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Volume II

APPENDIX

Prepared by

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Nexant Inc.

List of Acronyms

ABB	Asea Brown Boveri
ADB	Asian Development Bank
BOI	Board of Investment
CDM	Clean Development Mechanism
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CEnS	Center for Energy Studies
CNG	Compressed Natural Gas
COE	Cost of Electricity
CPC	Ceylon Petroleum Corporation
DFCC	Development Finance Corporation of Ceylon
DistCos	Distribution Companies
DSM	Demand-Side Management
ECF	Energy Conservation Fund
ECS	Electricity Consumer Societies
EIA	Environmental Impact Assessments
ESC	Energy Supply Committee
ESCOs	Energy Service Companies
ESD	Energy Services Delivery
FCCISL	Federation of Chambers of Commerce and Industry of Sri Lanka
GDP	Gross Domestic Product
GenCo	Generation Company
GOSL	Government of Sri Lanka
GTZ	German Technical Corporation
GWh	Giga Watt hour
ICE	Internal Combustion Engines
INR	Indian Rupees
IOC	Indian Oil Company
IPP	Independent Power Producers
IRP	Integrated Resource Plans
ISB	Industrial Services Bureau
IT	Information Technology
ITDG	Intermediate Technology Development Group
JBIC	Japan Bank for International Co-operation
JICA	Japan International Co-operation Agency
KFW	German Credit Institution for Reconstruction (Kreditanstalt fur Wiederaufbau)
kV	kilo Volt
kWh	kilo Watt hour
LECO	Lanka Electricity Company
LNG	Liquefied Natural Gas
LPG	Liquid Petroleum Gas
LTTE	Liberation Tigers of Tamil Eelam
MAC	Monitoring and Advisory Committee
MDB	Multilateral Development Banks
MIS	Management Information Systems
MMP	Matchmaking Program

MOPE	Ministry of Power and Energy
MW	Mega Watt
NERD	National Engineering Research and Development
NGO	Non-Governmental Organizations
NORAD	Norwegian Agency for Development
NREL	National Renewable Energy Lab
PCARC	Petroleum Conservation And Resource Center
PCRA	Petroleum Conservation Research Association
pf	Power factor
PPA	Power Purchase Agreement
PRS	Poverty Reduction Strategy
PSA	Power Supply Agreement
PSS/E	Power System Simulation for Engineering
PTI	Power Technology Inc
PUC	Public Utility Commission
PV	Photo Voltaic
R&D	Research and Development
RERED	Renewable Energy for Rural Economic Development
RES	Rural Electrification Schemes
SARI/E	South Asian Regional Initiative on Energy
SCADA	Supervisory Control And Data Acquisition
SEEDS	Sarvodaya Economic Enterprises Development Services
SGF	Sustainable Guarantee Fund
SIDA	Swedish International Development Agency
SL Rs	Sri Lanka Rupees
SLEMA	Sri Lanka Energy Managers' Association
SME	Small and Medium-sized Enterprise
SOE	State-Owned Enterprise
TA	Technical Assistance
TCI	The Competitiveness Initiatives
TDA	Trade and Development Agency
TOE	Tons of Oil Equivalent
TransCo	Transmission Company
UDA	Urban Development Authority
UN	United Nations
UNEP	United Nations Environment Program
US	United States of America
USAEP	US-Asia Environmental Partnership
USAID	United States Agency for International Development
WHO	World Health Organization

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Appendix A-1 Summary of Interventions with Estimated Costs

	Menu of Options for Interventions in the Energy Sector		Estimated Costs in US$
	Institutional Support:		
1.	Short	National Energy Model and Policy Analysis Tool	$315,000
	The Power Sector Interventions:		
2.	Immediate	Assistance to PUC for Training of staff	$360,000
3.	Immediate	Definition of the Legal/Regulatory Status of Off-Grid RES	$105,000
4.	Immediate	Technical Assistance for TransCO Management on Systems Operations and New Bulk Supply/Sale	$175,000
5.	Immediate	Technical Assistance to DistCo Management for improving operational performance	$350,000
6.	Immediate	Technical Assistance to DistCos to meet new Regulatory requirements	$180,000
7.	Imm.-Short	Technical Assistance to improve reliability of the power grid	$100,000
8.	Immediate	Financial Support for training on "Small Wind-Energy Systems"	$ 8,000
9.	Short	Capacity Enhancement in Hydroelectric Power Plants	$200,000
10.	Short	Assistance to Institutional Energy Users (schools, clinics, etc.) to Implement Small-Scale Energy Systems	$222,000
11.	Short	DistCo Loss Reduction Project	$238,500
12.	Short	Capacity Building for TransCO to Negotiate PPA Contracts	$150,000
13.	Short	Energy Survey and Needs Assessment for the North and East	$167,805
14.	S to Med	Development of a National Renewable Energy Resources Database & User -friendly Resource Guide	$141,000
	The Industrial & Commercial Sector Interventions:		
15.	Immediate	Fuel Switching for Drying Process in Tea Industry	$ 37,000
16	Imm.-Short	Fuel Switching for Spray Dryers in Ceramic Industry	$250,000
17.	Immediate	Development of a Web-based 'Bench Marking Database for Hospitality/Tourism Industry – funded (am)	$ 35,000
18.	Short	Improvement in service delivery of ESCOs and project developers	$225,000
19.	S to Med	Promoting Energy Efficiency in Cluster Industries	$ 20,000/yr
20.	Short	Construction of a Cold Storage/Ice Factory for Northern Area	$500,000
21.	S to Med	Facilitation Establishment of a Sustainable Guarantee Fund (SGF)	$ 90,000
22.	Short	Promote and disseminate information on Renewable Energy applications in Tourism Sector	$260,000
	The Transport Sector, including the Petroleum Industry Interventions:		
23.	Immediate	Development of an updated Petroleum Products Accounting System for Ceylon Petroleum Corporation	$450,000
24.	S to Med	Establishment of a Transport Sector Baseline Database	$375,000
25.	S to Med	Establishment of a National Vehicle Inspection and Tune-up Program	$320,000
26.	S to Med	Establishment of a Petroleum Conservation and Resource Center	$175,000
27.	Medium	Introduction of Zero-Emissions Electric Vehicles	$286,000
28.	Medium	Replacement of Colombo Taxi Fleet with Hybrid Vehicles	$460,000

Appendix B-1 Potential Institutional Support and Power Sector Interventions

Menu of Options for Interventions in the Energy Sector with Estimated Costs		Estimated Costs in US$
Institutional Support		
Short	National Energy Model and Policy Analysis Tool	$315,000
The Power Sector Interventions:		
Immediate	Assistance to PUC for Training of staff	$360,000
Immediate	Definition of the Legal/Regulatory Status of Off-Grid Rural Electrification Schemes	$105,000
Immediate	Technical Assistance for TransCO Management on Systems Operations and New Bulk Supply/Sale	$175,000
Immediate	Technical Assistance to DistCo Management for improving operational performance	$350,000
Immediate	Technical Assistance to DistCos to meet new Regulatory requirements	$180,000
Imm.-Short	Technical Assistance to improve reliability of the power grid	$100,000
Immediate	Financial Support of ITDG training course on "Design of Small Wind-Energy Systems"	$ 8,000
Short	Capacity Enhancement in Hydroelectric Power Plants	$200,000
Short	Assistance to Institutional Energy Users (schools, clinics, etc.) to Implement Small-Scale Energy Systems	$222,000
Short	DistCo Loss Reduction Project	$238,500
Short	Capacity Building for TransCO to Negotiate PPA Contracts	$150,000
Short	Energy Survey and Needs Assessment for the North and East	$167,805
S to Med	Development of a National Renewable Energy Resources Database & User -friendly Resource Guide	$141,000

Intervention 1:

National Energy Model and Policy Analysis Tool

Sector Description or Thematic Classification:
Energy Sector; Institutional Capacity Building for Improved Decision-Making and Good Governance

Justification for Selection of Project:
Integrated energy resource planning in Sri Lanka is hampered by the absence of reliable data at sufficiently disaggregated levels even for commercial fuels. The absence of reliable time series data on consumption makes it difficult to identify trends in total demand or to relate them to other economic variables.

Poor coordination between various line agencies, delays in decision-making, inadequate preparation for new projects and consequent delays in their implementation are all factors contributing to problems in the energy sector. Presently, the two main energy suppliers in the country, CEB and CPC prepare their plans independent of each other. With the restructuring / privatization taking place there will be more organizations involved in the future.

The objective of energy planning is to estimate future energy requirements and identify the appropriate supply technologies and investment needed to satisfy the energy requirement. A dynamic energy database and model is essential to integrate current discrete sets of information/data to assist the Ministry of Power and Energy (MOPE) fully analyze energy linkages across energy sub-sectors, including renewable energy and rural off-grid systems and to provide essential inputs for National Accounting Systems and other sector plans.

The MOPE lacks the staff capability to undertake this exercise alone. Sri Lanka has in the past maintained a National Energy Database with limitations explained above and developed a National Energy Balance since 1975, and the Energy Conservation Fund has prepared and annually published the Energy Balance through 2000. The MOPE, the current Energy Supply Committee and the Energy Conservation Fund have recently resolved to work together to further expand, develop and update the Sri Lanka Energy Database and the Energy Balance and to identifying an appropriate energy-planning tool. This proposed assistance to help develop a national energy model also provides the basis for understanding energy/power sector requirements for the rehabilitation and re-integration of the development process in the North/East within a national context and framework. Useful models that may be considered include:

1. The Long-range Energy Alternatives Planning (LEAP) model, that provides exercises on data analysis for energy planning that covers energy demand, transformation and supply; It uses a simulation approach to represent the current energy situation for a given area and helps develop forecasts for the future under certain assumptions;
2. The MARKAL model is used to simulate energy systems to deal with a wide range of technical and economic issues facing the energy sector, such as, least cost simulation of a wide range of policy instruments, measures and long run

technology based scenario analysis. Its key capabilities include, among others:

i. A comprehensive representation of existing and potential technologies over a long run projection period, including economic costs and engineering features, such as, energy efficiencies and emissions coefficients
ii. A regional structure that will allow for representation of inter-provincial electricity transmission and modeling of the electricity supply sector represented by all existing and prospective generation types (within a projection period beyond 2040)
iii. Simulation of competitive energy markets by minimizing objective functions incorporating the costs of energy technologies and resources
iv. Autonomous efficiency improvements explicitly represented in the existing stock of technologies that allows for price-induced investment in higher efficiency options.

Targeted Beneficiaries:
Ministry of Power and Energy, Energy Supply Committee, Public Utilities Commission, the proposed unbundled elements of the CEB/LECO system, CPC and other petroleum players, CEA, Forestry Department, Provincial and Local Authorities, private developers of various types of power systems (grid-connected and off-grid), etc.

Expected or Proposed Project Implementation Partners:
It is proposed that the Ministry of Power retain 'ownership' of the developed national energy model. However, the collection of data and information sets and resources, the integration of the current 'Sri Lanka Energy Balance', the 'Wind Energy Resource Atlas of Sri Lanka', electric power and petroleum sector data and other energy data sets into the model and for dissemination and outreach to a very broad group of users, it is recommended USAID considers placing this support at a suitable Institution, in connection with the stakeholders.

The Institution would be responsible for providing qualified counterpart staff that should be selected after further consultation with stakeholders. The model could also be co-hosted by a University to ensure that a more varied and sustainable level of cross-thematic policy analyses will take place.

Cooperation in this effort will be required from the unbundled electric power units, the petroleum sector players, the PUC, Central Environment Authority and others.

Expected Benefits or Outcomes:
The major benefit from this intervention is the contribution towards an effective and truly dynamic integrated resource planning policy tool that will lead to more informative decision-making and better governance of various inter-related energy sub-sectors.

The model itself can be useful for measuring performance of energy sub-sectors based on pre-determined and objective parameters and will therefore assist and support the GOSL Poverty Reduction Strategy.

Effective use of a national energy model promotes good governance and transparent participatory processes by allowing for broader and independent debate of energy issues using an analytical tool available to a greater segment of academics, energy professionals, private sector, government agencies and NGOs. More frequent and vigorous analyses of critical energy flows should also help expedite critical project implementation.

Potential for Sustainability and/or Replicability:

By hosting the model at a suitable Institution/University, there is a ready body of persons available to undertake the regular collection, verification and collation of data as well as to input different data sets into the requisite framework of the operational model.

Appropriate use of the model should increase the ability of private project developers to effectively assess and evaluate various energy project opportunities across the country.

Estimated Costing:

Technical assistance in terms of identifying an appropriate model, developing the critical parameters and framework and in integrating current data sets to suit the operational requirements will be required, as will the need to ensure that international best practices and comparability of the results from the model are inherent to the model. The technical assistance support will require:

Consultants (local) for one-year each:	
Energy Economist;	
Statistician/Modeler;	
MIS Specialist	
Sub-total:	$140,000
Consultants (International) for 4-6 person months:	$ 75,000
Procurement of Software & Hardware:	$ 50,000
Support logistics	$ 50,000
Estimated Total Cost	**$315,000**

Time Horizon and Duration:

This is a short-term activity that can be initiated during the first or second quarter of 2004 and will run for approximately one-year.

Intervention 2:

Technical Assistance to PUC Staff

Sector Description or Thematic Classification:
Power Sector; Institutional Capacity Building

Justification for Selection of Project:
The newly created PUC will be responsible for implementing a range of regulations, including issuing licenses and allowing license exemptions to generators, TransCo and DistCos, and reviewing annual tariff filings by the DistCos and the TransCo. Although the appointed PUC commissioners will make all final decisions, it is the PUC Staff that will carry out most of the day-to-day work in terms of reviewing the filings made by the companies and making recommendations to the commissioners. As the PUC is a new institution in Sri Lanka, as is regulation in general, it is unlikely that the staff that is appointed to PUC will have the necessary skills and experience necessary to successfully regulate the industry. A well-trained and highly skilled staff is vital to the future success of the PUC, and the reform process in general. In particular, given that the PUC commissioners will all be appointed for a relatively short period of three years, it will be the PUC staff that will provide continuity in terms of principles and procedures for carrying out the regulatory function.

