

**GLOBAL VILLAGE ENERGY PARTNERSHIP (GVEP)
SUPPORT TO SRI LANKA ON ACTION PLAN DEVELOPMENT**

Submitted to

**Office of Energy and Information Technology
Economic Growth, Agriculture and Trade Bureau
U.S. Agency for International Development (USAID)
Washington, D.C. 20523**

Submitted by

**CORE International, Inc.
5101 Wisconsin Avenue, N.W., Suite 305
Washington, D.C. 20016**

April 8, 2004

Table of Contents

- I. Background**
 - II. Sri Lanka GVEP Action Plan Development Status**
 - III. Rural Electrification (RE) and Rural Energy Services (RES) Assessment**
 - A. Rural Electrification (RE)**
 - B. Rural Petroleum Supply**
 - C. Ceylon Electricity Board Restructuring**
 - IV. Current Energy Policies and Institutions**
 - A. Government of Sri Lanka Energy Policy Initiatives**
 - B. Poverty Reduction Strategy Institutions**
 - C. Role of Provincial Councils**
- Annex I: Sri Lanka Working Group of Global Village Energy Partnership: Minutes of the Inaugural Meeting**
- Annex II: Excerpt of the Issue Paper "Implementing the Functions of Public Utility Commission of Sri Lanka under the Electricity Reforms"**

I. Background

Sri Lanka is one of the initial nations that joined Global Village Energy Partnership (GVEP) at the World Summit on Sustainable Development held in Johannesburg, South Africa in August 2003. To move forward with its participation in GVEP, the Government of Sri Lanka (GOSL) has designated the Ministry of Power and Energy as its lead ministry for coordinating the development of its initial GVEP Action Plan. CORE International, Inc. under USAID Task Order No. 3 is supporting GOSL in this endeavor building on its GVEP technical support experience in other developing countries.

Key objectives of the technical assistance to be provided by CORE to GOSL, as set forth in CORE's Terms of Reference, are to:

- Conduct a review and assessment of the current rural electrification (RE) and rural energy services (RES) setting and the role of various entities and institutions in adapting a multi-sector approach to rural development
- Initiate in-country technical consultation among all major RE/RES stakeholders at national level, and assist in the establishment of a multi-sector GVEP Working Group
- Assist Sri Lanka in the development of an initial Action Plan for enhancing its participation in the GVEP movement

In implementing the Action Plan technical assistance, CORE has followed the guidelines – *Guidelines for Development of Global Village Energy Partnership Action Plans* – prepared by the GVEP Technical Secretariat and issued in November 2003. These Guidelines offer a roadmap for identifying multi-sectoral requirements for energy services to be addressed under GVEP. This roadmap emphasizes the importance of linking a GVEP Action Plan to a country's Poverty Reduction Strategy Paper (PRSP) when these exist.

Sri Lanka has developed an extensive PRSP that has been endorsed by the multilateral development banks and the IMF. The PRSP is part of GOSL's overall economic reform and development program titled "*Regaining Sri Lanka*".

II. Sri Lanka GVEP Action Plan Development Status

CORE International, Inc. initiated GVEP Action Plan development support to the Government of Sri Lanka (GOSL) on October 30, 2003 through an initial strategy meeting with the then Secretary of the Ministry of Power and Energy, the Hon. Michael A. Warnakulasooriya. Subsequent to this meeting, a formal letter was transmitted to Secretary Warnakulasooriya by the USAID/Sri Lanka Mission Director, Dr. Carol

Becker, specifying the main components of GVEP Action Plan support to the Ministry and GOSL. The Sri Lanka Mission also appointed Mr. Upali Daranagama as its local facilitator for supporting CORE with its assistance to GOSL. In response to USAID's letter, the Ministry established a GVEP Secretariat headed by Mr. Ariyapala Silva.

Starting in November, CORE and its local partner institution, the Energy Forum, have worked with the Ministry of Power and Energy to (i) establish an Action Plan Working Group and (ii) organize an initial GVEP Multi-Stakeholder Workshop. This work has included (i) meetings with a wide range of stakeholders to build understanding of and support for GVEP participation (ii) identification of the structure and membership for a GVEP Working Group, and (iii) an analysis of the existing poverty reduction programs to determine potential linkages to be supported under an initial Sri Lanka GVEP Action Plan. In undertaking the above work CORE and the Energy Forum have received the full support of the USAID/Sri Lanka Mission. Both organizations are grateful for the extensive support provided to them by the Mission.

At midnight of February 7, the President of Sri Lanka, Chandrika Bandaranaike Kumaratunga, dissolved the Sri Lanka Parliament and set a nationwide, general election for 2 April. The President's calling of a snap national election is a consequence of a bitter power struggle between Sri Lanka's two main political coalitions, the United National Front (UNF) and the Freedom Alliance (formerly the Peoples Alliance (PA)). Under current political conditions it is not practical to conduct a meaningful National Multi-Stakeholder Workshop. However, with the support from USAID/Sri Lanka, it has been possible to form a GVEP Working Group and conduct an initial introductory technical consultation meeting on 21 March 2004.

However, because of the national election and holidays, the Working Group is not scheduled to reconvene until May 10, 2004. Holding of the second Working Group meeting in May should allow for the formation of an effective national Government following the election and provide time to begin to clarify any changes in the Government's economic development priorities. Clarification of the latter is deemed particularly important for GVEP Action Plan development because it appears that there are significant differences of opinion on development policies between the two main political coalitions. The role of the private sector is apparently particularly contentious issue between the two coalitions.

On March 22, 2004 an Inaugural Meeting of the Sri Lanka Working Group of Global Village Energy Partnership was held at the Ministry of Power and Energy Auditorium (please see meeting minutes in Annex I). A decision was made to circulate CORE's Interim Report in order to receive comments from the Working Group members by April 20, 2004. It was also suggested that CORE and Energy Forum analyze the data and suggestions on further actions. The next Working Group meeting will be held on in May 2004, where a final decision can be made.

This Interim Report documents the analysis work that has been completed by CORE and the Energy Forum to date. This work was initially directed at preparing for the National Multi-Stakeholder Workshop. However, by documenting it now it can be used by the GVEP Working Group to prepare for its next meeting in May, 2004. It is hoped that the National Multi-Stakeholder Workshop can be conducted shortly after this meeting to allow the Working Group to fully incorporate national-level poverty inputs into the GVEP Action Plan development process from the beginning of its work.

III. Rural Electrification (RE) and Rural Energy Services (RES) Assessment

According to the World Bank in its latest *Country Assistance Strategy 2003 – 2006*, "over 90 percent of Sri Lanka's identified poor live in rural areas of the South and on tea/rubber estates in the Central region where the depth and severity of poverty are almost twice as high as in urban areas". Because of this situation, the initial energy services assessment has been concentrated on energy supply to rural areas. However, it is recognized that GOSL may decide to include in its GVEP Action Plan a component that links to the GOSL's plans for urban poverty reduction as presented in its PRSP.

The Sri Lanka Energy Conservation Fund (ECF) issues periodic national energy statistics for Sri Lanka based on data from multiple sources within the country. Exhibit 1 presents the 2001 ECF Energy Flow Diagram, the latest available.

