will be endorsed by at least five key stakeholders acceptable to AU/IDA, or ratified by a recognized industry association. AU will contract consultants and oversee the technical assistance efforts.</p> <p>Based on results achieved the cost of the assignment will be funded by the project.</p> <p>The AU will approve the activities up to US\$75,000. Applications for more than US\$75,000 need a no-objection from IDA.</p>
31. Renewable Energy Technical Assistance: where an organization is the primary beneficiary	<p>Stakeholder will prepare TOR. The AU - with support of independent technical expertise if required – will approve the activities up to US\$75,000. Applications for more than US\$75,000 need a no-objection from IDA. AU will contract consultants and oversee technical assistance efforts.</p> <p>Activities will be cost-shared with a substantial portion (not less than 25%) borne by the stakeholder.</p>
32. Off-Grid Project Supervision Fee to PCIs	\$1,000 per subproject only for off-grid village based sub-projects.
33. Trigger for Release of Off-Grid Project Supervision Fee	Certification by a Chartered Engineer that system is complete, complies with specifications, and is operational.
34. Off-Grid Project Supervision Fee Eligibility Period	Subloan refinance application received by the AU after 30 June 2002 and up to six months prior to date of Project close.
35. Verification of village based and household based systems	<ul style="list-style-type: none"> ▪ AU will prepare TORs (in consultation with IDA) for design verification, installation verification and spot checks to ensure installation compliance ▪ AU will maintain a list of qualified consultants for above and release grant funds for PCI to contract consultants

	<ul style="list-style-type: none"> ▪ AU will follow-up on design and installation irregularities and seek remedial action. If the remedial action is unsuccessful and suspension from the Credit Program is required, the AU will notify all PCIs. ▪ AU will verify SHS data furnished by solar companies for completeness, technical compliance and duplication before releasing cofinancing grant.
36. Off-grid Consumer Protection Facility	AU will prepare TOR for Consumer Education and Protection Facility (in consultation with IDA). GEF grant will cover the costs of maintaining and publicizing the facility, which will investigate consumer complaints and seek appropriate solutions.

Part 2. Eligibility Criteria for Participating Credit Institutions

Participating credit institutions (PCIs) shall satisfy the criteria given in section (A) below, as well as those identified for specific classes of institutions as applicable.

A. For all Participating Credit Institutions

1. In order to become eligible to participate in the Renewable Energy for Rural Economic Development (RERED) Credit Program and to maintain their eligibility, credit institutions must be privately owned and controlled, and meet the following criteria:

(a) The International Development Association (IDA) should receive a satisfactory statement approved by the Board of Directors of the institutions outlining:

- A proposal as to how they would plan to utilize the credit facility, how they would get internally organized to market the RERED scheme, evaluate the subproject proposals and manage subsequent follow-up monitoring and loan recoveries
- Name of the senior officer who will be in charge of RERED credit operation and key team staff;
- Lending institutions which are not PCIs under the Energy Services Delivery (ESD) Project should submit the institution's business strategy and operating policies, and
- Details of their existing term lending programs and portfolio management scheme, if any.

(b) Except as IDA shall otherwise agree, a profitable operation for at least two full years of operation preceding its application for participation, attested to by unqualified audit reports from independent private auditors acceptable to IDA.

(c) A majority of the share capital of the PCI should be held by private sector

(d) The PCI should furnish to IDA, a certificate from the external auditors within 90 days of the date of audited financial statement, that the financial performance of the PCI concerned is in conformity with the applicable financial criteria outlined below. The PCI shall physically forward this certificate to the World Bank's office in Colombo who will receive it on behalf of IDA.

(e) After fulfilling the eligibility criteria, the PCI shall continue to meet the eligibility criteria aforementioned to the satisfaction of GOSL and IDA, which will monitor the PCI's compliance therewith semiannually. If the PCI fails at any time to satisfy the above specified criteria the GOSL and IDA reserve

the right to suspend subloan authorizations under the RERED Project until the PCI has taken specific steps to address its problems in a manner acceptable to GOSL and IDA.

B. For Commercial Banks and Licensed Specialized Banks

2. Compliance with Ministry of Finance and Planning/Central Bank of Sri Lanka guidelines on prudential regulations, capital adequacy, classification of risk assets, provisioning, single borrower exposure limit, sector exposure limits, and disclosure and reporting requirements.

3. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution met the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines:

(a) A minimum total cash collection ratio of principal and interest of 80% on term loan portfolio calculated on a rolling twelve-month basis;

(b) A minimum total cash collection ratio of principal only of 80% on term loan portfolio calculated on a rolling twelve-month basis;

(c) A minimum after tax profit equivalent to 9% p.a. on average shareholders' funds;

(d) A minimum debt service cover ratio of 1.25 times (only for Licensed Specialized Banks and similar institutions);

(e) A maximum portfolio infection rate of 20%;

(f) A maximum debt equity ratio of 8:1;

(g) Compliance with minimum capital adequacy ratios for tier-1 and tier-2 as required by prevailing Central Bank of Sri Lanka (CBSL) guidelines;

(h) Credit exposure (loans and leases) to one party or any one group of companies must not exceed 30% of the PCI's total capital funds (shareholders' funds);

(i) Credit exposure (loans and leases) to any one sector, as defined in the UN Standard Classification of Economic Activities, must not exceed 30% of PCI's total credit portfolio.

