

SRI LANKA  
Renewable Energy for Rural Economic Development

**Project Appraisal Document**

South Asia Regional Office  
SASEI

<b>Date:</b> May 24, 2002		<b>Team Leader:</b> Subramaniam V. Iyer						
<b>Country Manager/Director:</b> Mariana Todorova		<b>Sector Manager:</b> Penelope J. Brook						
<b>Project ID:</b> P076702		<b>Sector(s):</b> PY - Other Power & Energy Conversion						
<b>Lending Instrument:</b> Specific Investment Loan (SIL)		<b>Theme(s):</b> Environment; Rural Development; Energy						
		<b>Poverty Targeted Intervention:</b> N						
<b>Global Supplemental ID:</b> P077761		<b>Team Leader:</b> Subramaniam V. Iyer						
<b>Focal Area:</b> G		<b>Sector Manager/Director:</b> Penelope J. Brook						
<b>Supplement Fully Blended?</b> Yes		<b>Sector(s):</b> PY - Other Power & Energy Conversion						
<b>Project Financing Data</b>								
[ ] Loan    [X] Credit    [X] Grant    [ ] Guarantee    [ ] Other:								
<b>For Loans/Credits/Others:</b>								
<b>Amount (US\$m):</b> IDA 75.0; GEF 8.0								
<b>Proposed Terms (IDA):</b> Standard Credit								
<b>Financing Plan (US\$m):</b>								
	<b>Source</b>	<b>Local</b>	<b>Foreign</b>	<b>Total</b>				
BORROWER/RECIPIENT		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	4.40	6.20				
GLOBAL ENVIRONMENT FACILITY		2.90	5.10	8.00				
<b>Total:</b>		51.40	82.30	133.70				
<b>Borrower/Recipient:</b> GOVERNMENT OF SRI LANKA								
<b>Responsible agency:</b> 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: 94-1 447-633                      Email:								
<b>P076702 Estimated Disbursements ( Bank FY/US\$m):</b>								
<b>FY</b>	2003	2004	2005	2006	2007	2008		
<b>Annual</b>	7.50	15.00	15.00	15.00	14.25	8.25		
<b>Cumulative</b>	7.50	22.50	37.50	52.50	66.75	75.00		
<b>P077761 (GEF) Estimated Disbursements ( Bank FY/US\$m):</b>								
<b>FY</b>	2003	2004	2005	2006	2007	2008		
<b>Annual</b>	1.20	1.60	1.60	1.60	1.40	0.60		
<b>Cumulative</b>	1.20	2.80	4.40	6.00	7.40	8.00		
<b>Project implementation period:</b> 5.5 years								
<b>Expected effectiveness date:</b> 09/15/2002 <b>Expected closing date:</b> 06/30/2008								

## **A. Project Development Objective**

### **1. Project development objective:** (see Annex 1)

This Project aims to (i) Improve the quality of rural life by utilizing off-grid renewable energy technologies to bring electricity to remote communities and (ii) Promote private sector power generation from renewable energy resources for the main grid.

These objectives conform to Sri Lanka's goal of making electricity accessible to at least 75 percent of its population by 2007. That aim, if realized, would help to increase the non-farm incomes of rural households through productive uses of electricity and improve the delivery of social services such as health and education in rural areas. Consistent with the opening up of the northern and eastern parts of the country following recent peace initiatives, the Project will also enable the Government to give conflict-affected people living in those regions access to electricity. The Project concept and design recognize and respond to Sri Lanka's desire to preserve its unique ecology and bio-diversity.

Further, the Project will contribute significantly to Government measures aimed at reforming Sri Lanka's struggling power sector. First, it promotes greater private sector investment and participation in generating and distributing electricity, with an emphasis on the use of renewable resources. Second, it facilitates the growth of a vibrant energy industry based on commercial principles and transparent rules. Third, it helps Government integrate renewable energy into overall national energy policy and the country's decentralized administrative setup. Fourth, through its emphasis on linkage of electricity with economic growth and social well-being and the goals of the Government's new rural electrification policy, the Project helps to amplify the "voice" of rural communities and stakeholders in designing development solutions. Finally, the Project will enable Sri Lanka for the first time to trade 'carbon emission reduction credits' in the global market that the Clean Development Mechanism (CDM) is bringing into existence.

### **2. Global objective:** (see Annex 1)

The Project's global objective 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.

- Measurable increases in incomes of households that gain access to electricity, assessed through periodic monitoring and evaluation.
- Number of strategies developed and implemented by government and nongovernmental institutions in non-energy sectors for using electricity to improve the delivery of their products and services in rural areas.
- Sustainability of renewable energy businesses as measured by the annual financial performance of companies operating in Sri Lanka.
- Installation of additional 85 MW of grid-connected electric-power generation capacity.
- Direct access to electricity for 100,000 households and 1,000 rural small and medium enterprises and public institutions through off-grid systems (solar, community hydro and biomass).

## **B. Strategic Context**

**1. Sector-related Country Assistance Strategy (CAS) goal supported by the project:** (see Annex 1)  
**Document number:** 15633-CE **Date of latest CAS discussion:** June 13, 1996

The Project is consistent with key CAS objectives: promoting sustainable private-sector led growth; increasing efficiency in delivery of infrastructure, especially in rural areas; preserving the environment; and working closely with communities and NGOs to generate development solutions. The Project will seek to establish a commercial and sustainable renewable energy market, with emphasis on private sector and community solutions, enabling wider energy access and higher productive consumption of electricity in rural areas. This Project follows strategies described in the CAS Progress Report discussed by the Board on January 19, 1999 (IDA/R98-190) for invigorating the rural economy, empowering and building assets of the poor and promoting rural economic development and well-being. Further, by broadening the 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:**

#### ***Electricity Sector***

According rural electrification a high priority, the Government of Sri Lanka envisions rapid expansion of electricity access as a catalyst for enhancing rural economic and social development. While conventional grid extension has made good progress connecting nearly 60 percent of Sri Lankans on average to grid electricity, accessibility differs widely among regions. The more developed Western Province has over 80 percent coverage, but other Provinces like Uva enjoy less than 30 percent coverage. Though expansion of the main grid is the principal vehicle for electrification, the success of the ongoing Bank-GEF financed ESD Project has demonstrated that off-grid systems - such as solar home systems and community-level independent grids - are frequently better-suited to serve remote, rural communities in an economic and efficient manner. Besides extending access, the main grid is also facing a shortage of generation capacity at the same time that the Government is pushing aggressively to increase electricity generation. While relying on its predominantly hydro-based system to meet its electricity needs, Sri Lanka is seeking to expand generation capacity through conventional thermal generation on the one hand, and by tapping the full potential of renewable resources such as small hydro, wind and biomass energy on the other. Demonstrated to be least cost, renewable energy resources are also particularly suited to the island's desire to preserve its ecology and environment. Hence, Sri Lanka's emerging electrification strategy relies on using both main grid and off-grid systems to widen access rapidly enough to attain its goal of 75 percent electrification by 2007. Text Box 1 summarizes the country's strategic approach to rural electrification.

#### ***Electricity Sector Reforms***

**Status:** The sector has two utilities; the Ceylon Electricity Board (CEB) is the main, vertically integrated utility and a smaller, Colombo-based distribution company, the Lanka Electricity Company (LECO). These institutions have functioned reasonably well in the past and compare favorably with other similarly

structured utilities in the region. A major share of the country's electricity supply (nearly 70 percent) is from low cost hydro plants and it has well-developed transmission and distribution networks. The operational parameters of the utilities, such as system losses of about 20 percent, appear reasonable by South Asian standards, but need improvement. Despite its strengths, the sector currently faces acute power shortages and a serious financial crisis. An overall, unfavorable view of the sector's management arises from significant power cuts, along with perceptions that electricity prices are high in relation to the service provided. Inattention to upgrading thermal capacity to match demand and inadequate tariff adjustments are responsible for the current state of affairs. These impediments create disincentives for economic development and threaten the country's competitive position.

#### **Text Box 1**

#### **Sri Lanka's Strategic Approach to Rural Electrification**

The Government envisions a rapid expansion that will make electricity access possible for 75 percent of its population by the year 2007, a challenge requiring actions to provide access to nearly one million households. Recent success in establishing peace in the northern and eastern parts of the country has opened up demand for electricity as a precursor to economic development in those areas.

The Government's most recent policy document on Rural Electrification presents the outline of its strategic approach to realize these goals. Since technical and financial concerns limit grid extension, even widespread and rapid expansion of the system would leave nearly 20 percent of the island's population reliant on off-grid systems. Many areas will require off-grid provision until the grid is able to reach such locations. Given that off-grid and renewable energy systems at present provide electricity to less than one percent of total population, there is considerable scope to expand their reach. Accordingly, the Government has articulated its rural electrification strategy as "*expanding access in the most economically efficient manner, including connection to the main grid and, where this is not feasible, (providing) off-grid services at the village or household level.*" The policy also emphasizes maximizing economic, social and environment benefits of electrification and leveraging government resources by seeking private sector and community participation. The key principles of the strategy are:

- (a) *A level playing field in rural electrification so that:* (i) all electricity suppliers can compete on equal terms and (ii) cross-subsidies between rural consumers and other consumer groups are eliminated; and (iii) any subsidies are made available to all parties interested in rural electrification on a competitive basis.
- (b) *An enabling regulatory framework that:* (i) is separate and independent from policy and operation aspects; and (ii) sets a "light-handed regulation" regime that while retaining necessary safety standards, will simplify licensing for village hydro and mini-grid projects.
- (c) *Cost-reflective tariff setting that:* enables cost recovery and a reasonable rate of return on investments for stand-alone mini-grid systems and establishes a tariff regime under which bulk supply tariffs from the main grid will be made cost-reflective, permitting any isolated mini-grid to compete on an equal footing with main grid supply.
- (d) *Third Party Access:* small producers of electricity will be allowed to sell directly to any consumer connected to the main grid using the distribution and transmission network at a cost-reflective network service charge, subject to issues of technical and operational feasibility.
- (e) *Subsidy Mechanism for Rural Electrification:* is to be established based on principles of economic efficiency, transparency and social equity to support rural electrification programs. The subsidy mechanism would be financed through government contributions and donor assistance.

**Strategy:** The Government acknowledges that sector reforms would bring high economic gains and considers them critical to the sector's revival. Under new political leadership, the Government is taking steps to address the short term crises as well as implement long term reforms. Special legislation has established a high-powered Energy Supply Committee (ESC) to resolve immediate problems and play the role of an interim reform, regulation, policy planning and implementation body. Chaired by the Secretary, Treasury, the ESC has taken initial steps to arrest the sector's decline. Emergency power is being contracted, and tariffs have been increased. Actions to speed up institutional and regulatory reform are underway. The strategy is to restructure the sector along the lines of a modern, commercial electricity industry driven by competition and private investment in generation and distribution and overseen by confidence-building regulation that facilitates private investment. Recognizing that the process is politically difficult, high-level policy makers and political leaders nonetheless appear committed to quick implementation. The World Bank, ADB and other donors are supporting the Government in this effort.

### ***Renewable Energy Development***

**Status:** Sri Lanka has successfully promoted energy efficiency and renewable energy development under the ongoing Bank-GEF financed ESD Project (scheduled closing date December 2002). The ESD Project has exceeded its targets for providing rural energy access through Solar Home Systems, grid connected small hydro projects and off-grid village hydro systems.

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. The main issues are:

- Increasing market size to reap further economies of scale, target poor households and serve productive and service sectors.
- Expanding participants and stakeholders, as well as capacity building initiatives to achieve greater outreach and proliferation of renewable energy technologies/applications.
- Ensuring a level-playing field for private sector and utility operators in terms of market entry, pricing and financing of energy supply.
- Integrating renewable energy in the country's overall electrification strategy, including those for rural development, reforms and decentralized governance.
- Enhancing the volume and quality of micro-financing for renewables such as Solar Home Systems through participation by 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 issues, certain specific barriers affect the respective components – solar, hydro, wind and biomass energy segments (see Annex 11).

The Project envisages addition of about 85 MW of grid-connected renewable energy capacity compared to the current total installed capacity of about 1700 MW. Given the currently estimated 600 MW capacity shortfall, as well as an annual electricity demand growth of 8-10%, the renewable energy capacity additions can be expected to make an important contribution to the overall stability of the grid network.

### *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 power sector reform legislation and regulations, for which a draft electricity reforms act is under consideration of the Sri Lankan Cabinet. The key issues enshrined in the Government's policy and proposed to be given effect under this act are:

- electricity pricing for grid-connected renewables to be placed under the purview of the regulator;
- exemptions from licensing to be provided for small generation and distribution systems or mini-grids, while retaining a 'light handed' regime to ensure appropriate technical and safety standards;
- establishing mini-grids in rural areas to produce and distribute electricity on a smaller scale with latitude 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 at the same time that they extend access to more people in rural areas and promote renewable energy; and
- enabling third party sales (via wheeling of power through the network where necessary for smaller systems) subject to appropriate regulatory restrictions.

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

*First*, In the context of the sector issues discussed above, the Project's aim of increasing rural electricity access required choosing between supporting the Government's grid expansion strategy or commercializing rural energy grid and off-grid options with an emphasis on renewables. The Project has chosen to support the latter approach for the following reasons: (i) the large potential for renewables to address country's electrification needs in a sustainable and market-oriented fashion; (ii) to build on the foundation laid by the ESD project and the market demand created for renewable energy services; (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 (v) substantial private sector development and community focus in implementation of the proposed project.

*Secondly*, Another strategic choice was between simply expanding electricity access or focusing on the catalytic role of energy for rural economic development. It is expected that the greater benefits flowing to the rural areas as a result of the latter choice would increase rural communities' interest in and support for renewable energy. Consistent with this choice, the Project includes support not only for electricity access for households, but also support for rural institutions to install energy systems, such as in remote health clinics or educational facilities. Technical assistance is to be provided for including energy supply as part of rural development plans.

*Finally*, at the request of the Government of Sri Lanka, this Project has been prepared in an expedited manner in order to preclude any break in the flow of IDA and GEF funds to the ongoing renewable energy programs implemented by the private sector and community participants.

## 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 socioeconomic improvements in rural areas through: (i) grid-connected and off-grid hydro, wind and biomass renewable energy technologies; (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 villages' access to electricity; and (iv) technical assistance to promote 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. This component will absorb nearly 70 percent of the IDA project financing. GEF grant funding is not envisaged for any grid-connected investments. This component, successfully implemented, will result in an increase of nearly 85 MW of grid-connected small-scale renewable energy capacity. Sri Lanka's main grid will then receive nearly eight percent of its current installed capacity from such projects, a proportion that is higher than for most other countries. All grid-connected renewables will come under the purview of standardized small power agreements and tariffs developed under ESD. In order to accommodate wind and biomass, however, the existing agreement may need some changes, that are expected to 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 Project. Since experience from prior projects under ESD has led to a better understanding of risks, banks are now willing to explore other, local, long term financing sources to complement the refinance available from this Project.

*Wind Projects:* After the successful implementation of a CEB 3MW pilot wind farm under the ESD project, regional wind resource measurements supported by UNDP/GEF and specific evaluations of sites by a commercial company, the private sector now has access to adequate information in Sri Lanka to develop and implement these projects. The 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 promising potential for wind projects. The Project will support technical assistance for business development, feasibility studies, and off-shore resource assessment. In response to strong private sector interest in wind power development, the Government has recently issued a 'Request for Proposals,' declaring its intent to expedite wind power development to augment much needed generation capacity. Wind projects are expected to be an early beneficiary of carbon trade financing opportunities, proposed to be developed under this Project.

*Biomass:* Ad-hoc and small biomass (research) projects have provided limited experience with grid connections to such energy sources. The Project, while taking a conservative approach to biomass

energy development, will support the marketing of viable grid-connected biomass projects. It will focus initially on small-scale co-generation/gasification projects in the coconut and tea-industry and on larger scale dendro projects with potential biomass plantations. It will provide technical assistance for business development, feasibility studies, and regional trade shows, as well as longer term financing for developers through the Participating Credit Institutions (PCIs). The necessary additional support for pilot biomass gasification investments will be determined and implemented during the life of the Project. Subprojects anticipated are one 8 MW project (coconut-based) and about 4-5 smaller biomass generators in the range of 1-2 MW based on wood waste (from saw mills) and/or new plantations.

- (b) **Solar PV Investments.** Sri Lanka currently has a good foundation for the solar home system market to expand and gain commercial viability, and the Project will provide credit and grant support for solar PV investments for household, commercial, and institutional use to enable the market to become fully commercial. In particular, the Project's proposed refinance, grant, and TA support will seek to solidify the existing middle-range solar home system market and expand service to other applications such as: (i) smaller systems accessible to poor households; and (ii) community applications for health clinics, schools, street lighting, etc. These initiatives will build economies of scale to solidify the market and also increase outreach and awareness for poor 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. These measures will enable Sri Lanka to achieve the indicated target of 85,000 solar systems.
- (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 refinancing and grant support for investments and project preparation support. Additionally, TA would address such issues as daytime electricity use for income generation activities and mechanisms for disposition of assets once an area served by an independent grid is connected to the national system (stranded assets). 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 15,000 new households and enterprises through independent grids – village hydro projects, as well as projects based on biomass and other technologies, where feasible.
- (d) **Energy Efficiency and Demand Side Management (DSM).** The project intends to provide TA and limited credit support for further private sector development for provision of energy-efficiency services, including a framework for integrating sustainable implementation of such programs into sector reforms. The Government's strategy paper, "Energy Efficiency, Conservation and Demand Side Management Strategies for the Electricity Sector," will underpin such support. It is envisioned that responsibility for energy efficiency/DSM-related policy and regulatory issues, as well as 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.** For helping rural communities to realize the direct and indirect economic benefits of electrification, the Project would provide rural enterprises credit support for larger systems. It will provide service institutions TA for the development of energy, standardized energy packages to create awareness and to integrate energy provision into improved service delivery. In addition, co-financing 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 and commercial systems, spurring interventions that are critically important in restoring economic development in the country's northern and eastern areas.

(f) **Technical Assistance.** In addition to the component-specific assistance described above, TA under the Project is projected for the following activities:

- Project administration/promotion;
- Subproject promotion/development support;
- Technology/market introduction/promotion/capacity building related to renewable energy and energy efficiency;
- Cross-sectoral energy applications;
- Sustainability; and
- Monitoring and Evaluation.

