

A Study on Untapped Renewable Energy Resources in Tamil Nadu

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Abstract

Energy is a tool for achieving the sustainable economic growth of the country. The population growth has been increasing tremendously, which requires a huge amount of energy demand. Which in turn, it is possible to widen the gap between the demand for energy and the supply of energy. The focus on energy policy is less significant by the government. The burning of fossil fuel sources such as Coal, Oil, Gas is emitted greenhouse gas emission which is adversely affecting on the environment and creates global warming. And also, endanger to the economic growth in the country. Therefore, it is an urgent need to change the alternative source of energy i.e., renewable energy system. Renewable energy is generated from naturally replenished resources and also eco- friendly sources. The present study consists of three objectives i) to know the status of renewable power scenario of Tamil Nadu ii) to examine the installed capacity of grid-interactive renewable power Tamil Nadu and iii) to analyze the off-grid decentralized renewable system/Devices in Tamil Nadu. The methodology of the study is based on a secondary source of information. The finding of the study shows that a higher level of power utilities accounted for by the thermal power source (Coal, Lignite, Gas, Diesel). It is found that wind power (8594.39 MW) is the highest place in terms of installed capacity of grid-interactive renewable power and its lowest installed capacity shared by Small Hydropower (123.05 MW), followed by solar power (2220.95 MW) and Bio-power (960.95 MW). Renewable energy is a possible solution to meet the present and future energy demand and also help to attain sustainable development goals.

Keywords: Energy, Interactive, Utilities, Wind.

Introduction

Energy is one of the major drivers for accomplishing the sustainable economic growth of the country. Across the world, the growth of population has steadily been increasing which leads to raising the demand for energy. Majority of the energy demand was fulfilled by

conventional sources like coal, oil, natural gas etc. These sources are very much limited and it's possible to be exhausted. The burning of conventional sources is emitted greenhouse gas emission it adversely effects on the environment; and also may create different types of environmental problems (Armeanu, Vintilă, & Gherghina, 2017). The climate change and global warming are major environmental issues in the world. It is caused by different factors of which major factor is CO_2 emission. Every year 8 billion tons of carbon was dumped into the environment of which, 6.5 billion tons from fossil fuels and 1.5 billion tons from deforestation in the world. It reveals that, majority of the carbon was produced by fossil fuels sources (Chandel, Shrivastva, Sharma, & Ramasamy, 2016).

India's total installed electricity capacity was 3, 56,774 MW as on March 2019. Of which, 63.40 per cent (226279 MW) of electricity was generated from thermal sources, 21.95 per cent of electricity was produced by renewable sources, and remaining 12.73 per cent and 1.92 per cent electricity was generated from the hydropower and nuclear energy respectively. The result indicates that India's majority of the electricity was produced from the thermal sources. Therefore, it is an urgent need to change the alternative source of energy i.e., renewable energy system. Renewable energy is generated from naturally replenished resources and also eco- friendly sources.

Renewable energy is globally recognized as a crucial source to achieve economic development without environmental contamination. The deployment of renewable power in India has reached 4th and 5th place in wind and solar power respectively across the world. The utilization of renewable power was more than doubled in April 2014 to March 2019. More than 10 million man-days employment was being created in the sector. Among the renewable sources, solar power capacity has increased from 2.6 GW to 28.18 GW in April 2014 to March 2019 respectively. Further, Government of India, under the National Action Plan on Climate Change (NAPACC) has submitted its Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC), in the country's post-2020 climate activities. The INDC aims to install 175 gigawatts (GW) electric power capacity through renewable power by 2022. Also, 40 per cent of country's energy demand is fulfilled by the renewable energy source (solar, wind, small hydro, power, and biomass) and to reduce greenhouse gas emissions intensity per unit GDP by 33 to 35 per cent below 2005 levels by 2030. And also to create an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide by additional tree cover (MNRE, Annual Report, 2018-2019).

Methodology

The present study is based on secondary sources of information. This information is collected from reputed journals, government reports, and magazines. The secondary data with regard to energy statistics were collected particular from the recent issues of energy statistics 2019.

Objectives of the study

The present study focused on three objectives;

- i) to know the status of the power scenario of Tamil Nadu
- ii) to examine the installed capacity of grid-interactive renewable power Tamil Nadu and
- iii) to analyze the off-grid decentralized renewable system/Devices in Tamil Nadu.

Review of Literature

Nesamalar, et al (2017) study emphasized that the potential of renewable energies (wind, solar, hydro and bio-mass) are enormously available in Tamil Nadu. Tamil Nadu is one of the top states in India for the installed capacity of grid-connected renewable power and its wind power is accounted by nearly 35 per cent in total installed capacity of wind power in India. Its contribution is very high in environment pollution by emitting greener house gas. The study indicates that there is a caution to use the fossil fuel sources and policies are not satisfied. The government should encourage the renewable sector and creating more awareness to the people.