The World Bank is providing Technical Assistance to the PUC for capacity building of the appointed commissioners, as well as assistance with the definition of license terms and conditions for generators TransCo and DistCos, conditions for exemptions, planning and procurement guidelines as well as the scope of required tariff filings. At present, no Technical Assistance has been identified for the PUC staff. For the reasons outlined above, we believe that training in this area is crucial to the successful establishment of the PUC as an independent regulatory agency with the capability of effectively regulating the industry.

The scope of the training would cover the following areas:

- Tariff principles and procedures, including accounting principles for regulated companies
- Legal and Regulatory procedures
- Information requirements for TransCo and DistCo tariffs
- Regulation of TransCo, in particular overseeing generation and transmission planning. This is crucial to curtail future power purchase costs, since the TransCo, as the single buyer, will be responsible for contracting for new generation capacity, based on their estimates of future demand growth. If they overestimate demand growth, then generation costs will be too high, while if they underestimate it, system reliability will be threatened. It is important, therefore, that the TransCo's generation and transmission planning activities are subject to review by the PUC for adequacy and economic efficiency. This will require additional skills and experience.

The exact scope of the training would be developed in conjunction with the PUC, once the staff has been appointed, and the tariff and license filing requirements have been developed.

Targeted Beneficiaries:
Direct beneficiaries will be the staff members of the PUC, and the commissioners who will be making the decisions.

Ultimately, all electricity consumers, and the companies that are regulated by the PUC will benefit from a well-trained and skilled staff that can carry out their functions in a timely and transparent manner.

Expected or Proposed Project Implementation Partners:
Public Utilities Commission of Sri Lanka
Overseas PUCs – possible twinning arrangement for knowledge transfer and training partner. Proposed partner would be identified when the scope of the training program is developed.
CEB training institute – to facilitate the training, as well as benefiting from a "train the trainer" component.

Expected Benefits or Outcomes:
The primary benefit will be a well-trained and experienced core staff at the PUC, that can support the commissioners in creating a functioning and independent PUC, that is able to balance the interests of both the companies that they are regulating and the electricity consumers, through timely, transparent and effective regulations.

A secondary benefit will be building a capacity within the CEB training institute to replicate the training for additional PUC staff as necessary.

Potential for Sustainability and/or Replicability:
The initiative will be sustainable by training a sufficient number of core staff attached to the PUC, so that in the event of a few trained staff leaving the PUC, there will always remain a core of trained staff. Ideally, all staff should receive training in all aspects of the functions of the PUC.

Estimated Costing:

Part 1: Technical assistance to develop day-to-day regulatory/operational procedures, tariff filings processes, and implementation of license requirements,	$280,000
Part 2: Technical assistance on regulation of TransCo's long-term generation and transmission planning	$ 80,000
Estimated Total Cost	**$360,000**

Time Horizon and Duration:
Part 1: This training component should begin when the staff of the PUC have been appointed, Q1 2004, and should continue for approximately 1 year, so that the staff is supported through an entire tariff review cycle.

Part 2: This training component should be in the second quarter of 2005 with a duration of 3-4 months.

Intervention 3:

Technical Assistance to Define Legal/Regulatory Status of Off-Grid Rural Electrification Projects

Sector Description or Thematic Classification:
Renewable Energy/Rural Electrification/Legal/Regulation

Justification for Selection of Project:
The legal and regulatory status of rural electrification projects is ambiguous in the new restructured environment. The existing off-grid community owned electricity systems do not have a legal status as only CEB is currently mandated to generate and distribute electricity. These systems however are recognized and promoted by the national and provincial governments. It is important that the reform process clarifies the status of these systems and ensures that they remain in operation.

With the unbundling of CEB, the responsibility for continued rural electrification has not been clearly defined. A continued expansion of the rural electrification process, through on-grid and off-grid investments is a priority for the GOSL, and financing for these investments is included in the proposed ADB project loan for energy sector developments. The role of off-grid investments is a major concern of many parties to the reform process, including the PUC, ESC, DFCC, NGOs, such as, the Energy Forum and ITDG. In particular, the proposed reforms require all generators and distributors of electricity to have a separate license or an exemption from required to hold a license, to carry out these respective activities. The existing regulations prevent a single license holder from both generating and distributing electricity, which is the norm for these off-grid renewable systems. There is a danger that the absence of a well-defined legal and regulatory structure for rural electrification projects, through renewable energy, will prevent new investments from taking place.

Targeted Beneficiaries:
The ultimate beneficiaries will be the 20% of the population, in the long-term, that will not be electrified via the national grid, the existing village based hydro-schemes whose legal status is uncertain, and those communities that may be initially electrified via off-grid developments, and subsequently get connected to the grid at a later date.

The direct beneficiaries to the Technical Assistance would be:

- The PUC/Ministry of Power and Energy – definition of regulatory status for off-grid systems, regulatory procedures for dealing with off-grid systems
- Provincial Councils – who will likely be responsible for the regulation of off-grid systems, definition of regulatory requirements for off-grid systems, assistance with developing regulatory operating procedures, to facilitate issuance of licenses, etc.

Expected or Proposed Project Implementation Partners:
The PUC, local provincial councils, NGOs, such as, ITDG, ISB and Energy Forum, which are promoting rural electrification, through renewable energy.

Expected Benefits or Outcomes:
The benefits of this project will be a clearly defined legal and regulatory treatment for off-grid electric systems, to define the legal status of the existing systems and to facilitate continued investment in this area, to bring electric power to the 20% of the population that will not receive grid connected power.

The outputs of this proposed project will include:

- Draft sections for any necessary changes to the Electricity Act (2002) and the Public Utilities Commission Act (2002)
- PUC operating principles and procedures for the treatment of off-grid renewable energy systems
- Provincial Council operating principles and procedures for the treatment of off-grid renewable energy systems, including draft licenses or conditions for exemptions, safety standards, etc.
- Training for Provincial Councils on implementation of new regulatory procedures

Potential for Sustainability and/or Replicability:
The primary activity that will require replication will be the training of the Provincial Councils, to act as quasi regulators for off-grid systems. An NGO, such as, the Energy Forum could carry out further training as and when needed after1-2 provincial councils are trained.

Estimated Costing:

Consultants:	
Regulatory Specialist – 2 Months:	$ 60,000
Renewable Energy Specialist – 1 Month:	$ 30,000
Logistics:	$ 15,000
Estimated Total Cost	**$105,000**

Time Horizon and Duration:
This project should be completed in the immediate/short-term.

Total duration – 1-2 months.
Completion date: 1st quarter 2004

Intervention 4:

Technical Assistance for TransCo Management on Systems Operation and New Bulk Supply/Sale Role

Sector Description or Thematic Classification:
Power Sector Operations; Power Quality & Stability Improvements, Capacity Building.

Justification for Selection of Project:
The role of the TransCo will be crucial to the success of the unbundled electricity industry. In the restructured environment, they will have two roles – first to manage the transmission wires business, including system operations, and second to manage the bulk purchase and sale business, where they will act as the single buyer of all generation output and sell this output under pre-determined tariffs to the DistCos.

The CEB has seen significant problems with unplanned outages and system stability problems in recent years. New infrastructure is required and the existing infrastructure needs to be operated more efficiently. Most unplanned outages, and by association, system stability problems could be avoided by better-planned maintenance of generation equipment to ensure generator availability, including generator protection schemes. Unplanned outages may be reduced by the installation and use of SCADA systems that will empower the operator to monitor and observe system conditions and flows, and conduct supervisory controls remotely. System reliability would also be enhanced by investments in the transmission infrastructure, including using meshed circuits rather than radial feeders, using underground cables in areas that are prone to weather related problems and enhancing protection schemes to detect and clear faults.

The CEB system operations department currently lacks a dispatch model to manage the short-term dispatch of generation and transmission. With the increase in the amount of thermal generation on the system, the short-term hydro-thermal coordination becomes increasingly important.

The bulk-supply and sale function will be an entirely new function for the TransCo which is not presently carried out by the CEB, since it is an integrated utility. When the distribution, transmission and generation functions are unbundled, it will be necessary to account for the power flows from the GenCo to the TransCo and from the TransCo to the DistCos. This will require new functions for meter reading, data collection, accounting, funds transfer and management. The smooth operation of these functions, as well as, transparent dispatch procedures, will be essential for the transparent operation of the TransCo, and to instill investor confidence that IPPs will be treated equitably in the new environment. This in turn, is vital to attract private sector investment to meet future demand for power.

Training program would cover three components:

1) Training in the use of the ADB financed short-term dispatch model. The dispatch model will be purchased using ADB funds available for the power sector-restructuring project.

2) Training in the implementation of transparent operating procedures
3) Capacity building in the area of accounting and settlement for bulk supply transactions

Targeted Beneficiaries:
System Operations division of TransCo
Bulk Sale/Supply division of TransCo
The exact format of the Training and Capacity Building should be defined, once the staff or the new TransCo has been identified, and the terms and conditions of the TransCo operating license, the GenCo licenses and the DistCo licenses have been defined by the PUC.

Expected or Proposed Project Implementation Partners:
ADB, in conjunction with the purchase of short-term dispatch model
Bonneville Power Administration, with whom CEB have an existing twinning arrangement
Existing CEB Training institute

Expected Benefits or Outcomes:
Improved stability and economy of system operations, including improved short-term dispatch procedures
Increased transparency of operations of the dispatch and settlement procedures

Potential for Sustainability and/or Replicability:
Sustainability of the capacity building would be achieved through leveraging the use of the CEB training institute. Part of the training program would encompass a "train the trainers" component, so that the trainers would become proficient in the international experience and operating standards covered in the courses. The institute-based trainers would, then, have the requisite skills to train future intakes of staff.

Estimated Costing:

Cost of training program: Component 1:	$ 25,000
Components 2&3:	$150,000
Estimated Total Cost	**$175,000**

Time Horizon and Duration:
Training should begin during the first quarter of 2004. Duration: approximately 6 months.

Intervention 5:

Technical Assistance for DistCo Managements to Improve Operational Performance and Achieve Customer Focused Targets

Sector Description or Thematic Classification:
Power Sector Operations; Power Quality and Stability Improvements, Capacity Building and Good Governance

Justification for Selection of Project:
The success of the program to unbundle the CEB, will require the successful operation of the successor companies. When the companies are unbundled, institutional weaknesses will exist in the areas of financial and human resources management, management information systems and customer relations. A particular reason for this is that all existing CEB staff will be allocated to successor companies, with no external manpower hired in the first instance. It will be important to enhance the cultural focus of the new DistCos, to focus their operations on customer service and satisfaction metrics, as well as changing the emphasis of their activities from engineering targets to an overall operational efficiency, focusing on quality of customer supply (voltage, and outages), speed of response to public complaints, and profitability. This will require good corporate governance, the development of performance indicators, and the management of all systems to meet those indicators. Comparative regulation by the PUC will encourage this through comparison of the results of the new DistCos. This comparative regulation should focus on technical efficiency and service goals, such as loss reduction, voltage reliability, customer satisfaction, and other measures of operational efficiency. While setting targets for the companies to meet is a necessary exercise, it alone will not lead to the desired results without competent and motivated management within the companies.

The lack of management capability within the companies is a serious concern, and could have a serious detrimental effect on the overall success of the reform program from the point of view of customer satisfaction. No assistance to the DistCos will be provided under the current ADB provided technical assistance. The proposed training program would cover the following areas:

- Corporate planning, establishment of objectives, goals and targets, and their regular monitoring
- Development of customer service performance indicators and the procedures to meet those targets
- Management information systems – such as, customer database, information on outages, distribution losses, customer complaints, etc.
- Technical information systems- such as, customer connectivity information, network information, energy purchases and flows in the network
- Finance, human resources and organizational change

The exact scope of the training program would be developed when the unbundling has taken place, and the staff are assigned to their new roles.

In the last ten years, LECO has put in place such a customer-focused organization. The skills and experience developed by the LECO staff should be leveraged for the benefit of all the new DistCos.

A second component of the training would cover procurement capabilities for the DistCos to access ADB funds for new investments. As part of the reform program, ADB is making available up to $130m for investment projects to improve the operation of the electric system. Some of these funds will be available to the DistCos, to invest in new distribution facilities to improve reliability, expand service areas and reduce distribution system losses. There will be little capacity within the newly formed DistCos to harness these funds. This training would cover:

- Development of project requirements
- Financial analysis
- Project management

Targeted Beneficiaries:
The ultimate beneficiaries of this training program will be all electricity customers, through improved operations and reliability, as well as customer satisfaction. The initial beneficiaries would be the core management group of 1-2 DistCos. This initial training would then be leveraged out to the other DistCos.

Expected or Proposed Project Implementation Partners:
1 - 2 DistCos,CEB training institute – under a "train the trainer" approach, staff of the CEB training institute would also be trained, so that the knowledge base is built up within Sri Lanka, and can then be used for future training activities. Distribution companies operating in other countries, through twinning arrangements.

Expected Benefits or Outcomes:
The expected benefit would be
1) more efficient operations of the distribution system;
2) increased reliability;
3) reduction in losses and
4) improved customer satisfaction.

Potential for Sustainability and/or Replicability:
The training program would initially target 1-2 DistCos, depending on funds available. The staff are trained as part of this initial group would be used to build capacity within the other DistCos. Using the CEB training institute as a partner in the training program will also develop the knowledge base in Sri Lanka that could be leveraged for future training programs.

Estimated Costing:

Part 1:	$250,000
Part 2:	$100,000
Estimated Total Cost	**$350,000**

Time Horizon and Duration:

Part 1 (general management training) should begin soon after the DistCos are unbundled, during the first quarter of 2004. Duration would be approximately 6-8 months.

Part 2 (Capacity building for ADB procurement) should begin in medium-term, during the first quarter of 2005. Training would occur for 1-2 month periods, at strategic points in the procurement process.

Intervention 6:

Technical Assistance to DistCos to Meet New Regulatory Requirements

Sector Description or Thematic Classification:
Power Sector Operations; Capacity Building

Justification for Selection of Project:
The newly created DistCos will be regulated by the PUC. Since the DistCos will retain a monopoly over distribution and supply services, they must be regulated to ensure that they are operating efficiently, and to set tariffs to end-use customers. This is an entirely new function for the sector.

Each DistCo will be required to file an annual tariff with the PUC. This will entail significant data collection and analysis, requiring legal, economic, statistical and accounting expertise. The staff that will be allocated to the DistCos from the existing CEB and LECO companies will not have any experience in this area. These functions will be critical to the success of the reformed industry. Unless tariff filing information is provided by the DistCos, the PUC will be unable to regulate the companies and set tariffs. It is vital, therefore, that the DistCos have the staff with the required skills to carry out this function.