**Exhibit 1
Sri Lanka Energy
Flow Diagram
Thousand TOE**

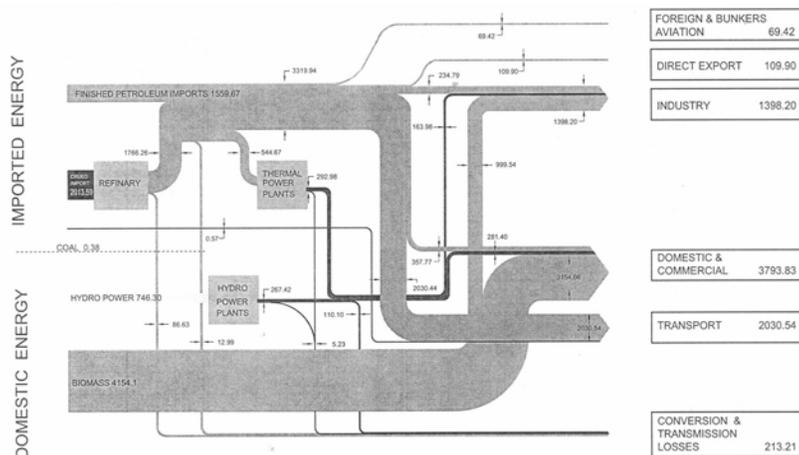


Exhibit 1 clearly indicates the heavy dependence of Sri Lanka on biomass (50 percent of Primary Energy Supply) and petroleum (41 percent of Primary Energy Supply) as primary energy sources. The share of petroleum in the energy balance will grow significantly in the future because Sri Lanka's remaining undeveloped hydropower resources are limited, annual electricity demand is growing at around 7 percent, and there are growing demands for transport fuels. With the exceptions of biomass and hydropower, Sri Lanka is poorly endowed with primary energy resources and faces increasing imports of commercial energy to realize economic growth. However, there

are some indications of potential off-shore oil and/or gas reserves and wind resources (essentially undeveloped to date) are reportedly significant.

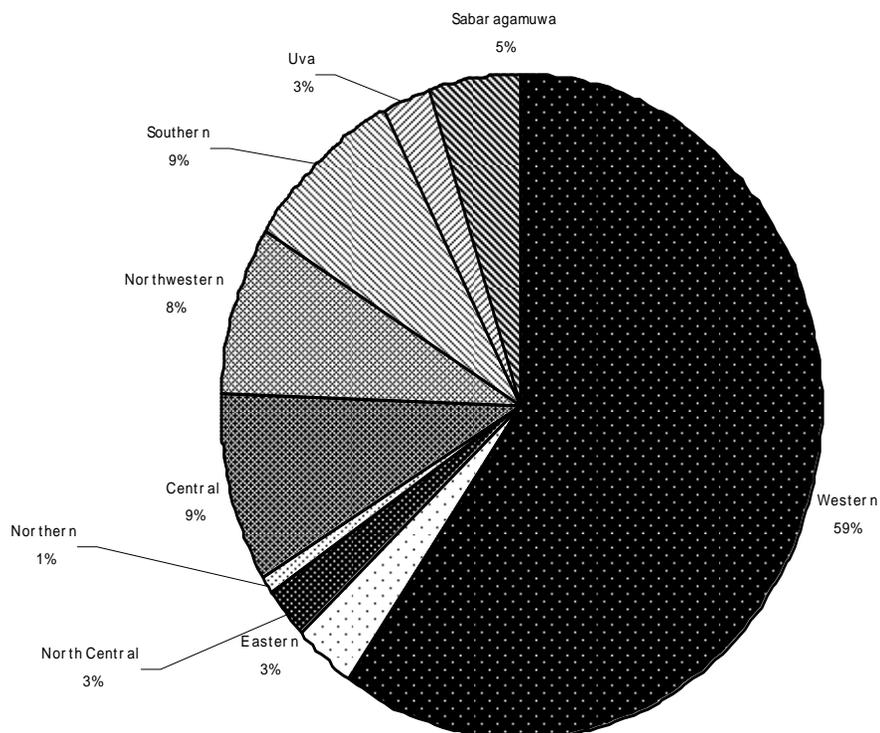
A major acknowledged deficiency in the energy data available for Sri Lanka is the inability to differentiate between rural and urban energy consumption. In Exhibit 1, rural energy consumption is aggregated with the Domestic & Commercial and Transport categories – the two main energy end consumption categories. Also, it is currently not possible to accurately estimate energy consumption within the agriculture sector. This could present a problem in GVEP Action Plan development because of the concentration of poverty among the country's farmers.

The lack of any real, agriculture sector energy consumption data is a situation not confined to Sri Lanka. The lack of good rural energy data is common throughout South Asia and is an indicator of the level of neglect that has traditionally been accorded to commercial energy supply as an important contributor to rural poverty reduction. An additional complication in Sri Lanka to understanding the dimensions of rural energy supply is the lack of data for the North East region. This is the direct consequence of 25 years of insurrection.

The lack of real data for rural energy consumption complicates the targeting of initiatives for a development program like that typified by GVEP. This includes the establishment of realistic regional priorities. It will also complicate eventual program performance monitoring and evaluation. To initiate GVEP Action Plan development, it will be necessary to attempt develop improved estimates of rural energy consumption patterns throughout Sri Lanka. It will likely also be necessary to understand the relationship between rural incomes and commercial energy consumption.

Exhibit 2 presents the geographic disaggregation of estimated electricity consumption for 2000. However, the data does not differentiate between electricity end uses.

**Exhibit 2
Estimated
Electricity
Consumption by
Province 2000**



The estimates presented in Exhibit 2 clearly show that rural commercial energy consumption is at the very low levels associated with large-scale subsistence and/or low-productivity agriculture. The indicated low levels of rural commercial energy use imply that commercial energy availability is likely a limiting factor, but not the only limiting factor, for increased agriculture productivity and improved rural living standards. Improvement of agricultural productivity is an important component of the Sri Lanka PRSP. As a result, in Action Plan development it will be important to gain a much better appreciation of how limiting a factor commercial energy supply, including energy cost, is to agricultural productivity and the associated price elasticities.

Sri Lanka's extensive dependence on biomass as an end-use energy source implies that the rural population may suffer from the indoor health effects that have been documented in other South Asia countries. The prevailing climate and rural home construction practices in Sri Lanka may, however, mitigate these effects to some degree. Nearly 76 percent of the population of Sri Lanka still depends on firewood and other forms of biomass for their household cooking. The balance, 24 percent, is consumed by industry, including the plantation industries. Supply of biomass mainly comes from crop residues and home gardens.

In the work completed to date, no estimates of the magnitude of rural indoor biomass burning health effects have been found. This area is being further investigated and may require further assessment as part of Action Plan development.

The main proposed solution to the biomass indoor health problem is increased use of commercial petroleum fuels, particularly LPG. In Sri Lanka, LPG supply has been privatized and LPG is in common use. However, the use is indicated to be sparse in rural areas because of cost. With exception of the North East, the rural road network does not appear to be a limiting factor for delivery of commercial petroleum fuels.

A. Rural Electrification (RE)

Sri Lanka has in place a significant electricity grid that reaches into most of the country's rural areas with the exception of the North East. The lack of North East electricity service is a direct consequence of the insurrection and the associated widespread infrastructure destruction.