### Project Costs and Financing

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

Note: Both the terms - investment project and subproject - refer to grid-connected or off-grid projects proposed for finance or financed out of the credit and/or grant proceeds. The terms subloan and subgrant refer to loan or grant financing with respect to investment project/subprojects.

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

The Project makes an important, positive contribution to power sector reform by giving issues of renewable energy, energy efficiency and rural economic development deserved prominence on the policy agenda. The Project will also support Government compliance with international regulations to access carbon funds, including ratification of Kyoto Protocol by the Parliament. In addition to the comprehensive rural electrification policy and power sector reform legislation already discussed (Text Box 1 and Section B 2), reforms that the Project will advance include:

- (a) **Leveraging domestic financing:** This is a critical factor in maintaining the viability of renewable energy projects, especially those connected to the grid. The lack of long term liquidity in Sri Lanka's financial sector inhibits lending in sufficient volume and maturities

for infrastructure projects. Mechanisms are therefore needed to make long term funding more available for energy projects as well as micro-credit for small consumers. The Project will help PCIs to explore and realize complementary sources of local funds, such as through issuing 'green' bonds.

**Text Box 2: Energy Efficiency, Conservation and DSM strategy for Sri Lanka**

The Government of Sri Lanka has announced a five-part strategy for promoting energy efficiency, conservation and demand side management in its electricity sector. Key elements include: (a) Formulation of a long-term governmental policy to promote and implement energy efficiency, DSM and conservation. Fiscal incentives and disincentives will be applied through taxation and tariffs as companion measures to standards and specifications promoting end-use efficiency; (b) Energy efficiency education and awareness programs will target public and private institutions as well as other end-users; (c) Research and investigations will be conducted regarding energy efficiency/DSM or energy substitution schemes, (d) An EE financing approach will focus on increasing the role of the commercial banking sector; and (e) an institutional framework will be developed to facilitate implementation of EE measures.

As part of its implementation plan, the Government of Sri Lanka will review the existing Energy Conservation Fund Act (1985) in the context of this strategy and recent developments by October 2002 and establish a new institutional framework for energy efficiency, conservation and DSM by March 2003.

- (b) **Energy Efficiency Strategy:** As noted earlier, the Government has prepared a strategy paper on the future of energy efficiency, conservation and demand side management activities in the power sector. Part of the strategy entails formulating a long-term policy in the area of EE/DSM and introducing user awareness and education programs. Research and development of EE measures will be promoted, and commercial bank financing of EE projects will be encouraged. The salient features of the strategy are summarized in the text box above.

### **3. Benefits and target population:**

The Project's principal beneficiaries are *rural households* and *enterprises* for whom increased access to adequate and reliable supplies of electricity will mean expanded productivity, higher earnings potential and a better quality of life, due not least to their greater ability to operate small appliances and to improve indoor air quality by reducing kerosene smoke (see text box 3).

**Text Box 3: Rural Economic Development From Village Hydro Schemes**

The Project will build on Sri Lanka's successful experience of stimulating rural economic development *via* village hydro schemes, of which there are over a hundred operating in the country today. Many of the village hydro projects have contributed to the economic well-being of rural households and enterprises by affording income generating opportunities. A good example is the one found in many villages where local carpenters have converted to using power tools from hand tools – usually with a “combination tool” such as a table saw, planer, drill, and router. This versatile electric woodworking tool reduces production time from weeks, to a matter of 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 that are developing spontaneously 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.

In addition to such direct benefits, electrified rural public institutions - health, education and water – would

deliver indirect benefits in the form of improved service. *Utility customers*, moreover, will gain greater access and reliability of electricity service due to increase in generating capacity, and the mitigation of tariff increases due to increased energy efficiency investments. While *financial institutions* will be able to expand their services with long term financing, *medium to large scale local investors* will benefit from opportunities to invest in proven renewable energy businesses. *Government* will gain greater leverage of its financial resources for investments in adding capacity and promoting rural electrification. *Globally*, the Project's environmental benefits include direct and indirect reductions in greenhouse gases, resulting in global environmental benefits.

#### **Monitoring and Evaluation arrangements:**

The Project includes a detailed two-part evaluation program to establish its effectiveness in meeting its access and related economic development objectives:

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

The elements to be monitored include: (i) physical progress of rural electrification through grid extension, village grid, solar, etc.; (ii) impact on development as seen in quality of life enhancement, rural employment, and changes 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 and as guides to revisions of the Project design if needed. Additional surveys or market analyses that may be needed throughout the Project's implementation period to assess specific areas such as biomass gasification market development, village grid productive use etc. are also to be covered.

#### **4. Institutional and implementation arrangements:**

*Implementation period:* Five and one-half years (FY2003 to FY 2008)

*Executing agencies:* Ministry of Finance and Planning

*Project coordination:* The Administrative Unit (AU) in the DFCC Bank, which was established for the ESD Project will also implement this Project. The AU is well staffed, professionally managed under the leadership of a Senior Vice President of the DFCC Bank, and has established an excellent track record in implementation of the ESD Project, earning 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 NGOs, non-profit and for-profit renewable energy firms and advisers are expected to participate in project implementation.

The AU would be responsible for administering the Credit Program and the GEF grants, guiding the cross-sectoral activities, and technical assistance. Although it will also administer the technical assistance intended for other project entities such as the CEB, other ministries and the various industry associations, the institutions concerned will be responsible for supervising and reporting on the work. 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 accountability safeguards that have been enhanced and strengthened, as necessary, for this Project. The guidelines define the on-lending

mechanism, including the on-lending rate, the terms and conditions, the responsibility of the Administrative Unit, PCIs and other grant/credit receiving organizations, procurement procedures, disbursement procedures, environmental and other safeguards 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 on-lending and new 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 for consumer education and protection.

*Project oversight (policy guidance, etc.):* The Ministry of Power and Energy will provide policy guidance to incorporate renewable energy and energy efficiency into the power sector reform process and specific implementation of policy elements such as the set up of the rural electrification subsidy mechanism.

*Accounting, Financial Reporting and Auditing arrangements:* Although the AU has a significantly enlarged administrative role compared to the ongoing ESD project – reflecting the enlarged scope of the proposed project -- the PCIs/MFIs and project beneficiaries will conduct the actual implementation. The financial management assessment did not cover the PCIs/MFIs, since there are other existing arrangements in place for their evaluation. Under ESD, the Bank's South Asia Financial and Private Sector Development Unit carries out annual assessments of their compliance with eligibility criteria, and in the new Project, this annual review will be undertaken by the Government in consultation with the Bank. Furthermore, the Banking Supervision Department of the Central Bank of Sri Lanka closely reviews the financial soundness of the PCIs. External auditors, to be appointed by November 30, 2002, will audit the Project accounts and submit their reports to the Bank within six months of the end of each fiscal year. Audit reports of the ongoing ESD project have been received on a timely basis and have been satisfactory without any major audit observations. The Project has provision to finance the cost of external audits.

*Funds Flow:* On behalf of the Government, the DFCC AU will administer the credit and grant programs. The Government will make adequate budget provision to ensure that credit and grant proceeds are available to the DFCC AU for making subloans and subgrants respectively to MFIs, PCIs and other participating organizations. PCIs will be responsible for approving the loans to ultimate project beneficiaries following their own loan-screening procedures. Once the loan has been approved, PCIs will forward a Loan Refinance Application form to the AU requesting commitment for a maximum of 80 percent of the approved loan amount. As and when the PCI disburses funds against the approved loan amount, it will forward a disbursement request form (with appropriate supporting documents) to the AU to obtain 80 percent of the amount disbursed to the beneficiary. Similar procedures will operate for release of subgrants to participating organizations. 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 Project, after modifications), the Project Operating Guidelines (Annex 12) and Procurement, Disbursement and Financial Management (Annex 6). The DFCC AU will also implement all TA funding on behalf of the Government. All TA activities will be cost shared, either by the beneficiary organization/community or the Government. At a minimum, the cost sharing will cover 20 percent of the activity cost, this being the local taxes and duties component that is not financed by the IDA Credit or the GEF Grant. Therefore, the Government has assured that adequate annual budget provisions for credit and grant proceeds from the Project and

counterpart funding on a quarterly basis will be made available to DFCC AU for implementing TA activities.

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, against the Government’s budgetary provisions. AU will have the right to operate the SDAs and withdraw funds, as needed, to disburse subloans, subgrants or technical assistance. The Project will follow a Financial Monitoring Report (FMR) based disbursements process. The DFCC AU will upgrade its financial management system to enable computerized preparation and submission of quarterly FMRs, which are simplified financial reports of physical and financial progress, as well as estimates of projected disbursements for the next six months. The FMRs will be used for disbursement purposes and release of adequate funds from the Credit and Grant to the SDAs. DFCC AU also confirmed that the first set of FMRs will be submitted to the Association within 45 days of the closing of the first quarter after Project Effectiveness, which will include the request for the initial deposit to the Special Accounts. The required FMR formats have been developed by DFCC AU and agreed with the Government and the Bank.

## D. Project Rationale

### 1. Project alternatives considered and reasons for rejection:

Three alternative instruments to the SIL were considered. An APL was rejected because the pace and extent of power sector reform is not yet sufficient to justify the need for, and scope of a longer-term, multi-project program. Further, the size of the proposed operation exceeds the LIL threshold, and because structural adjustment was not viewed as the key issue to address at this stage, an SAL was not judged appropriate.

A decentralized implementation approach based on Provincial Councils, rather than a centralized AU was considered and rejected. While such an approach would have possibly matched the grant provisions for rural energy offered by provincial authorities, it would overtax their administrative capacity. Firstly, even though initial steps of provincial grant funding have been promising (such as by the Uva province), it is premature to pursue this option as the flow of funds from the province to the businesses has not been steady. Secondly the management capacity at the provincial level is limited and cannot yet handle a project of this scale and complexity.

### 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)
<b>Bank-financed</b>			
Private sector delivery of energy Services	Sri Lanka Energy Services Delivery Project (P010498)	HS	HS
Commercialization of Renewable Energy	India Renewable Resources Development Project (P02449)	S	S
Rural Access through Renewable Energy	Laos Southern Province Rural Energy (P044973)	S	S
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		
Projects under Preparation			
Electricity Sector Reforms	Sri Lanka Power Sector Restructuring Project		
Renewable Energy- Micro credit as well as pay for service channels	Bangladesh Rural Electrification and Renewable Energy Development Project		
Renewable Energy-community Based Hydro Development Project	Nepal Power Sector Development		
<b>Other development agencies</b>			
Asian Development Bank	Sri Lanka Rural Electrification and Power Sector Reforms Project (under preparation)		

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 the necessity of providing consumer choice, ensuring pricing that reflects costs, overcoming high start-up costs, encouraging local participation, and implementing sound sector policies.

The Energy Services Delivery Project in particular offers many useful lessons for the Project design. Flexibility is key, with each supervision mission being viewed as an opportunity to adjust project design to address emerging problems and issues. The grant design and delivery models are simple and easy to implement; credit lines and grant administration are commercially managed; and industry associations and advocacy groups play important roles in guiding industry growth and directions. Technology-specific lessons learned are given below:

**Grid-based renewables:** Certainty of tariff regime and availability of long term financing are critical to private sector development of grid-connected projects. The private sector mini-hydro experience has opened the door for similar projects using biomass and wind resources.

**Village Electricity Systems:** Participation and mobilization of the whole community is essential for long-term sustainability. While village hydros remain the least-cost solution for many isolated rural communities, high development and investment costs continue to be a barrier. To overcome these, increased productive activities, energy conservation, and streamlined project development to reduce costs are needed to enhance returns. Commercial banks based in urban centers are averse to financing these transactions due to the small value of each loan and the rural and dispersed nature of the projects. Increasing the role of rural credit institutions could ease this constraint. Technical capacity to operate and

maintain such projects can be easily developed within the existing infrastructure of village technicians and 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 cost risks in the event of a grid's reaching a village hydro system. A light-handed regulation would be appropriate for small systems in remote, rural areas.

**Solar PV:** The relevant lessons from the recent *World Bank Solar Home Systems Projects: Experiences and Lessons Learned 1993-2000* are that adequate after-sales service, including consumer education in proper maintenance and operating procedures, is important for increasing consumer satisfaction, reducing maintenance costs and enhancing overall system reliability. In as much as marketing campaigns are important to enlarge the market, consumer awareness must be combined with other factors such as affordability, demonstrations, opinions of neighbors, and service presence etc. to be effective. Also, the adequate facilitation of consumer credit is key to expanding the market beyond cash sales. Additional solar industry lessons on scaling-up operations point to the need to involve large firms with business plans featuring sales of thousands (rather than tens or hundreds) of systems 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. To promote market growth, more micro-credit/consumer finance institutions are needed, and consumers must be made aware of the potential of solar systems to raise their incomes and quality of life (see Annex 2, Box 1).

**Energy efficiency and conservation:** Key lessons learned within the Bank from the implementation of Bank-supported energy efficiency projects in Thailand, India, Sri Lanka and China are that 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 equally important. Also, financial packaging of energy efficiency projects is important as such projects often need innovative financing and security structures. Energy Services Companies (ESCOs) are appropriate private sector vehicles for implementing energy efficiency projects, but the industry needs to be nurtured through technical assistance.

**Cross-sectoral Energy Applications:** Although there is still little operational experience in this area, the lessons learned during the preparation of the *Uganda Energy for Rural Transformation* Project have been incorporated into the design of this Project. The key lessons are that cross-sectoral applications -- welcomed by all stakeholders -- can stimulate demand for electricity services, making it more attractive for private sector participation in rural electrification schemes. Given the paucity of precedents, however, it would take time to develop operational models.

#### **4. Indications of borrower and recipient commitment and ownership:**

The Government of Sri Lanka has announced a Rural Electrification Policy that articulates its vision and intentions to create enabling conditions for: (i) promoting rural access to electricity; (ii) integrating renewables into the overall electrification strategy; and (iii) facilitating the spread and adoption of renewables in a variety of ways. The draft policy, which also contains a strong indication of the Government's commitment to renewable energy, underpins the proposed Project.

The Government is taking steps to reform the power sector. It has recently enacted legislation to establish the Energy Supply Committee (ESC) with a wide-ranging mandate to address short term crises arising from power shortages and implement the longer term reform program. The reform program will take into account the directions provided in the new Rural Electrification Policy (see Text Box 1).

In separate meetings, such private sector participants, NGOs and community based organizations 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. have made commitments to participate and scale up their efforts under this Project. Collectively, these associations represent nearly sixty different companies, enterprises, financial institutions, developers/investors and organizations. The current five participating credit institutions under the ESD project have also confirmed their participation and appetite for scaling up their financing activities appropriately. The PCIs have confirmed that projects worth nearly US\$ 20 million are approaching financial closure and are targeted for refinancing 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 such other donors as UNDP, for renewable energy development and energy efficiency. The 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 regimes for renewables and to integrate initiatives by the private sector and community based organizations to deliver access and more productive use of electricity to the rural poor.

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, 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 being developed elsewhere. In particular, the Project team brings together professionals with a range of expertise and experience with renewable energy projects in Uganda, Laos, Vietnam, Cambodia, Indonesia, Bangladesh, South Africa, Argentina, and India, besides Sri Lanka.

## **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)  
Other (specify) NPV=US\$ million; ERR = % (see Annex 4)

Since the project analysis has been carried out on a component basis, the 'other' option from available choices for reporting economic analysis results has been selected.

Anecdotal evidence points to the likelihood that rural electrification based on renewable energy would bring significant improvements in quality of life. At present, however, Sri Lanka lacks widespread experience with rural power derived from renewables and has none at all of cross-sectoral energy applications. It is therefore difficult to estimate at this time the two key elements of economic benefits – the consumer surplus and the indirect benefits – that will be assessed as part of the monitoring and evaluation activities of this Project.

## **Economic Comparison of Grid and off-grid alternatives**

Solar: SHS are least-cost alternatives for areas with dispersed populations and/or where grid extension is expensive. Even in other areas, the costs of SHS compare favorably with those of grid expansion. The solar component under this project would provide electricity to nearly 85,000 households at a capital cost of nearly US\$ 28.0 million (US\$ 330 per household). Extending the grid to the rural areas in Sri Lanka, on the other hand, would cost about US\$350 per connection, not counting the cost of generation investment – which is at least US\$500 per KW. At this greater cost however, grid electricity provides a different and better level of supply and service and has a much higher impact on economic development and social well-being than electricity from off-grid services, especially solar. The latter supports a very basic level of service, mainly lighting, which is also the dominant use among rural households. Most of them are low-intensity consumers, using less than 50 kWh per month, mainly for lighting purposes, a level of service consistent with the power available from solar/hydro off-grid systems to illuminate by using low-watt fluorescent lamps. Also, this Project is looking at strategies to increase the impact of renewable electricity sources on economic development and social well-being. To a limited extent, therefore, the Project could also produce the economic and social benefits generally associated with grid-supplied electricity. An example of this comes from Cambodia where solar panels are powering donated computers in about 40 village elementary schools, with plans to extend such provision to 200 schools eventually.

Mini-Hydro: The economic analysis carried out for a recent mini-hydro project in Sri Lanka shows 24 percent EIRR under standard assumptions.

Village Hydro: An incremental cost analysis for off grid village hydro that used a representative project implemented under ESD found that the approach yields an incremental cost of about US\$ 11,400 for an 11 kW system as compared to the levelized costs of kerosene and battery use by the beneficiary households. An economic analysis yields a 12 percent EIRR.

The details of the analysis are at Annex 4.

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

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

The Project faces two major financial issues. *First*, commercial debt finance for renewable energy developers (grid-connected and off-grid) and consumers (solar pv) is still constrained, even though significant progress has been made under the ESD Project. Part of the problem arises from the generally limited level of development of Sri Lanka's financial markets, and part stems from the lenders' view that the risks associated with these activities are high. *Second*, it is important to ensure that the private sector enterprises' need for grant funds declines over time, a principle that 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 7 percent. This compares favorably with the rural household's savings rate.

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 an 11kW village hydro project. The financial analysis indicates a FIRR of 10 percent.

#### **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 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 which is 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 will provide technical assistance to evaluate these options and, in line with eventual findings on the number of installations impacted, assist the Government to reach a feasible alternative.

### **4. Institutional:**

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

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

#### **4.1 Executing agencies:**

The DFCC Bank will execute the Project through the Administrative Unit, which is currently operating the ESD Credit Program. This unit has been working very smoothly, and both its capacity and safeguards are being strengthened so that it can continue to perform to expectations.

