Achievements of Renewable Energy Targets in Sri Lanka 2011

Prepared By: Public Utilities Commission of Sri Lanka

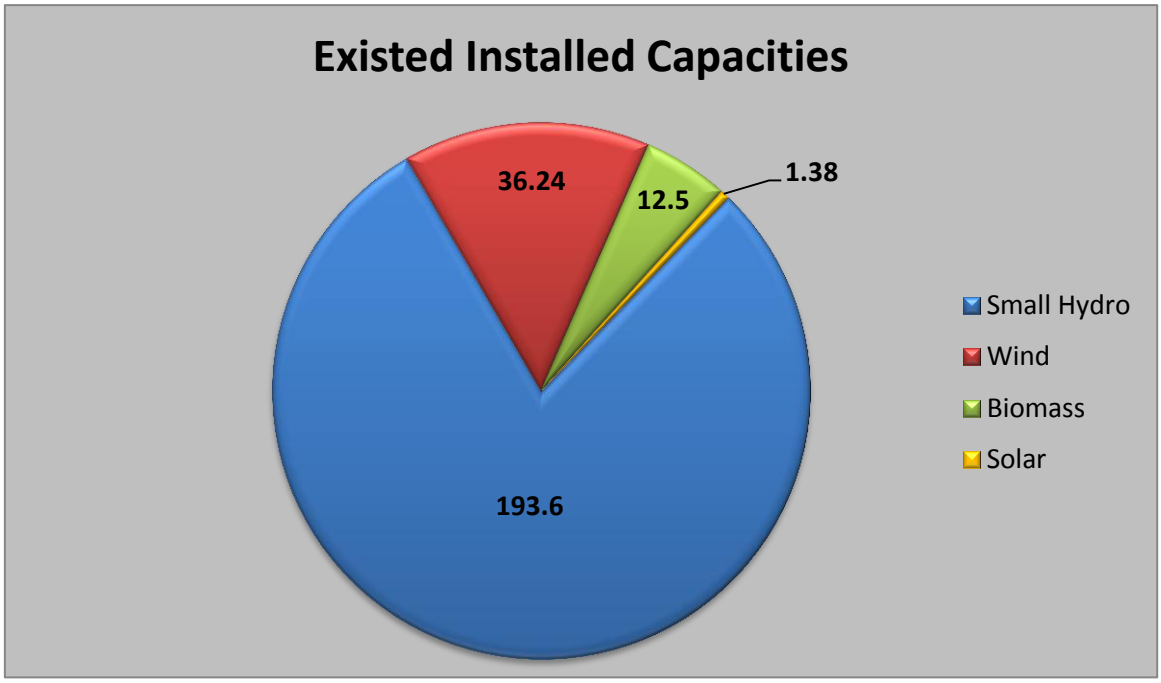
Introduction

The present world's trend more concerns energy security and sustainable development, hence the role of renewable energy in that has become ever more significant. The developed world is already on the track for walking out from fossil fuel era and to involve mainly in the areas of energy efficiency and renewable energy technologies. Therefore renewable energy is emerging as the energy supply solution for the 21st century. Sri Lanka, a small island located south of the Indian subcontinent, also has embraced renewable energy in electricity generation setting many trends.

For the first time in Sri Lanka, a National Energy Policy was introduced in 2006, which clearly highlights the importance of promoting energy efficiency and conservation and the main thrust of the policy is to promote indigenous energy resources. And the government has the target to reach a minimum level of 10% of the gird electricity using non-conventional renewable energy by 2015.

On the way to achieve this target, power generation through NCRE sources has contributed 6.25% of the total electricity generation of the national grid in 2011. In the Sri Lankan power sector, the grid connected installed capacity for electricity generation from NCRE sources was 243.7MW including 91 small hydro plants, 6 wind power plants, 4 solar power plants and 4 Biomass power plants known as Small Power Producers (SPPs) as at the end of 2011. But 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.

The chart below shows the existed installed capacity in MW of each type of NCRE power plants by the end of 2011.