Currently, the Ceylon Electricity Board (CEB) is the main rural electricity supplier to and operator-owner of the rural electricity grid. CEB is a vertically integrated, parastatal, electric power utility. Over the past 10-years, CEB has faced continuing cash-flow problems due to the GOSL's frequent borrowing needs and inability to increase retail electricity tariffs to cost recovery levels. Despite its cash-flow and other problems associated with being a parastatal utility, CEB has managed to provide quite reasonable rural electricity service. Compared with other parts of South Asia, the existing rural electricity distribution system is of modern design and is well maintained and operated. Distribution losses are indicated to be at acceptable levels for a rural

supply system in South Asia. The main deficiencies of the rural electricity distribution grid from an economic development standpoint are its coverage and number of service connections.

Much of the CEB's electricity plant has been built over the past 25-years with grants and concessional loans from the multilateral development banks and bilateral donors, particularly Japan. This is major reason why Sri Lanka possesses a quite modern rural electricity grid. Exhibit 3 presents the history of Sri Lanka's major rural electrification projects and the estimated impact on electricity service availability up to the end of the 1990's. The total investment associated with RE 1 through RE 3 is on the order of \$1 billion. Between 1980 and 1998, the total number of village electrification schemes in Sri Lanka increased from 2,115 to 14,690.

To be in a position to attract the needed investment in generation, transmission, and distribution over the next five years and significantly expand rural electrification, GOSL has articulated a two pronged strategy:

- Creation of investor confidence by restructuring the electricity industry along commercial lines and establishing appropriate regulation critical to secure the scale of investments required
- Establishment of a coherent and credible rural electrification and renewable energy policy to promote sustainable market-based provision of rural energy services and reduce the need for larger grid investments.

Exhibit 3 Sri Lanka Rural Electrification Projects

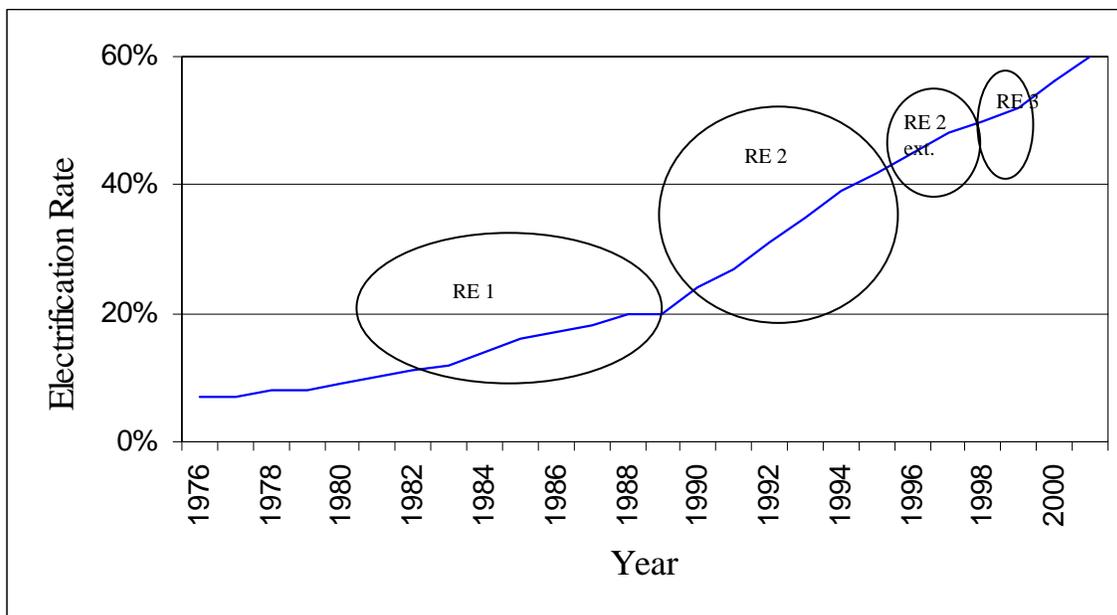
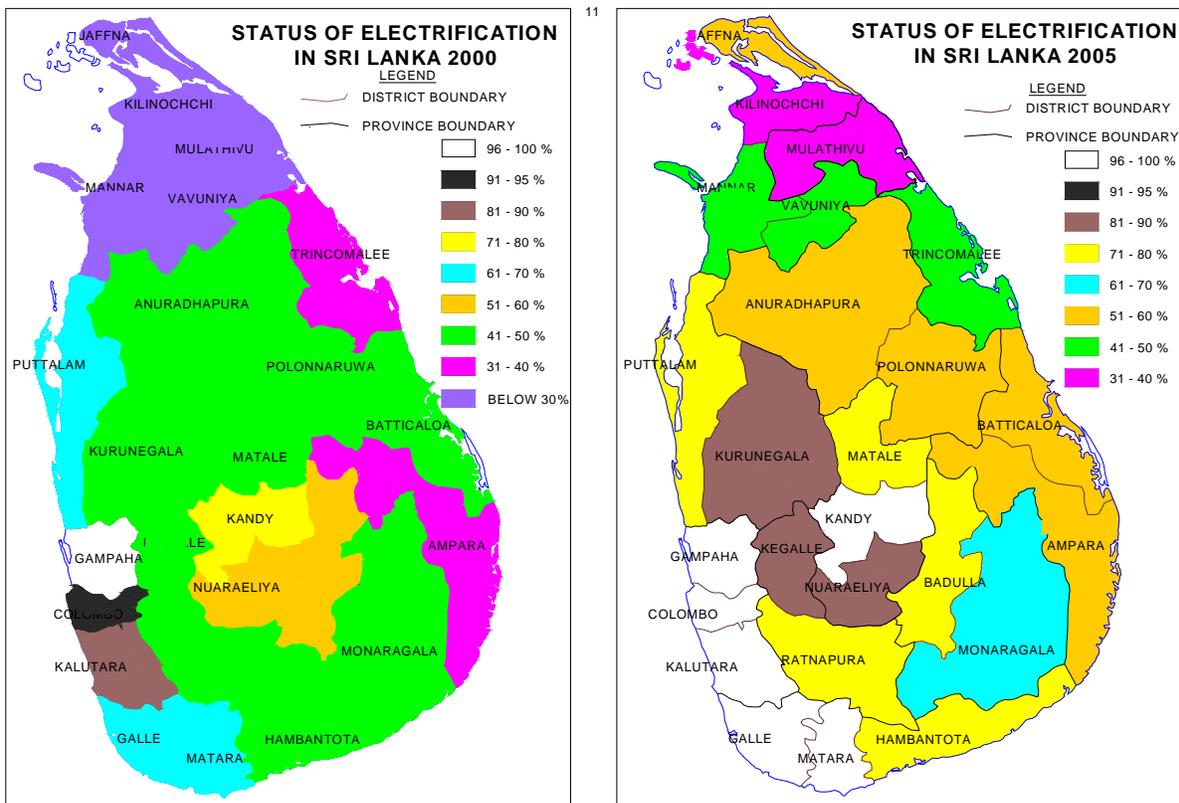


Exhibit 4 presents the estimated level of rural electricity service by Districts as of 2000 and, as such, reflects the Exhibit 3 RE programs. It clearly shows that the availability of electricity supply beyond the major population centers, the South West and the Kandy region, remains an economic development issue. The areas in green and magenta and the North East where the estimated electricity supply is below 50 percent are the areas with the greatest potential for agriculture productivity improvement.

