

## Relationship with Rural Development and Renewable Energy of Sri Lanka.

### Introduction.

Sri Lanka is predominately a fossil fuel utilizing country, because Sri Lanka has no oil or natural gas reserves. The demand for energy is increased day by day due to increasing population of the country. In many applications, renewable and environmentally friendly energy sources can play a vital role in the development of rural economics. In 2001 the total population of Sri Lanka estimated to be 19.0 million. The major forms of primary energy used in Sri Lanka were Biomass 51%, petroleum 37% and hydro power 12%. Most of rural population are still used "oil lamp" as two million households about 80% live in rural areas.

Although the electrical energy demand of Sri Lanka is increasing 8% annually in the next 10 years requiring an additional 100 - 120 Mw. However, only 56% of households presently have access to electricity 48% of Sri Lanka households are still remain off grid connected. Rural electrification extending cost is high. The Ceylon Electricity Board looks to archive at least a 12% rate of return on grid extension investments. Therefore renewable energy is most important alternative energy for rural electrification in Sri Lanka.

### Renewable Energy and Rural Electrification.

Rural electrification programs undertaken by the government owned utility is the CEB. Sri Lanka is currently developing the use of a number of RE technologies for off grid rural electrification. Currently 75% of national energy supply comes from renewable sources of energy, large scale hydro power plants and biomass. Most of biomass energy is used for traditionally for domestic / cooking and space heating. In Sri Lanka the use of biomass is over about 50% of the total energy usage and more than 80% of the rural population mainly use it for cooking purpose.

Sri Lanka is currently developing the use of a number of renewable energy technologies for off-grid rural electrification. About 1.5million households (35%) will still remain un-electrified. This is where off grid renewable energy technologies such as solar, mini hydro, wind power and biomass-based "Dendro" thermal power have a role to play. The government has invited private sector to develop these decentralized electricity markets to meet the demand of rural population.

The Ceylon Electricity Board(CEB)has implemented several electrification projects in Sri Lanka. CEB pioneered the introduction of sola photovoltaic (PV) in this country in the early 1980's with the participation of the private sector. The project was implemented in Uva and North Central province by private sector. It is reported that about 8000 Sola photovoltaic (PV)system have been installed throughout the country. However expansion of P. V. market is obstructed by financial constrain especially in rural off-grid areas.

The renewable energy for Rural Economic Development project will bring electricity to remote communities and individual households through village electricity societies and Sola energy dealers. The renewable energy is helpful for protecting the environment and rural electrification. Also it will contribute to global environmental issues such as reduction of atmospheric carbon emissions. Therefore, International Organizations give their fullest assistance for implementation of renewable energy related projects such as Cleaner Development Mechanism(CDM) Green Energy projects etc. these projects are always funded by GEF, UNDP, UNEP and World Bank.

### Hydro Power

The central and south-western part of Sri-Lanka is characterized by heavy rainfall and mean annual rainfall varies from about 5000 mm in wet zone of Sri Lanka. This Condition has led to the formation of large number of streams, which radiate from reaches of central highland and merge downstream from major rivers. Small scale streams of Upper Catchment areas as well as major rivers offer considerable potential for generating hydro power.75% of the total energy supply is met by 15 hydro power stations. colonial planters were first to use micro-hydro to generate electricity to tea and rubber factory operation. provide sector was allowed to develop mini hydro powers plants by the CEB in 1996 and connect it to their grid system. The CEB has already connected 10 such power plants to the national grid and letters of intent (LOI) have been issued to develop more than 40 such plantst to generate about 95 Mw.

About hundred community based village hydro projects exists in the rural areas of country. this system is owned and operated by the community through village electricityCo-operative societies service. generally 50 households are supplied through a local distribution grid which is energized by a small hydro generator. These mechanisms have effectively contribute to economic well being of rural households. Hydro power based electricity generation is expected to rise to 4400 GWH in 2005, GWH in 2010

making a major contribution to the local energy supply. though available sites for large scale hydroelectric plants are limited, there are many small and medium scale streams in the highlands which can be utilized to generate hydro power. Total exploitable hydro power potential is estimated to be 2000 Mw.of which about 60% has been already developed.