C. For Merchant Banks and Leasing Companies

4. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its financial year, the credit institution met the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines:

(a) A minimum total cash collection ratio of principal and interest of 70% on the lease and loan portfolio calculated on a rolling twelve month basis;

- (b) The value of non-performing leases and loans less cumulative provisions shall not at any time exceed 30% of the shareholders' funds of the company;
- (c) A minimum after tax profit equivalent to 9% p.a. on average shareholders' funds;
- (d) A maximum debt equity ratio of 8:1;
- (e) Compliance with the minimum risk weighted capital adequacy ratio in accordance with measures prescribed by the Central Bank of Sri Lanka or the Basle Committee on banking supervisory practices appointed by the Bank of International Settlements (BIS);
- (f) Credit exposure (leases and loans) to any one party or to any one group of companies should not exceed:
- 15% of the PCI's total lease rentals receivable, and
 - 25% of the shareholders' funds.
- (g) Credit exposure (leases and loans) to any one sector, as defined in the UN Standard Classification of Economic Activities, must not exceed 30% of the PCI's total credit portfolio;
- (h) Lease receivables at fixed interest rates which are financed by loans at variable interest rates shall not at any time exceed 50% of the shareholders' funds;

5. Compliance with pertinent laws and regulations regarding capital adequacy, classification of assets, non-accrual of interest and provisioning, exposure limits, etc.

6. In the absence of relevant regulatory framework, merchant banks or leasing companies that wish to participate in the Credit Program should adopt and comply with their own financial policies acceptable to IDA, which might be tighter than the eligibility requirements listed in paragraph (4) above. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its each financial year, the credit institution is in full compliance with its own financial policies. Any changes in financial policies of these institutions would be subject to prior review and approval by IDA.

D. For Micro Finance Institutions

7. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its each financial year, the micro finance institution met the following financial criteria, ratio requirements and exposure limits calculated in accordance with IDA standard guidelines:

- (a) Minimum loan collection ratio of 92 percent
- (b) At least 100,000 borrowers with strong expansion potential
- (c) At least Rs100 million in Accumulated Fund (including foreign grants)
- (d) Maximum debt/accumulated fund ratio of 3.5 times

- (e) Minimum liquidity ratio (liquid assets to deposits) of 20 percent
- (f) Minimum current ratio of 1.5 times
- (g) Minimum capital adequacy ratio of 20 percent
- (h) Minimum debt service cover ratio of 1.25 times
- (i) Minimum rate of return on capital of 2 percent

8. Five-year successful track record, substantiated by written confirmation by external auditors acceptable to IDA of running a successful micro-credit program.

9. In the absence of relevant regulatory framework, micro finance institutions that wish to participate in the Credit Program should adopt and comply with their own financial policies acceptable to IDA, which might be tighter than the eligibility requirements listed in paragraph (4) above. A confirmation from external auditors acceptable to IDA that, at the date of its application for participation and subsequently at the end of its each financial year, the credit institution is in full compliance with its own financial policies. Any changes in financial policies of these institutions would be subject to prior review and approval by IDA.

**Additional Annex 13: Summary of ESD Project Achievements and Remaining Barriers
SRI LANKA: Renewable Energy for Rural Economic Development**

Renewable Energy Technology	Achievements	Remaining Barriers
Solar	<p>SHS technology well accepted and established.</p> <p>4-5 commercial suppliers with a network of over 50 sales and service centers</p> <p>Global technical and service quality standards in place</p> <p>Microfinance and private sector partnership model for market development and financing; commercial banks involved.</p> <p>Over 500 technicians and sales professional trained</p> <p>Adoption of Solar programs by vanguard provincial governments</p>	<p>Economies of scale to sustain business not achieved.</p> <p>Development has not progressed to non-SHS applications/productive uses.</p> <p>Outreach and awareness building for poorer households and for other applications are lacking</p> <p>Limited microfinance players and also limited availability to SHS.</p> <p>Only a few provincial governments have adopted the solar program, and even there, it has not been integrated into rural development strategy</p>
Village Hydro (off-grid)	<p>Community based projects have evolved to the point where total grant dependence has been eliminated.</p> <p>Capacity built in private sector to identify, develop and implement such projects through communities.</p> <p>8-10 capable players now involved in developing these projects, and actively sharing know-how.</p> <p>Potential village hydro resource study available</p> <p>Commercial banks are financing such projects</p>	<p>The business model still requires grant funding.</p> <p>The issues of stranded investments not addressed and legal/policy status of village hydro is unclear.</p> <p>Daytime productive use of electricity from such projects not realized.</p>
Mini-Hydro	<p>Substantial capacity built for feasibility study, design, construction, operation, maintenance, and financing of mini-hydro investments.</p> <p>Small Power Purchase Agreement provides effective legal basis for electricity sale to CEB.</p>	<p>Need to ensure that mini-hydro is appropriately incorporated into restructured power sector</p> <p>Long-term financing still a constraint</p> <p>Transparent pricing mechanism needed for SPPA.</p>