#### **4.2 Project management:**

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

#### 4.3 Procurement issues:

There are no procurement issues. The Project will follow the established arrangements of the ESD Project, which is being satisfactorily implemented. In addition to new sub-projects, this Project will finance sub-projects developed under the ESD Project pipeline. Since this is a financial intermediation project, there are no major direct procurement of goods and works. The only significant procurement under International Competitive Bidding (ICB) procedures in respect of goods and works will be by the private sector project developers of grid-connected wind, hydro and biomass sub-projects. These will follow Bank guidelines. Compliance will be ensured through ex-post reviews and audits, except in cases where the procurement is of value greater than prior-review thresholds, as described in Annex 6. In the case of technical assistance, only small outlays for goods are envisioned. In respect of services and training, the technical assistance will be administered by DFCC AU using both grant and credit funds. Since procurement for sub-projects would be handled by Project developers consistent with the pace of their sub-project implementation, and no large value technical assistance contracts are anticipated in the first year of implementation, the "Procurement Readiness for Implementation" box in Section H2 has not been checked.

#### 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 ESD Project. DFCC Bank has demonstrated capacity in submitting project audit reports and informative quarterly project management reports to the Bank on a timely basis. The Project will be using a Financial Monitoring Report (FMR) based disbursement process, and the quarterly FMRs will include both physical and financial progress information.

Because of significant risk arising from the substantially increased scale of this Project in comparison to the ESD Project, the DFCC Bank has agreed to take various risk mitigation measures. It will, for instance, expand the scope of the project audit to cover independent physical verification of assets and procurement/accounting practices of the beneficiaries. Further, it will engage the services of consultants to verify satisfactory installation of the Solar PV systems (the most dispersed and transaction-intensive project component) and will computerize its project accounting system.

### **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 'F' 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.

As actual subprojects and sites are yet to be identified, environmental issues for specific subprojects cannot be identified at this stage, but the information given below identifies generic environmental issues associated with typical renewable energy systems proposed under this project. The Government has prepared and adopted an Environmental and Social Assessment Framework based on which sub-project specific EAs will be conducted once sub-projects have been identified. The Bank reviewed the draft Framework, based on which the Government has adopted and disclosed a revised version which is acceptable to the Bank. The framework was placed for public disclosure on February 26, 2002, both in the

Public Information Center and in-country, as required by Sri Lankan National Environmental Act and IDA guidelines. No significant issues have been raised.

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 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 solar systems is benign from an environmental point of view, with the only potential concern being 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, long term impacts should be minimal. 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. To insure that biomass power generation does not raise deforestation risks, the Government has decided that only dedicated fuelwood plantations grown on agriculturally marginal lands will be used to supply the biomass energy plants. Sri Lanka's stringent permitting system for transport of any type of locally grown timber has been reasonably successful in controlling illegal timber felling and will be used to control illegal deforestation. Biomass sub-project feasibility assessments will include environmental impact assessments of lands identified for fuelwood plantations. 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 establish emission standards for biomass energy plants.

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 agreed Framework. This process is consistent with World Bank environmental and public disclosure requirements. Although the CEA's regulated EA procedure is less than a decade old, the CEA has made substantial progress in evaluating EAs. 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 capacity to implement the environmental review process satisfactorily.

### 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 for which EAs will eventually be conducted, 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: February 20, 2002

### 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. Since relevant indicators are likely to be sub-project and area specific, they 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.

With an emphasis on low-income rural households, the Project will include specific measures to enhance rural development. In particular, it will encourage the solar-power industry 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 section F1 and 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 favor women and children, who spend the most time indoors. The targeting of grants will extend these benefits to women and children in lower income households 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 Project preparation has been, and will continue to be highly participatory in nature, carried out 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 preparing the Project 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 with key stakeholder groups to elicit ideas and concerns regarding design of the Project. Discussions on project design between the mission and project stakeholders that began during earlier ESD supervision missions continued during preparation of this Project, including one-on-one and group discussions with the following organizations:

<b>Private Sector:</b>	<b>Non-Governmental Organizations</b>	<b>Government</b>
Solar dealers	Energy Forum	Ministry of Power and Energy
Participating Credit Institutions	Intermediate Technology Development Group (ITDG)	Ministry of Finance
Mini and Village hydro developers	Sarvodaya Economic Enterprises Development Services (SEEDS)	Ministry of Health
Most consulting firms active in Renewable Energy and Social Mobilization	Small Power Producers Association	Ministry of Education
	Sri Lanka Solar Industries Association	Ministry of Environment and Natural Resources
	Sri Lanka Business Development Centre (SLBDC)	Samurdhi Authority
	Consultant and Professional Services (CAPS)	University of Moratuwa
<b>Bilateral and Multilateral</b>		Provincial Councils of the Southern, Uva, Sabaragamuwa, Northwestern and North-central provinces
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 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 built into the process by which communities decide to participate in the off-grid component. The community reaches all decisions with regard to electricity design, financing, tariffs, maintenance of the systems and amount of electricity to be used by each household in a participatory manner. Households purchasing solar systems have the same freedom as any buyer of consumer appliances has to choose a particular system or supplier based on perceived suitability, reliability, value, etc. With only one MFI now operating in the field, however, purchasing households are severely limited in the financing arrangements they can make. Market assessment conducted by the AU and the Participating Credit institutions monitor overall satisfaction among end-users. These practices will be continued and strengthened, 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 proposed 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. 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 promising Puttalam

coastal region. Capacity building in renewable energy and energy efficiency, including training energy managers in key private industries and developing university-level educational material, have also added to the momentum behind renewable energy and energy efficiency 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. The Project 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 EAs. 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 that insures that 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 socioeconomic impact of electricity on rural households and beneficiaries. The baseline for such indicators would be established through pre-project implementation surveys with impact being 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 checked="" type="radio"/> Yes <input 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 the Government of Sri Lanka 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 supplies will be harvested from designated fuelwood 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. The Pest Management (OP 4.09) will be triggered in cases where it is proposed to use pesticides for developing fuelwood plantations. 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 to 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 small, run-of-the-river hydro power projects of less than 10MW capacity. Therefore, dam safety is not expected to be an issue. As a precautionary measure nonetheless, the Safety of Dams Safeguard Policy (OP/BP 4.37) has been identified as applicable. The EA Safeguard Policy (OP/BP 4.01) will be triggered under the Project and be fully addressed under the Environmental and Social Assessment Framework.

All sub-projects will be subject to the EA process as outlined in the Environmental and Social Assessment Framework. Each project specific EA will undergo the appraisal process outlined in the National Environmental Act, and the CEA's environmental clearance is a prerequisite for disbursements to each sub-project under the Credit Line. With the environmental clearance experience of sub-projects in the IDA-financed ESD Project as a precedent and in light of the on-going institutional strengthening of the CEA under the IDA-financed Environmental Action 1 Project, the Project will rely 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 tariff announcements under the SPPA framework represent a major breakthrough for renewable energy development. They include a floor price so that the developer is guaranteed to receive 90 percent of the first year's tariff during the contract's lifetime. The short-term volatility is addressed by calculating tariffs as an average of annual tariffs of the past three years. Further, the Project will include TA to the regulator to ensure that the future tariff regime is developed with appropriate incentives and security for economically viable grid-connected investments. The availability of long-term financing to the developers is key to sustainability. The Project will support PCIs to tap local sources of long-term financing.

**Off-grid village hydro systems.** Experience shows that the system of village ownership and operation of hydro systems is working well so far in Sri Lanka, implying sustainable operations. At the same time, it will be necessary to monitor their functioning closely to detect any problems that may arise and take timely corrective action. The financial sustainability of the systems to be supported arises from relatively low operational costs that can be covered from revenues, once capital costs and most development costs have been partly subsidized with GEF funds. Furthermore, the emphasis on productive uses is expected to help boost financial sustainability. While GEF capital-cost subsidies for additional schemes are expected to decline over time, the need for such subsidies for future schemes, though reduced, will remain necessary even at the end of this Project. Therefore, the establishment of a rural electrification subsidy mechanism as proposed by the Government under its Rural Electrification Policy will be necessary and timely substitute for grants now available under GEF. Another issue in relation to the sustainability of village hydros is that of stranded assets, in case the grid is extended to an area served by village hydro systems. In order to address this issue, the Government is considering use of a separate set of distribution system and interconnection standards for small size rural systems so that village hydros can be interconnected to the grid. The Project intends to assist the Government in establishing the rural electrification subsidy mechanism, as well as develop strategies to deal with the interconnection of rural systems to the grid.

**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 countries of Sri Lanka's size. A fourth company that has not yet made significant investments 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, these steps lay 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. Although it is essential for GEF to have an exit policy from the solar PV market development, it is also clear that the private sector, particularly foreign companies that perceive local risks to be high, would prefer continued GEF support beyond this project. Accordingly, an exit policy has been developed in consultation with stakeholders. While complete phase-out of grants for SHS during the Project's lifetime is expected, grant support for second-generation uses – for productive purposes and delivery of services – may continue to be needed. However, such future grant requirements are likely to be met through government funding as indicated above.

In addition to the above, two risk-mitigation measures against high GEF grant dependence are being adopted: (i) the grant provision for smaller systems (10 to 19 Wp) will depend on the revenue contribution of these systems to the total industry revenue. If the revenue share is more than 30 percent of the total industry revenue, then the GEF grant for such systems will be reduced to US\$ 20/unit from the proposed

US\$ 40/unit; and (ii) if for any product range a company gains more than 85 percent of the total market share, that company will not receive any more GEF co-financing grants. The salient features of the solar system grant program are summarized in the following box (Text Box 4).

**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. The design of this component is flexible enough to accommodate these adjustments.

**Text Box 4:  
GEF Grant Design for Solar Home Systems**

The grant mechanism under this Project reflects the objectives of the five main stakeholders:

- (i) building a market around proven systems and ease of administration (DFCC AU);
- (ii) reducing grants over time with a clear exit strategy (GEF);
- (iii) providing incentives to deepen the market and enable access for rural poor (IDA);
- (iv) assuring sustainability of successful product lines and increasing scale (Solar Industry);
- (v) affording quality and choice at reasonable prices (Consumers).

The mechanism developed by adopting the above objectives precludes subsidies for already viable solar products; limiting grants only to systems smaller than 60Wp during the first year, then only to those smaller than 40Wp during years 2 and 3, and finally only to systems smaller than 20Wp during the last two years of Project implementation. This mechanism specifically supports the extension of electricity services to poor people in rural areas. It also promotes sustainability of the market since the subsidy-reduction scheme would, at the end of the Project, ensure that less than 5% of the turnover of the solar-home system market would be coming from grants. Post-Project grant needs would be funded from a rural electrification subsidy mechanism that the Government of Sri Lanka has announced under its recent Rural Electrification Policy.

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

Risk	Risk Rating	Risk Mitigation Measure
<b>From Outputs to Objective</b>		
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.
<b>From Components to Outputs</b>		
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. Design of grant regime to develop smaller

Barriers to community wind and biomass projects are not overcome.	S	systems. Opening up of north and east as potential markets. Build on social mobilization experience of community hydro, capacity building, and technical assistance.
Framework for wind and biomass projects is unattractive to the private sector.	M	Ensure that initial projects are soundly structured and demonstrate commercial viability. Incorporate Carbon financing.
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.
Working capital financing could be misused by solar dealers.	M	AU will issue stringent guidelines for working capital finance and carefully scrutinize such requests. Working capital financing requests are expected to be few in number.
<b>Overall Risk Rating</b>	S	The overall risk mitigation approach is to strengthen and utilize local resources, capabilities and institutions, which is expected to promote long-term sustainability.

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 seeks to promote private sector and community led implementation, while touching on several key socioeconomic 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. Furthermore, the size of the Project in relation to the nearly 100,000 households that will gain access to electricity is reasonable. That this target will be achieved with little direct Government funding is notable. Almost the entire non-IDA and non-GEF financing is being met by capital from private sector, village communities, households and commercial banks. 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 those of 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

- (a) Execution of the Administration Agreement between Sri Lanka and DFCC Bank, and the execution of Participation Agreements between Sri Lanka and at least two Participating Credit Institutions.

- (b) Satisfactory legal opinions addressed to IDA and IBRD (for GEF) from the Attorney General of Sri Lanka regarding the due authorization, ratification and binding nature of the Administration Agreement and the Development Credit Agreement or the Grant Agreement, as the case may be.
- (c) Satisfactory legal opinions addressed to IDA and IBRD (for GEF) from DFCC Bank's counsel regarding the due authorization, ratification and binding nature of the Administration Agreement and the IDA Project Agreement or the GEF Project Agreement, as the case may be.
- (d) Appropriate and necessary action has been taken by the Government to ensure that sufficient allocations are made for Project expenditures for FY2002, which are not otherwise financed by the Credit or the GEF Trust Fund Grant proceeds.
- (e) The Government has made available to DFCC Bank necessary funds for its share of Project expenditures in FY2002 for the quarter following Project effectiveness.
- (f) Appropriate and necessary action has been taken by the Government to ensure that sufficient allocations are made for Project expenditures to be incurred in FY2002 out of the proceeds of the Credit and the GEF Trust Fund Grant.

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

Legal Covenants

- (a) The Government shall develop standards for the recycling and disposal of batteries used in solar home systems within two years of Project effectiveness.
- (b) The Government shall ensure that Investment Projects, which receive Sub-grants under the Project, comply with the environmental, resettlement and social standards set forth in the Environment and Social Assessment Framework.
- (c) Each Participating Credit Institution shall ensure that Investment Projects, which receive Sub-loans under the Project, comply with the environmental, resettlement and social standards set forth in the Environment and Social Assessment Framework.

Financial Covenants

- (a) The Government shall make adequate annual budgetary provisions for making available sufficient Credit and Grant proceeds to the Administrative Unit for implementation of the Project.
- (b) The Government shall make adequate annual budget provisions for meeting its share of funding under the Project. Such funds will be made available to the DFCC AU in a timely manner to implement the technical assistance program smoothly.
- (c) The AU shall establish a computerized financial management system for the Project by March 31, 2003 and maintain it throughout the Project implementation period.
- (d) The AU shall prepare and furnish FMRs to IDA no later than 45 days after the end of each quarter.

- (e) The AU shall appoint a Project auditor by November 30, 2002, with terms of reference satisfactory to IDA.
- (f) The Government and the AU shall submit audited annual financial statements of the Project accounts before June 30 of each year.
- (g) The Government shall furnish to IDA by September 30 each year, the results of an independent evaluation of the continued eligibility of each PCI under the Project. The Government shall suspend the right of ineligible PCIs to participate in the credit program, and take such other actions agreed with IDA, to recover loans made to ineligible PCIs.

#### **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):

#### **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.

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Subramaniam V. Iyer  
**Team Leader**

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Penelope J. Brook  
**Sector Manager**

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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><b>Sector-related CAS Goal:</b></p> <p>1.0 Invigorate rural economy, empower and build assets for the poor, promote rural economic development and well being.</p> <p>2.0 Promote establishment of a competitive electricity industry with significant private sector participation.</p>	<p><b>Sector Indicators:</b></p> <p>1.0 Improved living conditions, rise of rural income and enhanced economic and social activity.</p> <p>2.1 Progress on sector reforms</p> <p>2.2 Increased private investments in various parts of the sector</p>	<p><b>Sector/ country reports:</b></p> <p>1.1 National Poverty Assessments.</p> <p>1.2 Public expenditure review</p> <p>1.3 Government reports, including Central Bank annual reports.</p> <p>1.4 Dialogue with GOSL, donors, and other relevant stakeholders.</p> <p>2.1 Sector reports and dialogue.</p> <p>2.2 Review of investment data in power sector.</p>	<p><b>(from Goal to Bank Mission)</b></p> <p>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><b>GEF Operational Program:</b></p> <p>1.0 Promote adoption of renewable energy by removing market barriers and reducing implementation costs.</p> <p>2.0 Reduce greenhouse gas emissions</p>	<p>1.1 Proportion of electricity capacity being derived from renewables.</p> <p>1.2 Number of rural consumers served by renewable energy systems.</p> <p>2.1 Quantity of CO2 avoided.</p>	<p>1.1.1 Project implementation reports and sector statistics.</p> <p>1.2.1 Customer surveys.</p> <p>1.2.2 Household surveys.</p> <p>1.2.3 Monitoring &amp; evaluation program outputs</p> <p>2.1.1 Project implementation reports</p> <p>2.1.2 Sector Studies</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>



Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p><b>Output from each Component:</b></p> <p>1.0 Grid-connected hydro, wind, Biomass.</p> <p>2.0 Off-grid solar PV household systems</p> <p>3.0 Standalone mini grid systems to serve remote villages</p> <p>4.0 Energy efficiency and DSM strategies to be implemented.</p> <p>5.0 Public service institutions and rural industrial, commercial enterprises are served by renewable energy systems.</p> <p>6.0 Technical assistance to promote use of renewable energy</p> <p>Global environment benefits.</p>	<p><b>Output Indicators:</b></p> <p>1.0 85 MW grid connected renewable energy plants.</p> <p>2.0 85,000 Solar households connected.</p> <p>3.0 15,000 households are connected to mini-grids</p> <p>4.0 3 -4 private energy service companies are in operation.</p> <p>5.0 1,000 institutions and enterprises are supplied by renewable energy sources</p> <p>6.0 Project development opportunities identified and developed, market barriers reduced and energy planning for other sectors systematically introduced.</p> <p>1.25 million tons of carbon avoided.</p>	<p><b>Project reports:</b></p> <p>Quarterly Progress Reports.</p> <p>Project Supervision Reports.</p> <p>Monitoring &amp; evaluation program outputs</p>	<p><b>(from Outputs to Objective)</b></p> <p>Small power project tariffs are certain and stable</p> <p>Lenders perception of the risk profile of renewable energy investments improves.</p> <p>Village off-grid hydro development costs remain stable.</p> <p>Long-term lending constraint of PCIs are removed</p> <p>Macroeconomic problems that reduce demand and increase cost of renewable energy services are eliminated.</p> <p>Public acceptance of renewable energy technologies continues to grow.</p>