**Exhibit 4
Sri Lanka Existing and Planned National Electricity Service**



At the end of the 1990's, the insurrection in the North East became more protracted. A direct consequence was a sharp decline in the Sri Lankan economy and significantly increased GOSL borrowing. These developments and the Government's apparent inability to end the insurrection resulted in a significant withdrawal of Sri Lanka's traditional international donors, particularly ADB and the World Bank. As a result, starting in the late 1990's extension of the rural electricity distribution grid came to a virtual standstill and, likely, received less than optimum maintenance due to a lack of funds. In 2001, this situation reversed. Following the 2001 national election, the UNF gained a slim majority in the Parliament and negotiated a Memorandum of Understanding (MOU) with the North East insurgency movement, the LTTE. The

signing of the MOU in February 2002 resulted in a cease-fire between the Government and the LTTE that has held to date. The UNF Government has also advocated support for private sector lead growth in Sri Lanka and changing the role of the Government "from being a leading provider of goods and services to being a facilitator of private sector economic activity". These policy actions were sufficient for the international donors to return to Sri Lanka in a major way.

Rural electrification has been an area in which international donor funding has moved forward rapidly. Exhibit 5 presents the RE program currently being implemented by the CEB on a fast-track basis. By 2005, GOSL is planning to have electrified approximately 80 percent of Sri Lanka's villages through implementing some 600 RE schemes.

**Exhibit 5
Current CEB Rural Electrification Construction Program**

Rural Electrification Project	Substations	MV lines km	LV lines km	Total Project Cost (Rs)	New customers	Provinces No. of schemes
REP 7: Chinese Fund	485	728	2425	2700M	70,000	Central - 65, North western- 160, Southern - 130, Sabaragamuwa -130
REP 4: SIDA	400	600	2170	2360M	65,000	Central - 70 North Western - 60 North Central - 70 Uva - 70 Southern - 70 Sabaragamuwa – 60
REP 6: ADB 6	600	1200	3000	5200M	150,000	Western -18 Central - 57 North Western - 100 North Central - 84 Uva - 68 Southern - 100 Sabaragamuwa – 125

Detailed plans for each of the new RE projects are available from CEB. This will allow the GVEP Working Group to understand the actual level of new/expanded rural electricity service associated with these projects when they are completed.

The second map of Exhibit 4 provides CEB's general estimates of the electricity service improvement that will result from the current RE program by District. As indicated, the potential for the current RE program to facilitate rural economic development could be very significant.

A weakness from the viewpoint of rural economic development, of the GOSL's current RE program and its predecessor RE programs, is the lack of any supporting development program to promote the uses (consumption) of electricity for reducing rural poverty through enhancing rural poor productivity, particularly agriculture productivity. That is, the CEB RE programs are/have been "wires" provision programs that anticipate that rural consumers of their own initiatives or with assistance from other institutions will use electricity in ways that improve their income earning abilities and not just to improve their living conditions. In many cases, rural consumers are able to respond to the new provision of electricity in positive ways. In other cases, the existence of supply is not in itself sufficient to raise the productivity and prosperity of rural consumers, particularly among the poorest segments of the rural population. Other factors limit the ability of the rural poor to avail themselves of the potential productivity benefits of electricity supply. In Sri Lanka, these other limiting factors can include the unavailability of capital to procure productivity raising equipment/appliances, such as irrigation pumps and power tools. Lack of knowledge and training on the applications of electricity can also be limiting factors in productive rural electricity use.

Related to the issue of electricity service not in itself necessarily being sufficient for the realization of rural poverty reduction will likely be the issue of establishing rural retail electricity tariffs that will promote and sustain productive uses of electricity for new consumers, particularly poor consumers. The CEB, as a matter of GOSL policy, has in the past always tied its RE programs to attempting to recover the full cost of rural (and urban) electricity supply through the application of cost-of-service reflective retail tariffs. In regions where this could not be achieved, the CEB has, in the past, routinely refused to provide service. In many cases, this means that poor rural consumers living under low-voltage distribution lines are not able to receive service, even life-line type of service.

The current, fast-track RE program is expanding the rural electricity grid to many villagers and farmers that can not afford to pay rural cost-of-service reflective tariffs if they are to consume the amounts of electricity required to improve their economic productivity and increase income earning power. This will likely apply for at least a significant period after electricity is initially made available. Therefore, if the rural poor are to avail themselves of electricity as a means of increasing their productivity and prosperity, tariff subsidies will likely be required. As yet, no attention appears to have been given to neither this rural development issue nor how it can be best addressed under a pro-poor PRS. It is also an issue that the international donor community is commonly reticent to address. Part of this reticence stems from the problem of ever reducing subsidies to rural consumers once they have been granted.

For Sri Lanka to effectively use its expanding rural electricity grid as a driver for a pro-poor PRS more than the provision of an efficient electricity supply network will be required. Building rural capacity to apply electricity productively and electricity pricing to promote its productive uses will be two important issues. As discussed below, in Sri

Lanka retail electricity prices are expected to increase significantly in real terms in the future. This will make getting the rural electricity pricing issue "right" a very challenging task. These types of poverty reduction issues are precisely the types of development problems that GVEP is designed to address.

As indicated above, by 2005 GOSL plans to electrify approximately 80 percent of the country's households. Currently and for the foreseeable future it appears that the remaining 20 percent will have to do without grid-connected electricity or without electricity at all. The 20 percent of the population without potential grid-connected electricity supply are in remote, sparsely populated areas that contain some of the poorest segments of the population. Because of cost recovery considerations, the GOSL reportedly has no plans for additional rural electricity grid extension after the completion of the current RE program. Unless this plan changes, the only source of electricity for the "20 percent" of the consumers will be from off-grid supply systems, either individual household systems or isolated micro grids. Fortunately, the potential for off-grid rural electricity supply is good in many parts of Sri Lanka. At least seven of Sri Lanka's provinces have appreciable micro-and mini-hydropower potential. There is also limited potential for small hydropower. And, solar insolation is appreciable throughout much of the island.

Sri Lanka is one of the most progressive countries in South Asia with regard to off-grid electricity supply. This is in part a consequence of the situation existing in the late 1990's when the CEB's RE programs stalled due to reductions in international donor funding. However, the pioneering of off-grid electricity supply in rural Sri Lanka by NGO's and a range of international donors goes back to at least the early 1990's. The situation at the end of the 1990's gave NGO's and Provincial Governments additional incentives to implement off-grid systems as a way to sustain rural electrification. One consequence of this need was the initiation of the World Bank funded Energy Services Delivery Project (ESDP) in 1999. This project has demonstrated the benefits to rural households and villages of off-grid electricity supply systems - such as solar home systems and community-level independent grids. Frequently, this approach has been demonstrated to be better suited to providing electricity services to remote, rural communities in a more timely and economic manner than grid expansion. The likelihood of attaining Sri Lanka's vision of 80 percent electrification by 2005 will be increased by a rural electrification strategy that uses both main grid and off-grid systems.

The highly effective, \$55.3 million ESDP consisted of three components:

- ESD Credit Component
- Pilot Wind Farm with CEB
- Capacity building to support CEB's Pre-electrification Unit and its Demand Side Management Unit.