<p>Wind</p>	<p>Technical and economic feasibility of projects established.</p> <p>Interconnection issues resolved.</p> <p>Capacity now exists within the utility and the indigenous engineering industry to oversee construction and operation of such projects.</p> <p>Private sector interest in wind projects becoming evident.</p> <p>Resource assessment completed (through GEF support, via UNDP)</p>	<p>High costs of wind energy pose problems for widespread applications.</p> <p>Framework for commercial development of wind projects not available. Incremental costs and power pricing for grid sales not established.</p> <p>Limited private sector players and capacity in Sri Lanka.</p> <p>Constrained availability of long term finance and limited appetite among lenders.</p>
<p>Biomass</p>	<p>Biomass widely used for domestic and commercial applications, but was not addressed under ESDP. However, indigenous entrepreneurs have proposed biomass gasification projects and there is interest and limited capacity to develop this resource.</p>	<p>While technical feasibility of biomass gasification has been established in other countries of the region, Sri Lanka has little experience and limited capacity/skills to develop such projects.</p> <p>Grid and off-grid markets assessments not available.</p> <p>Commercial awareness among private sector and financial institutions is limited.</p>
<p>Capacity building in utility for energy efficiency/DSM and renewables</p>	<p>Concept has been accepted and mainstreamed within utility</p> <p>Capacity to design and execute DSM programs in place</p> <p>Energy efficient building codes developed and in use.</p> <p>Partial Private Sector Energy Service Company established</p> <p>Framework for power purchase from grid-connected small hydros in place</p> <p>Training and awareness generation programs for renewables within utility staff</p>	<p>Limited adoption of energy efficient practices by commercial builders and industries</p> <p>Limited ESCO development.</p> <p>Lack of framework for power purchase from wind and biomass projects.</p> <p>Limited expertise and capacity in private sector to implement energy efficiency projects.</p> <p>Uncertain future of DSM under reforms scenario and independent regulation.</p>

Additional Annex 14: ESD Evaluation Report
SRI LANKA: Renewable Energy for Rural Economic Development

Sri Lanka
Energy Services Delivery Project

Independent Evaluation/GEF Project Completion Report
DRAFT

International Resources Group, Ltd
Silver Spring, Maryland

April 2002

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List of Acronyms

AU	Administrative Unit based at DFCC Bank
BII	Bureau of Infrastructure Investment
CAPS	Consultancy and Professional Services Pvt. Ltd.
CB	Capacity Building
CboC	Commercial Bank of Ceylon
CBSL	Central Bank of Sri Lanka
CEA	Central Environmental Authority of Sri Lanka
CEB	Ceylon Electricity Board
DSM	Demand Side Management unit of CEB
ESD	Energy Services Delivery Project
EVC	End-user village cooperatives
GCMH	Grid connected mini hydro
GCSPDA	Grid connected small power developers association
GCSHDA	Grid connected small hydro developers association
GEF	Global Environment Facility
GoSL	Government of Sri Lanka
HNB	Hatton National Bank
IDA	International Development Association
ITDG	Intermediate Technology Development Group
MFI	Micro finance institutions
MoFP	Ministry of Finance and Planning
NDB	National Development Bank
NGO	Non-governmental organization
OGVH	Off grid village hydro
OOPP	Objective oriented project planning
PCI	Participating Credit Institutions
PEU	Pre-electrification unit of CEB
PGCWF	Pilot grid-connected Wind Farm
SHS	Solar Home Systems
SIA	Solar Industries Association
SEEDS	Sarvodaya Economic Enterprises Development Services
SELCO	Solar Electric Light Company Inc
SLBDC	Sri Lanka Business Development Centre
SPPA	Small Power Purchase Agreement
SPPT	Small Power Purchase Tariff
ToR	Terms of reference
UNDP	United Nations Development Programme

Executive Summary

The World Bank and Global Environmental Facility (GEF)-assisted Sri Lanka Energy Services Delivery (ESD) Project commenced on 22 July 1997 with the Ministry of Finance and Planning (MOFP) and Ceylon Electricity Board (CEB) named as the executing agencies. The principal objectives of the project include:

- Promoting the provision by the private sector, NGOs and cooperatives of grid-connected and off-grid energy services using environmentally sustainable renewable energy technologies;
- Strengthening the environment for demand side management (DSM) implementation; and,
- Improving public and private sector performance to deliver energy services through renewable energy and demand side management (DSM).

The Project is expected to result in the addition of about 26 MW of environmentally sustainable generating capacity, including a Pilot Wind Farm, grid-connected mini-hydro, and electricity services to up to 32,000 rural customers through solar home systems and village hydro schemes. The Project will also strengthen demand side management and energy conservation capabilities within the CEB and the Sri Lankan architecture/ engineering community.

As of the end of 2001, the project has been successful in meeting these targets, with the installation of 30 MW grid-connected minihydro capacity, 287 kW from off-grid village hydros, and some 13,300 solar home systems (at a monthly rate of 1,300 systems). This is in stark contrast to the status at mid-term wherein the project was basically on schedule with the grid-connected activities, but was bogged down with many issues concerning off-grid components. With the implementation of key interventions, weak areas in the project design were successfully addressed and appropriate adjustments were made. It has been estimated, in fact, that by project completion in December 2002, the following shall have been accomplished: (1) additional 22 MW from private sector mini-hydro projects, (2) additional 765 kW through village hydro projects, and (3) additional 10,000 solar home systems. These are expected to translate into a shortfall of US\$1.2 million to maintain credit off-take at the current level, and to maintain the current SHS sales of 1,300 units per month. For the GEF co-financing grants on the other hand, there is an estimated shortfall of US\$400,000.

The ESD project has clearly established the necessary foundations for the successful and sustainable implementation of renewable energy projects throughout Sri Lanka. Technical, financial, policy, and information barriers have been addressed by the project, and many lessons can be learned from how these were overcome. The next question, naturally, is how the current success can be sustained or even increased, and, if it can be replicated elsewhere. While the project has performed very satisfactorily, there are issues that remain and will need to be addressed if the gains made under the project are to be sustained. Several elements under the existing program, especially the co-financing aspect for off-grid projects, need to be retained even after the project concludes. These and other issues are all addressed in a proposed follow-on project called Renewable Energy for Rural Economic Development.