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p><b>Project Components / Sub-components:</b></p> <p>1.0 Grid Connected Hydro, Wind, Biomass</p> <p>2.0 Solar PV Investments</p> <p>3.0 Community investments - hydro, wind, biomass</p> <p>4.0 Energy Efficiency and DSM</p> <p>5.0 Cross-sectoral Energy Applications</p> <p>6.0 Technical Assistance</p>	<p><b>Inputs: (budget for each component)</b></p> <p>1.0 Total cost US\$ 90.3 million of which IDA US\$ 49.2 million</p> <p>2.0 Total cost US\$ 28.3 million of which IDA US\$ 18.8 million; GEF US\$ 3.9 million</p> <p>3.0 Total cost US\$ 4.4 million of which IDA US\$ 3.6 million</p> <p>4.0 Total cost US\$ 1.0 million of which IDA US\$ 0.6 million.</p> <p>5.0 Total cost US\$ 4.6 million of which IDA US\$ 2.3 million; GEF US\$ 0.8 million</p> <p>6.0 Total cost US\$ 5.1 million of which IDA US\$ 0.5 million; GEF US\$ 3.3 million</p>	<p><b>Project reports:</b></p> <p>Quarterly Progress Reports</p> <p>Project Supervision Reports</p> <p>Monitoring &amp; evaluation program outputs</p>	<p><b>(from Components to Outputs)</b></p> <p>Framework for wind and biomass projects is attractive to the private sector.</p> <p>Institutional market for solar PV materializes and market for smaller systems develops.</p> <p>Working capital financing properly used by solar dealers</p> <p>Barriers to community wind and biomass projects are overcome.</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 solutions</p>

## Annex 2: Detailed Project Description

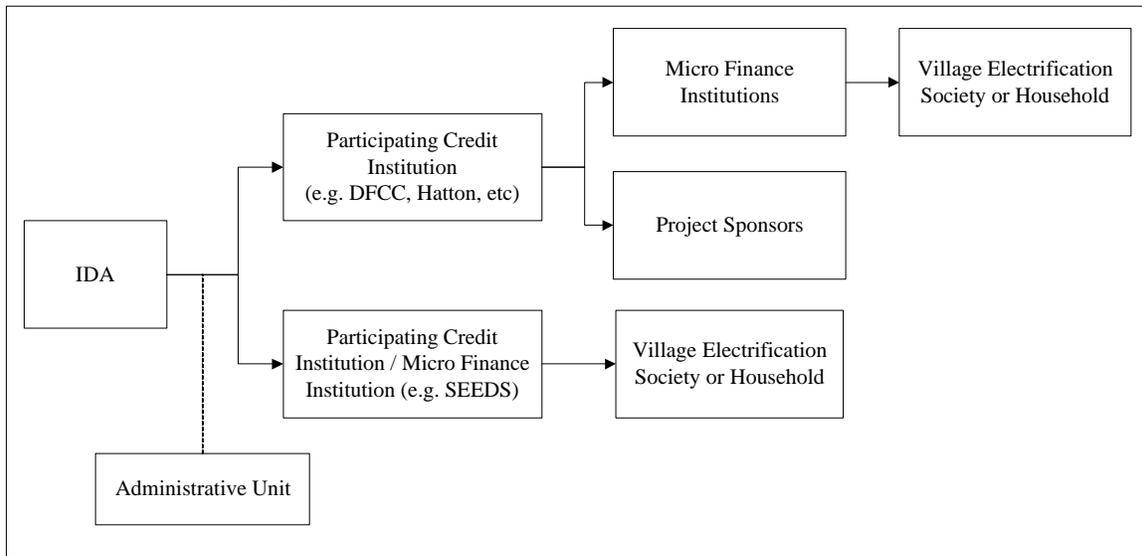
### SRI LANKA: Renewable Energy for Rural Economic Development

#### Overview

The Project design aims to build a sustainable market for renewable energy through IDA and GEF support. Of the six distinct elements in the Project, the four that support grid-connected and off-grid generation of energy from renewable sources all have antecedents in the ESD project launched in 1997. Accounting for nearly 90 percent of total Project costs, these four components build on the success of the ESD project laid in small hydro, wind and solar power and in promoting energy efficiency. This Project seeks progression in scaling up investments in these components and introduce initiatives to develop grid connected wind and biomass projects, off-grid wind and biomass projects, and cross-sectoral impacts for economic development and improved delivery of such social services e.g. health and education. In addition, technical assistance for policy development, second-generation performance based subsidy design and energy services are new features.

A summary of the Project components and financing plan is described in section C of the PAD. The DFCC Bank AU will be the implementing agency on behalf of the Ministry of Finance. The AU will administer the IDA Credit program to refinance subloans made by Participating Credit Institutions (PCIs) to Investment Projects or subprojects, developed and implemented by the private sector, village communities and NGOs. The AU will also administer the GEF grant program to co-finance development of off-grid investment projects, develop new renewable energy applications and technical assistance for an array of activities described later in this Annex. The Project's credit program will utilize the same structure as the highly satisfactory ESD program. PCIs currently include development banks, commercial banks, and one large micro-finance institution. The PCIs use their standard procedures to appraise and finance subprojects. Eligible subprojects are then refinanced in accordance with the Operating Guidelines (see Annex 12). Figure A-1 summarizes the flow of credit funding. Under this Project, new PCIs will be encouraged to enter the credit program in compliance with the Operating Guidelines.

Figure A.1 RERED Credit Program Structure



The GEF grant for technical assistance will have two windows, cost-shared and full-cost, both operated by the DFCC AU. The cost-shared scheme will support existing renewable energy organizations if the

proposed projects directly contribute to achieving the technology objectives (see below). It will not include support for hardware and will be offered to a company no more than twice. Full cost TA activities would require endorsement by a majority of key stakeholders in the relevant technological areas. The regular stakeholders meetings chaired by the AU will provide the decision forum for such activities. The AU- with support of independent experts if required – will approve the activities up to US\$ 100,000. Applications for more than US\$ 100,000 will need approval from the World Bank. The TA projects would be appraised in accordance with the Operating Guidelines (see Annex 12).

A detailed description of the Project by component follows.

## **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, only a few companies had managed to negotiate power purchase contracts with the Ceylon Electricity Board (CEB), a process that required substantial time and effort on both sides. CEB and the developers did, however, acknowledge the potential for commercially viable mini hydro projects in more than two dozen Letters of Interest signed for promising locations. Technical expertise for the mini hydro projects was available because of the considerable number of large hydro systems in Sri Lanka, but financing proved difficult because of the unavailability of longer-term funds. Similarly, at the start of the ESD project, the very limited experience with wind energy in Sri Lanka was confined to the few initiatives 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 had been supported under the ESD project or otherwise.

**The ESD Intervention:** (a) *Small hydro*- The ESD project, focusing on ways to reduce the transaction cost of the individually negotiated power purchase agreements with the CEB, supported the development of a Standardized Power Purchase Agreement that included a formula-based tariff calculation following avoided cost principles that was up-dated and published annually. Furthermore, the project supported the Participating Credit Institutions with long term financing for mini hydro investments in particular. (b) *Wind* - The ESD project demonstrated the technical and economic viability of large-scale wind operations and worked to attract initial private sector involvement through a transparent and open bidding process.

**Progress made during ESD:** (a) *Small-hydro* – The combination of the Standard Power Purchase Agreement and the availability of long-term credit contributed to a rapid increase in mini-hydro installed capacity from about 1 MW in 1997 to nearly 30 MW at the end of 2001. In addition to gaining necessary technical and managerial skills, the private investors have strengthened their position in the market and with CEB by establishing a Small Power Association. At the same time, PCIs have acquired sufficient experience to gauge with heightened confidence the risks and potential of mini-hydro investments. (b) *Wind* - A 3 MW demonstration plant designed to supply about 4.5 GWh annually was commissioned in March 1999 with GEF support and has been operating successfully. International bidding resulted in a competitive unit cost of about US\$ 1,200/kWh. The wind farm is successfully interconnected to the CEB grid and operates at an average capacity factor of 14 percent, which is lower than the projected value of 17 percent.

**Business environment for the Project:** (a) *small-hydro* - the investment climate for mini hydro projects continues to be favorable. At the end of 2001, seven private developers were operating 15 projects. The

tariff formula for the Standard Power Purchase Agreement provides a floor price for the tariff equivalent to 90 percent of the first year's tariff and sets tariffs as a rolling average of three year values. These measures along with the CEB's good payment record provides confidence and certainty to developers and financiers. Under these conditions, a quadrupling of the current installed capacity of 30 MW is attainable in the next five years. PCIs are actively considering eight projects that would add approximately 40 MW of capacity, and the mini-hydro industry anticipates developing as much as 100 MW in the coming five years, given that the Project eligible size has been increased to 10 MW from 5 MW under ESD. CEB's declining creditworthiness is a risk that could undermine the program. The fact that the Government is addressing this issue through a reform program provides some mitigation (see Section B 2 of the PAD for details). (b) *wind* – there is considerable private sector interest in developing wind power projects at several promising sites in Sri Lanka. In response to this interest, the Government has formally invited expressions of interest from potential developers through an advertisement in February 2002. The solicitation is in respect of two sites, Puttalam and Hambantota, On these sites, nearly 40 MW of capacity is possible, of which this Project envisages support for about 20-25 MW project. CEB has developed the requisite capacity to adopt the standardized small power purchase agreement and tariff setting for projects smaller than 10 MW to a project of this scale as well as manage the interconnection requirements. (c) *biomass* – based on currently available biomass resources and large areas that could be used as plantations, the total theoretical potential for biomass electricity is estimated to be around 1,800 MW. It is estimated half a million hectares of scrub and hena lands in Sri Lanka could - in a sustainable manner – provide 10 million tons of fuel wood yearly, enough to fuel 1,700 MW of small to medium biomass based power stations at a plant factor of 67 percent. In addition, of the approximately 635 operational tea factories in Sri Lanka, nearly 300 have a good potential for modernization that could include the introduction of modern co-generation technologies. The total potential for the tea sector is anticipated to be in the range of 80-100 MW. The sugar, coconut, rice and wood industries could, on a considerably smaller scale, also contribute to biomass based electricity generation. Biomass technologies are yet to be demonstrated on a commercial scale consistent with the available potential in Sri Lanka. The business environment for grid connected biomass plants will thus have to be developed and this Project intends to attempt this task by supporting selected transactions that have potential for commercial success.

**Project vision and targets:** (i) *mini-hydro* - the mini hydro industry will continue to expand its operations on a profitable basis, drawing on newly available, local long-term funds while at the same time providing least cost power to the national grid. The Project aims at seeing at least 50MW of new capacity added within the next five years. 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. Limited wheeling will be allowed to match production profiles with loads; (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 – adding about 20-25 MW of capacity -- as an integral part of the country's plan to expand generation 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 grow by about 12 MW over five years, promoting rural development by adding value through the usage of biomass supply contracts. In line with these targets, nearly half of the approximate US\$ 90 million value of this component is expected support hydro projects and the balance shared more or less equally between wind and biomass projects.

**Barriers to overcome:** (i) *mini-hydro* - even though growth of these activities has been substantial, long term sustainability requires: (a) boosting the amounts of local long-term financing; (b) reforming the power sector to establish a transparent and independent pricing mechanism for the SPPA through the regulator; and (c) improving the creditworthiness of CEB or its successor entities. (ii) *wind* - critical barriers to full commercialization include: (a) the absence of regulation, including tariff setting for commercial development of larger than 10 MW wind projects; (b) weak transmission grid in certain wind-rich areas of the country; and (c) limited private sector players and capacity in Sri Lanka; (iii) *biomass* – among the high barriers on the road to expansion are: (a) limited experience with the technology in Sri Lanka; (b) underdeveloped biomass supply chain; (c) lack of experience with financing biomass projects, (d) limited awareness and experience among stakeholders and (e) developing and using fuel wood plantations in an environmentally and socially responsible manner.

### **Project 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 the support provided under the ESD project. Mini-hydro development will continue to be led by the private sector, with PCIs making at least 20 percent of the needed long-term loans, on the strength of the Small Power Purchase Agreement and tariff from CEB. The AU will process refinance applications and facilitate funds flow as needed.

*Technical Assistance:* TA – both cost-shared and full-cost -- will directly support the main objective of commercializing wind and biomass energy systems. Greater emphasis will be on cost-shared activities, with full-cost activities being the exception.

- The cost-shared scheme - ranging from 20 to 80 percent of company contributions – will support such activities as: (a) *wind*: training of technicians and management, resource analysis, and peak load/supply studies; and (b) *biomass*: detailed feasibility studies for tea and coconut processing factories' energy, audits combined with pre-feasibility studies for tea/coconut processing factories, and detailed feasibility studies for up to four small dendro-based projects
- The full-cost scheme could support: (a) *wind*: development of technical specifications and/or macro-level wind mapping. New companies in the sector could receive a one-off preparation grant up to US\$ 9,000 for business plan development. 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 in both supply and generation; (iv) awareness (e.g. study tours) and information generation and dissemination; (v) regulatory issues (third party sales, wheeling); and (vi) policy issues (including biomass-based electricity in energy policy/plan). New companies could receive the same business plan development support as in the wind sector up to the same limit of three business plans.

*Transparent, rule-based, professional administration, enforcement and facilitation.* The project will continue in an enhanced and reinforced fashion the transparent implementation and compliance framework managed by the AU under the ESD project. The effort would include: (i) developing working arrangements with the industry; (ii) facilitating and managing technical assistance in close coordination with main stakeholders; (iii) arranging independent verifications; and (iv) data gathering and reporting, and implementation/monitoring roles.

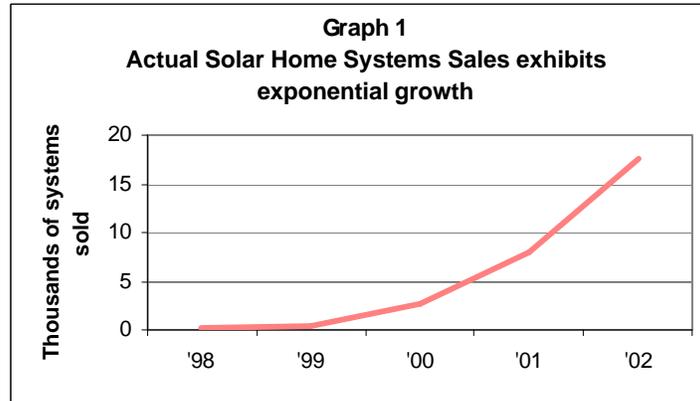
**Monitoring and Evaluation:** AU quarterly progress reports will continue to be the main instrument of monitoring progress on all grid-connected projects. Formats and indicators developed under ESD will be employed for hydro projects, whereas similar but more detailed monitoring and evaluation process will be developed for wind and biomass project investments and TA.

## **Project Component 2 - US\$28.30 million**

### **Solar PV Investments**

**From zero to mini-boom:** ESD has helped transform the reality and the prospects of the private solar power industry in Sri Lanka, to the point that sales – negligible when ESD began in 1997 -- have skyrocketed (see graph 1) from fewer than 30 systems per month in 1998 to about 1,300 systems in December 2001 for a cumulative total of over 15,000 systems installed at the end of 2001. At that time, the three main companies were each reporting monthly sales in the range of 400 – 800 systems. The fourth company has sales on the order of 100 – 120 systems per month. By way of contrast, private investment in the solar PV sector in Sri Lanka had been minimal before 1997. One company in particular had been making vain efforts for close to 10 years to develop its PV business, but the company was not growing, and there were few established sales and service outlets in rural areas. Although several NGOs had been pursuing pilot, demonstration-type efforts, commercial development had not followed. Unit prices were high. No financial institutions offered consumers credit for SHS purchases, and no widely applied technical standards provided a basis for consumer protection arrangements. Notwithstanding power shortages, politicians continued to promise constituents in unconnected villages that the grid would be extended to their areas.

**The ESD intervention:** In that setting, the ESD project worked to make solar systems affordable by targeting the interlocking barriers of high unit costs and prices and low sales volumes with an output-based subsidy that reduced the consumer's first cost and a refinance facility to ease credit to buyers. Other support went to technical assistance for promotion and business development and for the transparent administration of the rules for technical standards and subsidy payments. Among the key features of ESD project interventions were: (a) grant subsidies channeled to the companies based on their sales performance and not linked to costs or retail prices; (b) partial mitigation of the forex risk through the dollar-denominated GEF grant arrangement -- now on the order of 50-55 percent of the direct foreign exchange costs of the companies' payments to their suppliers of system components; (c) the technical specifications and verification arrangements that provide a world-class consumer protection framework that also encourages fair competition; (d) transparent, rules-based, professional administration of grant payments and enforcement of technical and other requirements that reinforces commercial discipline; and (e) flexible design with changes 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.



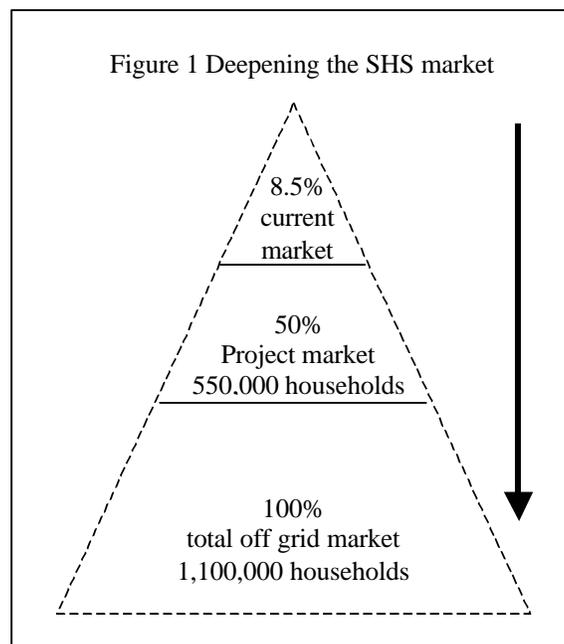
**Progress made during ESD:** The project has scored significant progress in building a platform for the growth of a sustainable, commercial market for SHS. Sales, number of professional dealers, investments and sales outlets, consumer financing, product quality, price trends, consumer awareness, and a provincial government as market enabler have all evolved to the point that, as of the second half of 2001, dealers are operating on a profitable basis with high gross margins generating funds for continued development and attractive returns to equity (27 to 57 percent). Although no company has as yet been operating at this level of sales for a full year, in the years before 2001, the operating profits of two of the large companies would have been negligible at best. In that period, they were moving up the learning curve and the lack of adequate consumer financing was holding sales down. The third large company entered the market only in mid-2001, but with its own consumer credit capacity and the availability of the supplementary grants from the Uva Provincial Government. It is positioned to move quickly to profitable operations. 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 sales surge of the third quarter of 2001, the businesses' cash needs for working capital rose 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. Difficulties faced by the main credit provider in keeping pace with rapid sales growth has exacerbated the cash flow problem.