The proposed training will be given to staff in the regulatory affairs divisions of the DistCos, to help them carry out their functions. The target is to achieve an international level of skills and experience for this function in each DistCo.

Targeted Beneficiaries:
DistCos/PUC - The exact number of staff in this function has not yet been determined for each DistCo. Based on experience in other countries, we estimate that a total of eight to ten staff per DistCo should receive training.

Expected or Proposed Project Implementation Partners:
The training program would be developed in conjunction with the newly formed DistCos. Once they are established, they will be in a position to identify the skills gaps for their staff. It is expected that similar skills gaps will be identified for each DistCo, so a standard training program would be developed for all DistCos.

The existing CEB training institute could be used to facilitate the training program. Trainers with international experience would be used for the training program, including training future trainers.

Expected Benefits or Outcomes:
The long-term benefit of this training program will be a better regulated industry, an effective PUC, and ultimately lower tariffs and improved services to end-use customers.

The immediate benefits will be a core of staff in each DistCo trained in the implementation of regulatory procedures and tariff setting to an international level of expertise.

Potential for Sustainability and/or Replicability:
Using an established training institute, such as, the existing CEB training institute, will provide for capacity building in the area of regulatory procedures and tariff setting, once the initial training period is completed. Expanding the training program beyond a small core of staff will, in the face of inevitable turnover of staff within the DistCos, ensure that the skill capability is sufficiently broad within the DistCos, to maintain the capability.

Estimated Costing:
Training Program: approximately 6-8 person months **$180,000**

Time Horizon and Duration:
Training needs to be completed before the DistCos make their first tariff filing to the PUC, in the last quarter of 2004.

Intervention 7:

Technical Assistance to TransCo to Improve Reliability of the Grid

Sector Description or Thematic Classification:
Power Sector Operations; Grid Reliability and Stability, Capacity Building

Justification for Selection of Project:
CEB presently has no capability to conduct analysis of stability; analyze the emergency and steady state stability of the grid. As a result, the grid is experiencing an increasing number of blackouts.

However, the Transmission Planning Division of the CEB is equipped with PSS/E model from PTI Inc. for transmission planning. This has significantly improved the transmission planning capabilities at the CEB with the model regularly being used by the planning engineers to identify transmission system bottlenecks and voltage profiles, and to examine options to strengthen the network by way of new lines, reconductoring of existing lines, transformer replacement and various other measures. Transmission engineers also use the PSS/E model to examine and calculate the short-circuit performance of the grid.

With diverse types of generating plants in the system increasing, and the ever-increasing complexity of the Sri Lanka grid, CEB requires to establish state-of-art techniques to model the dynamic behavior of the grid. PSS/E model already acquired by CEB has the capability to offer this facility, by the full implementation of the stability module of the software package. PTI Inc. continues to provide support and improvements to the model. Presently the PSS/E model is used by the Planning and the System Control (i.e. Load Dispatch) Divisions of CEB Transmission Division.

Although the PSS/E model has capability for stability studies, this facility is not utilized due to lack of data and training to operate the stability module of PSS/E. However, to improve the reliability of the national grid through analysis of short and medium-term stability of the grid is required. The improvement of power quality will contribute to industry competitiveness.

The specific requirements are the following. This requires the establishment of a dedicated CEB team of 2-3 engineers from both the Planning and Dispatch Divisions, supported by one or two transmission stability experts by USAID to:

a) Develop a complete database of all the stability-related parameters and indices of the grid, required to operate the PSS/E stability model.
b) Produce and install models of PSS/E required to model non-conventional power plants, such as, wind power.
c) Train a team of CEB TransCo engineers at a training course in Sri Lanka conduct study using this stability model.
d) Provide regular training to 2-3 CEB TransCo engineers every year to keep them up to date on the new developments and further application of PSS/E model to improve grid stability and power quality.

Target Beneficiaries:
CEB, LECO and successor companies and all electricity customers

Expected or Proposed Project Implementation Partners:
CEB Transmission division/TransCo (Planning and Dispatch Branches)
Expected Benefits and Outcomes:
The long-term benefit of this intervention is improved power quality by way of reduced partial or total blackouts, and through minimal frequency excursions.

The immediate benefits will be a core staff in the transmission division/ TransCo after the sector is unbundled, to operate to PSS/E stability modules to improve system reliability.

Potential Sustainability:
TransCo, after unbundling of the sector is completed, has the capability to assign and retain staff to fully benefit from the Project, and would then include the work in the project into the regular annual planning cycle.

Estimated Costing:
Three to four man-months of stability expert/s to develop a data bank for PSS/E stability module operations and train staff to operate the module once the data bank is developed.

Total Estimated Cost **US$100,000**

CEB Transmission Division should dedicate 2-3 qualified transmission engineers, at least one of whom would have extensive experience on the present level of implementation of the PSS/E model.

Time Horizon:
Development of the data bank should commence immediately, followed by initial training. Training can be repeated every year for three consecutive years from 2004 – 2006.

Intervention 8:

Financial support for training on Wind Energy Systems

Sector Description or Thematic Classification:
Power Sector; Institutional Capacity Building, and Training.

Justification for Selection of Project:
Wind power is slowly growing in Sri Lanka. CEB is currently operating a 3 MW pilot project in the South and a few small wind systems have been implemented around the country. However, small-scale wind energy generation has received little official attention in Sri Lanka. Initial studies financed by USAID under the SARI/Energy Program indicate that many sites exist with strong wind potential. Promoting wind development could greatly benefit isolated rural communities that will be missed under the CEB electrification plan.

In order to develop small wind energy systems, training on design and manufacture of small systems, wind resource assessment, and management of wind power systems is required and institutions, such as, Intermediate Technology Development Group (ITDG) would require financial support to host these training courses on the design and implementation of small wind energy systems in Sri Lanka. The main goal of this course will be to enhance the technical expertise in wind power development.

Targeted Beneficiaries:
Project Developers, Energy Consultants, New Generation Company Staff, with long-term implications for households, resorts/hotels, remote schools and medical facilities.

Expected or Proposed Project Implementation Partners:
Developers and promoters of small wind projects, such as, Intermediate Technology Development Group (ITDG)

Expected Benefits or Outcomes:
The major outcome of this would be improved awareness of the applications for wind technology and a clear understanding of the manufacturing process. If a local wind turbine industry can be created, the cost to the average consumer would be substantially reduced from the prices currently paid to import this technology.

Potential for Sustainability and/or Replicability:
The initiative can create a sustainable domestic capacity to produce wind technology, which could then begin to market the technology in Sri Lanka.

Estimated Costing:
USAID could support this wind technology dissemination training course in the following ways:

- Direct financial support to promoters: **Total Cost would be variable and dependent on USAID's level of interest**
- Sponsorship of several local participants: **SL Rs15,000 per participant for the ITDG scheduled training session.**

- Financing of two U.S. based wind experts to teach a special 1-day training module (after the main training session). This could be on specialized topics such as *Wind Energy Financing*, *Wind Energy and the Carbon Credit Market*, *Wind Energy and Water Pumping*, etc.

Total Estimated Cost **$8,000**

Time Horizon and Duration:
The timeline for this intervention is short. The ITDG training course is planned for December 8th through the 20th.

Intervention 9:

Capacity Enhancement in Hydroelectric Power Plants

Sector Description or Thematic Classification:
Electricity Sector; Generation Capacity Enhancement

Justification for Selection of Project:
CEB hydroelectric power plants are strongly linked to the irrigation system. The generating system itself is moving from a predominantly hydroelectric system to a mixed hydro-thermal system. Existing hydroelectric power plants designed to operate on base load will now gradually move to peaking duties. Some hydroelectric power plants have large reservoir capacity upstream, and hence they can deliver more capacity in the peaking mode.

Previous studies under the Electricity Masterplan (1989, co-funded by GTZ) and Hydropower Optimization Study (2003 on-going, co-funded by JICA) have identified the potential to add capacity to the existing hydroelectric power plants:

The potential for capacity addition at Victoria and Samanalawewa had been identified in the design stage and physical provisions have been made to enable capacity additions. However, in other power plants, no studies have been conducted about the feasibility and ground conditions to enable capacity additions. The on-going study as well as the 1989 study attempt to justify capacity additions from a hydro system analysis and optimization points of view, and the need now is to translate those findings into site-specific feasibility reports for each power plant.

Target Beneficiaries:
CEB/GenCo, GOSL and all electricity customers through cheaper peaking capacity

Proposed Project Implementation Partners:
CEB/GenCo, MOPE and GOSL

Potential Sustainability:
CEB/GenCo has the qualified staff and capacity to participate in the study, and take-up the project from feasibility to construction stage.

Estimated Costing:
Two man-months of hydroelectric project specialists for each of the six sites, particularly with experience in capacity enhancement and/or rehabilitation of old power plants.

Estimated Total Cost **$ 200,000**

Time Horizon:
To begin immediately at the end of the on-going Hydro system optimization study in April 2004.

Intervention 10:

Support to Small Institutional Energy Users (schools, hospitals, clinics, etc.) to implement small-scale energy systems

Sector Description or Thematic Classification:
Rural Electrification; North and East Development

Justification for Selection of Project:
At present, 33% of medical facilities (66 sites) and 44% of secondary schools (176 sites) are not connected to the grid in the north and east. The DFCC Bank under the World Bank sponsored RERED Program is financing the initial site selection and community outreach program necessary to bring distributed energy generation to government, medical, and educational facilities in the north and east of Sri Lanka.

The primary usage for energy in the medical field is refrigeration, lighting, and water pumping. In many areas not connected to the grid, hospitals and clinics lack the ability to generate electricity or pump water and thus provide adequate medical services. A significant need for energy is refrigeration, without which small hospitals and clinics are not able to keep blood, vaccines, and other medications. Some depend on diesel or kerosene to fuel refrigerators for this purpose but recently have seen fuel deliveries reduced due to increases in fuel prices.

Schools require a basic level of electrification in order to provide lighting, and if possible an expanded regular source of electricity to provide for computer access. Many schools have advanced equipment (computers and/or lab equipment), but are unable to use them due to lack of access to or unreliable electricity. Provision of electricity to these schools will allow teachers to access computers and possibly the internet to provide better quality education to local children.

In most cases the targeted institutions are government run and thus are not eligible for loans under the World Bank/DFCC Bank RERED project (this program is solely targeting the private sector). They have stated that they will provide all necessary technical assistance to do any pre-project design or feasibility work under a RERED technical assistance grant, but the capital contribution for hardware purchases would have to come from another party. DFCC has just hired consultants to begin the site selection and pre-project development work, which should commence shortly.

The proposed project intervention is to sponsor the purchase of hardware for these medical and educational facilities identified by the DFCC Bank in isolated communities in the north and east. This will provide substantial health and social development benefits to the region at a very important stage in the country's transition to lasting peace.

Targeted Beneficiaries:
Local schools, hospitals, and clinics with wider benefits going to the community. In some areas effected by the civil conflict, many schools and medical facilities have been damaged or destroyed and are now only being rebuilt. A program specifically

targeting these institutional service providers would greatly contribute to improving the social and economic conditions in the north and east.

Expected or Proposed Project Implementation Partners:
The DFCC Bank is currently managing the overall program while the Energy Forum, an NGO, will be identifying actual project opportunities

Expected Benefits or Outcomes:
Grid based electricity will not reach many areas in the north and east in Sri Lanka for several years. At present 33% of medical facilities and 44% of secondary schools are not connected to the grid in this area. The development benefit of bring electricity to this customer class will be substantial. Hospitals and clinics will be able to refrigerate blood, vaccines, and other medications and schools can offer better and longer services to students. This in turn will have a major impact on the social and economic development of each community in which USAID sponsors a project.

Potential for Sustainability and/or Replicability:
If this program can prove that distributed generation technologies can work viably in schools and medical facilities (as is the case in other countries) it is possible that the government or the new distribution company in the north and east could replicate the project in other facilities. The main factor impacting sustainability is the ability of each facility to meet annual operating costs. These annual costs could come from each school or medical facilities' budget for diesel and/or kerosene.

Estimated Costing:
The costs indicated below are based on a complete electrification of each facility type.
For schools this cost can range between Rs 800,000 to Rs2.2 million
For medical facilities the cost can range between Rs1.1 million to Rs3.5 million
In many cases this will mean multiple solar systems are being installed per facility. For example, the cost structure presented below would cover the installation of 5 solar systems for a rural hospital and 2 for a 1C School. The tables below indicate the number of systems needed per use and the estimated installation and operating cost.

Table 1: Number of electricity supply packages per health facility and estimate of capital and yearly recurrent costs.[1]

Health Facility	Number Wards	Number of Delivery Rooms.	Number of Labs	Number of Cold chain	Installation Cost (000s Rs.)	Annual Operating Cost (000s Rs)
Peripheral unit	3	1	1	1	3,566	258
Rural Hospital	2	1	1	1	2,969	215
Central Dispensaries and Maternity Homes	1	1	1	1	2,372	172
Central Dispensaries	0	0	1	1	1,178	86

[1] Source: RERED Project, *Proposal for the rapid electrification of health, education, and government sectors in the rural areas of North and East Sri Lanka*, June 15, 2003.

Table 2: Number of electricity supply packages per education facility and estimate of capital and yearly recurrent costs. [2]

Education Facility	Number of Science Lab packages	Number of Comp/admin packages	Number of Audio Visual packages	Installation Cost (000s Rs.)	Annual Operating Cost (000s Rs)
1AB School[3]	3	1	1	2,201	30
1C School[4]	0	1	1	842	12

As an example, **USAID could finance the following bundle of projects at a cost of Rs 21,096,000 or approximately US$222,000**:

- Three 1AB Schools (Cost: Rs 6,603,000)
- One 1C School (Cost: Rs 842,000)
- Two Central Dispensaries and Maternity Homes (Cost: Rs 4,744,000)
- Three Rural Hospital (Cost: Rs 8,907,000)

The actual level of commitment would depend on the level of interest by USAID, the specific needs of schools and hospitals, and the available budget.

Time Horizon and Duration:

Realistically speaking, the Energy Forum and DFCC Bank will need approximately 4-6 months to identify specific facilities and get an official confirmation of interest. Once this is complete, equipment purchase and installation could begin in as little as 6 months. Investing could then be done in a phased manner, starting with only one or two facilities in the first months and then ramp up to more sites depending on the initial project development experience.