1.0 Background of the ESD Project

1.1 Objectives & Scope

The World Bank and Global Environmental Facility (GEF)-assisted Sri Lanka Energy Services Delivery (ESD) Project commenced on 22 July 1997 with the Ministry of Finance and Planning (MOFP) and Ceylon Electricity Board (CEB) named as the executing agencies.

The principal objectives of the project include:

- Promoting the provision by the private sector, NGOs and cooperatives of grid-connected and off-grid energy services using environmentally sustainable renewable energy technologies;
- Strengthening the environment for demand side management (DSM) implementation; and,
- Improving public and private sector performance to deliver energy services through renewable energy and demand side management (DSM).

The Project is expected to result in the addition of about 26 MW of environmentally sustainable generating capacity, including a Pilot Wind Farm, grid-connected mini-hydro, and electricity services to up to 32,000 rural customers through solar home systems and village hydro schemes. The Project will also strengthen demand side management and energy conservation capabilities within the CEB and the Sri Lankan architecture/ engineering community.

1.2 Objectives of GEF Support

Global Environment Facility (GEF) grant funds are available to off-grid (i.e. solar home systems and village hydro) sub-project developers who have signed a subloan agreement with a participating credit institution (PCI). The grant funds are used to co-finance the initial cost of equipment installed through the project and are available to subloan beneficiaries. They are released on a reimbursement basis, after installation of the off-grid system.

Part of the GEF grant is also allocated to providing technical assistance for the preparation of off-grid subprojects. Specifically, it finances consultant services to help project developers prepare feasibility studies, business plans, and bank loan documentation. The GEF grant is also available to PCIs to supervise off-grid village hydro and solar home system subprojects.

1.3 Major Components

The ESD Project has three principal components, namely:

ESD Credit Component. This provides support for medium and long-term financing of private sector firms, NGOs and cooperatives for off-grid solar home systems (SHS) and village hydro (OGVH) projects, grid-connected mini-hydro (CGMH), wind and other renewable energy investments. It makes funds available for energy subprojects up to 5 megawatts (MW) through PCIs. Support for the ESD credit program and associated technical assistance is available under IDA credit as well as the GEF grant.

Pilot Grid-Connected Wind Farm Component. This component has an estimated

cost of \$3.8 million and is co-financed by \$2.23 million of IDA credit and a GEF grant of \$0.88 million. The 3-MW pilot wind farm project is designed to demonstrate the commercial viability and long-run economic potential of wind power in Sri Lanka and to catalyze future private sector wind farm development.

Capacity Building Component. This component has a total estimated cost of \$2.5 million and is co-financed with \$1.0 million of IDA credit and \$1.05 million of GEF grant. This component is to provide training and technical support for renewable energy and energy efficiency initiatives by both the public and private sector.

1.4 Project Cost

The total project cost was pegged at US\$ 55.3 million. The project financing includes US\$24.2 million from IDA and \$5.9 million from the GEF. The remaining project financing includes \$13.7 million from private sector Participating Credit Institutions (PCIs), \$9.6 million from renewable energy project developers/entrepreneurs/energy end-users and \$1.9 million from the Ceylon Electricity Board/Government of Sri Lanka. A summary of the project's financing plan is presented in **Table 1-1**.

Table 1-1. ESD Project Financing Plan (in US\$MM)

Project Component	IDA	GEF	PCIs	Entrepreneurs	CEB/ GOSL	Total
ESD Credit Program						
Mini Hydro	14.4	-	10.1	6.3	0.1	30.8
Village Hydro	0.3	0.1	0.1	0.1	0.1	0.7
SHS	5.0	2.9	3.5	3.0	-	14.4
Business Dev't	-	0.3	-	0.2	-	0.5
Off-grid Support	-	0.5	-	-	0.7	1.2
<i>Subtotal</i>	<i>19.7</i>	<i>3.8</i>	<i>13.7</i>	<i>9.6</i>	<i>0.9</i>	<i>47.7</i>
Wind Farm	2.1	0.8	-	-	0.6	3.5
Capacity Building						
PE Unit	-	0.3	-	-	0.2	0.5
DSM Unit	1.0	0.7	-	-	0.2	1.9
Subtotal	1.0	1.0	-	-	0.4	2.4
PPF*	0.3					0.3
Unallocated	1.1	0.3				1.4
Total Project Cost	24.2	5.9	13.7	9.6	1.9	55.3

*The PPF is US\$340,000.

1.5 Stakeholders

The following table lists the various stakeholders of the ESD project by sector:

Table 1-2. ESD Project Stakeholders

Private Sector Companies	Participating Credit Institutions	Non-government organizations	Government institutions
Consultant and Professional Services (Pvt) Ltd	Development Finance Corporation of Ceylon (DFCC)	Solar Industries Association (SIA-SL)	Ministry of Irrigation, Power, and Energy
Alpha Thermal Systems (Pvt) Ltd.	Sarvodaya Economic Enterprises Development Services (SEEDS)	Grid-connected Small Power Development Association	Ministry of Science and Technology
SELCO Solar Lanka Ltd.	National Development Bank	Sri Lanka Business Development Center	Ceylon Electricity Board (CEB)
Shell Renewables Lanka Ltd.	Sampath Bank	Energy Forum	Pre-electrification Unit, Ministry of Finance and Planning
NEG Micon A/S Denmark	Commercial Bank of Ceylon	Intermediate Technology Development Group (ITDG)	Board of Investments (BOI) and Bureau of Infrastructure Investment
Eco Power (Private) Ltd.	Hatton National Bank	United Nations Development Programme	Local government institutions – provincial councils and divisional secretariats
Zyrex Power Co. Ltd			
Vidya Silpa			
Associated Batteries (Pvt) Ltd			
LGA Associates (Pvt.) Ltd			