Also on the positive side, investments in SHS distribution from foreign and local companies have been significant. Three of the companies have each made investments estimated at US\$ 1.0 – 1.5 million to develop 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. From the consumers' standpoint, price discounting signals 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. 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 more or less similar prices for their systems and are competing more on service and quality considerations.

**Business environment for the Project:** The business environment for investment is relatively encouraging, due to the supportive framework for development of SHS-based businesses. Specifically, a legal and judicial framework for investment and contract enforcement, supported by professional accounting and other services, has already enabled the two foreign companies to enter the market. Additionally, a functioning commercial infrastructure for importing, banking and trading is in place, and no

generalized practice of rent seeking (unofficial fees or levies, exacting taxes on commercial businesses operating in private markets) distorts transactions.

Several business environment aspects have specifically favored rural SHS market development: (a) 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; (b) no significant government or donor programs for pilot or demonstration SHS projects distracted the attention of the solar companies from commercially based development; (c) rural consumer expectations of grid connections have weakened over recent years. Sri Lankans have learned that the power sector crisis, with 8-10 percent annual increases in demand outpacing generation and transmission investments and frequent power cuts, holds no short term solution in spite of incentives to small producers introduced in 1996; and (d) prices of diesel and kerosene have been at competitive levels for solar.



The potential household market for SHS in Sri Lanka remains largely untapped. Market assessments indicate that around 1.1 million households will not receive electricity from the CEB grid by 2007. Of that number --assuming the same solar system and price -- around 150,000 households (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 for a sustained sales growth of some 20 percent per year. That expansion would be based on a 50-percent reinvestment of company profits to support the continued sales growth and a parallel growth in available consumer finance. In addition, institutional and community sales for schools, clinics and other public goods type applications hold the potential for further growth.

**Project vision and targets:** The Sri Lankan solar industry could become a model for the development of solar PV systems worldwide. Expanding on the successful market creation supported by the ESD project, the Project's solar component will seek to: (a) sustain the existing solar home system market and build further financing capacity to serve more communities; (b) deepen market penetration to poorer households by offering smaller and more affordable solar home systems so as to provide, in all, solar services to

85,000 new customers over five years and an additional 1000 institutional systems from solar and village hydros; and (c) expand service to other applications. Through effective strategies, the market will be developed as the rural poor become fully aware of solar energy, and that success will, in turn, attract more, coordinated donor assistance and lead as well as to 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.

**Barriers to overcome:** With the foundations laid for sustainable growth of the solar energy industry, it is still critical to address such obstacles as (i) the small, fragile scale of the market in which only one solar product (30 – 50 Wp solar home system) is offered; (ii) the equally precarious network of small dealers and rural distribution; (iii) the lack of outreach to poorer households and for non-home applications; (iv) the limited availability of microfinance; and (v) the limited and uncoordinated involvement of provincial governments.

**Project strategy for intervention:**

*Investments:* Building on the successful credit program established under the ESD project, the Project 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 financing 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. To support additional investment, the Project will offer output-based subsidies on an incentive basis to be disbursed only after confirmation of installation. The mechanism will broadly follow ESD implementation arrangements, but on a declining 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 the second and third year of operations, subsidies will be provided for systems up to 10-40 Wp, but will be limited in the final two years to 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

For a description of the proposed subsidy regime, see also section F 1 of the main PAD.

*Technical assistance* for solar systems will follow the exact pattern and set of purposes as for grid-connected mini- hydro, wind and biomass outlined above in the discussion of Component 1. Activities that could be supported on a cost-shared basis include 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. Full-cost TA would enable new companies in the sector to receive a one-off preparation grant for business plan development up to US\$ 9,000. This support would focus particularly on companies entering the market for water pumps, health centers, schools, and telecom as well as new entrants with innovative arrangements to deepen the SHS like fee-for-service or leasing.

*Technical specifications to ensure consumer satisfaction of the systems offered.* The Project will continue to use the industry-accepted technical specifications established under the ESD project, reviewing

specifications, as needed, to accommodate smaller systems. In addition, specifications will be revisited and modified as required based on field experience. Products that meet PV-GAP standards or recommendations will also be accepted. For institutional systems specifications will be based on standardized packages prepared under the cross-sectoral component.

*Transparent, rule-based, professional administration, enforcement and facilitation.* The project will continue in an enhanced and reinforced fashion the transparent implementation and compliance framework managed by the AU under the ESD project. The effort would include: (a) developing working arrangements and developing and managing TA in close coordination with the SIA; (b) setting technical specifications and performance for non-home applications; (c) continuing the AU's arrangements for independent verifications and transparent grant payments; and (d) continue the AU's data gathering and reporting, and implementation monitoring roles.

To be effective, the interventions will require deft management, and, most likely, continual fine tuning in line with market development experience. 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. In decisions on the utilization of TA, stakeholders – facilitated by the AU – have been given maximum leverage.

**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 Energy**

The community-based component builds on the successful implementation under ESD of village hydro projects, widening the scope however to such other renewable energy technologies as biomass and, possibly, wind.

**Baseline:** (i) *Village Hydro:* Prior to ESD, the Intermediate Technology Development Group, an NGO, pioneered village hydro development through projects developed with its technical and social assistance and financed by a combination of sweat equity and donor grant funding. That work effectively proved the technical and social viability of the concept, and market assessments indicated a large potential market. A survey carried out in seven districts of Sri Lanka identified 853 sites suitable for construction of village hydro systems, of which 444 were found technically viable with a potential installed capacity of about 18 MW; (ii) *Community Biomass:* Results from a study carried out in 2001 by the Energy Forum (implementation of a WB/GEF PDF A) revealed substantial community level interest in biomass electricity. Currently there are some limited initiatives underway in Sri Lanka. With support from several donor organizations, Government research and development organizations have designed pilot projects and are in the process of establishing testing sites. The Ministry of Science and Technology, Alternative Energy Division, is commissioning a 35 kWe gasification system as a pilot project to generate electricity in single

fuel mode.

**The ESD intervention:** *Village Hydro:* The ESD project aimed to commercialize the development of village hydro projects allowing the projects to become less dependent on grant funds. Funding under ESD was a blend of commercial funds, co-financing grants, project preparation grants, supervision grants, and TA for innovations. ESD did not include any interventions on biomass energy.

**Progress during ESD:** Credit and grant support from the ESD project has helped establish 28 village mini-grids ranging from 4 - 45 kW, serving about 1,400 households.. This blend of financing has led to a nearly 50-percent reduction in grant funds per project, leveraging twice the number of beneficiaries. Following the initial gains in pipeline development, however, progress slowed. Concerns about this leveling off gave rise to the “innovation solicitation” process described in Text Box 2. Reinvigorated by this solicitation, the village hydro project preparation grants became a strong incentive for steep growth in this area.

Over the project’s life, a small decrease in costs has meant an average of US\$ 1550/kW for projects under implementation and US\$ 1425/kW for those under consideration. This decline is attributable to a drop in the costs of such equipment as turbines and PVC pipes as well as to higher currency devaluation compared to product cost inflations. The average connection cost was found to be in the range of US\$ 300-500/household.

**Business environment for the Project:** (i) *Village Hydro:* The environment for developing village hydro projects is favorable. Villagers who have lost their confidence that the national utility will extend the grid to their village in the near future are willing to invest in such power systems. The favorable perception is reinforced by the record of more than 130 operating village hydro projects in the country, familiarity with the technology involved, positive word-of-mouth advertising and contacts by developers. The Government is working on a policy change to allow village projects to sell electricity to CEB if the grid is extended to their area. Since it is clear that new projects will continue to require co-financing grant support for preparation and implementation, the government will need to establish alternative funding mechanisms to operate after the Project ends. Risks involved are: (a) the interest of NGOs/Consultants in developing new projects may decrease because of the decrease in grant levels under the Project; (b) some PCIs have indicated that image-building is the main business consideration in providing support for village hydros, not -- by itself -- an incentive guaranteed 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.

**Project vision and targets:** (i) *Village Hydro:* The Project aims to support about 100 village hydro installations, serving about 5000 households. At the same time, a sustainable subsidy mechanism, one which does not depend on GEF or on ad-hoc donor support, must be in place by Project close. Taking the place of international support, a transparent rural electrification subsidy mechanism established by local and national government will allocate and disburse funds along performance based principles as adopted under the ESD project. A large portion of village hydro electricity will be used to generate income, thus giving villagers added reasons to support the development. Project developers will have optimized the preparation activities through further standardization and bundling of projects. The village hydro electrification model will be used for other technologies as well, including biomass, and -- for some of the developers -- as a guide to work in support of village hydro programs in other countries. (ii) *Biomass :* Biomass-based electricity generation -- planned for introduction in 25 village power systems averaging 40 kW each -- has a large potential to contribute to off-grid sustainable electricity supply. Use of locally available resources will add value to rural Sri Lankan economic development through building a biomass

energy supply chain and reducing imports of fossil fuels. Since off-grid applications do not require hydro resources, large areas of the country without hydro resources can become part of the process and gain basic infrastructure for economic development

**Barriers to overcome:** (i) *Village-Hydro*: Even though substantial progress has been made during the ESD project, several factors still impede accelerating the increase in the number of village hydro projects. Key barriers identified are: (a) total project costs remain too high; (b) commercial banks continue to be cautious about the sector's commercial viability; (c) limited active involvement of Micro Finance Institutions (MFIs); (d) no purchase policy exists to cope with stranded assets if national grid is extended to the village; and (e) only initial steps have been made toward promoting productive uses. (ii) *Biomass*: Barriers to development of community biomass projects include (a) the lack of a biomass supply chain, especially the lack of dedicated biomass energy plantations; (b) lack of access to investment and working capital for biomass plantations (c) awareness among potential developers as well as potential beneficiaries is low, and available information is limited.

**Project strategy for intervention:** This sub-component under the Project's Credit Program will be implemented largely by Village Cooperative Societies with help from consultants, NGOs and contractors. Building on ESD experience and other donor-funded activities, this component would support further commercialization of village hydro and other community-based independent grid systems through: (i) Credit Program investment support; (ii) co-financing grants; and (iii) technical assistance including project preparation grants and supervision grants. It is expected that the GEF grant support will be scaled down over the life of the Project and, after Project closure, lower levels of support would be part of a comprehensive rural electrification policy, including a Rural Electrification subsidy mechanism or other Central/provincial government creation. .

*Investments.* The Project builds on the successful ESD Credit Program which supports Participating Credit Institutions (PCIs) in 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 -- limited to US\$ 400 per kW of installed capacity, up to US\$ 20,000 per installation -- would be made available to developers of mini-grid village hydro. The AU will release grant funds upon verification of eligibility and certification by a Chartered Engineer as indicated in the Operational Guidelines (see Annex 12).

*Technical Assistance.* As in other components, cost-shared and full-cost TA for village hydro and community based biomass projects will be offered to support accelerating commercialization through better usage of income generation activities and with declining subsidies. Full cost activities, provided only on an exceptional basis, should prove to have an added value for the village hydro industry and biomass generation system as a whole.

- The cost-shared window - ranging from 20 to 80 percent company contribution - will support existing organizations if the activities contribute to reaching Project 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 in regular meetings chaired by the AU and attended by the key stakeholders in the sector could be supported in full. 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 applications 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 grants and supervision grants will be available per the Operating Guidelines.

*Technical Specifications and Certification.* (i) *Village Hydro*: The technical specifications for village hydro systems and the associated village mini-grid system developed under the ESD project will continue to apply in so far as the village hydro projects are concerned. . The AU will release grant co-financing for 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 will be developed shortly after project effectiveness. Grant co-financing will be released subject to the same conditions as apply to village hydro.

**Monitoring and evaluation:** The Administrative Unit (AU) will be responsible for monitoring the following indicators: (i) Physical progress in the implementation of community 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 community systems. Since the Project has a specific focus on promoting income generation end-uses through community systems, the AU, apart from the required technical monitoring, 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 of Sri Lanka has recognized the need to promote efficient utilization and conservation of electricity. It acted, for instance, during the 1990s to promote energy efficiency/DSM through the preparation of a Demand Side Management (DSM) action plan, establishment of a DSM branch within the CEB 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 – despite technical assistance it received under the ESD project -- its capacity to design and implement projects remains limited.

**Progress made during ESD:** The ESD project helped build capacity within the DSM branch at CEB,

notably one of the best load-research capabilities in the region, and CEB is better placed to implement and evaluate existing DSM programs as well as design new ones. Support was also provided to develop Energy Efficiency Building Codes, but their application has so far been limited to CEB's own buildings.

An unplanned 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 the private sector -- about 20 projects so far -- 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, worth SLR 1-2 million, is attractive for achieving 2-2.5 year simple paybacks. The total market size in the industrial sector alone is estimated to be on the order of US\$ 160 million, and savings in that sector could run up to 960 GWh annually.

**Project Vision:** This sub-component will focus on accelerating the private sector delivery of energy efficiency services in Sri Lanka through: i) technical assistance targeted at building capacity within the fledgling ESCO industry; ii) encouraging new ESCOs to enter the market through training and awareness programs; and iii) 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 in support of 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 overcome:** Although early efforts hold promise of advancing energy efficiency goals, significant impediments to progress include: (i) lack of capacity, specifically in monitoring and verification protocol and legal agreements; (ii) lack of knowledge and capacity within commercial Banks on Energy Efficiency technologies and project appraisal; (iii) insufficient awareness/promotional efforts and training to bring new entrants into the ESCO market; (iv) low awareness of and attention to the Energy Efficiency Building Codes (EEBC); and (v) non-implementation of the appliance-labeling program due to lack of test facilities.

### **Project strategy for interventions**

*Investments.* Support for ESCO Development: The project will support awareness and training programs to encourage local groups to enter the ESCO field. 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 to apply the codes to two buildings through an RFP process. GEF support will be provided to meet the incremental 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 such sectors as textiles, tea etc.;
- **Energy Labeling Program:** Support will be provided to set up a refrigerator testing laboratory that will help implement appliance labeling;
- **Monitoring and Verification protocol:** 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 knowledge base on EE technologies and their costs, to develop sound appraisal templates for EE projects and to structure options to mitigate credit risks; and
  - Access to Credit for ESCOs/end-users: In addition to renewable energy technologies, the Project's 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:** Except for a few, small, donor-initiated demonstration efforts marked by weak follow-up, the energy needs of rural public service agencies and institutions in such fields as health, education and water go unattended. Since no explicit guidelines authorize consideration of energy equipment and services beyond grid connection, CEB is almost universally seen as the only source for electricity supply. As a result, the 40 percent of Sri Lankans without access to electricity service for themselves also lack it for their public service facilities. Because of large geographical disparities in coverage, very large gaps in service, especially in the North and East, leave 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 and some cottage industries use power from solar "home" systems and village hydro for daytime energy and nighttime lighting (see Text Box 1). There also are limited productive activities in connection with village hydros such as refrigeration, carpentry, battery charging, etc.

**Business Environment for the Project:** Both suppliers and ministries have limited experience with designing, procuring, installing, and maintaining electricity solutions beyond CEB service. With respect to institutions already receiving CEB service, although energy costs can be a significant portion of the total operating budget, energy conservation receives little attention. 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, despite limited supplier and customer experience with commercial/industrial systems, 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.

**Project Vision and Targets:** Project interventions seek to improve public services delivery through access to energy services. In addition to ensuring that policy-level energy guidelines are in place and in use in at least two ministries and that standard energy packages are developed and deployed, it aims at connecting at least 500 rural institutions, most of them in the North and East, during the Project. In unelectrified rural areas, lighting, refrigeration and telecommunications are to be made available for health service delivery, and 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, and energy conservation arrangements will be in place in two-four large institutions.

**Text Box 1**  
**Rural Economic Development in the Energy Services Delivery 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 has got a Sun Panel 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. If I get a loan from the local moneylender, he will charge me very high interest. Still, 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 came to my kiosk to buy oranges. I asked for a leaflet and whether I could have a Sun panel system. He visited my house a week later and gave me details. He could arrange a loan from "SEEDS" if I pay Rupees 7,500 (US\$ 85) as the first payment and continue to pay Rupees 1,200 per month regularly and find two people to guarantee my loan.

Every thing appeared to be going well – but my wife started grumbling: Rupees 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 so that we can improve sales if there are lights in the night instead of just 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.. Decision was postponed until a visit 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. That was the turning point of my life. My well-illuminated kiosk caught the eyes of all commuters, and my night income became higher than the day income. I keep the place open until midnight. My income has gradually increased. I have saved enough money to purchase a small truck, which I now use instead of my kiosk. 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.



(Mrs. Bemchandra with the family's business kiosk truck, with attached solar panel)

In general, policy level energy guidelines will be in place and well understood by stakeholders including both energy supply and conservation. Energy conservation practices will be regularized in larger institutions. Cross-sectoral ministries will 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. A Monitoring and Evaluation scheme will be in place to assess the impact of the intervention.

Further, for **commercial** institutions, the Project aims to establish a broad-based understanding of the productive potential of off-grid systems and to mainstream their productive uses. For existing village hydro schemes, the project will support the adoption of more commercial practices **such as carpentry, agricultural processing, or refrigeration**, that 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 overcome:** 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 is 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

**Project Strategy:** To address these barriers, the project will work with stakeholder ministries to apply energy solutions appropriate to 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
- Co-financing support for implementation of selected investments. This cofinancing will leverage additional financing from ongoing and planned Government initiatives and donor-supported projects.

The near-term focus will be on the North and East where the strong need for this support constitutes a political imperative and development funds are available from both Government and donor sources. 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 and directly linked, where possible, with M&E activities of the concerned ministries.

Table 2 summarizes the main issues and proposed actions under the 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.