The ESDP concentrated on creating and sustaining the conditions for the local private sector to implement micro-, mini-, and small hydropower schemes and sell household Solar Photovoltaic (SPV) systems. Other than a quality assurance and quality control activity, it did not deal with technology issues; these were left to consumers and the private sector equipment and services providers. A major feature of the ESD Credit Component (\$49 million) was the disbursement of financing for village micro-hydropower schemes and SPV systems through participating credit institutions (PCIs). PCIs were the actual lenders for financing of village micro-hydropower and household SPV schemes. In addition to financing, the ESDP included a grant component to support off-grid project development and technical assistance for project feasibility studies.

For areas where micro-hydropower is not feasible, Sri Lanka has been aggressively implementing household SPV systems; again with the NGO and ESDP support. Prior to the implementation of the ESDP, about 5,000 household SPV systems had been installed. This resulted in a nascent local SPV supply industry. Under the household SPV part of the ESDP, an additional 40,000 systems were installed by 2003.

In 2003, because of the success of ESDP, the World Bank initiated a follow-on project, the Renewable Energy for Rural Economic Development Project (RERED) Project. The RERED Project's objectives are to:

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

RERED emphasizes utilization of renewable energy resources, based on:

- (i) Least-cost principles
- (ii) Successful results from the ESDP
- (iii) Mechanisms to enable access to poor households
- (iv) Promotion of productive uses of electricity
- (v) Sri Lanka's desire to preserve its unique ecology and bio-diversity.

As part of this emphasis, the Project plans to formulate and implement the mechanisms that will enable Sri Lanka to sell, for the first time, its 'carbon emission reduction credits' in the global market that is now emerging under the auspices of the Clean Development Mechanism.

The experience gained from the ESDP and the advances that the RERED Project will demonstrate will be of significant value to formulation of the GVEP Action Plan for supporting pro-poor rural economic development. Some of the rural poor issues that

will need to be considered where quantified in a survey conducted by the Energy Forum in 2002 - 2003. This survey found that:

- Electricity is a principal requirement at the village level. Other main requirements at the village level are water, a stable market for agricultural products, and industries to create more employment
- The main requirements at the household level are house construction/repair, electricity, education, and employment. When it comes to electricity, having electricity for domestic lighting during 7.00 pm - 10.00 pm and for viewing a TV is a basic need
- Richer people with a decentralized energy source are not satisfied with the available energy supply
- Grid-connected higher income groups consume more electricity, than off-grid higher income groups
- Even though the survey showed that electricity was a priority, several community leaders felt that malnutrition was a more important problem
- The income generation opportunities in the electrified villages are higher than in un-electrified villages, and include opportunities in welding, carpentry, vehicle repair, rice milling, and cereal grinding
- People do not have the financial capital to invest in industrial activities even if electricity is available. It is also very difficult to get bank loans. Technical training is unavailable which influences income-generating potential regardless of whether a village is electrified or not
- Value-addition for agricultural products is a potential economic growth sector.

The recent success in the off-grid sector is mainly due the presence and certain to deviations from the original ESDP implementation plan. Those deviations ensured the participation of civil society and public-sector organizations in this private sector-driven project. Major deviations from the original plan include: SEEDS qualifying as a Participating Credit Institution (Civil Society Involvement), Contributions from Provincial Councils (Public Sector Involvement), NGO activists qualifying as Village Hydro Scheme developers (Civil Society Involvement), and Establishment of Federation of Electricity Consumer Societies (Civil Society Involvement).

A survey conducted by the micro-financing institution SEEDS revealed that the Loan Recovery rate of micro-financing institutions is 85 percent. Reasons given for late repayments are:

Technical problems	- 26.4%
Crop failure	- 23.6%
Recovery officer not visiting on agreed date	- 27.8%
Personal problems	- 12.5%
Current economic difficulties	- 9.7%

According to the finding of the survey, satisfaction rate of after sales services is 60 percent. Reasons given for dissatisfactions are:

Spent long time for technical repairs	- 41.8%
No counseling service	- 13.9%
Not giving of permanent solution for technical problems	- 44.2%

In Sri Lanka, off-grid energy services have been largely private-sector driven. However, the capacity of the private sector is not sufficient to cater to the needs of the entire off-grid community. Development of partnerships to include public institutions and civil society organizations in the process will be needed to enhance the capacity to cater to a wider target group. This is the main reason for the off-grid energy sector's great leap forward during recent years.

The strengths and contributions of each sector are as follows:

- **Private sector:** Providing technology, energy services (for a fee) and after sale services for a fee (Service Companies)
- **Public institutions:** Developing a master plan incorporating grid extension and off-grid energy technology, in linking potential end-users with civil society organizations and the private sector, in establishing one-stop-shops for clearances, and in monitoring after sale services
- **Civil Society Organizations:** Providing micro-financing, in mobilizing the community, in organizing end-users, in conducting R&D, and in monitoring after sale services.

Off-grid energy technologies such as wind, biogas, and dendro power (biomass-based electricity generation) have improved rapidly in Sri Lanka, even without the existence of funding mechanisms from multilateral agencies to facilitate the developmental process. Exhibit 6 summarizes these technologies in the context of Sri Lanka.

Exhibit 6
Off-grid Energy Technologies in Sri Lanka

Technology	Nature of the Technology	Energy Supply	Number of units installed	Costs per installed capacity 1kW (In US \$)	Potential Market
Solar Home System	Solar PV -Proven, Domestic level units. There are over 9 firms importing PV panels and components.	20-60W per household	37,000 households	10,000	About 200,000 rural households have the capability to purchase SHS.
Village hydro	Community owned mini-grids; Locally manufactured turbines; Head between 20-50m. There are about 15 manufacturers and 30 developers	Capacity 3kW-50kW. Number of households per scheme: 10-150. Power available per household 100W- 250W.	Total number of schemes - 150. Around 5,000 households electrified.	2,000	About 1000 villages covering 30,000 households.
Wind Home Systems	Domestic level units. Currently at the Pilot stage. 1- trained turbine manufacturer	Capacity of a home system is between 200-250W.	15 pilot wind turbines installed.	3,000	Limited potential sites to operate thought the year.
Biomass-Dendro power	Gasification Imported from India Community owned mini-grids, pilot stage	Capacity 3kW-35kW	2 pilot plants. 3kW for coconut estate & 35kW community project.	3,000	Has the potential to provide electricity to all off-grid villages in Sri Lanka.
Bio-gas	Domestic level Chinese (linked with cattle sheds) and Dry batch (linked with Paddy farming-straw) type digestion. Generation of bio-gas is proven. Electricity generation with mini-grids -is currently being pilot testing.	One Ton and 2 Ton systems are widely used for bio-gas generation. Electricity generation-450W and 2.5kW (Pilot projects)	Bio-gas generation -1200 units. Electricity generation - 2 units	3,000	Potential not estimated yet.

The problems of providing electricity to Sri Lanka's rural population may not be confined to just the distribution infrastructure and determining how to most effectively harness the productivity enhancement potential of adequate rural electricity supply. The supply of electricity may also be an issued that will need to be considered as part of Action Plan development. For over a decade, the CEB has not been able to maintain adequate electricity reserve margins that meet Sri Lanka's growing demand for electricity. Scheduled, rolling electricity cuts were applied in years 1969, 1973, 1980, 1981, 1983, 1984, 1987, 1992, 1996, 1999, and 2002. Electricity rationing may again be required in 2004 given current reservoir water levels.

CEB's inability to maintain adequate electricity reserve levels is entirely attributable to limitations on the ability to finance new generation capacity and not on the planning abilities of the CEB. CEB has always demonstrated excellent expertise in national load forecasting and in least-cost generation planning.

