

# Country Paper: Sri Lanka

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Sri Lanka is an island in the Indian Ocean, located to the south of Indian Subcontinent. sprawling over the area of 65,525 sq. km. The area excluding the inland water 62,336 sq. km. It lies between 6 - 10 of north latitude and between 80 - 82 of east longitude. Sri Lanka with its tear-dropped shape is dominated by the astonishingly varied features of topography, making it one of the most scenic places in the world.

## a) Details of the most promising renewable energy sources in the country

Sri Lanka has developed Hydropower to almost its maximum economical potential. Work is already being carried out to develop the remaining large hydropower projects even with low economic viability so that maximum use of indigenous resources are made.

As there are no indigenous fossil fuel, the Sri Lankan Government in its National Energy Policy has stated that the accelerated development of non-conventional renewable energy is a priority.

The other renewable energy sources available for system expansion are mainly non-dispatchable and are developed in small capacities. Therefore, presently system absorbs these energy sources considering the system limitations. However system can absorb more and more plants with system developments. This has been continued in parallel with the conventional generation expansion options.

Sri Lanka has a history of enabling local development of renewable energy resources in the electricity systems. This includes:

- Hydropower
- Wind Energy
- Biomass
- Solar Power
- Power from Municipal Solid Waste

As of 31<sup>st</sup> December 2008, 150 MW of embedded renewable energy plants are available in the country. Out of this, most are mini hydro plants while a 1 MW fuel wood power plant, 1MW biomass (charcoal) power plant, 18 kW solar power plant and a 3 MW wind power plant are also connected to the system.

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Though the Ceylon Electricity Board initiated renewable energy development, it is presently the private sector, which is mainly involved in the renewable energy development process. The renewable energy industry is rapidly growing in the country with several local and foreign partnerships. In comparison with the conventional large power plants, the total contribution from the Non Conventional Renewable Energy (NCRE) sector to the National Grid still remains small. Table 1 shows the system development and renewable energy development during the last 5 years in the Sri Lanka system. Recently a 'Cost based technology specific three tiered tariff' has been introduced as an incentive for NCRE development.

**Table 1: Energy and demand contribution from non conventional renewable sources**

Year	Energy Generation			Capacity		
	Non Conventional Renewable		System Total	Non Conventional Renewable		System Dispatchable Total
	GWh	%	GWh	MW	%	MW
2001	68	1.0	6625	27	1.5	1758
2002	107	1.5	6946	38	2.1	1772
2003	124	1.6	7612	43	2.3	1849
2004	206	2.5	8159	77	3.6	2115
2005	280	3.2	8769	89	3.8	2322
2006	346	3.7	9389	111	4.9	2256
2007	353	3.6	9821	119	5.3	2256
2008	435	4.4	9901	150	6.6	2456

### Mini / Micro Hydro

Well over 400 micro hydro sites have been reported in the country especially in the central hilly areas. Most of these sites are now abandoned and studies have revealed that only about 140 such sites could be developed to generate useful energy. Sixty of such sites are already rehabilitated and are in operation. The master plan studies carried out in 1988 reveals that there is potential for,

- a) Development of new sites
- b) Harnessing the head from irrigation canals, tanks and reservoirs
- c) Rehabilitation, upgrading or extension of existing sites.

It is estimated that 30 MW of small hydro potential exists in about 60 undeveloped sites while further 8 MW exist in about 290 irrigation tanks and reservoir sites. Another 50 MW of small hydro potential can be tapped in about 140 sites, which can either be rehabilitated or re-developed.

According to a study carried out in 1999, in addition to the 50 MW potential identified by the Master plan as mentioned above, the exploitable small hydro potential in Sri Lanka has been estimated to be around 100 MW from about 250 identified sites.

Therefore development of this mini and micro hydro potential in a cost effective manner could contribute a significant portion of the country's electricity energy requirement. The total capacity of small / mini hydroelectric plants connected to the national grid by December 31, 2008 was 138.1 MW and all these sites were developed by private developers. Around 75 MW of private plants are under construction and Letters Of Intent have been issued for

another 152 MW. However transmission capacity to transport this energy to load centres remains a technical and economic problem.