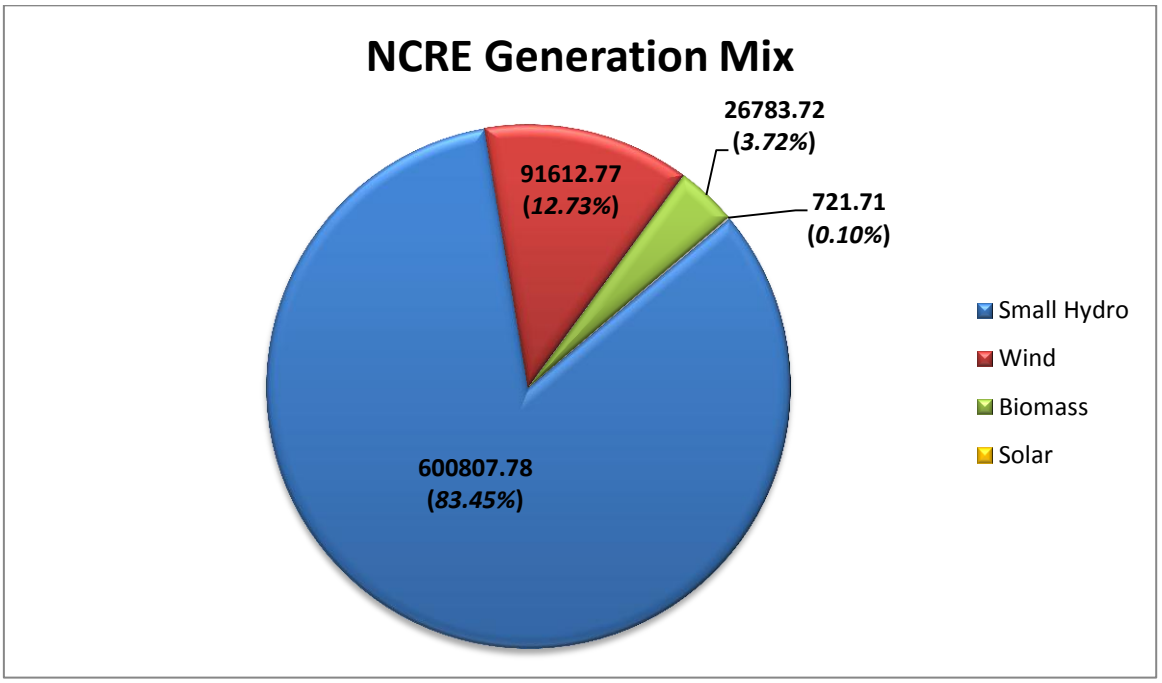


This report contains a summary of information and performance statistics of the grid connected renewable generation units in Sri Lanka for the year 2011. And it moreover presents the Sri Lankan case in renewable energy development, and also looks at the potential for future growth for renewable energy for power generation in Sri Lanka.

Energy Generation

NCRE sources include generating power deploying small hydro plants, solar power, wind power and biomass projects. 105 NCRE power plants have contributed 6.25% of the total electricity generation for the national grid in Sri Lanka in year 2011. Out of those 105 power plants only hambantota wind power plant is owned by Ceylon Electricity Board (CEB) while others were owned and operated by private parties.