CEB currently uses WASP 3+ planning software for least-cost electricity generation expansion planning. However, WASP3+ (part of the ELECTRIC module of Energy and Power Evaluation Programme (ENPEP)) is not a tool for quantifying and costing environmental impacts for the purposes of least-cost generation planning. Therefore, CEB applies WASP 3+ in combination with the IMPACTS module of ENPEP to provide the following:

- (i) After preparing a generation expansion plan based on the least internal costs, it selects the cheapest abatement technology (out of its database) that could meet respective ambient environment standards and hence estimates system-wide costs for complying with atmospheric emissions regulations
- (ii) Calculates both uncontrolled and controlled emissions of the generation expansion plan based on fuel consumption projected by WASP and standard emission factors available from their database.

As indicated above, Sri Lanka's available hydroelectric resources have been nearly fully developed. And, as a result, it is becoming increasingly dependent on imported fossil fuels for electricity generation. Exhibit 7 presents the current hydroelectric potential of Sri Lanka. Sri Lanka's hydroelectric resource, of course, depends on both geography and rainfall. In the last decade, Sri Lanka has suffered from several droughts that have impacted the availability of generating capacity. Whether the recent pattern of droughts represents a permanent shift in Sri Lanka's long-term weather pattern or is an aberration remains to be determined.

Exhibit 7
Sri Lanka Hydroelectric Potential

Category	Estimated Capacity – MW
Total Hydroelectric Potential	2,000
Developed	1,135
Under Construction	70
Balance	795

Exhibit 8 presents Sri Lanka's historical generation mix. It clearly shows the growing dependence on fossil fuels.

**Exhibit 8
Sri Lanka Electricity Generation by Primary Source**

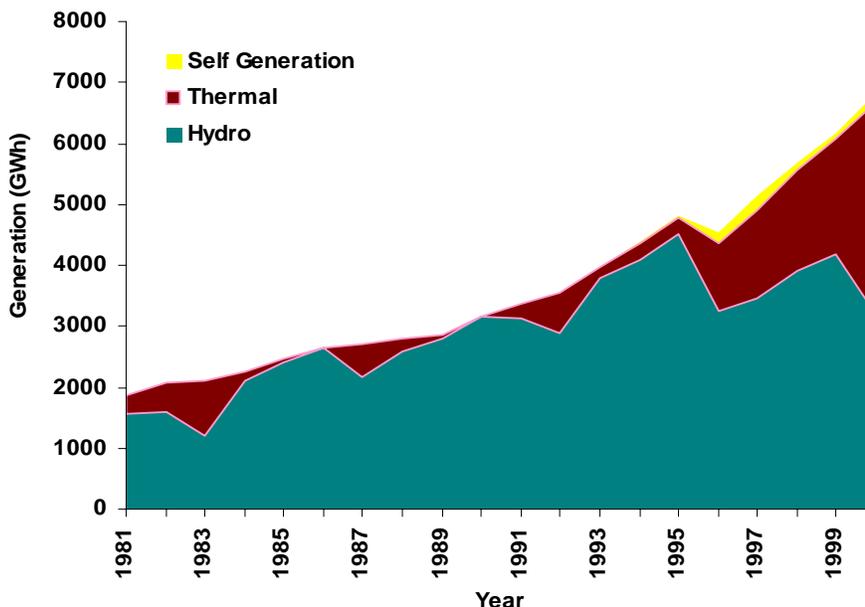


Exhibit 9 presents the pattern of recent CEB generation expansion.

**Exhibit 9
Recent CEB Generation Expansion**

Year	Hydro Additions (MW)	Thermal Additions (MW)
2002	-	109 Gas Turbine of AES CCY 20 Diesel at Matara
2003	-	61 Steam turbine of JBIC CCY 54 Steam Turbine of AES CCY 20 Diesel at Horana 22 Pielstick Diesel at Sapugaskanda
2004	70 Kukule	-
2005	-	300 CCY at Kerawalapitiya
2006	-	-

Exhibit 9 demonstrates that in the near future Sri Lanka will witness oil based thermal additions leading to higher electricity prices. This is not the least-cost option that CEB initially proposed and this could have a negative impact on the poor consumers, rural and urban. Current CEB fuel costs are as follows:

➤ Fuel Cost of CEB owned plants (May 2002)

Sapugaskanda (A)	- 3.74 Rs./kWh
Sapugaskanda (B)	- 3.43 Rs./kWh
Kelanitissa GTs	- 7.41 Rs./kWh
Kelanitissa GT 7	- 5.79 Rs./kWh
Comb. Cycle GT	- 5.49 Rs./kWh

Average Thermal - 4.79 Rs./kWh

➤ IPPs (Total Cost per kWh)

Lakdhanavi	-	Rs. 7.16
ASIA Power	-	Rs. 7.80
Barge	-	Rs. 7.54
ACE Power (Matara)	-	Rs. 6.10

Financing of rural electricity supply is frequently difficult because of the associated poverty levels. Section 3.3 below, dealing with CEB Restructuring, presents the current approach to regulating a restructured Sri Lanka electric power sector. The Public Utilities Commission Act No.35 of 2002 establishes a regulator for the "new" electric power sector and has specific provisions related to the future financing of rural electricity supply. An analysis of these provisions presented in the Issue Paper "*Implementing the Functions of PUCSL under the Electricity Reforms*" is presented in Annex A.

B. Rural Petroleum Supply

There are no known natural reserves of petroleum in Sri Lanka. But as indicated above, there are indications of potential off-shore reserves. Currently, the bulk of the country's petroleum product requirement is imported as crude oil, which is then processed at a refinery located at Sapugaskanda with an installed refining capacity of 51,000 barrels/stream day. The refinery and, with the exception of LPG, the petroleum products distribution network is owned and operated by the Ceylon Petroleum Corporation (CPC). CPC is a vertically integrated parastatal petroleum company. CPC acquires part of its crude oil requirement through contacts with government oil companies of Iran, Saudi Arabia, Egypt, UAE and Malaysia, while the balance is brought in the spot market. The current Sri Lanka economic reform plan provides for the privatization of CPC.

C. Ceylon Electricity Board (CEB) Restructuring

The ADB and the World Bank with support from the international bilateral donors have been attempting to reform and restructure Sri Lanka's electric power sector for over a decade. The intent of this effort has always been the eventual privatisation of at least some components of an unbundled CEB. And, the GOSL *Regaining Sri Lanka* economic reform plan specifically provides for such privatisation. The timing and actual form of privatisation, however, remains to be determined.

The Ministry of Power and Energy published power Sector Policy Directions in 1997/1998. These stated that the electric power sector is being restructured to accommodate competition and facilitate private investments. And, that the roles of Government as owner, operator and regulator needed to be clearly defined and separated. The 'Policy Statement on Economic and Social Objectives of the Power Sector Restructuring' published by GOSL states as that:

"The rationale behind the reform objectives in relation to electricity is that, given proper institutional frameworks, pricing signals and regulatory regimes, markets can efficiently deliver on the economic development objectives, including adequate, high quality and reliable services."