## **Wind**

Studies have revealed that wind is the most promising option of the available renewable sources, for grid connected power generation in Sri Lanka. The Pre-Electrification Unit of CEB carried out a resource assessment study of solar and wind potential in 1992. This study revealed an overall wind potential of 8MW/sqkm in open land area or an overall potential of approximately 200 MW in the South-eastern quarter of the island.

In March 1999, CEB commissioned a pilot scale 3 MW wind power plant in Hambantota, which is in the Southeast of the country. In year 2006, the Wind plant operated at a plant factor of 8.79% while in 2007 the plant factor was 8.64%.

A study of wind energy resource assessment of Puttalam and Central regions carried out by the CEB in 2002, too has produced encouraging results on wind energy potential in both Puttalam and Central regions.

The wind mapping study conducted by the US National Renewable Energy Laboratory (NREL) has also confirmed that Sri Lanka has many areas estimated to have good wind resources. These resources tend to be located in the north-western coastal region from Kalpitiya Peninsular to Mannar Island, Jaffna Peninsular and the central highlands. NREL estimates suggest that nearly 5000 sq. km of wind resource potential exists in Sri Lanka where they recommend additional studies to assess the practical resources by accounting for the transmission grid accessibility.

KfW consultants of Germany carried out another pre feasibility level study for a 30 MW wind power farm. Further, LOIs for 64 MW wind power plants have been issued to private power developers.

## **Wood Fuel**

Use of biomass mainly wood fuel in thermal plants have attracted widespread interest as a primary energy source for electricity generation, due to its potential as an indigenous source of energy for the country. In addition to this there are other benefits mainly resulting from reduced soil erosion, restoration of degraded lands, creation of local employment and various potential environmental benefits. Maintaining a regular supply of biomass to fuel the plant is foreseen as a major problem for effective implementation of commercial scale dendro plants.

At present a 35 kW model plant is in operation in Sapugaskanda and owned by Lakdhanavi (Pvt.) Ltd. In 2004, another grid connected 1 MW plant was also commissioned in Walapane by Lakdhanavi (Pvt.) Ltd. Letters Of Intent have been issued for capacity equivalent to 61 MW by 31<sup>st</sup> December 2008.

## **Solar**

Electricity generated directly from solar energy is still a quite costly option for grid connection. However solar electricity is a viable option by itself, or as a component of hybrid systems for off grid power systems, which cater to electricity demand in far remote areas.

## **Municipal Solid Waste**

Power generation using solid waste is being considered by the most of Local Authorities in the country. This could be a satisfactory solution for proper disposal of solid wastes generated by the human activities. Disposal of solid waste is the primary function of such facility and the power generation is a secondary function. Since this is directly linked with solid waste disposal of urban areas, CEB considers these plants separately taking into account the importance of solid waste disposal. Currently CEB has signed SPPA with two developers with 2.5 MW and 9.8 MW. LOI has been issued for another 143 MW.

### **b) Review of Public Policies that help renewable energy uptake and the demand side energy improvements in key sectors**

Renewable sources of energy will play a supplementary role in the national context while playing a very important role in decentralised applications, in meeting electrical energy needs of rural and remote communities.

According to the National Energy Policy and the “Mahinda Chintana 10 year Development Framework”, a 10% share is targeted from NCRE source by 2015 in electricity generation.

## **Sustainable Energy Authority**

Government of Sri Lanka established the Sustainable Energy Authority (SEA) in 2008 under the SEA Act, No. 35 of 2007. SEA is expected to develop renewable energy resources; to declare energy development areas; to implement energy efficiency measures and conservation programmes; to promote energy security, reliability and cost effectiveness in energy delivery and information management.

The objective of the SEA is to identify, promote, facilitate, implement and manage energy efficiency improvements and energy conservation programmes in domestic, commercial, agricultural, transport, industrial and any other relevant sector. Also SEA will promote energy security, reliability and cost-effectiveness of energy delivery to the country by policy development and analysis and related information management. Further the authority will ensure that adequate funds are available to implement its objects, consistence with minimum economic cost of energy and energy security for the nation. Relating to power development, SEA will hold two key sensitive parts namely declaration of energy development area and On-grid & Off-grid renewable energy resources. CEB and SEA will have to play a complementary role to each other in the future in order to optimise the power generation from NCRE.

### **c) Extent of Domestic Investments and Foreign Direct Investments (FDI) in low Carbon and pollution prevention technologies**

Sri Lanka has invested considerable amount of money in lowering the Carbon level and for pollution prevention technologies.