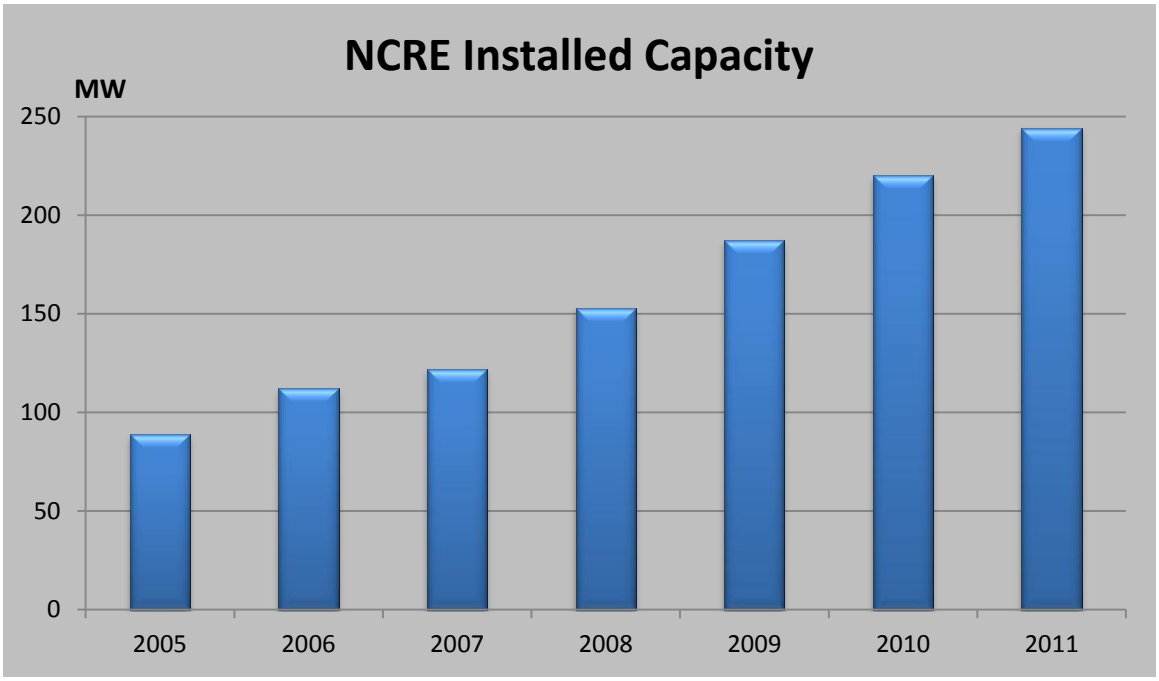
The Chart below shows the energy contribution in MWh which has been catered by different types of NCRE power plants in 2011.



Development of NCRE Electricity Generation in Sri Lanka

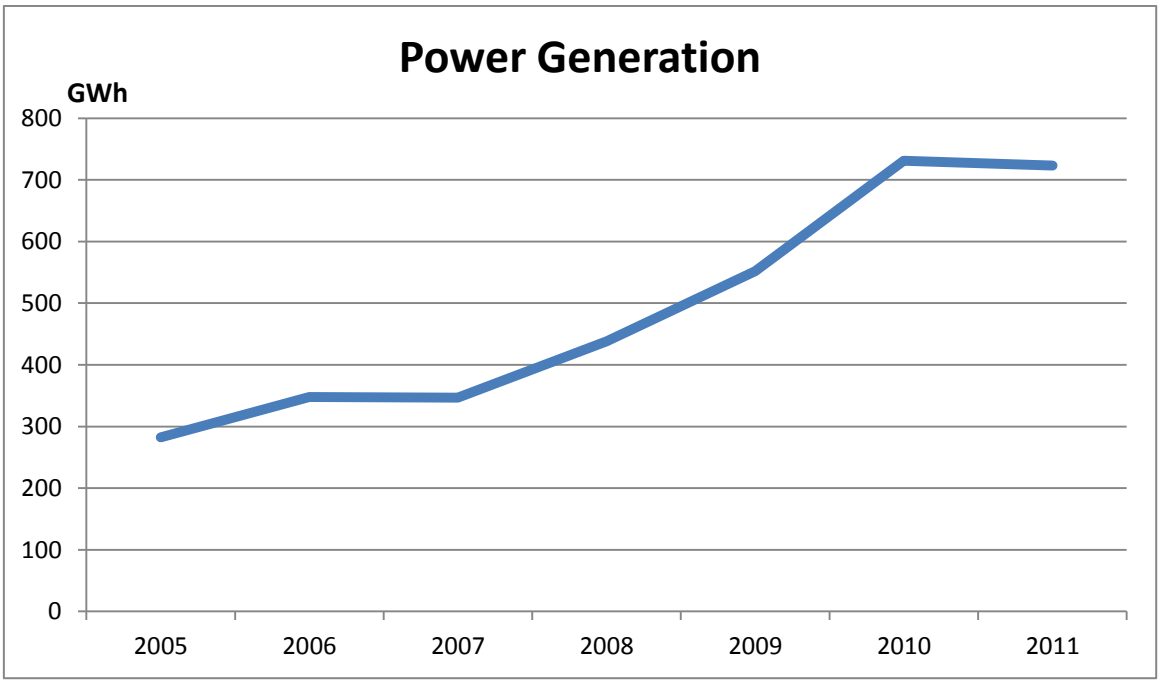
Since 1996, there has been a steady growth in NCRE power generation, which has added a total capacity of 243.7MW until 2011. Installed capacity over the past seven years has reported a Compound Annual Growth Rate of 18% emphasizing the significance of NCRE in generating electricity.