Much of the international technical assistance associated with Sri Lanka electric power sector reform and restructuring has been concentrated on the best way to unbundle CEB and the establishment of a regulator and clear and transparent sector regulation. To date, neither an analysis of the likely impacts of CEB unbundling nor the electric power sector privatisation (included in the GOSL's PRSP objectives) have been located. Neither have any estimates of the likely effects of the restructuring on electricity cost-of-service been obtained to date. The impacts of electric power sector restructuring could be substantial and positive and it is believed important to have reasonable estimates for these as part of the GVEP Action Plan development. Further analysis by the Working Group in this area is needed.

For a number of reasons, mostly political, the CEB is currently faced with a number of weaknesses:

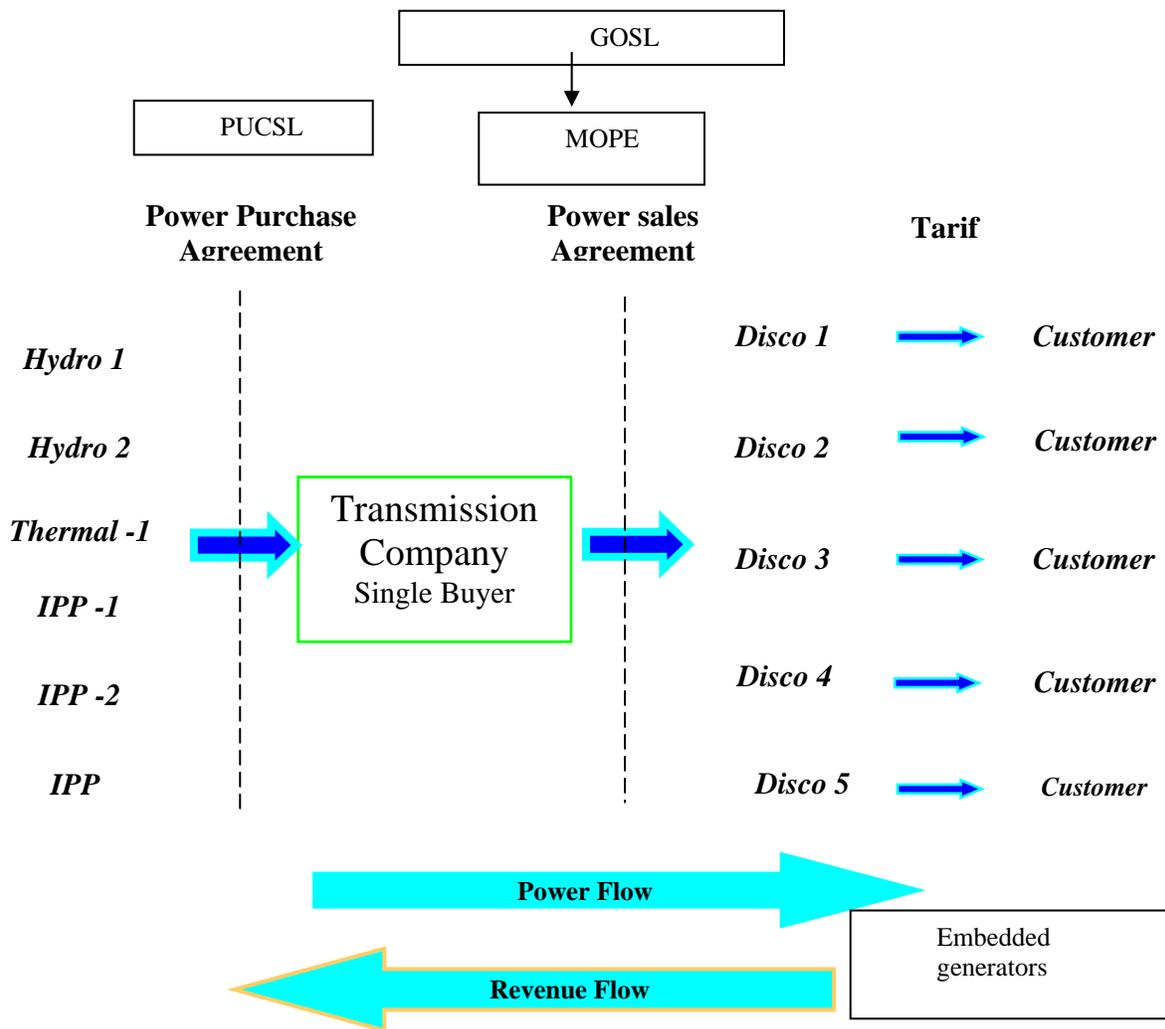
- ▶ The erosion of professional competence, especially at the top management level, resulting from increasing political patronage
- ▶ A phenomenal increase in the perceived level of corruption, especially after the introduction of an open economy model in the country
- ▶ A perceived increase in corruption is known to have dramatically increased costs of procurement and this undoubtedly had a serious effect on the efficiency of the CEB
- ▶ The CEB has been notorious for its disregard of public concerns over environmental and human rights issues, thus alienating the public even further.

Due to its intransigence, it has not been able to proceed with a single major project during the past few years

- ▶ The conditions have thus been created for the privatisation of the electricity supply industry.

The reform and restructuring process is targeted at addressing these issues as well as preparing parts of the sector for eventual privatization. Exhibit 10 summarizes the current process underway for the restructuring and unbundling of CEB.

**Exhibit 10
CEB Restructuring Approach**



To create the legal framework for electric power sector restructuring, the Electricity Reform Act No.28 of 2002, and the Public Utilities Commission Act No.35 of 2002, were enacted by GOSL.

Objectives established for the Public Utilities Commission are to ensure that:

- electricity demand is met
- licensees can finance their licensable activities
- the consumer interests are protected
- competitiveness in the industry is promoted
- efficiency and economy in licensees is practiced
- the safety of public and personnel is guaranteed
- the environment is protected

The Regulatory Commission, the Public Utility Commission of Sri Lanka (PUCSL), is to be independent, autonomous, transparent, aware of the industry requirements, accountable and open for scrutiny, provide certainty, stability, and predictability to industry participants and to be fair and equitable in treatment to all at all times. The responsibilities of the Commission are:

- Advising the government on all matters concerning the electricity sector
- Exercising licensing, regulatory, and inspections functions
- Approving of technical and operational codes
- Regulating tariffs and other charges levied by licensees
- Collecting of information on electricity industry participants
- Enforcing of technical and other standards
- Publishing a statement describing the rights and obligations of consumers
- Promoting efficient use and conservation of electricity
- Submitting an Annual Report.

The principles being applied by the GOSL in the initial unbundling of CEB include: that all successor companies are to be state owned; a reorganization scheme is to be prepared by the Minister of Power and Energy in consultation with the PUCSL and stakeholders; no job losses; no less favorable terms will be offered in the successor companies; and, VRS for those wishing to retire.

Once the electric power sector reform and restructuring is completed, it is intended that the private sector will become the providers of future power generation additions. All future thermal power plant installations will be offered to the private sector.

IV. Current Energy Policies and Institutions

In the recent past, there have been a number of GOSL initiatives whose main objective has been to develop and subsequently implement a comprehensive national energy policy that addresses Sri Lanka's current energy realities.