[2] Source: Ibid.

[3] Teaches children in school years 1 – 13 including A level science, commerce and arts subjects.

[4] Teaches children in school years 1 –13 with A level arts and commerce but not A level science. Science is taught only up to O level.

Intervention 11:

Technical Assistance for DistCo Loss Reduction

Sector Description or Thematic Classification:
Power Sector Improvements; Distribution Loss Reduction

Justification for the Selection of Project:
The average distribution loss for the CEB distribution system is currently at 14% but a study conducted by the ADB for LECO I & II, prior to the commencement of rehabilitation of LECO network, revealed that losses can be higher than the "average losses" typically cited.

A project to reduce distribution loss with necessary capital up-grade investment coupled with a DistCo best-practices management, DistCos should be able to reduce the losses to about 8.5% shortly after the project completion.

According to studies conducted by the CEB, Rs. 5 billion (estimated) will be required to reduce losses from 14% - 8.35% over the next 3-4 years.

The system up-grades would most likely involve not only the up-grade/replacement of the 33 kV and 11 kV distribution feeder systems and sub-stations but also include such things as: capacitor installation for power factor improvement, additional metering equipment, some testing and monitoring equipment, data logger, etc.

Although this has a very attractive payback period of 2.9 years, for a lending agency to fund a distribution loss reduction and a system upgrade, a detailed investment – grade project report will be required. This will involve an initial overall DistCo system evaluation and then a focus on a Region within the total DistCo system that provides the most loss reduction for a reasonable capital investment, assuming a nominal ROI that would be acceptable to lending agencies, such as, ADB or JBIC.

Technical assistance after the CEB unbundling to develop a detailed investment-grade project report on loss reduction/capital up-grade, to ADB and/or JBIC standards, for a Region of a specific DISCOM is required to attract investment for project implementation is required..

Targeted Beneficiaries:
DistCos, consumers due to better quality & reliable supply.

Expected or Proposed Implementation Partners:
DistCos, Donor Agencies, MOPE

Expected Benefits or Outcomes:
An investment-grade detailed project report on distribution loss reduction/capital up-grade, to ADB and/or JBIC standards, for a Region of a specific DistCo, which is required to attract investment for a project of this nature. The DistCo and region selected must have some form of customer database and have/intend to have some type of management information system for billing/collection in a timely manner. There would also need to be a commitment to customer service and the ability to

resolve customer complaints in a timely manner. It also must be a region with a reasonable cross section of customers, industrial-commercial-domestic, that in general should be a profit making Region for the DistCo.

Potential for Sustainability and/or Replicability:
With staff attached to the identified DistCo involved in the preparation of an investment grade report, the project can be extended to the remaining areas of the DistCo and be replicated in the other DistCos.

Estimated Costing:
Technical Assistance to produce an Investment grade, detailed project report to ADB or JBIC acceptance standards for a selected region of DistCo would take four months and estimated cost: **$238,500**

This is based on an LOE of approximately 210 man-days (about 40% ExPat and 60% Local support) with an ODC budget of approximately $50,000 involving international travel.

Time Horizon and Duration:
First quarter of 2004 after the unbundling of the sector and would take four months.

Intervention 12:

Capacity Building for TransCo for Negotiation of PPA Contracts

Sector Description or Thematic Classification:
Power Sector Operations; Capacity Building, Good Governance

Justification for Selection of Project:
The role of the TransCo will be crucial to the success of the unbundled electricity industry. In the restructured environment, they will have two roles – first to manage the transmission wires business, including system operations, and second to manage the bulk supply and sale business, where they will act as the single buyer of all generation output and sell this output under pre-determined tariffs to the DistCos.

The former CEB GenCo will not be responsible for any new generation capacity. All new generation capacity in Sri Lanka will take the form of IPPs. In the restructured environment, the TransCo's Bulk Supply and Sale division will be responsible for negotiating Power Purchase Agreements (PPAs) with independent generating companies. Curtailing the cost of PPAs will be crucial to maintain electricity tariffs at a reasonable level.

The PUC will develop guidelines for the TransCo to use when negotiating the PPAs, with respect to standards of operation, payment terms, etc. There will remain some terms and conditions that must be negotiated between the IPP and TransCo, that will affect the operation of the PPA and the price paid by TransCo for the generation output. A well-negotiated PPA will improve the operational reliability of the system and minimize the amount that is paid for the output, while a badly negotiated contract will have a detrimental impact on both the transmission grid and finances.

There is limited capacity within the CEB staff that will be transferred to TransCo to negotiate PPA contracts. They would benefit from a capacity building activity to bring skills up to international best practices in this area.

Targeted Beneficiaries:
Bulk Supply and Sales division of TransCo

Expected or Proposed Project Implementation Partners:
CEB/TransCo

Expected Benefits or Outcomes:
There are two expected benefits:

- Reduced costs of PPAs, feeding through into lower prices to customers for power supply.
- Improved operating performance of generators under PPAs.

Potential for Sustainability and/or Replicability:
Sustainability will be achieved by training the TransCo staff on the negotiation process, rather than doing the negotiation. Support for the PPA negotiation process would be provided for the initial PPA negotiation. Once capacity has been built

within the organization, further PPA negotiations could be undertaken by TransCo independently.

Estimated Costing:
Cost of capacity building to improve PPA negotiation: **$150,000**

Time Horizon and Duration:
First quarter of 2005, when TransCo will begin procurement process for additional generation. Technical assistance should be provided as needed during the procurement process with an expected duration of 6 months:

- Specification of requirements
- Tendering process
- Bid evaluation

The first procurement will be a 300 MW CC plant due for commissioning in 2006/7. The bids are already out, and will close late 2003. Negotiations will be in the first the quarter of 2004. Hence, this TA can begin immediately.

Intervention 13:

Energy survey and needs assessment for the North and East

Sector Description or Thematic Classification:
North and East Development

Justification for Selection of Project:
Since hostilities have ceased in the north and east, little work has been done to assess the economic development needs, and thus, the energy requirements for this region. Multiple governmental, private, and international groups, such as, CEB, DFCC Bank, ADB, GTZ, NORAD, and ITDG have begun to provide services in the region. CEB has installed a diesel generator in Jaffna to meet the near-term energy needs of the city. The World Bank/DFCC Bank RERED Program has a mandate to operate in the north and east, but only a few projects have been financed to date. ADB is assessing the development needs of the area, but from a macroeconomic perspective only. GTZ is operating in Jaffna providing social and economic development services, and the NGO, ITDG has begun to look at expanding energy services into the region. But no organization has systematically looked at the overall energy needs of the region.

Therefore, a detailed market survey of the region's electricity demand for the following periods: (a) the present, (b) three years out, and (c) five years out is necessary to improve the ability of energy planners to provide adequate service to the country and allow for economic growth and redevelopment in the region. Successful redevelopment in the region could contribute to the successful implementation of a peace agreement.

Targeted Beneficiaries:
The north and eastern communities, the new distribution company in the region, and the transmission company.

Expected or Proposed Project Implementation Partners:
This study would primarily be conducted for the newly formed distribution company and the Energy Supply Committee. It may also be necessary to coordinate with the LTTE in order to gather data in isolated communities.

Expected Benefits or Outcomes:
Much of meeting the north and east's energy demands will fall on the 5th distribution company that will be formed when CEB is unbundled. This Disco will have the hardest time operating profitably due to the low-income levels in the region and the huge reconstruction effort that will have to be implemented. Clear understanding of the energy growth patterns will allow for effective medium and long-term planning.

With little information available as to the current (let alone future) electricity demand of the north and east, no one knows what the impact of reconnecting this region to the national grid will have on grid stability and ability to supply to regular power all current customers. A clear understanding of this demand will prove the transmission company the needed information to make the appropriate investments and upgrades.

This data could then be integrated into the energy database started by the Energy Conservation Fund (ECF) and currently managed by the Energy Supply Committee (ESC).

Potential for Sustainability and/or Replicability:
This project will provide needed data to ensure the electricity supply system operates in a sustainable manner.

Estimated Costing:
The total estimated cost of the project is approximately **US $167,000**. The cost breakdown is presented in the Table below.

Table: Cost to conduct an electricity market survey in the north and east of Sri Lanka.

Costs	Rate (US$/day)	LOE (person-months)	Total
LABOR			
Project Manager	$ 1,000	2.5	$ 55,000
Energy Survey Statistics Specialist	$ 800	1	$ 17,600
Local Surveyors (4 individuals)	$ 200	4	$ 17,600
Energy Planner	$ 850	1	$ 18,700
Rural Electrification Expert	$ 800	1.5	$ 26,400
Total Labor Cost			**$ 135,300**
TRAVEL			
International Flights	$ 1,300	6	$ 7,800
Per Diem (days)	$ 150	60	$ 9,000
Local Travel (trips)	$ 75	6	$ 450
Total Travel Cost			**$ 17,250**
OTHER DIRECT COSTS			**$ 15,255**
TOTAL			**$ 167,805**

Time Horizon and Duration:
The procurement of consultants for this task is likely to take 3.0 months while the task itself would take approximate 6.0 months to complete.

Intervention 14:

Development of a National Renewable Energy Resources Database & User-friendly Resource Guide

Sector Description or Thematic Classification:
Power Sector; Renewable Energy, North-East Development, Economic Growth

Justification for Selection of Project:
There are many good information sources outlining the renewable energy resources in Sri Lanka. USAID under the SARI/Energy Program has just completed a satellite map of wind resources. An assessment of the country's solar resource has also been done. In addition to these, ITDG had completed a preliminary catalog of mini and micro hydro resources and USAID is already planning to make a more thorough hydro resource assessment.

What is still needed is an assessment of the biomass resource potential covering: all applicable fast growing tree species, animal husbandry (and thus animal waste), and rice and sugarcane growing (much of this could be gathered from the appropriate government ministries covering agriculture and irrigation).

However, the available information is not centralized and is not usually available to the public at large. Wider dissemination of this information could greatly enhance the ability of customers and developers to promote sound energy solutions. The proposed intervention would include: 1) gathering of all available data on Sri Lankan renewable energy resources into one database or document, 2) identifying and filling gaps in the data, 3) creation of a renewable energy resource handbook, and 4) development and implementation of an information dissemination strategy. This resource guide could be housed at a Sri Lankan University (perhaps Moratuwa) and updated every 5 years.

Targeted Beneficiaries:
Local communities, renewable energy project developers the, Public Utility Commission (PUC), and ESC

Expected or Proposed Project Implementation Partners:
Several parties have already expressed interest in this information gathering exercise. The main parties would be: ESC, USAID, NREL, ITDG, and the University of Moratuwa.

Expected Benefits or Outcomes:
For many renewable energy resources, it is difficult to assess whether a community has enough of a resource to generate electricity. The delivery of a renewable energy resource database and handbook will improve the ability of these communities to identify the right energy solution for their specific needs.

Potential for Sustainability and/or Replicability:
The database and handbook would only need to be updated very infrequently (perhaps every 5 years) and thus is relatively sustainable. These tools would disseminate renewable energy best practices and allow communities and project developers to replicate the successes of others in all parts of the country.

This could then be integrated into the database created by ECF and now being updated by ESC.

Estimated Costing:

This project intervention would have the following four discrete parts:

- **Gathering of all available data on Sri Lanka renewable energy resources compilation into one database:** This step could be completed by one local consultant and would likely take 2.0 person-months.
- **Identifying and filling gaps in the data:** This task could potentially require data gathering and thus could by financially and time consuming. Specific data that may be required includes: 1) site specific wind recording from prime spots identified in the SARI Wind Resource report, and 2) information on biomass resources that have not already been gathered by the government. The total level of effort for this task could be as little at 3.0 person-months of a local consultant's time to 3.0 (local) and 3.0 (international) person-months.
- **Creation of a renewable energy resource handbook:** Once the data gathering and database are complete, the information will be transferred into handbook format for dissemination to the wider community. Total cost 2.0 person-months for a local consultant.
- **Development and implementation of an information dissemination strategy:** Total cost of 3.0 person-months for a local consultant.

Total Estimated Cost **$88,000 to 141,000**

Time Horizon and Duration:

Total estimated time to complete: 12 months.

Appendix C-1 Potential Industrial and Commercial Interventions

Menu of Options for Interventions in the Energy Sector with Estimated Costs		Estimated Costs in US$
The Industrial & Commercial Sector Interventions:		
Immediate	Fuel Switching for Drying Process in Tea Industry	$ 37,000
Imm.-Short	Fuel Switching for Spray Dryers in Ceramic Industry	$250,000
Immediate	Development of a Web-based 'Bench Marking Database for Hospitality/Tourism Industry	$ 35,000
Short	Improvement in service delivery of ESCOs and project developers	$225,000
S to Med	Promoting Energy Efficiency in Cluster Industries	$ 20,000/yr
Short	Construction of a Cold Storage/Ice Factory for Northern Area	$500,000
S to Med	Facilitation Establishment of a Sustainable Guarantee Fund	$ 90,000
Short	Promote and disseminate information on Renewable Energy applications in Tourism Sector	$260,000

Intervention 15:

Fuel Switching for Drying Process in Tea Industry

Sector Description or Thematic Classification:
End-use Energy Efficiency; Industry Competitiveness

Justification for Selection of Project:
The tea industry, which is a major export industry in Sri Lanka, has a significant socio-economic impact. It is also among the largest employers, creating employment for rural communities. Historically, the Sri Lankan tea industry has dominated the international markets with its quality and price competitiveness. However, recently the industry is facing tough competition in the international market from several other developing countries. Through TCI, USAID is already helping the industry to identify several means to reduce it production costs to gain competitiveness.

Energy accounts for between 8%-12% of the total production cost, whereas thermal energy accounts for nearly 85% of the total energy consumed. Tea drying is highly energy intensive process and accounts for more than 50% of the total production energy. Super Diesel is the most commonly used fuel for the drying process and hence contributes significantly to the production cost.

Trend in plantation of sustainable firewood and technological development to use firewood for thermal applications in an environmentally friendly manner has significantly increased in recent terms in Sri Lanka. Tea industry also plants several species of firewood trees as complementary plantation to support its tea crops. ESCO audits have identified that replacement of super diesel with firewood based gasifier technology for the purpose of drying can reduce 2/3rd of the fuel costs. This roughly translates to almost 33% savings on total fuel/energy consumption and approximately 3%-5% reduction in production costs.