The growth of the grid connected installed capacity of NCRE power plants over past seven years is depicted below.



Source: CEB Statistical Digest 2005 to 2011

Growth in Power Generated by NCRE power producers is shown below.



Source: CEB Statistical Digest 2005 to 2011

NCRE Sources deployed in power generation in Sri Lanka

As there are no indigenous fossil fuels in Sri Lanka, National Energy Policy has stated that the rapid development of non-conventional renewable energy is needed to ensure the energy security in the country. Renewable energy sources available for system expansion are mainly non-dispatchable. Therefore, presently system absorbs these energy sources considering the system limitations. Though the Ceylon Electricity Board initiated renewable energy development, it is presently the private sector, who is mainly involved in the renewable energy development process. Sri Lanka is enabling local development of renewable energy resources in the electricity system including small hydropower, wind energy, biomass and solar power.

➢ Small Hydro

Sri Lanka has developed its large hydropower to almost its maximum economical potential. Work is already being carried out to develop the remaining large hydropower projects. Over the past decade Small hydropower as an alternative to large scale projects has emerged as an economical, sustainable and environmentally friendly source to contribute the national generation as well as to promote electricity to the rural populace in Sri Lanka. Hydropower projects below the capacity of 10MW are generally defined as small hydro plants and are primarily based on run-of-the-river principle. A large number of grid connected small hydropower plants developed by the private sector account for approximately 13% of the total hydro power capacity which was available in the country in 2011.

Small Hydropower Projects in Sri Lanka as at June 19, 2012

Status	Number of Projects	Capacity (MW)
In Operation	95	206
Under Construction	118	209.8
Provisional Approval Obtained	91	144.6

Source: Sri Lanka Sustainable Energy Authority

Plant Factors of small hydropower plants operated in year 2011

Rathganga MHP	67.56%
Hapugastenna - 2 MHP	66.70%
Somerset MHP	61.90%
Kotanakanda MHP	61.85%
Batatota MHP	58.47%
Wee Oya MHP	57.30%
Palmerston MHP	54.82%
Carolina MHP	53.28%
Delgoda MHP	52.78%
Badulu Oya MHP	51.85%
Lower Neluwa MHP	51.42%
Hapugastenna - 1 MHP	51.04%
Guruluwana MHP	50.54%
Halathura Ganga MHP	49.00%
Gampola Walakada MHP	48.06%
Sheen MHP	47.65%
Amanawala Oya MHP	47.32%
Erathna (Waranagala) MHP	47.06%
Asupiniella MHP	46.56%
Denawak Ganga MHP	46.15%
Gangaweraliya MHP	46.03%
Kotapola (Kiruwana) MHP	45.60%
Manelwala MHP	44.69%
Giddawa MHP	44.28%
Bogandana MHP	42.31%
Dunsinane MHP	41.51%
Gomala Oya MHP	41.36%
Watakelle MHP	41.36%
Kabaragala MHP	41.31%
Belihul Oya MHP	40.98%
Watawala (Carolina ii) MHP	40.45%
Alupola MHP	39.50%
Soranathota MHP	39.42%

Glassaugh MHP	39.34%
Ellapita Ella MHP	39.24%
Bambarabatu Oya MHP	39.12%
Delta MHP	38.53%
Ritigaha Oya II MHP	38.19%
Magal Ganga MHP	37.33%
Coolbawn MHP	36.85%
Barecaple MHP	36.22%
Loggal Oya MHP	36.22%
Miyanawita Oya MHP	35.80%
Atabage Oya MHP	35.72%
Kadawala II MHP	35.38%
Labuwewa MHP	34.90%
Sithagala MHP	34.42%
Kandureliya (Karawila Ganga) MHP	34.37%
Henfold (Agra Oya) MHP	34.13%
Kehelgamu Oya MHP	33.84%
Upper Korawaka MHP	33.69%
Kalupahana Oya (Lower) MHP	33.15%
Niriella MHP	32.90%
Kolonna MHP	32.63%
Aggra Oya MHP	32.05%
Radella MHP	32.01%
Black Water MHP	32.00%
Battalgala MHP	31.91%
Mandagal Oya MHP	31.88%
Pathaha MHP	31.76%
Koswatta Ganga MHP	31.18%
Adavikanda MHP	30.98%