1.6 Expected Outputs

The principal performance indicators for the Project at the initial expected completion date of 20 July 2002 include:

- Installation of at least 26 MW of grid and off-grid renewable energy capacity

including service to up to 32,000 off-grid rural customers through solar home systems (SHS) and village hydro schemes;

- Development of a 3 MW pilot grid-connected wind farm project;
- Issuance by the Ceylon Electricity Board (CEB) of a comprehensive Energy Efficient Commercial Building Code of Practice (EECB); and
- Support by the CEB for the development of small-scale grid connected renewable energy projects by:
 - (1) annually updating the Small Power Purchase Tariff (SPPT);
 - (2) signing of least 5 SPPA contracts by mid-term evaluation, and 12 by project completion; and
 - (3) incorporating intermittent, non-dispatchable renewable energy generating sources in the generation planning models prepared by the CEB.

2.0 Project Results vis-à-vis Objectives and Expected Outputs

The project's accomplishments (as of December 2001) are discussed below according to each component:

2.1 ESD Credit Component

The ESD Credit Component has 3 major sub-components: the grid-connected minihydro (GCMH) component; the off-grid village-hydro (OGVH) component, and the solar home systems (SHS) component. The following table shows the status of disbursements for each of these components – both from IDA Credit and the GEF grant – as of December 31, 2001.

Table 2-1. Status of ESD Credit Program Disbursements

(as of 31 December 2001, in US\$MM)

Project Component	IDA Credit	IDA Credit Disbursed	%	GEF Budgeted	GEF Grant Disbursed	%
GCMH	14.4	10.91	76	0	0	
OGVH	0.3	0.12	40	0.1	.05	50
SHS	5.0	2.02	40	2.9	1.34	46
Subtotal	19.7	13.05	66	3.0	1.39	46

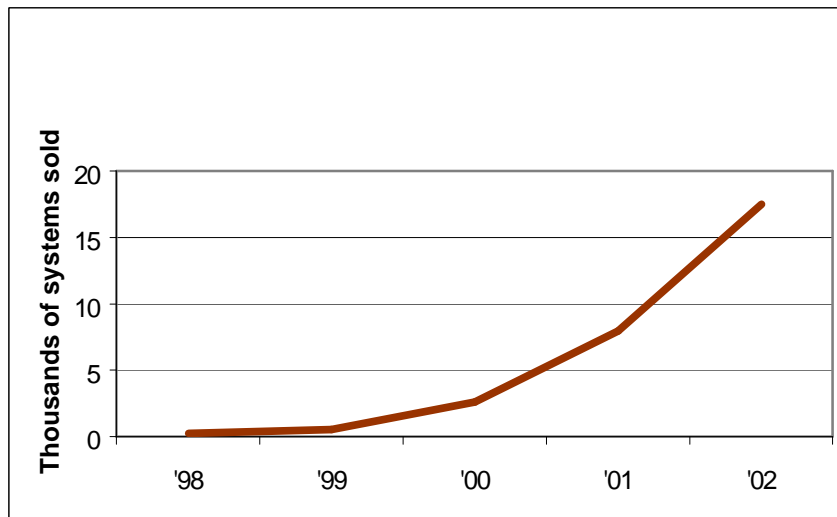
Source: WB Aide Memoire (Jan-Feb 2002)

SOLAR HOME SYSTEMS (SHS)

Sales over the past five years have followed a nearly exponential projection, from less than 30 systems per month in 1998 to about 1,300 systems per month in December 2001, with an accumulated number of systems installed of more than 13,000 (end-Dec 2001).

The three main companies in the Sri Lankan SHS market have reported monthly sales in the range of 400 to 800 systems, while a fourth company has reported sales of about 100-120 per month. This trend is expected to continue in 2002, and it is estimated that industry-wide, an additional 20 to 30,000 systems will be installed before the project ends. **Figure 1-1** shows the growth in SHS sales from project inception up to December 2001 vis-a vis targets. Most noticeable is the very sharp rise in sales beginning 2000.

Figure 2-1. Growth in SHS Sales



OFF-GRID VILLAGE HYDRO (OGVH)

As of December 2001, about 28 village mini-grids ranging from 4-45 kW serving about 1400 households with a total installed capacity of 287.0 kW are under implementation with credit and grant support from ESD project. This blend of financing has led to a reduction in grant funds per project of nearly 50% or serving twice as many households with the same amount of grant funds. In terms of capacity, this already exceeds the project target of 250 kW.

This contrasts greatly with the situation during mid-term, wherein there were only 7 projects approved, servicing 400 households and representing around 58 kW capacity. There was very little incentive for developers to participate, given the very high costs of coordinating and organizing village cooperatives to develop, own, and operate OGVH systems.