However, while the gasifier technology offers a demonstrated track record, in the absence of an industry-specific, operating demonstration project, the industry is reluctant to experiment with the option. Concern for sustainability of fuel supply and sensitivity to the product quality are the key barriers. Recently the tea industry has demonstrated the willingness to invest in projects that have been successfully implemented elsewhere. For example several factories have installed variable speed drives for withering after it was first introduced in 2001. Our meetings with tea industry managers found that the gasifier, based driers used direct and uniform heat, this technology is likely to rather improve the quality of the product.

A pilot project demonstrating the successful implementation of fuel switching is expected to create a similar drive/ for replication among the industry operators.

Targeted Beneficiaries:
Tea Industry in particular, Sri Lanka's export economy and rural population in general

Expected or Proposed Project Implementation Partners:
USAID, Local ESCO (e.g. LTL), and an Interested Tea Industry Operator.

Expected Benefits or Outcomes:

- Breaking the barrier for other tea industries to invest in such cost effective projects.
- Reduction of 33% of fuel costs and, between 3% and 5% of total production costs.
- Competitiveness in the form of reduced production costs
- Reduced consumption of imported petroleum fuel
- Potential for increase in the quality of the product

Potential for Sustainability and/or Replicability:
Due to the increasing competition in global markets, the tea industry has been investing in cost reduction projects based on proven and tested technologies. However, due to the sensitivity associated with product quality, there is still a reluctance to experiment with new techniques and technologies. Therefore an interest in cost efficient investment projects increases significantly if demonstrative projects establish the usefulness and effectiveness of the technology.

Consequently no further intervention will be required after successful implementation of the pilot project.

Intentions 16:

Fuel Switching for Spray Dryers in Ceramics Industry

Sector Description or Thematic Classification:
End-use Energy Efficiency; Industry Competitiveness

Justification for Selection of Project:
The ceramic industry, which is among the major export industries in Sri Lanka, has a significant socio-economic impact. It also creates substantial employment. The industry is facing tough competition in international markets. Through TCI, USAID is already helping the industry to identify several means to reduce it production costs to gain competitiveness.

Energy accounts for between 25%-35% of the total production cost, whereas thermal energy accounts for nearly 85% of the total energy consumed. There is significant energy efficiency potential available that has been addressed through a different proposal Promoting Energy Efficiency in Cluster Industries.

A synthesis of energy profile of a typical ceramic factory suggests that Kerosene is heavily used by the industry operators. Kerosene accounts for nearly 60% of the total energy consumption in a typical ceramics factory, followed by grid electricity 31% and diesel 9%. The key reason for the attractiveness of kerosene is special subsidies offered by the government. However, the petroleum industry is being restructured and it is highly likely that current subsidies will be withdrawn. It appears that the industry is not prepared for the increase in cost of fuel when subsidies are withdrawn. It is anticipated that effect of increase in fuel costs will severely affect the competitiveness of the industry.

Kerosene is largely used in a process called Spray Drying. ESCO audits of ceramics industry have identified the possibility of replacing kerosene with firewood as the fuel. While even with current subsidies the switching offers significant cost savings. For example a typical fuel-switching project offers less than 2-year payback period.

However, fuel switching requires substantial investment. A recent detailed audit of a large ceramics factory estimated an investment of SLR 24M for a project with an 18-month payback period.

A pilot project demonstrating the successful implementation of fuel switching is expected to create a similar drive among the industry operators.

Targeted Beneficiaries:
Sri Lankan Ceramic Industry in particular, Sri Lanka's export economy in general

Expected or Proposed Project Implementation Partners:
USAID, Local ESCO (e.g. LTL), Interested Ceramic Industry Operator and a third party financier.

Expected Benefits or Outcomes:

- Breaking of barrier for other Ceramic industries to invest in such cost effective projects.
- Competitiveness in the form of reduced production costs
- Reduced consumption of imported petroleum fuel

Potential for Sustainability and/or Replicability:

The proposed fuel switching offers significant savings and is expected to result in even more savings when fuel subsidies for kerosene are withdrawn. Fuel switching however requires substantial investment. Such investments can be secured through third party financiers. However, the industry operators are reluctant to experiment because of a lack of an operating demonstration project.

Consequently no further intervention will be required after successful implementation of the pilot project.

Estimated Costing:

USAID provides all or part of the funding required to implement such a project at an average sized Ceramic factory. To our knowledge several ESCOs have identified the potential of such projects at several Ceramic factories. For example, a local ESCO, Lanka Transformer Limited (LTL), has identified potential for such a pilot project at Royal Ceramics in Eheliyagoda.

Estimated cost would be SL Rs: 24 – 25 million or approximately: **$250,000**

Time Horizon and Duration:

Short-term: Can be implemented immediately within 3 – 6 months.

Intervention 17:

Development of a Web-based Bench Marking Database for Hospitality/Tourism Industry

Sector Description or Thematic Classification
End-use Energy Efficiency; Industry Competitiveness

Justification for Selection of Project:
While the hospitality industry in Sri Lanka is booming, it also faces significant challenges. The cost of electricity is expected to increase by about 40%, as there are plans to move hotels from industrial tariffs to commercial tariffs. This is expected to increase the net operating cost by more than 5%.

The hospitality industry is among the first industries to implement energy efficiency measures. A large section of the industry has achieved significant improvements in the areas of lighting, power factor correction, self-generation etc. However, the industry is also very sensitive to discomfort to guests as a result of energy efficiency measures. Consequently still significant potential is available for savings in the area of air conditioning control and building thermal envelop, waste treatment/ recycling, waste water recycling etc. Generally there is a lack of comprehension about the best practices within the industry. Consequently the industry members are only able to compare their current state with their past conditions. The industry members critically lack the benchmark information to compare themselves against the best practices locally and on international level.

The hoteliers association believes that this industry is one of the most integrated industries in Sri Lanka. The industry members are always willing to share information and resources that leads to the general well being of the industry. For example the industry is jointly funding an ideal eco tourist lodging facility in Sri Lanka.

The association believes that a web based benchmark database would be an excellent resource for the industry members to compare their performance in energy consumption and other cost factors against the best practices, locally and worldwide. Because both the data collection and information dissemination will be done over the Internet, the system can be operated with a very small operating cost. The key benchmarking data will be accessible by all members, USAID and other potentially interested donor agencies. The association also suggested that it can use the resources to launch an industry representative website that will be aimed at promoting tourism in Sri Lanka.

The project may also be used as an exemplary/ pilot project for other consolidated cluster industries such as tea and ceramic.

Targeted Beneficiaries:
Hospitality and Tourism Industry

Expected or Proposed Project Implementation Partners:
USAID, Hoteliers Association of Sri Lanka
Expected Benefits or Outcomes:

- Reduction in operating costs
- Improved competitiveness
- Incentive to explore new efficient technologies and practices
- Incentives for the operators of hotels to invest in web based applications e.g. online booking etc.
- Availability of industry approved information to potential tourists
- Potential for ESCOs to target best candidates for EE implementation

Potential for Sustainability and/or Replicability:
Currently the maintenance of such applications do not require significant resources. Generally the maintenance of such applications is outsourced. The industry association has shown the willingness to fund the maintenance of the application after its execution. No further intervention will be required on part of the USAID.

Estimated Cost:
USAID provides monetary assistance to the Hoteliers Association of Sri Lanka to setup **such web-based database**. Some input from market research organizations and software developers will be required.

Estimated Cost	**$25,000 and $35,000**

Time Horizon and Duration:
Short-term: Can be implemented within 6 months.

Intervention 18:

Technical Assistance to Improve service delivery of existing ESCOs and Developers

Sector Description or Thematic Classification:
Renewable Energy; Economic Growth

Justification for Selection of Project:
There are multiple groups (developers and ESCOs) in Sri Lanka that have a strong technical understanding of a few energy technologies, but no one group currently can offer rural, commercial, or industrial customers a technology neutral approach to assessing their energy needs.

Several NGOs are working with the project development community to improve their ability to provide energy services. There is currently a lack of coordination among these activities. As previously discussed ITDG is implementing a program to train Sri Lankans on the use of small-scale wind systems. The Energy Forum, a local NGO, is working with renewable energy system supplier and project developers to provide better quality energy solutions. This effort is specific to the mini-hydro village electrification schemes.

This intervention would assist the current ESCOs and energy sector consultants/project developers to understand a wider set of technology solutions in an effort to provide solutions to customers that more accurately fit their energy needs combined with available renewable energy resources. Specifically, the contractor would work with NGOs active in this area to provide a more systematic approach to solving this problem. Two training courses would be developed and implemented to improve the local knowledge base of: 1) energy audits and 2) renewable energy systems.

Targeted Beneficiaries:
Project developer community, ESCOs. With improvement of these private sector player, improved services to communities.

Expected or Proposed Project Implementation Partners:
ITDG and the Energy Forum

Expected Benefits or Outcomes:
Better targeting of solutions to actual local needs. Services will be technology neutral and the quality should improve with increased understanding of supplier, developer, and community needs.

Potential for Sustainability and/or Replicability:
Use the "train-the-trainer concept"
Estimated Costing:

The planned intervention would have the following three components:

- **Coordinate Current Activities in this Area:** Work with NGOs to come up with a systematic strategy to improve and expand the quality of energy sector consultants, project developers, and ESCOs. 2.0 person months over a period of 12 months would be required from a local and international consultant to coordinate this effort. Monthly meeting would be held with the key stakeholders in this process to plan and coordinate activities.

  Total Estimated Cost **$65,000**

- **Energy Audit Training Course:** This course would be specifically tailored to small energy users and allow consultants, ESCOs, and developers to send junior staff to learn the fundaments of the energy audit process. Students would meet once every other month over 1 year for a week.

  Two to three trainers would be needed at an estimated total cost: $75,000

- **Renewable Energy Technology Training Course:** Like the Energy Audit Training course, this class would meet every other month for one week. Each week session would cover one renewable energy technology from basic design to installation and maintenance. Specific topics would include: Wind Systems, Gasifiers, Solar PV and Thermal, biomass (wood, sugarcane, and risk husk), biomass (animal waste), and hybrid systems (including diesel systems). By the end of course students will have a clear understanding of all the commercially viable renewable energy technologies and their applications in Sri Lanka.

Two technology specialists would be needed for each week long session and 1 local coordinator at an estimated total cost: **$85,000**

Total Estimated Cost for all 3 components: **$225,000**

Time Horizon and Duration:
The classes would take place over a period of 1 year and likely need 3-4 months of preparation.

Intervention 19:

Promoting Energy Efficiency in Cluster Industries

Sector Description or thematic Classification:
End-use Energy Efficiency; Industry Competitiveness

Justification for Selection of Project:
USAID is currently sponsoring a large-scale project on improving the competitiveness of 8 cluster industries in Sri Lanka. The USAID sponsored, the Competitiveness Initiative (TCI) is aimed at supporting activities of these industrial clusters to enhance their competitiveness in regional and global market by improving product quality and reducing production costs.

Tea, Rubber, Ceramics, Coir and Tourism industries are highly energy intensive. Energy in these industries accounts from 4%-30% of the total production costs. Several energy audit studies of these industries have identified significant energy savings potential, ranging 10%-30%, which could have a direct impact on production cost by industry cluster.

Energy efficiency offers significant cost savings that in turn offer significant competitive advantage in the market. It is also worth noting that large-scale energy efficiency improvement projects often require plant rehabilitation or replacement of technology that could also help to improve product quality, another factor contributing to the competitiveness.

The lack of awareness about background information, insufficient capability to make sophisticated technical assessments, reluctance to invest, and lack of interaction with support organizations are key barriers in identifying, testing and implementing energy efficiency potential.

The coordination of ESCOs and Financial Institutes has significantly enhanced the energy efficiency activities, overcoming some of the above barriers. However, such arrangements are still in an evolving stage and the beneficiaries have mainly been large industrial facilities. The ESCO operations are not directly aimed at the cluster industries. There is a need to enhance the existing institutional structure to encourage similar support for small and medium cluster industries.

Cluster industry managers suggested that TCI could facilitate the forum of engineers, factory managers, ESCOs, third party financiers and other stakeholders to ensure sharing of information and success stories. For example, there is a significant potential for tea industries to install mini and micro hydro plants that would reduce their costs significantly. However, currently only few estates have successfully experimented with the idea. While the others may have identified the potential, several barriers may have reduced their ability to successfully follow through with project implementation. Tea industry, pressed hard by competition and mounting costs has adopted several innovative energy efficiency techniques. However, such practice is not widespread. TCI can also help showcase success stories to generate interest among other industry members.

Therefore, it is necessary to create/identify an institutional to provide technical assistance to TCI, Cluster Industries and third party financiers.

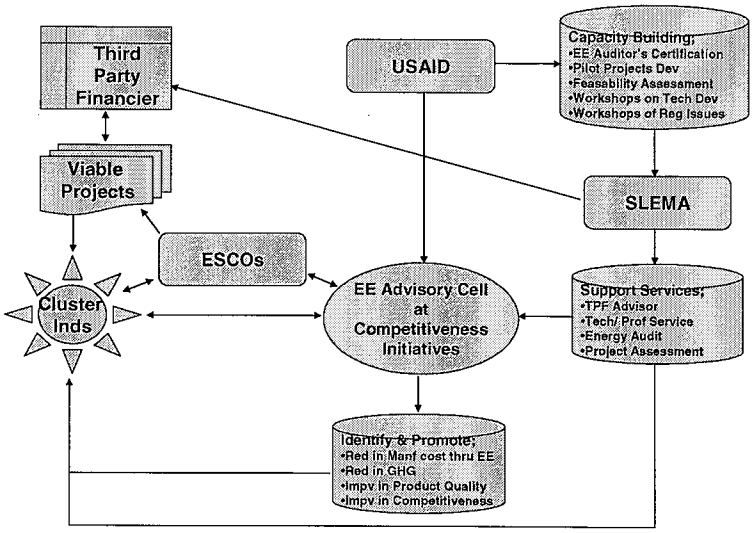
Targeted Beneficiaries:
Five cluster industries in particular, Sri Lanka's export economy in general

Expected or Proposed Project Implementation Partners:
USAID, TCI, Sri Lanka Energy Managers' Association (SLEMA), Energy Services Companies (ESCOs), Third Party Financiers.