A. GOSL Energy Policy Initiatives

The following is a summary of the main GOSL initiatives:

1. In 1997, the Hon. Minister of Irrigation, Power and Energy appointed a committee to formulate a Sri Lanka Energy Policy. This Committee submitted its report in May 1997. In its report, the Committee recommended that the national Energy Policy be based on ten policy elements. The elements, giving due emphasis to environmental considerations, were to:
 - Provide for basic human energy needs
 - Reduce dependence on imported energy and diversify energy sources
 - Choose the optimum mix of energy sources taking into consideration the ability to influence demand on source types
 - Optimise the operation of available energy resources
 - Conserve energy resources and eliminate wasteful consumption in the production, distribution, and consumption of energy
 - Develop and manage forest and non-forest wood-fuel resources
 - Adopt an appropriate pricing policy and ensure price stability
 - Ensure continuity of energy supply
 - Increase the content of local manufacture, fabrication, construction, and value addition in the energy supply and utilisation areas
 - Establish the capability to develop and manage the energy sector.
2. In November 2002, the Ministry of Power and Energy published a set of proposed power sector policy guidelines. The guidelines document proposed the following goal for the energy sector: "The basic goal of the sector is to meet the demand for electricity at all times at least economic, social and environmental cost and thereby promote economic development and social well-being".
3. In 2002, two more documents titled *Energy Efficiency, Conservation and Demand Side Management Strategies for the Electricity Sector in Sri Lanka* and *Rural Electrification Policy of Sri Lanka* was published by the Ministry of Power and Energy.
4. Currently the GOSL, with support from the ADB, is in the process of developing an Energy Sector Master Plan (ESMP) that will cover the power, petroleum, oil and gas exploration, liquefied petroleum gas, and renewable energy sub-sectors.

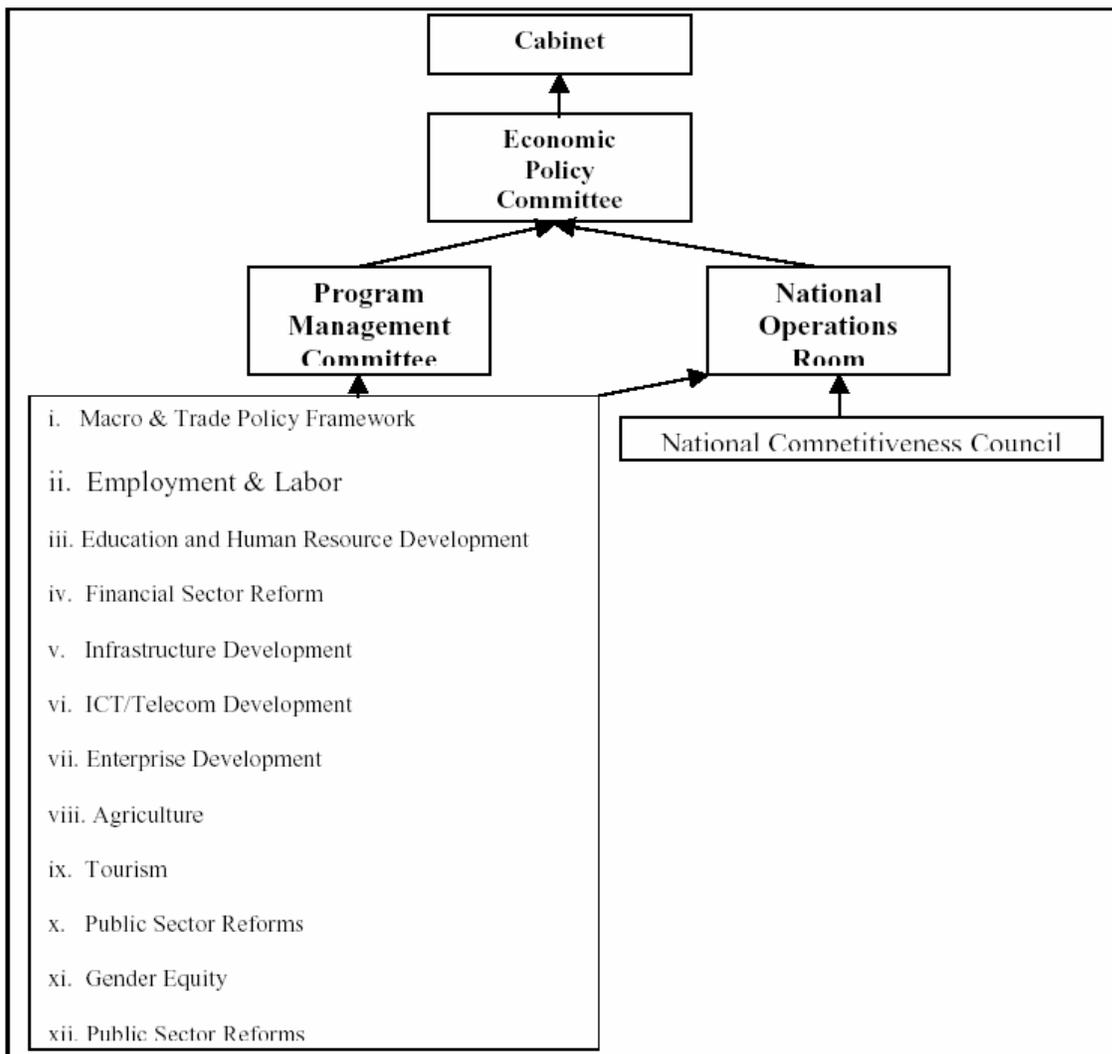
The ESMP needs to recognize that there are fundamental linkages between energy provision, economic development in various sectors of the economy, and environmental and social impacts. An integrated approach is thus needed to tie in all elements in a framework that comprehensively addresses the energy sector in the context of the socio-economic development needs of the country. Nexant Inc. has been awarded a contract by the ADB to provide technical assistance to the GOSL to develop the ESMP.

5. In 2003, the World Bank funded RERED Project issued a Request for Proposals (RFP) for developing a "Renewable Energy Policy for Sri Lanka" at the request of the Energy Supply Committee. However, there is no significant progress on this front to date.

B. Poverty Reduction Strategy (PRS) Institutions

An extensive organizational structure is proposed for evaluation and monitoring of the Economic Reform Plan (ERP) and the PRS that are combined in *Regaining Sri Lanka*. Exhibit 11 presents the proposed evaluation and monitoring structure.

Exhibit 11
Sri Lanka ERP/PRS Monitoring Organizational Structure



For each of the broad areas identified under the Program Management Committee, GOSL is proposing to establish Steering Committees consisting of 5 to 15 members, including a designated Convenor. The "Convenor will, in most cases, be from the private sector".

CORE and the Energy Forum are still in the process of determining how much of the actual organizational structure has been established and what are the plans for the establishment of the Steering Committees. In a number of the development areas it will likely be necessary to work closely with the Steering Committees in developing the linkages to the GVEP economic development program associated with the Action Plan.

C. Role of Provincial Councils

Under the 13th Amendment to the Constitution and subsequent introduction of the Provincial Council Act No. 42 of 1987 the planning and implementation of provincial economic plans is the responsibility of the Provincial Councils. There are three lists in the amendment, namely Devolved list, Concurrent list, and the Reserved list.

The Devolved List (Provincial Council List 1) - Section 34, provides for the development, conservation, and management of sites and facilities in the Province for the generation and promotion of electrical energy; other than hydro electrical power and power generated to feed the national grid.

The 13th Amendment to the Constitution also makes provision to set up a Finance Commission with the objectives of achieving balanced regional development in the country. The Finance Commission was given the power to allocate funds from the national budget to reduce progressively the Socio-Economic Disparities and the gaps in per capita incomes between the provinces within a framework of agreed principles, guidelines, plans, and programmes.