Minuwanella MHP	30.22%
Kalupahana MHP	29.53%
Way Ganga MHP	29.48%
Kumburuteniwela MHP	29.03%
Kudah Oya MHP	28.99%
Rakwana Ganga MHP	28.83%
Ganthuna Udagama MHP	28.46%
Huluganga MHP	27.16%
Galatha Oya MHP	25.79%
Nugedola MHP	25.70%
Sanquahar MHP	25.51%
Lower Atabage MHP	24.46%
Gurugoda Oya MHP	23.12%
Kadawala I MHP	22.44%
Kirkoswald MHP	22.37%
Forest Hill MHP	21.87%
Hemingford MHP	21.20%
Deiyanwala MHP	20.67%
Nilambe Oya MHP	20.63%
Dick Oya MHP	20.62%
Nakkawita MHP	19.77%
Kolapathana MHP	18.68%
Maduruoya MHP	14.65%
Bowhill (Kadiyanlena) MHP	12.66%
Kiriwan Eliya MHP	7.12%
Weddemulle MHP	6.91%
Brunswic MHP	4.31%
Seetha Eliya MHP	3.61%
Lemastota MHP	0.00%

Note: Plant Factors were calculated using LISS submission data

➢ Wind Power

Studies have revealed that wind is the most promising option of the available renewable sources, for grid connected power generation in Sri Lanka. This study done by CEB has revealed an overall wind potential of 8MW/sqkm in open land area in the South-eastern quarter of the island. CEB commissioned Sri Lanka's first ever wind power plant of 3MW in Hambantota as a pilot project in 1999 and later private sector came into the wind power business after identifying an encouraging wind energy potential in both Puttalam and Central regions in Sri Lanka.

Wind Power Projects in Sri Lanka as at June 19, 2012

Status	Number of Projects	Capacity (MW)
In Operation	6	36.2
Under Construction	9	89
Provisional Approval Obtained	-	-

Source: Sri Lanka Sustainable Energy Authority

Plant Factors of wind power plants operated in year 2011

- Nirmalapura WPP - 49.36%
- Vidatamunai WPP - 35.93%
- Seguwantivu WPP - 31.69%
- Mampuri WPP - 31.12%
- Willpita WPP - 13.92%
- Hambantota WPP - 10.13%

Note: Plant Factors were calculated using LISS submission data

➢ Biomass Power

As estimated, a 70 % of the national biomass consumption comes under the informal sector, for household cooking, small commercial and industrial applications while the rest is utilized for industrial usage and electricity generation. Power generation from biomass has been growing in Sri Lanka, as a result of increasing price in petroleum fuels and due to its potential as an indigenous source of energy. Government of Sri Lanka has identified that Dendro power has a great potential as a long term power generation option, both for grid-connected generation and for off-grid communities. Biomass power plants in Sri Lanka are currently operated mostly deploying fuel wood and agricultural waste. Maintaining a regular supply of biomass to fuel the plant has been foreseen as the major problem for effective implementation of commercial scale dendro plants and strategies has been implemented to solve this problem by promoting gliricidia plantations in rural areas which would be an additional income for rural community.

Biomass Projects in Sri Lanka as at June 19, 2012

Status	Number of Projects	Capacity (MW)
In Operation	3	11.5
Under Construction	18	91.75
Provisional Approval Obtained	9	85.5

Source: Sri Lanka Sustainable Energy Authority

Plant Factors of Biomass power plants operated in year 2011

- Badalgama BMP - 42.93%
- Tokyo BMP - 26.03%
- Kottamurichchana BMP - 15.11%

Note: Plant Factors were calculated using LISS submission data

➢ Solar Power

Sri Lanka receives a good supply of solar radiation throughout the year since it is situated close to the equator, hence it doesn't show a substantial seasonal variation, and the dry zone of Sri Lanka has been identified as area with a good potential for harnessing solar energy. Nevertheless generating electricity directly from solar energy is still a quite costly option for grid connection since amount of electricity can be produced depends on the number and efficiency of the panels and the size of the inverter.