**Table 2 – Cross Sectoral Energy Situation and Project Actions**

Sector	General Situation	Energy Situation	Barriers	Actions under Project
Health	<p>Currently working on a master plan for the health sector where there will be a re-classification of the facilities including upgrading to a specific service level for some facilities.</p> <p>The indicative numbers for the new classification are as follows</p> <p>10 Provincial General Hospitals            10 District General Hospital            30 Base Hospital            300 Divisional Hospital            600 Primary Care unit</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 sector - and design &amp; implementation 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</p>

				upwards.
Education	<p>There is very good coverage of schools with around 10.000 (primary/secondary)s chools countrywide.</p> <p>The main responsibility for schools comes under the provincial councils. However, 300 are under the central Government.</p>	<p>Around 50% do not have access to energy.</p> <p>Energy access only through CEB.</p> <p>Service like computers, electrical laboratory equipment and so on 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 is 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 sector - and lack of design and implementation 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% 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 sorely needed in the sector</p> <p>CEB often is not where the water is needed and cost for extension too high.</p> <p>The Water board has a rule that energy expenses cannot exceed more than 40% of total cost, which extension of the grid often doesn't do.</p>	<p>Ministry has looked for alternative energy solutions but lacked the experience and guidance.</p> <p>Ministry has 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**

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

1. Project administration/promotion
2. Sub-project promotion/development support
3. Technology/market introduction/promotion/capacity building related to renewable energy and energy efficiency capacity building
4. Cross-Sectoral Energy Applications
5. Sustainability
6. Monitoring and Evaluation

### **Package 1 – Project administration/promotion**

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

**Description:** The Project will be implemented largely through private sector actors with the support and facilitation of the Administrative Unit (AU) housed in the DFCC Bank that has already demonstrated its ability to implement the ESD Project efficiently and effectively. Building and expanding on this experience, the AU will continue to administer the Project’s Credit Program, itself 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. With particular 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) assisting in implementation of cross-sectoral investments; and (iv) conducting the innovation solicitations around rural development (see Text Box 2). In addition, the AU will continue to undertake and support Project representation and promotion domestically and internationally by convening local meetings, seminars, and workshops and presentations at selected conferences, as well as by hosting international groups seeking to learn from Sri Lankan renewable energy experience.

#### **Text Box 2**

#### **Tapping Into an Innovative Community**

Under the ESD Project, an Innovation Solicitation process was undertaken with the goal of eliciting new ideas on how to motivate the sluggish village hydro project pipeline. The solicitation invited bids addressing one of four general areas of concern in village hydro: technical issues, sustainable financing, legal and regulatory aspects, and capacity building. About 15 proposals were submitted. Each of the 6 accepted proposals included analytical work and, with the exception of the legal/regulatory category, included measurable outputs 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 applications to nearly 60. The analytical work also is being incorporated into new village hydro systems, as well as into Project 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 village hydro potential in a broader community.

**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 12) heavily based on the ESD Guidelines.

**Monitoring and Evaluation:** The AU will continue to provide quarterly reports for the Project 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 into overall national and provincial programs and plans.

**Description:** This activity will follow the successful experience of ESD village hydro sub-project development, (see Section C, Text Box 3) 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 through the tender process described below. Reduction in GEF contributions to project development will be sought through the increased participation of Provincial Councils and possibly through the Rural Electrification subsidy mechanism to be established during the Project lifetime.

**Implementation:** Since private and NGO entities with village hydro development experience are now in place, the process will seek to establish the “market clearing rate” for village grid project promotion through a tender process. Initially, the AU will seek to ensure a competitive rate by carefully monitoring performance and cost of project development consultants. If appropriate, the AU could 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. This approach will allow village grid promotion to continue with all current actors and any other interested parties able to maintain access to the program. The AU could issue a new tender at any time it determines that the current rate is no longer valid.

**Monitoring and Evaluation:** The AU will monitor financial and physical progress of village grids as under ESD. In addition, the AU will periodically evaluate village grid development costs and assess the need for changes.

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

**Objective:** Introduce and promote renewable energy technologies that 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 home systems, including small-scale systems targeted at low income households and new applications in agriculture, health, and education. In addition, the Project will support the introduction of alternative schemes such as a barter-based system for poor households now being successfully piloted in Nepal. Through NGOs, poor households could be taught handicraft skills. These households also could be given solar home systems, and the handicraft products could be accepted by the NGO in payment. The NGO could sell the products

through national/international outlets.

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

The AU will facilitate the integration of new stakeholders, such as microfinance institutions, consumer finance organizations, rural retail companies, and provincial councils 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 microfinance 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 that 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. Administering this activity, the AU will conduct/facilitate the necessary tenders.

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

#### **Package 4 - Cross Sectoral Energy Applications**

**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 objective 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 awareness among the broadest possible cross section of Sri Lankan society of the importance of energy in development, potential productive applications 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 2). 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. Among the several rural development initiatives now active in Sri Lanka supported by Government, NGOs and donors are Government activities at the national and provincial level, the Samurdhi Program, initiatives by Sarvodaya, Sanasa, and other NGOs, and donor-sponsored activities. Proposals that 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 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 using advertisements in local newspapers and announcements 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. Each of the several rounds of solicitations will build on the previous history, and 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. Since, however, it is necessary to ensure that the overall activity is demonstrably contributing to Project objectives, monitoring and evaluation of this activity will be incorporated into the Project Monitoring and Evaluation, described in Package 6 below.

### **Package 5 – Post-Project 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 a scenario to ensure continued development of financially and economically viable renewable energy and a continued contribution to rural development after the Project ends. Activity sub-components include:

*Preparation of an Integrated Rural Electrification Strategy and Plan* by the Ministry of Power and Energy. This sub-task will include consultant support as needed to develop a plan consistent with international best practices as relevant for Sri Lanka and assistance as well 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 before the Government.

*Design and Start-up of a National Rural Electrification Subsidy Mechanism* to act as the key nationwide 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 that will have 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 Project 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. Given the need to ensure that the overall activity is demonstrably contributing to Project objectives, however, monitoring and evaluation of this activity will be incorporated into the Project Monitoring and Evaluation, described in Package 6 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 Project in particular and the sector as a whole: (i) physical progress in all forms of rural electrification, including grid extension, village grid, and solar; (ii) impact of rural electrification on rural economic development including quality of life enhancement, rural employment and changes 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 the Project design if needed.

This activity also covers additional surveys or market analyses which may be needed throughout the 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
<b>Grid Connected Investments</b>	34.5	55.8	90.3
<b>Solar PV Investments</b>	10.2	18.1	28.3
<b>Community Investments (hydro, biomass)</b>	1.6	2.8	4.4
<b>Energy Efficiency and DSM</b>	0.4	0.6	1.0
<b>Cross Sectoral Energy Applications</b>	2.7	1.9	4.6
<b>Technical Assistance</b>	2.0	3.1	5.1
<b>Total Project Cost</b>	51.4	82.3	133.7

**Sri Lanka RERED**  
**Cost Estimates and Financing Plan**

Components	IDA	GEF	PCI	Private Equity	Carbon Trade Fin	Govt. Fin.	Total
<b>Grid Connected Investments</b>							
Mini-hydro	28.5	-	7.1	11.2	0.8	-	47.6
Biomass	10.8	-	2.7	2.6	1.9	-	18.0
Wind	9.9	-	2.5	8.8	3.5	-	24.7
<b>Sub-total</b>	<b>49.2</b>	<b>-</b>	<b>12.3</b>	<b>22.6</b>	<b>6.2</b>	<b>-</b>	<b>90.3</b>
<b>Solar PV Investments</b>							
Home Systems - household financing	18.8	3.9	4.2	1.4	-	-	28.3
<b>Sub-total</b>	<b>18.8</b>	<b>3.9</b>	<b>4.2</b>	<b>1.4</b>	<b>-</b>	<b>-</b>	<b>28.3</b>
<b>Community Investments (hydro, biomass)</b>							
village hydro	3.0	-	0.5	0.1	-	-	3.6
village biomass	0.6	-	0.1	0.1	-	-	0.8
<b>Sub-total</b>	<b>3.6</b>	<b>-</b>	<b>0.6</b>	<b>0.2</b>	<b>-</b>	<b>-</b>	<b>4.4</b>
<b>Energy Efficiency and DSM</b>							
Echo Investment	0.6	-	0.1	0.3	-	-	1.0
<b>Sub-total</b>	<b>0.6</b>	<b>-</b>	<b>0.1</b>	<b>0.3</b>	<b>-</b>	<b>-</b>	<b>1.0</b>
<b>Cross Sectoral Applications</b>							
Institutional/ Commercial Solar	2.3	0.8	0.5	1.0	-	-	4.6
<b>Sub-total</b>	<b>2.3</b>	<b>0.8</b>	<b>0.5</b>	<b>1.0</b>	<b>-</b>	<b>-</b>	<b>4.6</b>
<b>Technical Assistance</b>							
Energy Efficiency	0.2	0.5	-	-	-	0.2	0.9
Project Administration/Promotion Operation Expenses	-	0.2	-	-	-	-	0.2
Project Administration/Promotion Activities incl. CDM	-	0.1	-	-	-	-	0.1
Sub project promotion/development (village and biomass)	-	0.4	-	0.2	-	-	0.6
Technology introduction/promotion/capacity building	-	1.1	-	0.1	-	0.2	1.4
Sustainability (outphasing support)	-	0.1	-	-	-	-	0.1
Cross Sectoral Applications TA	0.1	0.4	0.2	-	-	0.2	0.9
Market Surveys, Monitoring and Evaluation	0.2	0.5	-	-	-	0.2	0.9
<b>Sub-total</b>	<b>0.5</b>	<b>3.3</b>	<b>0.2</b>	<b>0.3</b>	<b>-</b>	<b>0.8</b>	<b>5.1</b>
<b>Total Project Cost</b>	<b>75.0</b>	<b>8.0</b>	<b>17.9</b>	<b>25.8</b>	<b>6.2</b>	<b>0.8</b>	<b>133.7</b>

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

	<b>Investments (MUS\$)</b>	<b>TA (MUS\$)</b>	<b>Total (MUS\$)</b>	<b>% of Total</b>
Private	25.5	0.3	25.8	19
PCI	17.7	0.2	17.9	13
IDA	74.5	0.5	75.0	56
GEF	4.7	3.3	8.0	6
Carbon Trade Fin.	6.2	-	6.2	5
Government	-	0.8	0.8	1
<b>Total</b>	<b>128.6</b>	<b>5.1</b>	<b>133.7</b>	<b>100.0</b>

Note: Government financing covers participation in selected TA activities and counterpart financing of costs including taxes. This is consistent with the prevalent Standard Disbursement Percentages for Bank-financed projects in Sri Lanka.

## **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; and (iii) community-based village hydro 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;
- Exchange rate is assumed to be 92 SLR per US\$.

Under these assumptions the economic analysis shows EIRR of around 24 percent and the financial analysis shows a FIRR of around 21 percent.

#### **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 is used to convert the local cost of the project to get the economic input cost. For the economic analysis tax portion is excluded from the project cost to calculate the border price of the project. For financial analysis total project cost is considered.

#### **Valuation of Benefits**

To promote the mini hydro projects, 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 the mini hydro power plants and is assumed to be at the same level over the life of the project. 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 EIRR of the project is about 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

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 FIRR of the project is about 21 percent. The financial analysis of the project is shown below:

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

<b>Fiscal Year</b>	<b>Total Investment Cost</b>	<b>Operating Cost</b>	<b>Total Cost</b>	<b>Revenue</b>	<b>Net Flow</b>
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

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 home systems compares favorably with the cost 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\$ 28.0 million, i.e. US\$ 330 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. It needs to be pointed out 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 solar home systems 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 home systems, 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 15-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.

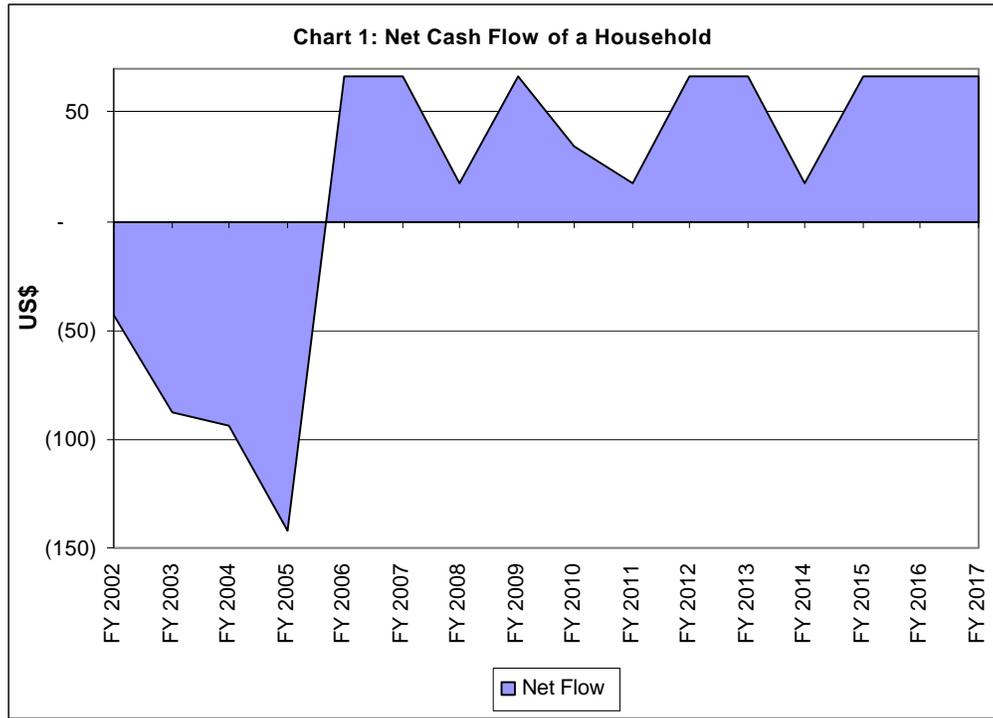
- The scheme would be administered by the Administration Unit of the project through providing refinancing to PCIs to extend micro finance to households to buy SHS;
- A solar home system of 40 Wp is considered for the analysis. The total cost of the system is assumed to be US\$ 452 with a life of 15 years;
- Battery life is considered to be 3 years;
- At the end of third year, household would replace the battery at their own cost;
- Controller life is considered to be of 7 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; and
- 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.

### **Results**

The cash inflows to the HH are the US\$ saved from not using kerosene lamps and not incurring cost for charging batteries. instalment 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 above assumptions the FIRR of the project is about 7%. 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	Investment Cost	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

Note: investment cost net of co-financing grant

FIRR of the Project is 7%

### 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 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	Investment cost	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

Note: Investment cost net of co-financing grant

FIRR of the Project is

10%

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

This Annex presents the financial highlights of potential PCIs which are likely to meet the eligibility criteria. These PCIs are participants under the ESD project and have expressed an interest in continuing their participation in this Project. Additional PCIs which meet the eligibility criteria will also be invited to join the Credit Program.

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

Subsection	Details	Actual for FY ending 31 December 2000					
		Minimum	NDB	DFCC (i)	HNB	Sampath (v)	Commercial
A	Cash collection ratio – principal and interest (%)	80.0	84.08	86.2	(vi)	84	96.71
B	Cash collection ratio – principal only (%)	80.0	88.38	82.4	(vi)	84	97.70
C	After tax profit on average shareholder's funds (%)	9.0	9.19	11.43	15.16	17.6	18.5 (v)
D	Debt service cover ratio (times)	1.25	3.14	2.34	(ii)	(ii)	(ii)
E	Portfolio infection rate (max. %)	20.0	12.03	11.77	6.19	13.1	9.36 (v)
F	Debt equity ratio (max.)	8:1	5.24:1	3:1	2.51:1	2:1	0.15:1 (v)
G	Capital adequacy ratio: Tier 1 (%)	4.0	14.61	25.1 (vii)	9.6	9.6	14.97 (v)
	Tier 2 (%)	8.0	13.02	25.3 (iv) (vii)	10.8	12.1	16.62 (iv) (v)
H	Single party/ group exposure (max. % of total assets)	10.0	3.5	1.55	2.0	Nil	<= 10.0
I	Single sector exposure (max. % of total loan portfolio)	30.0	15.6	14.9	55.17 (iii)	Nil	<= 30.0 (v)

*Notes*

- (i) DFCC Bank FY ends 31 March 2001
- (ii) Not required for commercial banks
- (iii) HNB's largest sectoral exposure is to commercial sector as defined by Central Bank of Sri Lanka (CBSL). The commercial sector includes sub sectors such as exports, imports, trading, construction, housing etc.
- (iv) Tier 1 and Tier 2
- (v) Not certified by auditors
- (vi) At present HNB is geared to extract data required by CBSL only and therefore the collection ratios are not extracted. However HNB is in the process of acquiring a sophisticated IT package which will facilitate flexible reporting in the future.
- (vii) From annual report

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

**Procurement**

**A. Procurement Implementation Capacity**

The 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 an IDA credit and a GEF grant. Grid connected investments include mini-hydro, wind, and biomass projects. Off-grid investments include solar 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.

The Project is a follow-on project to the ongoing Energy Services Delivery (ESD) Project. The Project's Credit Program is based heavily on the ESD Credit Program. The ESD Project is being implemented satisfactorily without any major issues or complaints, and therefore similar arrangements will continue under the Project. The DFCC Bank is the implementing agency for the Project through the Administrative Unit [AU]. The AU staff has gained sufficient experience in IDA project procurement during the implementation of the ESD project and is well placed to monitor and guide stakeholders accordingly. The procurement arrangements for the Credit Program have worked well and will be continued in the Project. Established commercial practices would essentially form the main mode of procurement under the Project.

Procurement oversight arrangements for the Project are as under:

- 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 strengthen the fiduciary review process, the following additional safeguards will be followed in the implementation of the 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 AU to carry out ex-post reviews and asset verification for 100 percent 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 to 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 for firms above US\$ 100,000 as shown in Table B below. Consultant contracts for firms under US\$ 100,000 would be procured using the Consultant Qualification method. For individual consultants requirements set for in paragraphs 5.1 to 5.3 of the *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* shall be followed. The following thresholds will be used to determine the applicable procurement method.

*Credit Line Component:*

- ICB for goods contracts in excess of US\$ 2.0 million.
- ICB for works contracts in excess of US\$ 3.0 million.
- ICB for turnkey contracts in excess of US\$ 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 three 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*

- Quality and Cost Based Selection method (QCBS) shall be used for consulting service contracts for firms above US\$ 100,000
- Selection based on Consultant Qualifications may be used for consulting contracts for firms below US\$ 100,000
- For individual consultants requirements set for in paragraphs 5.1 to 5.3 of the *Guidelines for Selection and Employment of Consultants by World Bank Borrowers* shall be followed.

*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.