#### **Investment in low carbon:**

Although not a significant contributor for global warming, Sri Lanka has mapped out series of actions to play its part in addressing this global problem. This includes wide range of actions to reduce the output of Green House Gases in transport, industries and energy section and increasing reforestation which will serve as a means of carbon sequestration.

### **Lowering the Carbon level by increasing forest cover:**

Forest are very important in sequestration of carbon because it acts as a Carbon pool and absorb Carbon from the air. Therefore measures have been taken to conserving the existing forest and same time increasing the forest cover by reforestation programmes and tree planting programmes. In 2008, the Department of Forest continued several projects to develop the forestry sector with assistance of the Government, foreign development partner agencies and private sector. Accordingly the Forest Resources Management Project (FRMP) among other projects, implemented programmes to promote the activities of forest maintenance and management and reforestation. Accordingly a new extent of 720 ha was reforested and 2332 ha of young plantation was maintained while successfully completing the survey and demarcation of forest boundaries of 11,200 km.

Further, the Department strengthened its activities on conservation of natural forests by ceasing all felling activities in reserved forests. It also encouraged the Community participation in environmental protection by managing woodlots and developing home gardens of total extent of 642 ha and 1200 ha respectively. During the year number of private commercial forest plantations also increased. In Sri Lanka in each year from 15<sup>th</sup> October to 15<sup>th</sup> November declared as a "Green month", during this period.

tree planting programmes and pollution control programmes are conducting throughout the country.

### **Establishment of Carbon Fund:**

The Sri Lanka Carbon fund was established in 2008. It is expected to encourage and facilitate Sri Lankan industrialists to undertake emission reduction projects. The carbon fund would be a proactive strategy to implemented by the government to reap benefits from this source while maintaining a clean environment.

The carbon fund engage in Carbon trading and enhance the capacities of the National Cleaner Development Centers and Local consultants in CDM. At the moment Number of Certified Emission Reductions programmes have been facilitated by Sri Lanka Carbon fund.

### **Investments in Pollution Prevention Technologies:**

Considerable amount of money has been allocated for various Projects and programmes to prevention of pollution such as waste management, Air and water pollution control.

### **Haritha (Green) Lanka Programme:**

In order to ensure the sustainability of development activities, National Council for sustainable development was established by the Government of Sri Lanka. This was under the chairmanship of H.E. President of Sri Lanka. Under this Council Haritha Lanka programme was launched to function as National platform to launch & promote the process of achieving sustainable development. The ten broad missions/ thrust areas covered by this programme are Clean air-Everywhere, Saving the Fauna and Flora and eco systems, Meeting the Challenge of Climate Change, Wise use of the Coastal belt and the sea around, Responsible use of the land Resources, Doing away with the dumps, water for all and always, Green cities for health and Prosperity, Greening the industries, Knowledge for right choices. The programme includes short, medium, long term targets spanning the period 2009-2016 and performance indicators. Now discussions are going on for budgetary allocation to implement this Programme.

**Investment in waste management:**

Substantial portion of Domestic Investments and Foreign Direct Investments (FDI) allocated for Solid, liquid, E-waste management.

"Pilisaru" programme –in order to address the Solid waste Problem in Sri Lanka the Pilisaru programme is launched by the Ministry of Environment and Natural Resources. This programme helps national and local level waste management by providing technical support and also by providing waste management infra-structural facilities.

Extent of Domestic Investments and Foreign Direct Investments (FDI) in low Carbon and pollution prevention technologies under the ministry of environment and natural resources are as follows:

Item/ project/ programme	Domestic Investments in Rs.		Foreign Direct Investments (FDI)Rs.	
	2008	2009	2008	2009
1. Implementation of Montreal protocol	3,419,000	-	13,600,000	10,000,000
2. National implementation plan for the implementation of the Stockhome convention on Persistants Organic Pollutants project	-	-	333,000	-
3. Preparation of 2 <sup>nd</sup> National communication and education Programme on Climate Change	76,000	-	31,000,000	18,000,000
4. Strengthening the National Coordination activities of the GEF focal points	-	-	1,116,000	1,050,000
5. Project on United nation convention to combat desertification	-	-	1,000,000	1,000,000
6. E- waste management Project	-	-	5,000,000	8,000,000
7. Biodiversity and Reforestation fund	11,804,000	10,000,000	-	-
8. Pavithra ganga Programme	3,720,000	10,000,000	-	-
9. Haritha Gammana Programme	74,300,000	30,000,000	-	-
10. Disposal of solid waste management (Pilisaru programme)	558,000,000	1,050,000,000	-	-
11. Pavithra Nagara Programme	74,650,000	25,000,000	-	-
12. Plastic waste management.	140,430,000	100,000,000	-	-
13. Household waste reduction and Minimization programme.	6,194,000	6,600,000	-	-
14. Forest Resources	152,007,000	21,820,000	250,802,360	41,480,000