Expected Benefits or Outcomes:
- Necessary impetus to kick start energy efficiency among small-medium industries
- Energy Savings
- Competitiveness in the form of reduced production costs
- Reduction in GHG emissions
- Capacity building of SLEMA to assume regional center of excellence and operate on sustainable basis.

Potential for Sustainability and/or Replicability:
The proposed initiatives require USAID involvement for up to 3-5 years. The current institutional and support structure requires short to medium-term intervention to initiate interest in energy efficiency and to bring about changes that will help overcoming the key barriers. The intervention shall generate enough upward spiraling momentum in achieving optimum energy efficiency levels and maximum competitiveness.

Estimated Costing:
Proposed Design:
a. USAID provides capacity building support to SLEMA that in turn provides technical assistance to TCI, Target Cluster Industries, and Third Party Financiers.
b. TCI, having a close relationship with cluster industries is well suited to drive energy efficiency activities focusing target industries. However, TCI lacks required technical skills that it will receive from SLEMA. Key tasks of TCI will be to promote awareness among target industries and facilitate liaison between industry operators, ESCOs, Third Party Financiers, and SLEMA.
c. Enhanced awareness and increased interaction with other partners is expected to create the anticipated impetus for energy efficiency among the target industries.



Estimated cost **$ 60,000 over 3 years**

<u>Time Horizon and Duration</u>:
Can be started immediately with intervention required over 3 years.

Intervention 20:

Construction of a Cold Storage/Ice Factory for Northern Areas

Sector Description and Thematic Classification:
Rural Electrification; Reconstruction of North

Justification for Selection of Project:
Years long war in the Northern region has resulted in destruction of basic infrastructure. This includes public assets that support local economies to function in an effective manner. Economies in the areas in North are dominated by fishing and agriculture industries. The perishable nature of these products demands that efficient storage and transport system are available to establish a balance between the supply and demand that optimizes the benefits for both producers and consumers. Because of the presence of efficient transport and storage system the prices of perishable products are mainly driven by the classic supply and demand model.

However, such is not the case in the North. A major diesel generator driven cold storage facility that was managed by community cooperative was among the many other infrastructures destroyed during the war. The lack of cold storage/ice making facility has determined that the perishable products must be sold immediately. We were told by the Federation of Chambers of Commerce and Industries Sri Lanka (FCCISL) that currently ice laden trucks are sent from South to transport perishable items, especially seafood, from North to demand centers in the South. However, this practice results in product loss of as high as 35%.

The lack of such facility has also affected the prices of agriculture and seafood products. Because of the fact that sellers must sell their products before they perish, the prices have been driven very low. For example the average price of king prawns in the North is around Rs. 100 compared with Rs. 500 in the south. This price difference is the key contributor to the proportional difference in the average annual earnings of similar producers in the two regions. A cold storage or ice making facility will allow the local communities to receive better return on their products, thereby significantly improving the socio-economic situation in the region.

Apparently a diesel generator driven cold storage facility existed in the region that was maintained by community cooperatives. However, the facility was destroyed during the war. The communities are therefore willing to support revival to such a system rather than allow private sector to monopolize the region. However, currently the local communities lack resources to install and operate a new facility.

Targeted Beneficiaries:
Fishing and Agriculture industries and rural and coastal communities in the North, Government and People of Sri Lanka due to accelerated reconciliation process.

Expected or Proposed Project Implementation Partners:
USAID, local communities, ESCOs and/or suppliers of equipment.

Expected Benefits or Outcomes:
Improved socio-economic conditions of the region, will support the reconciliation process and promote economic growth.

Potential for Sustainability and/or Replicability:
According to the FCCISL the communities in the region owned and operated a diesel generator driven cold storage facility that was destroyed during the war. That service was operated and maintained by the local communities successfully. Given the precedence the community can manage and operate the proposed facility. No further intervention will be needed.

Estimated Costing:
Approximately Rs. 50M (according to FCCISL): **$ 500,000**

Time Horizon and Duration:
Can be implemented on turnkey basis within 6 months. However, the process of establishing community involvement/operation may require approximately 2 extra months.

Intervention 21:

Facilitate Establishment of a Sustainable Guarantee Fund

Sector Description or Thematic Classification:
End-use Energy Efficiency; Industry Competitiveness

Justification for Selection of Project:
Availability of funds is one of the key barriers in implementing viable and practical energy efficiency projects. The DSM Cell at CEB and several ESCOs have established that significant energy savings potential is available for exploitation in Sri Lanka's commercial and industrial sectors. However, such potential cannot be realized because of the lack of funds available to facility owners/managers.

ESCOs in Sri Lanka started operating in 2001 and have since provided significant boost to the confidence of investors to invest in such viable option. The guaranteed savings and partial undertaking of financial risk offered by ESCOs on turn-key projects have encouraged third party financiers to provide lending money for energy efficiency projects at normal or even lower commercial rates.

However, the financial institutes are still skeptical about the success of energy efficiency projects and their evaluation criteria is still dominated by the financial strength of the client rather than savings potential offered by the project. Consequently, most of the small and medium-scale businesses or industries are not able to secure funding on competitive rates The lending institutes have shown their willingness to provide funds for energy efficiency projects at lower rates if risk to their loans is reduced through additional guarantees such a trust fund, etc.

The concept of a guarantee fund has been coined to create such additional guarantees. The USAID based SARI/Energy initiative has identified and developed the conceptual framework of such a fund, called a Sustainable Guarantee Fund (SGF), which is based on a financial model that has been found to be most suitable for countries in the) South Asian Region.

While the general framework of the fund is principally developed, there is a need to establish mechanisms that are specific to the financial systems in each country to facilitate the operation of the fund. During our fact finding mission, several stakeholders suggested that establishment of a SGF in Sri Lanka will provide a significant boost to energy efficiency in the country in particular and in the region in general.

In order to facilitate the establishment of the fund, it is important to establish necessary mechanisms and instruments.

Targeted Beneficiaries:
Commercial and Industrial Customers especially Small-medium scale businesses, Sri Lanka's economy, ESCOs, economic growth, competitiveness.

Expected or Proposed Project Implementation Partners:
USAID, Financial Institutes, SLEMA, ESCOs

Expected Benefits or Outcomes:

- Significant boost to investment in energy efficiency projects
- Reduction in production/operating costs
- Higher levels of end-use efficiency
- Economic Growth

Potential for Sustainability and/or Replicability:

No further intervention will be required.

Estimated Costing:

Technical assistance to an identified financial institution, such as, a development bank to develop and establish mechanisms for a "SGF" in Sri Lanka.

Estimated cost is between US$35,000 and US$50,000 (2 person months of expert time) plus training to the Fund Manager.

Total Estimated Cost: $90,000

Time Horizon and Duration:

Short-term: Can be implemented within 1 year.

Intervention 22:

Promotion and Dissemination of Renewable Energy Applications Information for Tourism Sector

Sector Description or Thematic Classification:
Power Sector; Ecotourism, Economic Growth

Justification for Selection of Project:
The Tourist Board of Sri Lanka has developed an *Ecotourism Development Strategy* to improve the economic viability and sustainability of the industry. This strategy and the *National Ecotourism Policy* specifically identify the need to target energy conservation and the use of alternative energy systems to improve the environmental quality of tourism services. What is missing from this Strategy is an outline of exactly how energy conservation and usage of alternative energy technologies could be implemented.

There are also many multilateral and governmental programs in place to promote renewable energy usage, but none is targeted at the tourism industry. The demand for ecotourism is growing in Sri Lanka and several communities and operators are beginning to provide services in this area. Despite this increased interest, renewable energy has only played a small role in current ecotourism projects in Sri Lanka (mainly solar water heating). Both NORAD and ADB have financed studies in this area and USAID has financed one such project, but no one has done so in cooperation with community development programs.

The proposed project intervention would be to work directly with the Tourist Board and develop specific renewable energy applications for each of the five ecotourism development opportunities identified in the Strategy. Most of these programs have a community development aspect and thus using renewable energy systems at these sites will have the possibility for replication in the greater community.

Targeted Beneficiaries:
The direct beneficiaries of this project would be the hotels and restaurants operating in the five Ecotourism Development Sites identified in the *Ecotourism Development Strategy of Sri Lanka*. These sites are

- Rekawa Ecotourism Site Development Concept
- Kirala Kelle Nature Park/Community Development Concept
- Unawatuna Marine Conservation/Community Development Concept
- Uda Walawe Ecotourism Site Development Concept
- Madu Ganga Wetland Park/Community Development Concept

These sites are distributed throughout the Southern region and represent several different habitats offering tourists a wide verity of ecotourism opportunities.

Expected or Proposed Project Implementation Partners:
Tourist Board and local hotel and restaurant operators.

Expected Benefits or Outcomes:
Improving the ecotourism profile of these development projects by providing *green* energy will improve the perceived value of these tourist destinations, leading to more business and increased capital flows to the community

Offsetting of grid based or diesel fueled generator electricity will also reduce local and global pollutant emissions.

Potential for Sustainability and/or Replicability:
In most of these areas hotels, resorts, and restaurants are clustered in a relatively small area (except those ecotourism resorts which are purposefully located in isolated areas). Successful implementation of renewable energy generation systems in one or two hotels in each of the development sites should provide the example necessary to generate interest in other close-by hotels or resorts.

Estimated Costing:
Basic cost estimate have been provided for the following elements of the proposed intervention:

- **Capacity Building at the Tourist Board:** Hiring of 1 local and 1 international consultant for a period of two person-months each to develop the renewable energy component of the *Ecotourism Development Strategy*.
  - **Estimate Cost** **$60,000**
- **Technical Assistance Training at the specific ecotourism development sites:** This will involve the development of a "Renewable Energy and the Hotels and Resorts Industry" training curriculum and user handbook to education local hotel/resource managers and facility managers on the exact usage of this type of energy system. The handbook will outline the specific hotel/resort energy needs and offer renewable energy based solutions. The curriculum will be presented at two three-day workshops at two locations in the south. Two local experts (a solar expert and an energy management expert) and two international experts with experience in the designing of this type of system (most likely with Caribbean tourism experience) will be used for this training.
  - **Estimated cost for the design of the training curriculum and user handbook** $75,000
  - **Estimated Cost for the two three-day workshops** $46,000
- Procurement of several distributed generation energy systems as pilots:
  - **1 Solar Photovoltaic Systems (approx 5 kW each)** $25,000
  - **1 Wind Power Generation Systems (approx 10 kW)** $25,000
  - **1 Backup diesel generation (to be used with one of the above listed systems) (approx. 10 kW)** $10,000
  - **2 Solar Thermal water heating systems** $20,000

Estimated Total Cost of above components, approximately **$260,000**

The actual equipment and number of systems will be dependent on actual site needs and USAID budget.

Time Horizon and Duration:

The initial training and capacity building exercises could be completed within 6 months. The procurement and placement of pilot equipment within the targeted development sites should be initialed after the training; in order to identify those communities based hotel or resort projects that have the greatest need and interest for such equipment. The entire project could be completed within 12 months.

Appendix D-1 Potential Transport Sector &Petroleum Industry Interventions

Menu of Options for Interventions in the Energy Sector with Estimated Costs		Estimated Costs in US$
The Transport Sector, including the Petroleum Industry Interventions:		
Immediate	Development of an updated Petroleum Products Accounting System for CPC	$450,000
S to Med	Establishment of a Transport Sector Baseline Database	$375,000
S to Med	Establishment of a National Vehicle Inspection and Tune-up Program	$320,000
S to Med	Establishment of a Petroleum Conservation and Resource Center	$175,000
Medium	Introduction of Zero-Emissions Electric Vehicles	$286,000

Intervention 23:

Petroleum Product Accounting System for Ceylon Petroleum Corporation (CPC)

Sector Description or Thematic Classification:
Transport Sector including the Petroleum Industry: Liberalization of Industry, Distribution Efficiency

Justification for Selection of Project:
CPC presently owns the only refinery in the country (50,000 bbl/day), and all the delivery and storage facilities. Recently, one part of the tank farm in Trincomalee was handed over to Lanka IOC as well as 100 retail filling stations. In a further plan to liberalize the industry, the Government plans to invite another Company to operate a further 100 filling stations. In the final industry structure, it is likely that CPC would retain the refinery and bulk of storage facilities, and well over 100 retail outlets. CPC's ownership will remain with the Government, at least for a few years to come.

CPC's oil accounting system is largely manual, with no significant degree of modernization to meet the challenges of a modern industry and a competitive business environment. To enable the state-owned petroleum supplier to remain competitive and to maintain its strategic objectives, an up-to-date oil accounting system is essential. This will require significant improvements to the system to match with international best practice in the

- accounting of imported crude oil received, reconciliation
- accounting of daily product balance and inventories
- accounting for product transfers from refinery to storage facilities
- tabulation of oil movements between refinery tanks
- estimation of losses (including methodology)
- instrumentation and telemetering required to implement the accounting system.

Target Beneficiaries:
CPC and all petroleum customers in the country, Business transparency

Proposed Project Implementation Partners:
CPC

Potential Sustainability:
CPC has been able to retain qualified staff, and would be able to implement the proposed system and maintain the relevant software and hardware.

Estimated Costing:
Two man-months of specialist time to study and develop the new accounting system, and a further man-month to establish and train the CPC staff. Procurement of needed software and metering hardware also to be included in the proposed intervention. It is anticipated that CPC would be in a position to cost-share some of the total cost, especially in the capital equipment area.

Estimated Total Cost **$450,000**

Time Horizon:
Immediate, and the project duration is expected to be about 3 months for analysis, 6 months for software and instrumentation, and one month for training.

Intervention 24:

Establishment of a Transport Sector Baseline Database

Sector Description or Thematic Classification:
Transport sector including Petroleum Industry; Efficiency & Environment

Justification for Selection of Project:
Transport sector perhaps is the most neglected in terms of taking measures to improve efficiency. Because of the complexities involved at end-use level, most of the initiative is directed at the upstream level. For example introduction of regulatory requirements for maximum sulphur contents in the petroleum fuels. On the end-use level the government has introduced mandatory emission control standards for all types of vehicles. However, the implementation of these standards has not been very effective.

Alternative options for the improvement of fuel efficiency and emission control, being considered by the government and donor agencies, include subsidized fine-tuning of vehicles, subsidized fuel system check-up, introduction of efficient fuel injection technologies, introduction of fuel additives etc.