The break-up of technical assistance subcomponents by method of procurement is summarized in the following table:

### Technical Assistance: Procurement Methods

Technical assistance area	Estimated costs	Procurement Method
<u>Energy Efficiency</u> : Training and capacity building activities, pre-feasibility studies, market assessments	About 10 cons. contracts ranging in value from US\$ 20,000 to US\$ 200,000. Total costs = US\$ 0.9 mill	QCBS, CQ
<u>Cross-sectoral</u> : project development, capacity building/training	About 20 contracts ranging in value from US\$ 20,000 to US\$ 100,000. Total costs = US\$ 0.9 mill	QCBS, CQ
<u>Village Hydro/Biomass</u> : project development, capacity building of developers	About 10 contracts ranging in value from US\$ 20,000 to US\$ 100,000. Total costs = US\$ 0.6 mill	QCBS, CQ, other
<u>Technology Promotion</u> : Media based awareness campaigns, training and demonstrations.	About 7 contracts ranging in value from US\$ 50,000 to US\$ 200,000. Total costs = US\$ 1.7 mill	QCBS, CQ
<u>Sustainability</u> : Evaluative studies on market development and utilization of subsidies, creation of RE subsidy mechanism.	About 6 contracts ranging in value from US\$ 100,000 to US\$ 200,000. Total costs = US\$ 0.1 mill	QCBS, CQ
<u>Monitoring and Evaluation</u> : Market surveys, customer Satisfaction surveys, audits etc	About 10 contracts ranging in value from US\$ 20,000 to US\$ 100,000. Total costs = US\$ 0.9 mill	QCBS, CQ

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

<b>Expenditure Category</b>	<b>ICB</b>	<b>NCB</b>	<b>Other</b>	<b>Total</b>
1. Credit Program			127.6 (74.5)	127.6 (74.5)
2. Technical Assistance				
(a) Consultant Services and Training			5.1 (0.5)	5.1 (0.5)
(b) Goods		0.7 (0)	0.3 (0)	1.0 (0)
<b>Total</b>		0.7 (0)	133.0 (75.0)	133.7 (75.0)

\* 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.

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)

<b>Consultant Services Expenditure Category</b>	<b>Selection Method</b>							<b>Total Cost<sup>1</sup></b>
	<b>QCBS</b>	<b>QBS</b>	<b>SFB</b>	<b>LCS</b>	<b>CQ</b>	<b>Other</b>	<b>N.B.F.</b>	
<b>A. Firms</b>	1.70 (0.30)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.40 (0.10)	0.50 (0.00)	0.00 (0.00)	3.60 (0.40)
<b>B. Individuals</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.20 (0.03)	1.30 (0.07)	0.00 (0.00)	1.50 (0.10)
<b>Total</b>	1.70 (0.30)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.60 (0.13)	1.80 (0.07)	0.00 (0.00)	5.10 (0.50)

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/Grant.

**Prior review thresholds (Table B)**

**Table B: Thresholds for Procurement Methods and Prior Review**

<b>Expenditure Category</b>	<b>Contract Value Threshold (US\$)</b>	<b>Procurement Method</b>	<b>Contracts Subject to Prior Review</b>
1. Sub Projects	Goods in excess of US\$ 2,000,000 Works in excess of US\$ 3,000,000 Turnkey in excess of US\$ 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		(a) Quality and Cost Based Selection or Consultant Qualifications	(a) Contracts of value more than US\$ 50,000 - full prior review
(b) Individuals		(b) Selection of Individual Consultants based on Section V of the Guidelines	(b) Contracts of value more than US\$ 50,000
3. Goods	(i) Goods in excess of US\$ 200,000  (ii) Goods between US\$ 25,000 -US\$ 200,000  (iii) Goods below \$25,000	(i) ICB  (ii) NCB  (iii) Shopping	(i) First two contracts every year regardless of value and all contracts of value more than US\$ 100,000

## **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 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 Project will follow report based disbursements from inception 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. This issue was discussed with the Government during Project negotiations, and the latter has agreed to make adequate budgetary provisions and ensure timely release of counterpart funds for the Project. Agreements in this regard have been incorporated in the Project documents.

### **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:

<b>Significant weaknesses</b>	<b>Resolution</b>
1. PCI/MFI compliance with the eligibility criteria were not confirmed in project audit under the ongoing ESD project.	TORs for the project auditor have been agreed.
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.	Separate audits will be undertaken; included in above TORs.
3. Given the significantly enhanced size of the project, the AU's capacity in terms of staffing and computerized facilities might be inadequate.	AU will computerize the financial management system by March 2003.
4. Project auditors and consultants for verifying implementation of the Solar PV installation yet to be identified.	AU shall appoint auditors and consultants by November 2002.
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, since there are other existing arrangements in place for their evaluation. Under ESD, the Bank's South Asia Financial and Private Sector Development Unit carries out annual assessments of their compliance with eligibility criteria, and in the new Project, this annual review will be undertaken by the Government in consultation with the Bank. Furthermore, 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 for technical assistance are to be provided by the project beneficiaries, PCIs or MFIs as the case may be or by GOSL.

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 a maximum of 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 a maximum of 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 and Operating Guidelines (see Annex 12). 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. An additional project officer is being appointed to strengthen AU's capacity.

### Accounting Policies and Procedures

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 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 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 Project, a computerized system will be developed.

### *Format of Financial Statements*

As the Project will adopt the report based disbursement specific FMR formats have been developed for the project. Financial reporting will be on the basis of these agreed 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 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 customized 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.

#### Action Plan

<b>Action</b>	<b>Responsible Person</b>	<b>Completion</b>
FMR formats to be agreed	AU and the Bank	Completed
TORs for project auditor to be finalized	AU	Completed
TOR for the solar PV systems audit to be finalized	AU	Completed
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 of the financial management assessment report.(available in project files) 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:

<b>Implementing Agency</b>	<b>Audit</b>	<b>Auditor</b>
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 agreed FMRs. 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.

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

#### **Allocation of credit/grant proceeds (Table C)**

**Table B: IDA Loan Disbursement Arrangements**

<b>Expenditure Category</b>	<b>Amount in US\$ (millions)</b>	<b>Expenditures to be Financed</b>
1. Subloans under Part A of the Project (finance for Investment Projects)	65.80	Upto 80% of amounts disbursed in respect of subloans
2. Investment Project Preparation grants		
(a) Grants made for preparation activities and feasibility studies carried out by tax-exempt consultants and non-government entities	0.48	100% of amounts disbursed
(b) Other grants for preparation activities and studies	0.63	80% of amounts disbursed
3. Sub-grants under Part A of the Project	1.27	100% of amounts disbursed
4. Consultants' services, training and internal audit expenses		
(a) Individual consultants	0.13	80% of amounts disbursed
(b) Consulting firms	0.51	80% of amounts disbursed
(c) training, workshops and study tours	0.13	80% of amounts disbursed
5. Goods	0.10	100% of foreign and ex-factory costs and 75% of local expenditures
6. Unallocated	5.95	
<b>Total</b>	<b>75.00</b>	

**Table C: GEF Grant Disbursement Arrangements**

<b>Expenditure Category</b>	<b>Amount in US\$ (millions)</b>	<b>Expenditures to be Financed</b>
1. Investment Project Preparation Grants		
(a) Grants made for preparation activities and feasibility studies carried out by tax-exempt consultants and non-government entities	0.25	100% of amounts disbursed
(b) Other grants for preparation activities and studies	0.05	80% of amounts disbursed
2. Subgrants under Part A of the Project	3.75	100% of amounts disbursed
3. Consultants' Services, training and study tours		
(a) Individual consultants	0.80	80% of amounts disbursed
(b) Consulting firms	1.90	80% of amounts disbursed
(c) Training, workshops and study tours	0.15	80% of amounts disbursed
4. Goods	0.80	100% of foreign expenditures and ex-factory costs and 75% of local expenditures
5. Support for Administrative Unit	0.20	100% of amounts disbursed
6. Unallocated	0.10	
<b>Total</b>	<b>8.00</b>	

**Special account:**

To facilitate project implementation the borrower shall open and maintain two Special Accounts (SAs) in US\$ in the Central Bank of Sri Lanka (CBSL) on terms and conditions satisfactory to IDA. There will be two special accounts, one for IDA funds and one for GEF funds.

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

<b>Project Schedule</b>	<b>Planned</b>	<b>Actual</b>
<b>Time taken to prepare the project (months)</b>	12	7
<b>First Bank mission (identification)</b>	01/03/2002	01/21/2002
<b>Appraisal mission departure</b>		01/21/2002
<b>Negotiations</b>	05/06/2002	05/06/2002
<b>Planned Date of Effectiveness</b>	07/31/2002	

**Prepared by:**

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

**Preparation assistance:**

NA

**Bank staff who worked on the project included:**

<b>Name</b>	<b>Speciality</b>
S. Vijay Iyer	Task Team Leader, Project Finance Specialist
Chandra Govindarajalu	Energy Efficiency and Renewable Energy Specialist
Malcom Cosgrove-Davies	Renewable Energy Specialist
Pradeep Perera	Policy and Project Dialogue
Jon Exel	Renewable Energy Business Development
Sriyani Hulugalle	Financial Sector and Banking Specialist
Sumith Pilapitiya	Environmental and Social Specialist
Raihan Elahi	Energy Finance Specialist
Santhanam Krishnan	Procurement Specialist
Vikram Raghavan	Legal Counsel
Irene Julitta Rasiah	Financial Management Specialist
Trine Refsbaek	Rural Energy/Development Specialist
Anna Goodman	Program Assistant
Subodh Mathur	Consultant - Renewable Energy
Jim Finucane	Consultant - Solar
Ad Dankers	Consultant - Biomass
Alfred Friendly	Consultant - Editor

**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
3. Sri Lanka Energy Efficiency, Conservation and Demand Side Management Strategies for the Electricity Sector

**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
6. Sri Lanka Energy Services Delivery Project Independent Evaluation/GEF Project Completion Report (Integrated Resources Group Ltd.)

\*Including electronic files

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

Project ID	FY	Purpose	Original Amount in US\$ Millions			Cancel.	Undisb.	Difference between expected and actual disbursements <sup>a</sup>	
			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
<b>Total:</b>			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

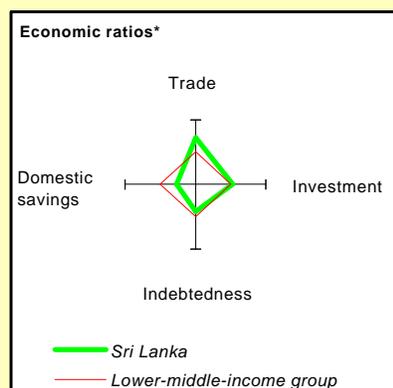
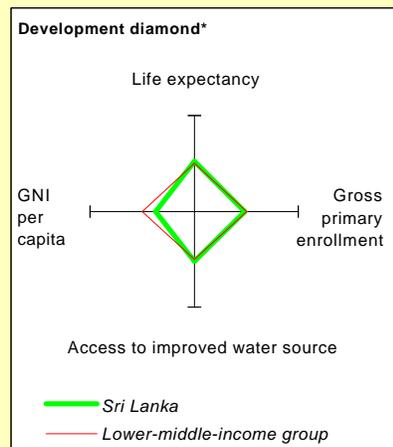
FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1999	Aitken Spence	0.00	2.73	0.00	0.00	0.00	2.73	0.00	0.00
1998	Apollo Lanka	0.00	1.11	0.00	0.00	0.00	1.11	0.00	0.00
1996/97	Asia Power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	Fitch 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
	<b>Total Portfolio:</b>	<b>37.57</b>	<b>23.43</b>	<b>0.00</b>	<b>0.00</b>	<b>14.17</b>	<b>19.61</b>	<b>0.00</b>	<b>0.00</b>

FY Approval	Company	Approvals Pending Commitment			
		Loan	Equity	Quasi	Partic
	<b>Total Pending Commitment:</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

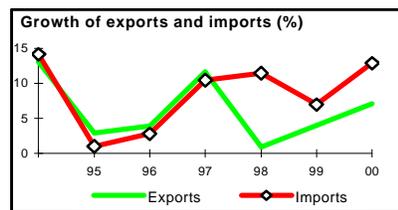
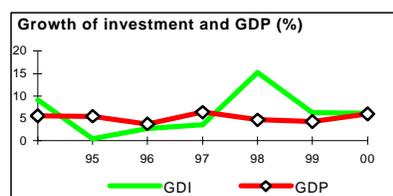
## Annex 10: Country at a Glance

### SRI LANKA: Renewable Energy for Rural Economic Development

POVERTY and SOCIAL	Sri Lanka	South Asia	Lower-middle-income		
<b>2000</b>					
Population, mid-year (millions)	19.4	1,355	2,046		
GNI per capita (Atlas method, US\$)	850	460	1,140		
GNI (Atlas method, US\$ billions)	16.4	617	2,327		
<b>Average annual growth, 1994-00</b>					
Population (%)	1.3	1.9	1.0		
Labor force (%)	2.2	2.4	1.3		
<b>Most recent estimate (latest year available, 1994-00)</b>					
Poverty (% of population below national poverty line)	25	..	..		
Urban population (% of total population)	24	28	42		
Life expectancy at birth (years)	73	63	69		
Infant mortality (per 1,000 live births)	15	74	32		
Child malnutrition (% of children under 5)	33	47	11		
Access to an improved water source (% of population)	83	87	80		
Illiteracy (% of population age 15+)	8	45	15		
Gross primary enrollment (% of school-age population)	111	100	114		
Male	112	110	116		
Female	110	90	114		
<b>KEY ECONOMIC RATIOS and LONG-TERM TRENDS</b>					
	<b>1980</b>	<b>1990</b>	<b>1999</b>	<b>2000</b>	
GDP (US\$ billions)	4.0	8.0	15.7	16.3	
Gross domestic investment/GDP	33.7	22.6	27.3	28.0	
Exports of goods and services/GDP	32.2	29.2	35.5	39.7	
Gross domestic savings/GDP	11.2	13.8	19.5	17.2	
Gross national savings/GDP	17.4	17.0	23.7	21.4	
Current account balance/GDP	-16.2	-5.6	-3.6	-6.5	
Interest payments/GDP	0.8	1.5	1.0	1.1	
Total debt/GDP	45.8	73.0	62.6	55.6	
Total debt service/exports	12.0	13.5	9.9	9.5	
Present value of debt/GDP	..	..	..	42.8	
Present value of debt/exports	..	..	..	89.6	
	<b>1980-90</b>	<b>1990-00</b>	<b>1999</b>	<b>2000</b>	<b>2000-04</b>
<i>(average annual growth)</i>					
GDP	4.0	5.3	4.3	6.0	3.9
GDP per capita	2.5	3.9	2.8	4.3	2.9
Exports of goods and services	4.7	7.0	4.0	7.2	6.1



STRUCTURE of the ECONOMY	1980	1990	1999	2000
<i>(% of GDP)</i>				
Agriculture	27.6	26.3	20.7	19.5
Industry	29.6	26.0	27.3	27.5
Manufacturing	17.7	14.8	16.4	16.9
Services	42.8	47.7	52.1	53.0
Private consumption	80.3	76.5	71.5	72.4
General government consumption	8.5	9.8	9.0	10.4
Imports of goods and services	54.8	38.0	43.3	50.5
	<b>1980-90</b>	<b>1990-00</b>	<b>1999</b>	<b>2000</b>
<i>(average annual growth)</i>				
Agriculture	2.2	1.9	4.5	1.7
Industry	4.6	7.0	4.8	7.5
Manufacturing	6.3	8.1	4.4	9.2
Services	4.7	6.0	4.0	6.8
Private consumption	4.0	3.8	5.3	4.4
General government consumption	7.3	8.8	5.3	24.4
Gross domestic investment	0.6	6.4	6.4	6.2
Imports of goods and services	3.4	8.6	7.0	12.9

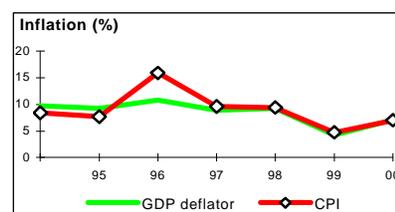


Note: 2000 data are preliminary estimates.

\* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

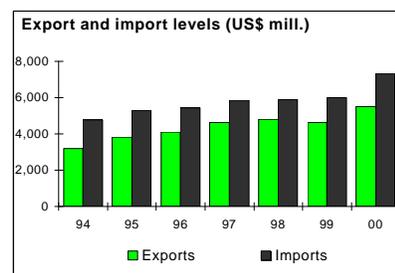
## PRICES and GOVERNMENT FINANCE

	1980	1990	1999	2000
<b>Domestic prices</b> (% change)				
Consumer prices	26.1	21.5	4.7	7.1
Implicit GDP deflator	20.0	20.1	4.2	7.1
<b>Government finance</b> (% of GDP, includes current grants)				
Current revenue	23.5	23.2	18.3	17.0
Current budget balance	5.0	0.9	-0.4	-3.3
Overall surplus/deficit	-19.2	-7.8	-6.9	-9.5



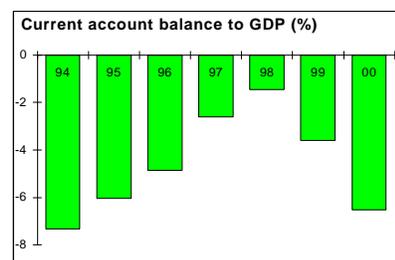
## TRADE

	1980	1990	1999	2000
<b>TRADE</b> (US\$ millions)				
Total exports (fob)	1,065	1,913	4,610	5,522
Tea	373	495	621	700
Other agricultural goods	285	308	375	427
Manufactures	360	628	3,308	4,012
Total imports (cif)	2,051	2,689	5,980	7,320
Food	379	485	662	693
Fuel and energy	442	310	500	901
Capital goods	492	584	1,565	1,737
Export price index (1995=100)	36	57	139	151
Import price index (1995=100)	42	71	122	132
Terms of trade (1995=100)	87	80	114	115



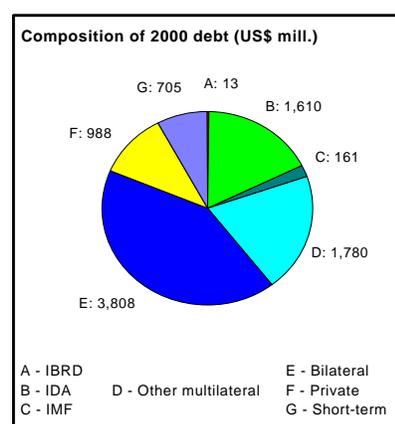
## BALANCE of PAYMENTS

	1980	1990	1999	2000
<b>BALANCE of PAYMENTS</b> (US\$ millions)				
Exports of goods and services	1,296	2,346	5,578	6,475
Imports of goods and services	2,197	3,054	6,800	8,235
Resource balance	-901	-708	-1,222	-1,760
Net income	-26	-167	-254	-305
Net current transfers	274	424	912	999
Current account balance	-652	-451	-564	-1,066
Financing items (net)	371	537	413	549
Changes in net reserves	282	-86	151	516
<b>Memo:</b>				
Reserves including gold (US\$ millions)	..	435	1,639	910
Conversion rate (DEC, local/US\$)	16.5	40.1	70.6	77.0



## EXTERNAL DEBT and RESOURCE FLOWS

	1980	1990	1999	2000
<b>EXTERNAL DEBT and RESOURCE FLOWS</b> (US\$ millions)				
Total debt outstanding and disbursed	1,841	5,863	9,797	9,065
IBRD	31	82	20	13
IDA	98	864	1,652	1,610
Total debt service	179	384	674	738
IBRD	5	14	8	7
IDA	1	8	27	31
Composition of net resource flows				
Official grants	161	221	112	109
Official creditors	135	307	160	159
Private creditors	86	10	-83	83
Foreign direct investment	43	43	176	173
Portfolio equity	0	0	6	6
World Bank program				
Commitments	152	321	56	18
Disbursements	20	128	49	47
Principal repayments	3	10	21	24
Net flows	18	118	28	23
Interest payments	3	13	14	14
Net transfers	15	105	14	10



## **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, this 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 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.