Management Project				
15. Implementation of Vehicular emission testing programme and indoor Air Quality Management in Sri Lanka	17,600,000	20,000,000	-	-
16. Green Accounting Preparation of economic models for calculate environmental services into National economy	465,000	1,000,000	-	-
17. Establishment of Clean development mechanism (CDM) secretariat including Carbon fund establishment	1,395,000	2,500,000	-	-
18. Ambient air quality monitoring	-	50,000,000	-	-

**d) The impact of current financial crisis and global economic downturn on Country`s Environment and poor income groups;**

The global financial system meltdown has had adverse macroeconomic impacts at varying intensities on developing country`s depending on their interaction with global economy. In the case of Sri Lanka, because of the fact that the capital account has not been fully liberalized and many local banks did not trade in complex financial instruments, the direct impact of global financial crisis on country`s financial sector was minimal. However, with the intensification of the crisis that has spilled into the real sector of the economy, the effect of the turmoil are being felt strongly by the country.

Due to the global financial crisis, many foreign investors who have invested in developing c markets repatriated their short-term investments back to their countries for meeting rising liquidity requirements. Sri Lanka has not been an exception. With increased outflow of foreign exchange and coupled with declined inflow of foreign exchange and coupled with declined inflows due to a lower demand for exports, there was a pressure on the exchange rate to depreciate amidst virtual drying up of credit lines.

The economic slowdown followed by the crisis has resulted in a reduction in demand for Sri Lankan exports specially apparel products. The tea industry, rubber based products, diamond and jewellery were also affected by the crisis and government had to unveil an economic stimulus package that aimed at revitalizing these key sectors. In meantime, some local industries resorted to short-term lay off of workers in the hope of staying afloat with the depressed demand.

Although poor community, the people who earn <2\$ /day have not been affected directly. Some of them lost their income due to loss of jobs. Also due to the high cost of living many of them are facing difficulty in managing their day today life. Country`s environment also affected to some extent because when the people lost their income most of them try to utilized natural resources for their living. Because of this there is a pressure inserted on country`s land resources, biodiversity, forest cover. On the other hand due to economic crisis, less interest pay towards to protection of environment. Therefore investments towards to control of pollution also very limited.

**e) Considerations for renewable energy, energy efficiency solutions and environmental protection in the new fiscal stimulus plans:**

In the action plan for the Haritha Lanka programme discussed above there are several programmes to promote the usage of renewable energy resource such as mini/micro hydropower projects, dendro, wind, wave, solar ocean thermal, wastes to energy, bio gas from sewerage etc.

That action plan also identified programmes to optimize energy consumption through energy efficiency in enterprises and promoting substitution of fossil fuels by renewable energies in economic and production sector. Some of the actions plan in that programme are ireplace petrolium based fuel by Gliricidia fuel wood for industrial heat,promote use of wood gasification technology,Promote biogas use for household cooking and lighting.

**Fiscal stimulus plans:**

**Major economic policy changes and measures during 2008 and 2009**

- Regional Infrastructure Development Levy (RIDL)was increased from 205 percent to 5 percent and from 7.5 percent to 10 percent on motor vegicals depending on the engine capacity and cargo capacity
- Telephone levy of 10 percent applicable to mobile and codeless telephones was expanded to be applicable to fixed line telephones.  
(This money will be used for recycling of used phones)
- Importation of selected categories of solar panel modules and accessories for the generation of solar power energy were exempted from VAT.
- Ministry of Environment and Natural Resources and Ministry of Transport jointly implementing vehicular emission testing programme since 2007. When licensing the vehicles each year they have to get a certificate for emission level.
- There will be a tax to impose for polluters namely "Green tax "Still to be implemented Still at the draft stage)