## Wind Power

In Sri Lanka CEB started systematic studies to develop wind energy in 1988. this study reveals an overall wind potential of 8 MW/km of the open land area,exploitable capacity of 200 MW with annual yield of 350 million Kwh in the coastal belt from Hambantota to Kirinda.Wind energy potential is available on the coastal belts from Puttalam to Jaffna,Jaffna to Trinkomalee on the east coast, and certin areas of the hill country such as Uva basin where the strong wind speed regimes are present. Winds been the most promising option of the available are renewable energy sources for grid connected power genareation, several community based wind power schemes are promoted by ITDG and NERD in rural sector.

In 1997, the Government of Sri Lanka signed an agreement with the World Bank and the Global Environmental Facility (GEF) for Energy Service Delivery Project (ESD). The ESD project includes a credit program to provide medium and long term financing for renewable energy projects, 3MW pilot wind farm project. This project operated by Ceylon Electricity Board (CEB). The Energy Service Delivery Project (ESD) has three major environmental friendly objectives such as;

- To incorporate environmentally sustainable renewable enrgy technologies within the planning framework for grid - connected power generation (wind and mini hydro) and pre - grid rural electrification (Solar House Systems and Village Micro hydro).
- To achieve acceptance by consumers project developers, and financial institutions for viability of grid and off grid renewable energy systems for electricity production and delivery.
- To incorporate demand side management and energy efficiency measures in standard construction design practices. ( Cynthia M Caron 2002 ESD Vol VI No. 01)

The main goal of the project is to provide direct electricity access to 100000 house holds and 1000 rural small and medium enterprises and public institutions. This would

contribute significantly to Intention of the Government of Sri Lanka (GOSL) of making electricity accessible to at least 75% of its population by 2007. End of the project, privately owned renewable energy should account for more than 5% total electricity generating capacity of Sri Lanka.

Recently considering small scale biomass based power generation has attracted fresh interest as an electricity source due to its potential as a low cost, indigenous supply of power, and potential environmental and development benefits. Biomass conversion is seen as one option for reducing CO2 build up local benefits can include reduced soil erosion, restoration depredated lands and number of social benefits. But not properly operation creates environmental issues such as noise pollution, air pollution and water pollutions. Recently residents of surrounding area of Biomass power plant located in Walapane (Dendro) have made compliant to Central Environmental Authority (CEA) regarding some environmental issues such as noise pollution and air pollutions. Therefore such plant should be operated with proper mitigatory measures. Otherwise public protest against biomass based power plant will increase.

### Energy Policy and Institutional Structure

The demand for electricity is increasing at an average rate of around 8-9% annually. Therefore, Government of Sri Lanka gave high priority to energy sector development by introducing an energy policy containing 9 important guidelines in 1985. These guidelines where further confirmed in that draft Energy Policy of 1997. The guidelines are;

1. Providing the basic human energy needs
2. Reducing depends on imported energy and diversifying energy sources.
3. Choosing the optimum mix of energy sources, taking into consideration the ability to influence demand on source types.
4. Optimisation of the operation of available energy resources (Hydro electricity, Biomass, Solar, Wind, Oil etc.)
5. Conserving energy resources and eliminating wasteful consumption in the production, distribution and use of energy.
6. Developing and managing forest and non-forest wood fuel resources.
7. Adopting an appropriate pricing policy and ensuring price stability.
8. Ensuring continuity of energy supply.
9. Increasing the content of local manufacture, fabrication, construction

and value addition in energy supply and utilization areas.

10. Establishing the capability to develop and manage the energy sector.

The main goal of the guidelines are to provide basic human energy needs at minimum cost to the national economy and to reduce dependence on foreign energy resources ensuring the country of energy supply and price stability as well as establishing the capacity to develop and manage the energy sector. After 1998, Sri Lankan energy policy is implemented through the Energy Service Delivery (ESD) project has taken the lead to bring together interest parties across all sectors of the economy. Electrifying of rural sector is necessary for rural economic growth. It will help to increase productivity of 80% of rural population.

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