However, these measures require that programs be designed for specific groups by type of vehicles. For example designing programs for small-medium family cars, vans and mini buses, buses and trucks, large transport trucks. Experience overseas suggests that a focused approach to program designing and execution ensures that programs are implemented successfully, evaluation is conducted accurately and reliably, and anticipated program results are achieved.

The focused approach in turn requires that baseline data for the entire vehicular stock of the country is available. The transport baseline data generally includes the segmentation of vehicles by classification, age, make and model, engine technology, engine capacity, average fuel efficiency, average emissions etc. The fuel efficiency and emissions for all vehicle categories then can be compared with manufacturers' factory data-sheets or baseline data elsewhere to identify the potential for improvement. Targeting vehicle types that offer the most potential for improvement can then help prioritize activities.

Development of a vehicle baseline database will help future investments in transport sector research to be more effective and useful.

Targeted Beneficiaries:
Transport sector, Government of Sri Lanka, society in general, the Environment

Expected or Proposed Project Implementation Partners:
USAID, Petroleum Industry, Institutes involved in research in transport sector.

Expected Benefits or Outcomes:
Reduction in consumption of petroleum fuels, improved air quality, reduced transport costs.

Potential for Sustainability and/or Replicability:
The database can be developed and handed over to Ministry of Transport or an institute involved in conducting research in transport sector and can also provide any required inputs to overall national energy modeling efforts.

Estimated Costing:
For data collection, procurement and operation of monitoring equipment for emissions and for consultancy efforts over a 2-year period will be approximately
$375,000

Time Horizon and Duration:
Can be a short to medium-term option that can be completed in 18-24 months for inception.

Intervention 25:

Establishment of a National Vehicle Inspection and Tune-up Program

Sector Description or Thematic Classification:
Transport Sector and the Petroleum Industry; Efficiency and Environment

Justification for Selection of Project:
The idea of a national tune-up inspection program has, in the past, attracted a lot of interest in many USAID energy/environment circles. It has the potential of significantly reducing pollution from automobiles, two wheelers and three wheelers, costs the government a relatively small amount of money (in the form of inspection equipment), and allows the donor, in principle, a low cost intervention and saves the vehicle owners in fuel more than they have to pay for annual inspection fees.

It is important to recognize that the numerous two and three wheelers operating with two stroke engines in Sri Lanka use as a fuel, a mixture of motor oil and gasoline. This is a very high polluting fuel. Vehicle operators trying to save money by using spent motor oil in their fuel mixture, often amplifying air pollution problems.

Targeted Beneficiaries:
Government of Sri Lanka (reduce out-flow of funds for petroleum products, increasing funds available for simulating economic growth and poverty reduction) and the general population of Sri Lanka from reduced environmental pollution

Expected or Proposed Project Implementation Partners:
The GOSL and Auto dealers/repair shops

Expected Benefits or Outcomes:
Increased funds available to GOSL to stimulate economic growth/job creation and reduce vehicle environmental pollution of Sri Lanka

Potential for Sustainability and/or Replicability:
National and State tune-up and inspection programs are in existence worldwide, giving many examples/models to consider what will work best for Sri Lanka

Estimated Costing:
Estimated Three (3) year Budget

a. 3 year NGO support for awareness/publicity, education for drivers and owners	$ 60,000
b. Training support costs of tune-up/inspection at Appropriate dealerships, repair shops etc.	$ 55,000
c. Training contractor	$ 50,000
d. Part-time consultants to advice on overall management enforcement, inspection stations, control, fines etc.	$130,00
e. Miscellaneous	$ 25,000
Total Estimated Cost	**$320,000**

Dealers and selected repair shops will have to commit to purchasing inspection equipment. GOSL must commit to the appropriate policy, administrative and enforcement arrangements.

Time Horizon and Duration: This should be considered a medium-term option and allow time to gather support from the appropriate GOSL Agencies and the auto industry. In addition, data should be gathered on what tune-up and inspection programs work best in countries similar to Sri Lanka.

Start project in late 2005 or 2006 and continue support for three years.

Intervention 26:

Establishment of a Petroleum Conservation and Resource Center

Sector Description or Thematic Classification:
Energy/ End-use Efficiency for Petroleum Products

Justification for Selection of Project:
Petroleum fuels account for almost 39% of total energy used in Sri Lanka. Tables below show consumption of petroleum fuels by sector.

Primary Fuel*	Share in Total Energy (%)*	Share in Total Imports (% of total import $)**
Petroleum	39	13
Hydro	8	0
Biomass	53	0

Share in Petroleum Fuel Consumption by Sector*	
Sector	**Share (%)**
Household/Commercial	51
Industrial	23
Transport	26

Share by Fuel Type by Sector (%)*				
Fuel Type	**Diesel**	**Kerosene**	**LPG**	**Other**
Residential/ Commercial	0.00	84.00	98.55	0.00
Industrial	19.94	9.96	1.45	0.00
Transport	80.06	6.04	0.00	100.00

* Sri Lanka Energy Balance 2000, ECF
** Annual Report 2002, Central Bank of Sri Lanka

Since there are no known petroleum fuel resources in Sri Lanka, the country relies heavily on foreign imports. As the table above shows, petroleum products account for almost 13% of the total annual imports of the country. Any reduction in the use of petroleum fuels, therefore, may almost directly translate into improvement in the trade balance.

The government has introduced regulations that aim to improve the end-use efficiency in the transport sector. This includes maximum vehicular emission levels and pollutant contents in the petroleum fuels. Unfortunately, a little has been done to increase consumer awareness on the importance of end-use efficiency and conservation. For example, vehicle owners may improve the fuel efficiency of their vehicles by the simple means of regularly checking tire pressure, and periodic tune-up of their vehicles. Similarly, householders may use several tips to reduce use of LPG at home.

Experience elsewhere in the world, including many developing countries, would suggest that a significant reduction in fuel consumption can be achieved by enhancing

consumer awareness. Dedicated consumer groups with sufficient technical background can create such awareness material and disseminate it through appropriate media channels. Because of the long-term commitment associated with such an awareness campaign, these consumer groups are sponsored either by the government or the petroleum industry itself. Improved industry image is the key advantage that the petroleum industry gains from sponsoring such groups/awareness. For example USAID sponsored the Center for Energy Conservation (ENERCON) that is now operated by the government of Pakistan and the Petroleum Conservation Research Association (PCRA) in India, which is sponsored by key petroleum industry players in the country.

These groups conduct research or obtain information from other research groups and produce consumer awareness material by targeting specific end-uses, end-use technologies and consumer types.

A similar institution in Sri Lanka, if and when established, can engage in petroleum conservation activities.

Targeted Beneficiaries:
General Consumer Groups, Sri Lanka's economy, Sri Lanka's Petroleum Industry, GOSL, the Environment
Expected or Proposed Project Implementation Partners:
USAID, GOSL Ministry of Energy, SL Petroleum Industry Players.

Expected Benefits or Outcomes:
Savings in use of petroleum fuel in transport, residential, and industrial sectors
Reduction in the cost of importing less petroleum fuels
Improved air quality
Awareness about various hazards associated with use of petroleum products

Potential for Sustainability and/or Replicability:
The Petroleum industry, which is largely seen to be the main contributor to the current environmental issues (especially under a competitive environment), tends to support such initiatives to improve the industry image.

However, the petroleum industry in Sri Lanka is currently undergoing a restructuring process. It is estimated that it will take several years for the industry to mature to a level where it can effectively establish and sponsor such an activity. This lead-time can be cut short by offering the industry a functioning center that it can own by simply sponsoring it through shared funding. Therefore, no further intervention from USAID will be required.

Estimated Costing:
USAID provides all resources to establish a Petroleum Conservation and Resource Center (PCARC), with possible contribution from Ministry of Industry in the form of building space.

USAID may continue to fund and monitor the center operation for 3-5 years until the petroleum industry, which is currently undergoing restructuring, becomes a mature competitive industry.

USAID then transfers the operation to the industry players.

Depending upon availability of contribution from GOSL, the establishment of the center may cost around US$100,000

For computer hardware/software; data collection, collation and analysis; dissemination of evaluations and of awareness materials; technology showcasing) and an additional US$75,000 over 3 years for staff support and logistics).

Estimated Total Cost **$175,000**

Time Horizon and Duration:
Short to Medium-term: Can be implemented between 1-2 years.

Intervention 27:

Introduction of Zero-Emissions Electric Vehicles in Colombo

Sector Description or Thematic Classification:
Transport Sector; the Petroleum Industry, Efficiency and Environment

Justification for Selection of Project:
USAID will purchase, over a period of 18 months, 15-20 electric vehicles from the Sri Lanka operations of either Bajaj or Mahindra & Mahindra in a commercial transaction and/or evaluate the appropriateness and potential for purchase from either Scooters India Limited or REVA of alternative electric transport vehicles for demonstration and introduction into Sri Lanka.

The demonstration program will be to prove the appropriateness of the technology involved to meet the driving profiles in Colombo and to assess the potential for reduction in harmful transport-related emissions.

Targeted Beneficiaries:
The general population of Colombo.

Expected or Proposed Project Implementation Partners:
The GOSL, USAID, the PUC and an appropriate DistCo, plus the alternative transport manufacturer selected and appropriate fleet owners and operators.

Expected Benefits or Outcomes:

- Demonstrate the operational viability of such vehicles;
- Demonstrate the social and environmental benefits of such vehicles;
- Create public awareness of the benefits associated;
- Develop public confidence in new transport options.

Potential for Sustainability and/or Replicability:
Highly dependent on either judicial or public pressure to use only "pollution free" transport options.

Estimated Costing:

Estimated Three (3) year Budget

a. 20 vehicles with 2 battery packs each	$ 76,000
b. 3 year NGO support	$ 45,000
c. charging equipment	$ 20,000
d. Part-time consultant	$ 120,000
e. miscellaneous	$ 25,000
Estimated Total Cost	**$ 286,000**

Time Horizon and Duration:
This is a medium-term option for duration over a three-year period.

Intervention 28:

Replacement of the Colombo Taxi fleet with Hybrid Vehicles

Sector Description or Thematic Classification:
Transport Sector and the Petroleum Industry, Efficiency and Environment

Justification for Selection of Project:
This would be an innovative approach to improve fuel efficiency and reduce pollution caused by taxis in Colombo. Such a replacement would be catalyzed by USAID through the introduction of a vehicle demonstration fleet. It should be viewed as setting a signal to other Asian countries to consider relative small but unconventional interventions to improve the current acute urban transport related air pollution problems.

Targeted Beneficiaries:
Government of Sri Lanka and the general population of Colombo from reduced environmental pollution

Expected or Proposed Project Implementation Partners:
The GOSL and Toyota (Sri Lanka) or Honda

Expected Benefits or Outcomes:
Reduces transport-related air pollution within the Colombo metropolitan area

Potential for Sustainability and/or Replicability:
It is highly dependent on judicial and public pressures to improve urban environment.

Estimated Costing:
A demonstration of the potential for replacing taxis in Colombo with the Toyota Prius / Honda Civic hybrid vehicles.

Estimated Three (3) year Budget	
Purchase of 20 Toyota/Prius Hybrid vehicles	$ 320,000
Two year local NGO support	$ 20,000
Publicity	$ 20,000
Transport Consultant (part-time)	$ 80,000
Miscellaneous	$ 20,000
Estimated Total Cost	**$ 460,000**

Time Horizon and Duration:
This should be considered a medium-term option and allow time to gather operating data on the Toyota Prius, worldwide. This project could be started in late 2005, lasting for approximately three years.

USAID Sri Lanka
Economic Growth/Energy Integration Strategy Development

Short-Term Support

Inception meeting
August 18, 2003

Nexant

Objective

Assist USAID Sri Lanka mission to determine the short & medium-term interventions in the energy sector that will contribute to the economic growth in Sri Lanka.

- Support efforts of GOSL
- Complement activities undertaken by other donors

Outcome

- Prioritized list of technical assistance options for the inclusion in the USAID/Sri Lanka economic growth program
- TA options (with Benefits and Schedule) to focus on:
  - Least cost & cost effective energy use
  - Renewable energy alternatives
  - Sound environmental practices
- For the Government, Private Sector & NGOs

Activities

- Technical assistance provided by a team of international & local experts
- Background research, done in advance of mission
- Discussions with the Mission & Embassy staff
- Discussions with country counterparts, other USG staff & other donors
- Develop strategy
- Present draft report to mission for review
- Workshop with stakeholders to obtain additional inputs/comments
- Present final report to USAID

Nexant

Main study areas

- Current energy scenario
- Risks & benefits associated with Energy sector development (reforms, IPP, EE)
- Gaps resource availability to GOSL in developing the energy sector
- Short & medium-term interventions to address above
- Interventions for successful implementation of USAID competitive initiative
- Mechanisms for strengthening stakeholder participation in Policy
- Estimate the likely contribution of proposed interventions

Deliverables

- Draft report: List of options for inclusion in a bilateral energy sector program
- A seminar to present the draft final report
- A final report incorporating all comments

TA team

- Team leader: Gary Staats: Energy policy specialist
- Legal & Regulatory specialist: Laura Brien
- Economist: Vijay Kannan
- Renewable Energy Specialist: Philip Doyle
- EE specialist: Shahab Qureshi
- Transport/Fuels specialist: To be determined (work from DC)
- Local policy specialist: Tilak Siyambalapitiya
- Local energy efficiency specialist: M.S.Jayalath

Nexant

Tentative Project schedule

- Inception report/presentation: Aug 18, 03
- Discussions with stakeholders: Aug 19 – 22, 03
- Mission briefing: Aug 22, 03
- Strategy framework: Aug 25, 03
- Mission briefing: Aug 26, 03
- Submission of draft report: Sep 12, 2003
- Review of draft report by the mission: Sep 15 – 19, 03
- Stakeholder seminar to present final draft: Sep 22, 03
- Submission of final report: Sep 26, 03

USAID Sri Lanka
Economic Growth/Energy Integration Strategy Development

Short-Term Support: Briefing

September 3, 2003

Nexant

Potential Areas Investigated

- Energy policy & regulatory sector
- Energy sector reforms
  - Electricity sector
  - Petroleum sector
- Renewable energy
- Energy efficiency
- Transport sector