Solar Power Projects in Sri Lanka as at June 19, 2012

Status	Number of Projects	Capacity (MW)
In Operation	3	1.36
Under Construction	-	-
Provisional Approval Obtained	2	20

Source: Sri Lanka Sustainable Energy Authority

Plant Factors of Solar power plants operated in year 2011

- Solar PV SPP - 69.56%
- Gonnoruwa I SPP - 13.81%
- Gonnoruwa II SPP - 10.68%

Note: Plant Factors were calculated using LISS submission data

Off grid renewable power generation

Electrification of rural areas in Sri Lanka has become a challenge since the high capital investment, operational costs and the difficulties associated with extending grid connected electricity lines to remote areas. In this context, renewable sources such as solar power, small scale hydro power and biomass power have emerged as economical and sustainable alternative sources to promote electricity generation to the rural population.

Today there are more than 350 villages in Sri Lanka electrified by village micro hydro schemes that tap the water streams passing by the villages while more than 10 villages electrified by dendro power. These off grid power plants are expected to be connected to the national grid later when the national grid is extended to those rural villages.

Future of NCRE power generation in Sri Lanka

Renewable energy has been recognized by the government as one of major sources which can be deployed in future power generation in the country. Even According to the National Energy Policy a 10% share is targeted from NCRE source by 2015 out of total electricity generation. Accordingly, a dedicated agency for renewable energy development and energy efficiency by the name of Sri Lanka Sustainable Energy Authority (SEA) also has been established by the government of Sri Lanka.

When compared with the conventional large power plants, the total contribution from the Non-Conventional Renewable Energy sector to the National Grid still remains small. And presently system absorbs NCRE generation subjected to the system limitations. Therefore, now the system developments are being carried and certain grid substations are also being upgraded out to absorb more NCRE generations in the future.

Power generation using solid waste is also being encouraged in the country since it is not only an option of power generation, but also a satisfactory solution for proper disposal of solid wastes. And presently provisional approvals have been granted to implement 5 solid waste power plants which will add 80MW capacity to the national grid in near future. The problem could be expected in solid waste power generation is the lack of supply of classified solid waste items which can be used as fuel. Otherwise the power producers will have to pay an additional effort to classify the dump. Therefore the people in the areas in which the solid waste power plants are going to be implemented, must be encouraged to classify their solid wastes before dumping them.

About 5 years ago, using renewable energy to produce electricity in Sri Lanka was so far limited to investors who could afford one hundred million rupees or more for that kind of project. But in order to allow electricity consumers to produce and sell electricity to the national grid the 'Net Metering' scheme was introduced by the present government for the first time in Sri Lanka in 2009. This is a great step forward towards harnessing renewable energy Resources Island wide in small scale. In the net metering scheme the customers are free to use whatever renewable energy source they like, based on the availability and their affordability. Even though this method is very much beneficial for the electricity customers in order to reduce their electricity bill, still there are very less number of

electricity customers who have joined with net metering scheme. The reason for that could be the high initial cost of implementing a renewable power generation scheme and the cost to be incurred for a one-time charge for a new meter and protection equipment. Therefore to promote this concept among electricity customers, especially for whom this method could be more beneficial such as electricity intensive small industries, they must be edified properly about the benefits they can earn in return. And also the government must implement a strategy to encourage the households who currently have a solar electricity supply which they have already invested since the grid supply has not reached them yet. Therefore once they get the grid supply, they can enjoy the benefits of net metering facility by continuing to use the solar electricity system under the net metering facility.

Ultimately on the way to achieve the energy policy targets and to enjoy the advantages of renewable electricity, such as reduced environmental impact, potential for lower costs and reduced dependence on imported fuels, both CEB and SEA will have to play a complementary role to each other in the future in order to optimize the power generation from NCRE in Sri Lanka.