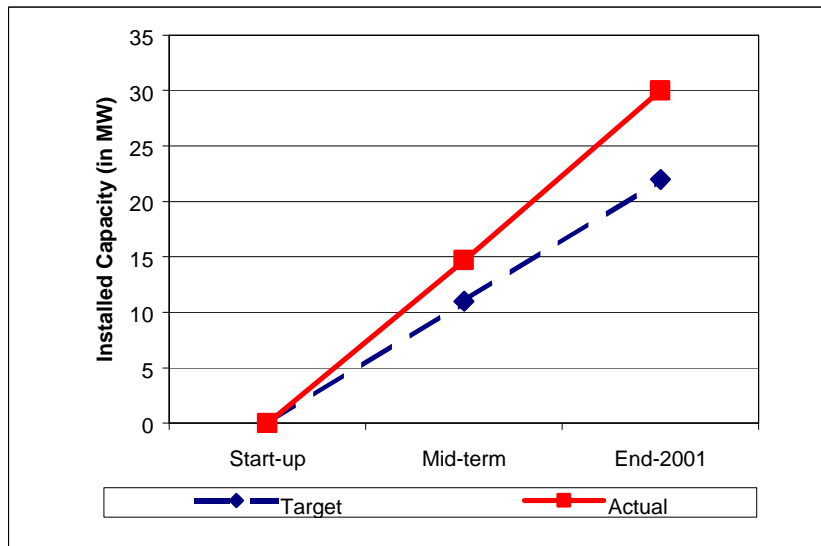
To address the situation, the CEB initiated an open solicitation process where consultants were asked to submit proposals on how to address the existing technical, financial, and sustainability issues pertaining to this particular component. To ensure that the process would lead to concrete achievements, the consulting contracts were tied to actual deliverables – a set-up that worked well and resulted in increased participation and more funding to OGVH projects by commercial banks.

GRID CONNECTED MINI-HYDRO (GCMH)

Sri Lanka's minihydro capacity has risen from about 1 MW in 1997 to nearly 30 MW at the end of 2001. **Figure 2-2** shows the steep rise in installed capacity from project inception to date.

At mid-term, the progress of this component was on-schedule, but the tariff-setting issue between the CEB and project developers remained unsettled. To address the situation, the government employed the services of an independent consultant to review and report on the tariffs set by the CEB for the purchase of power from small power producers. Based on his findings, a tariff floor price that was acceptable to both the CEB and private developers was set at 90% of the first year's tariff. This has largely mitigated the risk perception of the private sector.

**Figure 2-2. Growth in Minihydro Capacity
(Actual vs. Targeted, 1997- Dec 2001)**



2.1 Wind Component

The pilot grid-connected wind farm component required that the CEB build a 3-MW pilot wind farm on an Engineer, Procure and Construct (EPC) basis in the Hambantota district by May 1998. This component was completed not too far off the original schedule, with commissioning taking place in February 1999 and certification in May 2000. The plant consists of five 46-meter towers with 600 kW turbines designed to supply a total annual capacity of about 4.5 GWh. Total project cost amounted to US\$1,200/kW, which is acceptable for a first grid-connected wind farm operation in a country. Wind speeds have also been found to be as projected during project design. The CEB continues to monitor and record operational data from the wind farm and learn from this experience the issues that must be addressed for integrating non-dispatchable and intermittent renewable power.

At mid-term, there was concern that the CEB had not undertaken any measures to attract private sector development of wind power in Sri Lanka. To address this, regional wind resource measurements supported by UNDP/GEF and specific evaluations of sites were conducted by a commercial company in order to facilitate project identification by private developers. Consequently, there is now a favorable regime in Sri Lanka to develop and implement wind projects.

2.2 Capacity-Building Component

The capacity-building component was programmed to be carried out in the Pre-Electrification Unit (PEU), and in the Demand-side Management (DSM) unit of the CEB.

In the CEB Pre-electrification unit (PEU), the program was aimed at enhancing in-house expertise in off-grid project preparation and to facilitate and promote technically and economically viable renewable energy subprojects as part of the ESD credit and the pilot wind farm components. It was also targeted at enhancing the ability of PEU staff to train staff from CEB, the private sector, and NGOs in the areas of renewable energy project design and development.

This broad objective was met by the PEU by actively engaging in –

- Improved rural electrification coordination;
- preparation of materials describing off-grid electrification options
- training of CEB area staff in disseminating information and promotion of off-grid electrification options
- coordination between CEB and off-grid project developers on CEB rural electrification plans including indication of areas not likely to receive grid service in the near term
- Preparation and dissemination of a guide for practical implementation of grid interconnection /integration requirements;
- Off-grid renewable energy project development training;
- Non-dispatchable power source modeling and planning; and
- Mini and village hydro project development assistance.

Meanwhile, capacity building in the CEB Demand-Side Management (DSM) Unit consisted of:

- Design and implementation of a Code of Practice for Energy Efficient Commercial Buildings;
- Development of institutional capacity in the energy related public and private sectors to incorporate the Code of Practice into building design and operations and to monitor the energy savings;
- Demonstration of energy efficiency building design through design competition incentives; and
- Support CEB in implementation of a DSM Strategy and Load Research Program.

The concepts of energy efficiency/demand side management and renewables have been accepted within the CEB and the capacity to design and execute DSM programs is firmly in place. Energy efficient building codes have been developed and are available for use on a voluntary basis. Also, new ESCOs are now keen on operating in Sri Lanka, in part due to efforts by the CEB. The framework for power purchase from grid-connected small hydropower is likewise in place, and training and awareness generation program for renewables has been conducted internally among utility staff.

At mid-term, the observation was that the CEB was carrying out the capacity-building activities in isolation of its general activities, i.e. there was little real coordination between the activities of the ESD capacity building components and the normal day-to-day activities of the CEB.

Clearly, there is a stark contrast between the current project situation compared to the status at mid-term wherein the project was basically on schedule with the grid-connected activities, but was bogged down with many issues concerning off-grid components. With the implementation of key interventions aimed at addressing weak areas in the project design, targets for the off-grid components are being accomplished, and even exceeded (**Table 2-2**).