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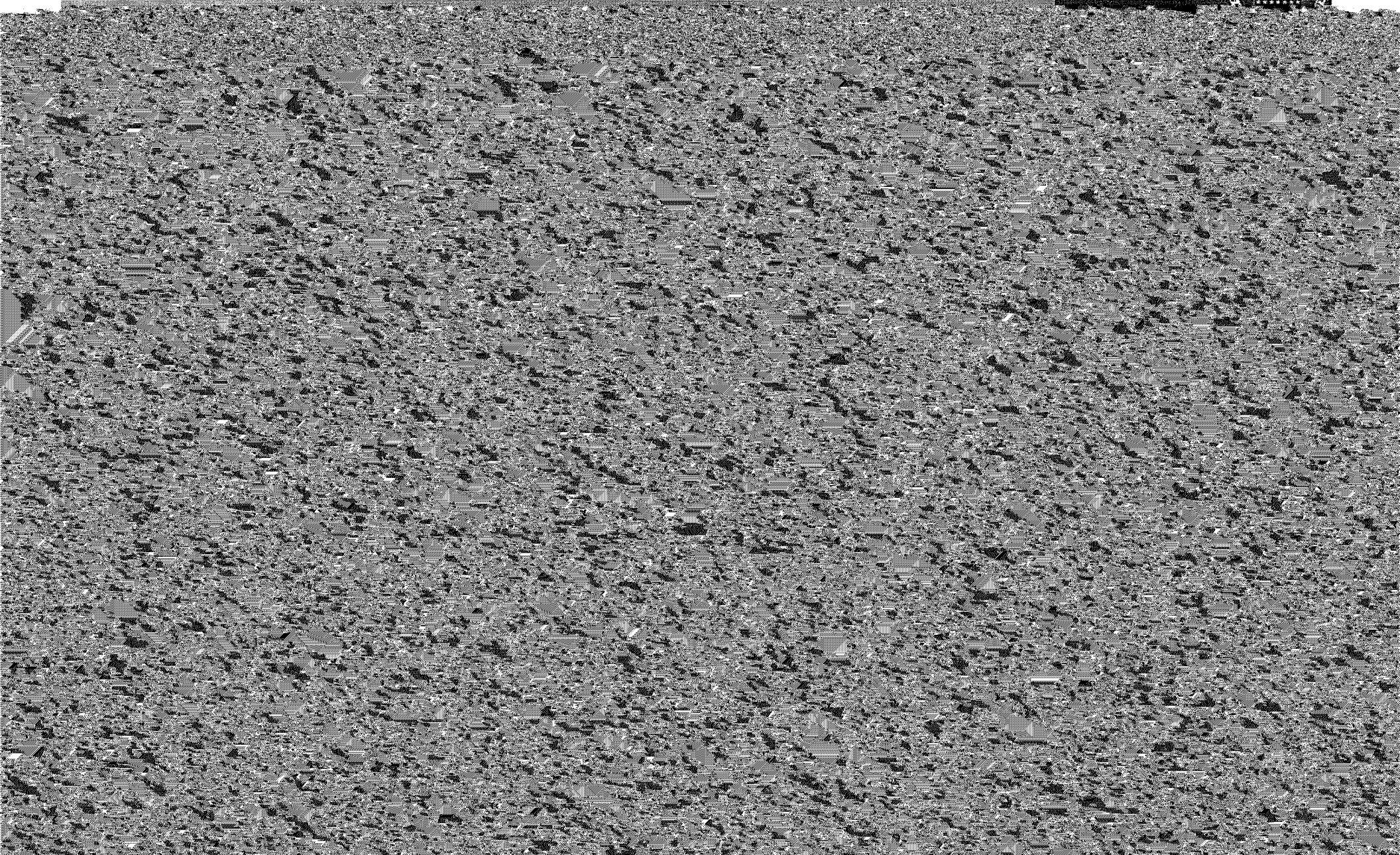
Stakeholders Consulted

- **Policy & regulatory:**
  - **Public Interests Program Unit**
  - **Energy Supply Committee**
  - **Asian Development Bank**
  - **Center for Energy Studies, University of Moratuwa**
  - **Ceylon Electricity Board**
  - **Lanka Electricity Company**
  - **Ministry of Power & Energy**
  - **Ceylon Petroleum Corporation**
  - *University of Peradeniya*

Stakeholders Consulted



Stakeholders Consulted

Renewable energy

- **World Bank**
- **Development Finance Corporation of Ceylon (DFCC)**
- **Energy Forum**
- **LTL Energy (Pvt) Ltd.**
- **Ceylon Electricity Board**
- ***SEEDS***
- *Solar Thermal Systems (Pvt) Ltd*
- *Tourist Board*
- *Small hydro Developer's Association*

Stakeholders Consulted

Energy Efficiency

- Ceylon Electricity Board
- LTL Energy (Pvt) Ltd
- USAID competitiveness Initiative
- Industrial Services Bureau (ISB)
- Sri Lanka Energy Managers' Association
- Ceylon Petroleum Corporation
- Energy Conservation Fund
- Federation of Chambers of Commerce & Industry
- Ceylon Chamber of Commerce
- *Kelani Valley Plantation*
- *Ceylon Wall tiles Ltd*
- *Hoteliers' Association*

Identified Options

- Policy and Regulatory
  - Short-Term
    1. Institutional support for energy policy and planning
    2. Training for staff of PUC on tariff operating procedures and principles
  - Medium-Term
    1. Training for staff of PUC on transmission and generation planning monitoring functions

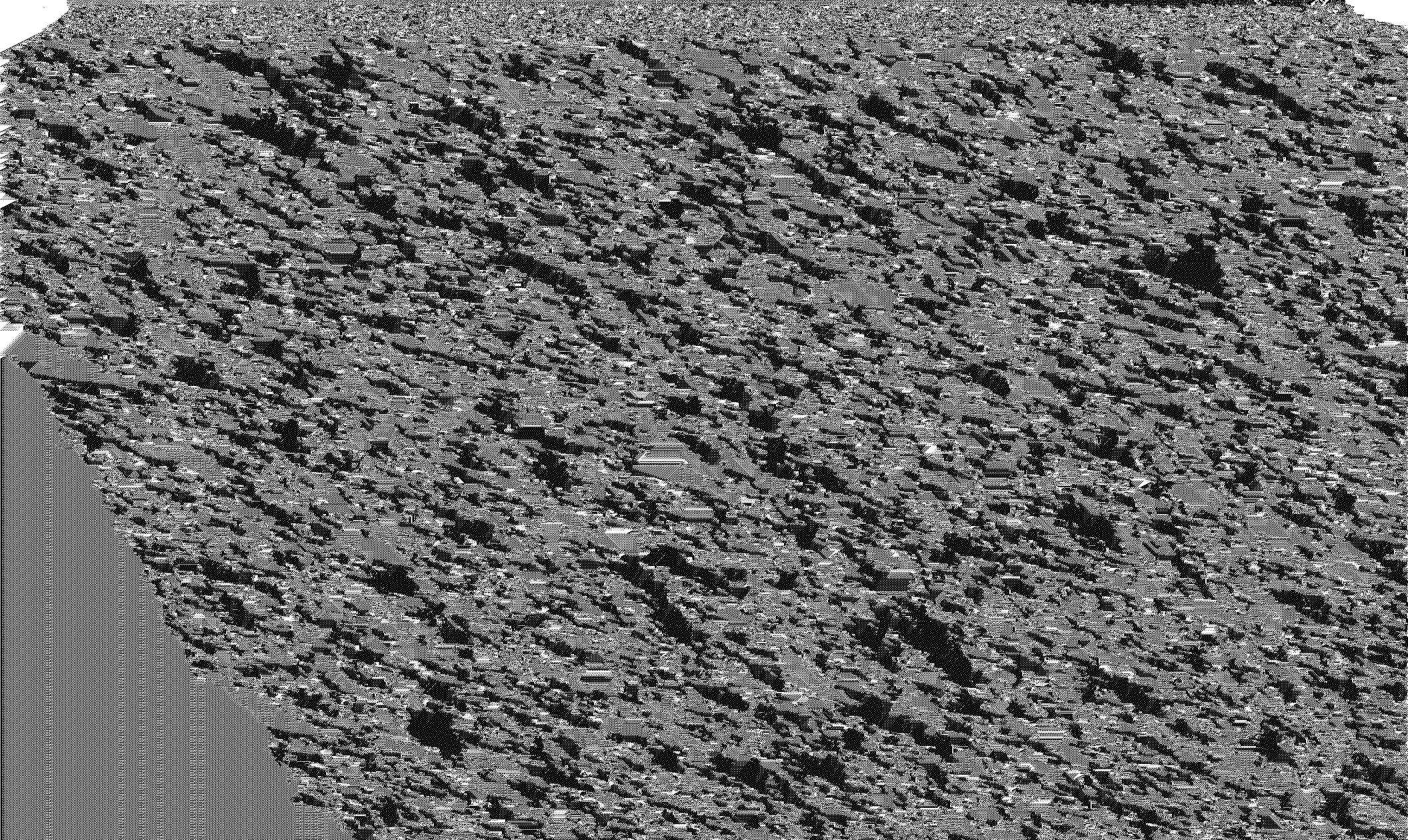
Identified Options

CEB UN-BUNDLING:

- **Short-Term**

1. **Training for new Distribution Companies (DistCo)**
   - *Training for DistCo management re. operation of customer focused companies, e.g., technical management and customer service functions*
   - *Training to meet new regulatory functions, including tariff filings*
   - *DistCo loss reduction / system upgrade*
2. **Training for Transmission Company (TransCo)**
   - *Training on the use of new dispatch model, to be purchased by ADB, and importance of transparency in operating procedures*
3. **Procurement Assistance - TransCo**
   - *Review of SCADA procurement specs - SCADA system to be procured using ADB funds*

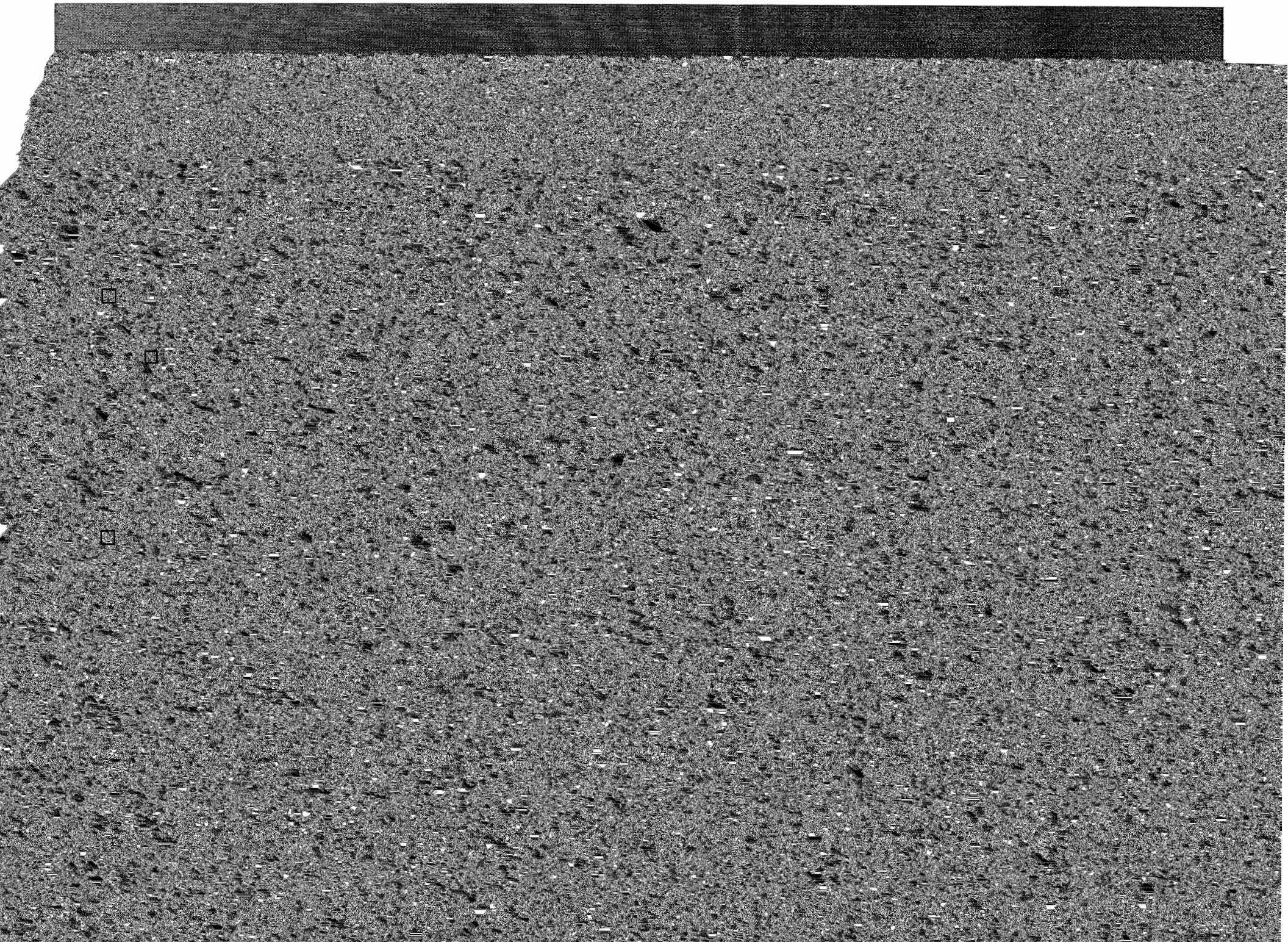
Identified Options



Identified Options

Renewable energy:

- **Short-term:**
  - Assistance with the legal and regulatory definition and treatment of off-grid systems in restructured environment
  - Financial support for ITDG training course on "Design of small wind energy systems"
  - Help institutional energy users (North/East: schools, hospitals, clinics..) implement small scale energy systems
- **Medium-term:**
  - Creation of renewable energy (Small business) development centers
  - Consultancy to compile all currently available data and development of a user friendly resource guide
  - Work with Ministry of Tourism to disseminate information on renewable energy applications in the resource and hotel sectors



Revised Project schedule

- Inception report/presentation: Aug 18, 03
- Mission briefing: Aug 22, 03
- Discussions with stakeholders: Aug 19 – Sep 4, 03
- Mission briefing: Sep 3, 03
- Submission of draft report: Sep 8, 03
- Review of draft report by the mission:
- Stakeholder seminar to present draft options: Sept 12, 03
- Submission of final report: Sept 19, 03