Annex 13 provides a technology-specific summary of ESD progress and remaining barriers.

## **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 baseline and GEF alternative are described below by project component:

### **Grid-Connected Renewable Energy**

Baseline – In general, the 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 Project will assist further mini-hydro development largely by means of the IDA-supported 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 the Project, wind development after ESD would have an uncertain future. The proposed limited Project 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 the Project, 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 the Project 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 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 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 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 the Project, 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 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 this 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.

## ***Cross Sectoral Applications***

### Baseline

The use of energy for applications in health, education, water, agriculture, and other cross-sectoral applications is generally not a subject emphasized by either designers or practitioners. In general, electricity is either available from CEB, in which case it is taken for granted, or is not available, in which case coping strategies are exercised, the most common of which is simply making do without electricity. In some cases, diesel generators are installed, frequently with little planning for operation and maintenance costs. With the recent increase in the solar PV market, this option would begin to find cross-sectoral applications, but institutional inertia would likely result in very slow uptake of any renewable energy solutions for cross-sectoral applications. In the absence of GEF support, there are expected to be no expenses on renewable energy solutions in cross-sectoral applications.

### Alternative

Through this Project, renewable energy solutions in cross-sectoral applications will be emphasized through a combination of technical assistance and targeted investment support. In particular, technical assistance will be provided to key cross-sectoral ministries such as health and education to: i) assess the impacts of energy on their ability to effectively accomplish their goals; and ii) create standardized energy packages for rural health, education, and other facilities to ensure that procurement, installation, operation and maintenance are properly handled. Targeted investment support may also be required in selected applications to demonstrate viability and replicability.

## Incremental Cost Matrix

	<b>Baseline</b>	<b>Alternative</b>	<b>Increment</b>
<b>Domestic Benefits</b>	<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) and increased rural access to electricity.</p>
<b>Global Environmental Benefits</b>	<p>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.</p>	<p>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)</p>	<p>1,250,000 tones of carbon emissions avoided</p>
<b>Cost by Component</b>			(\$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.</p> <p><i>Baseline expenditures on technical assistance and reform-related work directly relevant to grid-connected renewables: \$0.1 million</i></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>	\$0.2

	<u>Mini-hydro</u> – development of current pipeline as well as new investments will continue, pace and volume dependent on small power tariff	<u>Mini-hydro</u> - Development of new projects beyond existing pipeline would continue with greater confidence.	-0-
	<u>Wind</u> – development will only proceed with carbon financing	<u>Wind</u> - Development of first commercial wind farm. This experience could lead to additional private wind development.	-0-
	<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	<u>Biomass</u> – coordinated development leads to faster, broader introduction of commercially viable systems.	-0-
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</i> : \$36.4 million	Solar market encouraged to mature and stabilize, allowing smooth transition to non-GEF operation. Solar also reaching poorer households. <i>GEF Alternative</i> \$41.3 million.	\$4.9
Community/off grid 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</i> : \$19,300	Steeply expanded village hydro 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. <i>GEF alternative per 11 kW community system</i> : \$30,800 (increment = \$400/kW)	\$0.5
Energy Efficiency	<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</i> : \$0.1 million.	<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</i> : \$0.8 million.	\$0.7
Cross Sectoral Applications	Ad hoc energy design and usage in health, education, agriculture, water supply, etc. would continue. <i>Baseline expenses on cross-sectoral usage of renewable energy</i> : \$0	Cross-sectoral applications for renewable energy given appropriate attention, helping to catalyze increased efficiency and effectiveness in delivery of products and services. <i>GEF expenses on cross-sectoral usage of renewable energy</i> : \$0.8 million	\$0.8

Technical Assistance	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>	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	\$2.5
Monitoring & Evaluation	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&amp;E expenses: \$0</i>	Quantitative monitoring and evaluation of renewable energy progress and impacts, especially impacts on rural development undertaken. <i>Alternative M&amp;E expenses: \$0.7 million</i>	\$0.7
<b>GEF Incremental Costs</b>			\$10.3*

\* Of this total amount, GEF will finance US\$ 8.00 million, and the Government will finance the balance using US\$2.3 million from the IDA Credit as grant. For detailed financing plan, see Annex 3.

### **Sustainability**

The Technical Assistance and cofinancing grant structures included in the 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 the Project. 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 the Project 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 Project builds on the ongoing Energy Services Delivery (ESD) Project, which was originally scheduled to close in December 2002. Ideally, the 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 the Project, 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 counterproductive to the GEF/IDA objectives for both ESD and the Project. However, there is also a risk that problems existing in the ESD Project may be replicated – on a larger scale – in the Project. 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 the Project*
- *Build flexibility for the 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 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 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 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 the Project should not be expected. Similarly, Sri Lanka may graduate from IDA during the Credit period. For these reasons, a follow-on project modeled after the Project 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 fully 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.

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.

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.”

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.

Page 66 – Do any of these banks currently lend for SHS purchases?

Page 75: A summary of the ZESD Solar Progress Solar review should be included.

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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.

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.”

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

*References:*

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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 the Project.

*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 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 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 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 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 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**

<b>Comments</b>	<b>Responses</b>
<b>Page 4</b> , 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.
<b>Page 5, under 2.3 Rural Electricity Access and Rural Economic Development</b> - “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 on?	Previous successful project experience in Sri Lanka (for the commercial and development banks, and Bangladesh (for the MFI). These

	were augmented by best practice experiences world wide.
<b>Page 10 – under Solar PV investments</b> – “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.	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.
<b>Same para</b> – “The indicative targets are 85,000 household systems and 2,000 community, commercial and institutional systems”. How are these targets determined?	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.
<b>page 12</b> – “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.	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.  One of the dealers had a promotional activity where they provided free sewing machines if a household purchased their solar system.
Another opportunity is to develop housing in off-grid areas with a SHS built in to the house.	In keeping with the project approach of encouraging market driven solutions, this

Combine house loan + solar loan. This could also address war refugee issues.	suggestion could become a strategy of one of the solar dealers.
<b>Middle of page 17</b> – “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.
<b>Bottom of page 41</b> - “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.	
<b>Page 56</b> – “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.
<b>Page 66</b> – 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.
<b>Page 75:</b> A summary of the ZESD Solar Progress Solar review should be included.	Several of the results have been included in the detailed project description.
<b>Page 79, table 11.1</b> – 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.	
<b>Bottom of page 84</b> – The incremental cost calculations are sound..	
<b>Page 93 - Criteria No. 2</b> – “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 Project will include a redoubled effort to bring in additional consumer finance institutions.
The document should also address the means to support financing for technician training programs	This is part of the technical assistance package as mentioned under the solar

and the SLBDC awareness program.	component.
<p><b>Page 83</b> – “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**

<b>Measure</b>	<b>Arrangement/Entity</b>
1. Loan Amount and Financing Sources	<ul style="list-style-type: none"> <li>● Total estimated project cost: US\$ 133.7 million; IDA: US\$ 75.0 million, GEF: US\$ 8.0 million and others US\$ 50.7 million.</li> <li>● US\$ 10.0 million from IDA has been earmarked for off grid projects and will be reviewed at mid-term evaluation.</li> </ul>
2. Borrower	Democratic Socialist Republic of Sri Lanka
3. Executing Agency	DFCC Bank/Administrative Unit (AU)
4. Estimated Commitment Period	Four and half years for grid connected and five years for off-grid projects after Credit Effectiveness
<b>Interest Rates</b>	
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"> <li>● 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.</li> <li>● Rate subject to revision (both new and existing loans) every six months.</li> </ul>
7. Interest Rate from PCIs to Final Borrowers	To be determined by PCIs in agreement with their clients.
<b>Maturity Structure of Credit and Subloans</b>	
8. IDA to GOSL	Standard IDA terms with 40 years maturity.
9. GOSL to PCIs	Amortization based on an aggregate of individual subloans, repayable in 20 equal semi-annual installments immediately following the date of the sixty-sixth month's anniversary on which the PCI made the first withdrawal.
10. Subloans	<ul style="list-style-type: none"> <li>● Maximum ten years, including maximum two-year grace.</li> <li>● Maximum maturity not to exceed useful economic life of equipment financed.</li> </ul>
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"> <li>● Private investment proposals for: (i) grid-connected renewable energy power projects (with capacity not more than about 10MW); (ii) off-grid village based renewable energy power projects; (iii) solar home systems; (iv) other renewable energy investments and (v) energy efficiency, conservation and demand side management (DSM) investments.</li> <li>● Funds cannot be used for financing or acquisition of existing assets (including land) or refinancing of existing debts or accrued interest.</li> </ul>
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 percent of PCI total loan amount for a specific subproject.
<b>Other Measures</b>	

15. Responsibility of Administrative Unit (AU)	<ul style="list-style-type: none"> <li>● 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 is US\$ 1.0 million.</li> <li>● 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.</li> <li>● 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.</li> <li>● 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.</li> <li>● Maintain RERED credit program related statistical records.</li> <li>● Monitor timely preparation and submission by PCIs to AU of subproject completion reports.</li> <li>● Submit quarterly Financial Monitoring Reports (FMRs) on the RERED Project and other periodic reports (e.g., semi-annual collection performance report) as required by GoSL, IDA and GEF.</li> <li>● Perform project support including facilitating barrier removal with stakeholders, procurement of consultants, award of contracts, and monitoring of Technical Assistance assignments.</li> <li>● Perform other tasks and functions as are necessary to achieve the objectives of the Project.</li> </ul>
16. Loan Approval Procedures (if not previously satisfied under ESD Project)	<p>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 hydro, wind and biomass proposal and (vi) each PCI's first village based hydro, wind and biomass proposal.</p>
17. Environmental/Social Assessment Requirements	<p>In accordance with national standards and procedures as mentioned in the Environment and Social Assessment Framework prior review is required for: (i) all biomass projects; (ii) mini hydro projects &gt;5MW; (iii) wind projects &gt;10MW; (iv) all projects involving land acquisition and/or resettlement. Also, the first two EAs of mini hydro power, biomass, and wind power projects require IDA prior review.</p>
18. Subloan Documentation Requirements to be furnished for refinancing approval	<ul style="list-style-type: none"> <li>● Subloans involving refinancing below 'free limit': (i) PCI confirmation of assessment of creditworthiness of subborrower including description of business(es); (ii) description of project and confirmation of compliance with IDA procurement requirements and adequate due diligence in appraisal; (iii) list of goods and services to be financed; (iv) project costs and financing; (v) PCI confirmation that terms and conditions of subloans including adequate insurance of subproject assets; (vi) timetable for implementation; (vii) evidence of full compliance with environmental and social framework; (viii) financial justification for the project; and (ix) any other information as agreed between IDA and AU.</li> <li>● Additional information for refinancing above the "free limit". Appraisal report of the project which will include: (i) cash flow projections for subborrower and the project; (ii) assessment of technical and commercial feasibility; and (iii) financial</li> </ul>

	justification for the project.
19. Procurement Procedures	<ul style="list-style-type: none"> <li>● For Credit Line Component, bid packages over US\$2.0 million for goods contracts, over US\$3.0 million for works contracts and over US\$5.0 million for turnkey contracts are subject to International Competitive Bidding (ICB) requirements.</li> <li>● Goods contracts for technical assistance: (i) over US\$200,000 are subject to ICB; (ii) between US\$25,000 and US\$200,000 subject to NCB; and (iii) good and work contracts less than US\$25,000 local/international shopping with a minimum of three quotations.</li> <li>● Consulting service contracts for firms above: (i) US\$100,000 QCBS shall be used; and (ii) less than US\$100,000 CQ shall be used. Consultancy service contracts for individuals shall be based on requirements as per paragraph 5.1 - 5.3 of Guidelines for Selection and Employment of Consultants.</li> <li>● With regard to Parts B and C of the Project the first two contracts each year regardless value will require prior review of IDA.</li> </ul>
20. Disbursement Procedures	<ul style="list-style-type: none"> <li>● Eligibility of expenditures: (i) below prior procurement 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; (ii) above the prior review limits, AU to submit reimbursement applications to IDA for review/approval. 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.</li> <li>● 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. The 120 day limit will be relaxed until September 30, 2002 for ESD eligible claims for which no re-financing and grants were available under the ESD project. These projects will be subject to and paid on RERED terms.</li> <li>● AU would have the authority to notify the Central Bank of Sri Lanka (CBSL) to make payments from the Special Accounts and would be responsible for keeping track of these Accounts.</li> </ul>
21. Audit Requirements	<ul style="list-style-type: none"> <li>● Annual external audit required of Special Accounts, and separate opinion on FMR.</li> <li>● Annual external audit required of PCIs' financial statements and its compliance with the eligibility criteria.</li> </ul>
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. For PCIs not under the CBSL supervision, evaluator to be hired by AU and report to IDA.
<b>Grant Arrangements</b>	<b>Off-grid village based hydro, wind, biomass systems &amp; Off-grid household based solar, wind systems</b>
24. Basis and Amount of GEF Grant Cofinancing	<p><i>Off-grid, non-solar sub-projects:</i> \$400 per kW installed, up to a maximum of \$ 20,000.</p> <p><i>Off-grid solar:</i> Year1: 10 to &lt; 20Wp (US\$ 40); 20 to &lt; 40Wp (US\$ 70); 40 to 60Wp (US\$ 70); Years 2&amp;3: 10 to &lt; 20Wp (US\$40); 20 to 40Wp (US\$70); Years 4&amp;5: 10 to 20Wp (US\$40).</p>

	Limited to one subgrant per household and per system.
25. Trigger for Release of Grant Cofinancing	<p><i>Off-grid village based systems:</i> Certification by a Chartered Engineer that system is complete, complies with specifications and is operational.</p> <p><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.</p> <p><i>Household based wind:</i> Presentation of Acceptance Receipt(s) evidencing installation and confirmation of eligibility.</p>
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 percent of Preparation Costs subject to a maximum of US\$ 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 April 30, 2002 would be eligible. Each subproject developer would be eligible for only one grant.
29. Trigger for Project Preparation Grant Release	<p><i>Off-grid, non-solar subprojects:</i></p> <ul style="list-style-type: none"> <li>● On presentation of eligible expenses and submission of grant disbursement request: (i) 50 percent of grant amount (subject to a maximum of US\$ 3000) will be released on approval of subloan by PCI or any other lending institution acceptable to AU; (ii) 35 percent of grant amount (subject to a maximum of US\$ 2000) will be released on first disbursement of subloan; and (iii) 15 percent (subject to a maximum of US\$ 1000) will be released six months after date of installation certification of subproject.</li> <li>● 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.</li> </ul>
30. Renewable Energy Technical Assistance: where the industry as a whole is the beneficiary	<ul style="list-style-type: none"> <li>● 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. Payments to be based on agreed deliverables.</li> <li>● The AU will approve the activities up to US\$100,000. Applications for more than US\$100,000 need a no-objection from IDA.</li> </ul>
31. Renewable Energy Technical Assistance: where an organization is the	<ul style="list-style-type: none"> <li>● Stakeholder will prepare TOR. The AU - with support of independent technical expertise if required – will approve the activities up to US\$ 100,000. Applications for more than US\$100,000 need a no-objection from IDA. AU will contract</li> </ul>

primary beneficiary	consultants and oversee technical assistance efforts. <ul style="list-style-type: none"> <li>● Activities will be cost-shared with a substantial portion (not less than 25 percent) borne by the stakeholder. Payments to be based on agreed deliverables.</li> </ul>
32. Off-Grid Project Supervision Fee to PCIs	US\$ 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 April 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"> <li>● AU will prepare TORs (in consultation with IDA) for design verification, installation verification and spot checks to ensure installation compliance</li> <li>● AU will maintain a list of qualified consultants for above and release grant funds for PCI to contract consultants</li> <li>● 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.</li> <li>● AU will verify SHS data furnished by solar companies for completeness, technical compliance and duplication before releasing cofinancing grant.</li> </ul>
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.
37. GoSL provisions	PCIs to ensure that the terms and conditions of subloans provide for (i) GOSL and IDA to inspect Investment Projects including goods, works, sites and construction. This includes inspection of both physical assets and relevant documentation; (ii) GOSL to suspend or terminate access by the Investment Enterprise to the Credit Line, Subgrants, Preparation grants and/or Technical Assistance for failing to comply with the Operating Guidelines.

## **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**

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**

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.

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 percent on term loan portfolio calculated on a rolling twelve-month basis;
- (b) A minimum total cash collection ratio of principal only of 80 percent on term loan portfolio calculated on a rolling twelve-month basis;
- (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 Licensed Specialized Banks and similar institutions);
- (e) A maximum portfolio infection rate of 20 percent;
- (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 percent 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 percent of PCI's total credit 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 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 percent 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 percent of the shareholders' funds of the company;
- (c) A minimum after tax profit equivalent to 9 percent 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 percent of the PCI's total lease rentals receivable, and
  - 25 percent 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 percent 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 percent of the shareholders' funds;

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 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**

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 10,000 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 12 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 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**

<b>Renewable Energy Technology</b>	<b>Achievements</b>	<b>Remaining Barriers</b>
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>