It has been estimated, in fact, that by project completion in December 2002, the following shall have been accomplished:

- Additional 22 MW from private sector mini-hydro projects
- Additional 765 kW through village hydro projects
- Additional 10,000 solar home systems (with current monthly sales at 1,300 units per

month)

These are expected to translate into a shortfall of US\$1.2 million to maintain credit off-take at the current level, and to maintain the current SHS sales of 1,300 units per month. For the GEF co-financing grants on the other hand, there is an estimated shortfall of US\$400,000.

Table 2-2. Interventions Carried Out Following Mid-Term Review

	Status as of Mid-Term	Recommendations	Interventions	Results/Status as of end-Dec 2001
Off-grid SHS	<ul style="list-style-type: none"> ▪ As of end-Dec 99, only 682 SHS approved for GEF grant disbursement (vis-à-vis 30,000 target); only 9% of IDA credit disbursed; 2.4% for related GEF grant approvals disbursed ▪ SHS vendors reluctant to serve as consumer financing institutions due to the necessary institutional network, high costs and risks associated with administering micro-loans to low-income isolated rural households. ▪ Interest rates paid by the end-users in excess of 24 percent per annum and in some cases as high as 33 percent per annum 	<p>Participation of more MFIs that can service potential isolated rural SHS customers should be increased. This can be achieved by –</p> <ul style="list-style-type: none"> ▪ assisting potential MFIs in qualifying as PCIs for the ESD Project; ▪ considering less stringent criteria for MFIs to qualify as PCIs; and ▪ encouraging existing PCIs to work with and provide loans to MFIs that have proven outreach capabilities in the targeted rural areas. <p>ESD Project also needs to investigate the possibility of using the GEF grant to provide loan insurance coverage to enhance MFI financial security thereby allowing MFI to access the available ESD credit.</p>	<ul style="list-style-type: none"> ▪ Microfinance (with the accreditation of SEEDS as a PCI) and private partnership model for market development and financing introduced and actively promoted ▪ The job of financing was left to MFIs, while vendors were encouraged to concentrate on selling systems. 	<ul style="list-style-type: none"> ▪ Over 13,300 SHS in place ▪ Now 4-5 commercial suppliers, with 50 sales and service centers across the country ▪ More banks now involved in financing SHS ▪ Several provincial governments now adopting solar programs ▪ Technical standards in place
Off-grid village hydro (OGVH)	<p>Costs of coordinating and organizing village cooperatives to develop, own and operate the OGVH systems very high</p>	<ul style="list-style-type: none"> ▪ The option to allow private sector or NGO developers who build, own and operate OGVH systems and sell the electricity service to consumers should be considered within the ESD Project. ▪ GEF grant could be used to attract the participation of the private 	<p>Open solicitation process was initiated to get proposals from consultants on how to address policy, technical, and sustainability issues pertaining to the OGVH component. To ensure that the process would yield actual accomplishments, consulting contracts were tied to deliverables.</p>	<ul style="list-style-type: none"> ▪ 28 projects on the ground, serving some 1,300 households ▪ Total grant dependence has been eliminated ▪ Private sector capacity to implement OGVH projects through communities has been developed ▪ 8-10 developers currently involved

The following table, meanwhile, summarizes the accomplishments of the ESD project based on the expected deliverables (listed in Section 1):

**Table 2-3. Summary of Accomplishments (as of end-2001)
vis-à-vis Expected Outputs**

Objectives	Key Performance Indicators/Expected Outputs	Accomplishments
1. Promote the provision by the private sector, NGOs and cooperatives of grid-connected and off-grid energy services using environmentally sustainable renewable energy technologies	1.1 Installation of at least 26 MW of grid and off-grid renewable energy capacity by end of 2002, including service to 32,000 off-grid customers by end of project	Grid-connected: 30 MW minihydro capacity Off-grid: 287 kW from off-grid village hydros and 13000 SHS units.
	1.2 At least one power purchase agreement for a private wind power project signed by CEB	As a result of successful 3-MW demonstration project and wind resource assessment studies conducted, a number of investors have entered the picture, with one already investing in on-site wind measurement and feasibility studies, and in seeking financing from carbon trading mechanisms and investors.
2. Strengthen the environment for DSM implementation	2.1 CEB issuance of Energy Efficient Commercial Building (EECB) Code of Practice	EECB codes developed and in use, although still rather limited; to be expanded in proposed follow-on project
3. Improve public and private sector performance to deliver energy services through renewable energy and DSM	3.1 CEB annual update of Small Power Purchase Tariff	Annual updates being carried. Tariff issue between CEB and small power producers considered resolved with the setting of a tariff ceiling.
	3.2 Signing by CEB of at least 5 SPPA contracts by mid-term evaluation; 12 by project completion	43 minihydro refinance approvals
	3.3 Generation planning models prepared by CEB which incorporate intermittent, non-dispatchable renewable energy generating sources	CEB continues to monitor and record data from wind farm and grid-connected minihydro projects to become more familiar with issues that must be addressed for integrating non-dispatchable renewable energy generating sources.

3.0 Lessons Learned

As the project nears closure at the end of 2002, lessons to be learned from implementing the ESD project are already very evident.

Local or community participation in the implementation and monitoring of off-grid projects is a crucial element to project success at it ensures “project ownership” on the part of the communities involved and also promotes improvement of local capabilities, strengthening of community relations, and also aids in cost recovery.

For off-grid projects, especially those involving the installation of solar home systems, establishing a viable distribution and servicing infrastructure is essential. Under the SHS component of the ESD project, one of the factors behind the current success it is enjoying is the presence of some 50 sales and services facilities. Strengthening this infrastructure through continued human resource development is also desirable.

Innovative financing schemes are essential to the success of renewable energy projects, and they should also be flexible to the kind of technology involved. For instance, for solar home systems projects, making credit facilities available at the consumer level through microfinance, has been proven to be effective. This is well-demonstrated by the ESD project where the accreditation of a microfinance institution as a participating credit institution led to a sudden upsurge in SHS sales. For grid-connected projects like mini-hydro, on the other hand, active private sector involvement seems to be the key for widespread dissemination, as also demonstrated by the ESD project.

There is a big incentive to reduce the first-cost barrier associated with solar home systems through grants and credit schemes as operating costs are lower than most alternatives, such as small gensets, and it is usually the least-cost option when small quantities of electricity are required, as is often the case in rural areas. This also paves the way for the development of a wider market.

Demonstration of commercial renewable energy technologies can remove information barriers and facilitate widespread replication. This is best exemplified by the 3-MW wind demonstration project under the ESD project which has paved the way for the creation of a market for private wind power development in Sri Lanka, with four companies now in operation.

Investment in market development activities is crucial to the success of a renewable energy program. This can take the form of technical assistance directed at enhancing the capacity of the private sector, concerned government agencies, NGOs, etc to first, learn about the technologies and the associated issues, and then how to properly implement and monitor projects, as was carried out under the ESD project.

The largest density of SHS in an area can be attained if end-users have a wider choice in the size and type of system available. This was reflected in the design of the ESD project whereby end-users are not constrained by a one-size-fits-all scheme. Different end-users have different needs.

Lastly, flexibility in the implementation of a project is important. One of the major reasons for the current success of the ESD is that it was flexible enough to make some significant

changes in project design when it was determined during mid-term that some issues were preventing the attainment of specific targets. The strategic mix of investments and capacity building is also one of the key factors behind the ESD's success.

For a project to be attractive to the private sector, prices should ensure full cost-recovery and distribution costs should be lowered as much as possible.

In order to have a sustainable and efficient small power market, the implementation of a standardized power purchase agreement and tariff based on avoided cost principles should be ensured.

Finally, for a renewable energy program to succeed, the institutional structures in place must be effective and the policy framework must be conducive. Commitment by the government is very important, and this should be reflected its willingness to ensure consistency among national and sectoral objectives, e.g making sure renewable energy can compete with other technologies on a level playing field.

4.0 Opportunities for Project Acceleration and Replication

The ESD project has clearly established the necessary foundations for the successful and sustainable implementation of renewable energy projects throughout Sri Lanka. Technical, financial, policy, and information barriers have been addressed by the project, and many lessons, as outlined in Section 3, can be learned from how these were overcome.

The next question, naturally, is how the current success can be sustained or even increased, and, if it can be replicated elsewhere. What follows is a brief discussion of what areas still need to be addressed in order for acceleration and even replication to be carried out, all within the context of what has already been accomplished under ESD.

Technical

The project has undoubtedly succeeded in terms of demonstrating the technical viability of the various renewable energy technologies (hydro, solar, and wind) promoted under the project, but a number of related areas still need to be addressed. The technical viability of wind energy, for instance, has been proven by the 3-MW demonstration project and interest by the private sector has been generated by the resource assessment study carried out in Sri Lanka. To sustain the interest of the four companies that are currently probing the wind energy market and to attract more private investors to join in, there needs to be technical assistance carried out in the areas of business development and the conduct of feasibility studies, as was done in the case of mini-hydro developers under the ESD. In the area of demand-side management and energy efficiency, the relevant capabilities have been built up within the CEB and even among private companies and NGOs through the ESD, but DSM and EE measures have yet to be fully incorporated in standard design practices. The EECB has also been developed as programmed under ESD, but its use has been rather limited. ESCOs have also been established but have not really implemented energy efficiency projects at this point. TA clearly needs to be continued in this area.

FINANCIAL

The ESD project has demonstrated that both flexible and innovative financial mechanisms are crucial in ensuring success of renewable energy projects, especially in the case of off-grid ones such as solar home systems or village hydros. In the case of solar home systems, sales shot up significantly after a microfinance institution was accredited as a participating credit institution. But at the rate sales have been going, more microfinance channels will be needed in order to respond to the demand. This necessarily requires continued capacity-building, including technical assistance to existing PCIs who might consider expanding into micro-finance. There is also a continued need for subsidies in some areas, such as village hydros where project development and investment costs remain high for communities to bear alone.

POLICY/INSTITUTIONAL

The minihydro component of the ESD project demonstrated how important the stability of the power purchase tariff affects the decisions of investors and lenders. The project also showed how crucial government support and commitment is to sustainability, particularly in terms of ensuring that policies coincide with objectives, and making sure that renewables can compete

on an even playing field with other energy sources. There however remain some outstanding issues, such as the need of long-term liquidity by Sri Lanka's banking sector (which will constrain future development of grid-connected projects), and more reforms in the power sector related to pricing, incentives, etc.

In the final analysis, if all of the abovementioned issues are not addressed and the ESD project ends this year with no transition or follow-on project programmed for the near-term, Sri Lanka is in serious danger of losing all the crucial gains made under the ESD. This is one of the basic premises for the proposed follow-on project called Renewable Energy for Rural Economic Development (RERED).

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Interview(s)

March 28, 2002 Interview with C Govindarajalu (WB-ESD Task Team), Washington, DC, USA.

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