Tripathi, et al, (2016) study indicates that renewable power is non-polluted source of energy. The study highlights that renewable power offers sustained electricity supply and reduce the usage of fossil fuels as well as environmental damage.

Yaqoot et al, (2017) study reveals that domestic biomass cookstove, solar water heater, solar lantern and solar home system are cost-effective systems whereas solar cooker, solar photovoltaic water pump and solar dryer are economically very high systems. The study suggested that reduction of subsidy for fossil fuels sources which significantly improve the decentralized renewable energy systems.

Results and Discussion

The study discusses the potential of renewable energies, installed capacity of grid-interactive renewable power and Off-grid decentralized renewable power systems status in Tamil Nadu.

Power Scenario of Tamil Nadu

Tamil Nadu is surrounded on the north by Andhra Pradesh and Karnataka, on the west by Kerala, on the east by Bengal and on the south by the Indian Ocean. Tamil Nadu is also one of the largest economically well and highest urbanization states in India (Buckley & Shah, 2018). Electricity plays a vital role in domestic, industrial and service sectors for different uses such as lighting, cooking, heating etc. It is generated from both conventional sources and non-conventional sources. The state of Tamil Nadu is generated different sources of electricity as shown in table 1.

Table 1**Installed Capacity of Power Utilities in Tamil Nadu as on March 2019****(in MW)**

Sl.No	Sources of Power	Installed capacity (in MW)	Percentage
1	Thermal	14786.07	47.61
2	Nuclear	1448.00	4.66
3	Hydro	2178.20	7.01
4	Renewable energy sources	12646.88	40.72
	Total	31059.15	100.00

Source:(Central Electricity Authority, 2019).

Table 1 shows that the installed capacity of power utilities in Tamil Nadu. Among the various sources of power utilities, the thermal power is generated at highest (47.61 per cent) level as compared to other sources of power as followed by Renewable energy (40.72 per cent), Hydro energy (7.01 per cent), and Nuclear energy (4.66 per cent). It reveals that the higher level of power utilities is from a thermal power source (Coal, lignite, Gas, Diesel).

Renewable Scenario of Tamil Nadu

Tamil Nadu is one of the leading states in India for promoting and producing renewable energy. In 1985, Government of Tamil Nadu was established Tamil Nadu Energy Development Agency (TEDA) for promoting the utilization of renewable energy and energy conservation activities. Its main function is to formulating policy framework promulgated by the state govt. and effective implementation of projects (MoP, 2018).

The renewable energy is used for many activities of which generation of electricity is more in the world. Tamil Nadu is the second state for the highest installed capacity of grid-connected renewable power after Karnataka. It is mostly accounted for by wind and solar power. Tamil Nadu has received the highest potential of renewable energies. Energy statistics report estimates that the total potential of renewable energies (wind power @100m, small hydropower, biomass power, cogeneration-bagasse, waste to energy, and solar energy) in Tamil Nadu was 53800 Mw in March 2018. Of which, larger amount of power was shared by both resources such as wind power and solar power (33800 MW), and (17670 MW) respectively.

Table 2

Source Wise Installed Capacity of Grid-Interactive Renewable Power in Tamil Nadu as on 31.10.2018

(in MW)

State	BioPower	Wind Power	Small Hydro Power	Solar Power	Total
Tamil Nadu	960.95	8594.39	123.05	2220.95	11899.34

Source:(<http://mospi.nic.in>, 2019)

*Biopower = (Biomass Power & Bagasse Cogeneration and Waste to Energy)

Table 3 shows that the source wise installed capacity of grid-interactive renewable power in Tamil Nadu. Out of the renewable sources in Tamil Nadu, wind power (8594.39 MW) is the highest place in terms of installed capacity of grid-interactive renewable power and its lowest installed capacity is Small Hydropower (123.05 MW). The installed capacity of solar power and bio-power was 2220.95 MW and 960.95 MW respectively.

Table 3

Installation of Off-grid/Decentralised Renewable Energy Systems/Devices in Tamil Nadu as on 31.10.2018

Biogas Plants (Nos in Lakh).	SPV Pumps (Nos.)	Solar Photovoltaic (SPV) System				Aerogen/Aerogen/Systems (KW.)	Biomass Gasifier (MW.)	Waste to Energy (MW)
		SLS (Nos.)	HLS (Nos.)	SL (Nos.)	PP (KWP)			
2.23	4,459	39,413	2,89,333	16,818	12752.6	256.7	14.9	15.9

Source:(<http://mospi.nic.in>, 2019).

Table 2 reveals that 2.23 lakhs Biogas plants were installed on 31.10.2018. The solar Photovoltaic system such as Solar water pumps (4459 (Nos.), Street lighting System (39,413 (Nos.), Home lighting system (2, 89,333 (Nos.), Solar Lantern (16,818 (Nos.) and solar Power plants (12752.6 KWP) were installed during the same period. Aerogen system (256.7 KW), Biomass gasifier (14.9 Mw) and Waste to Energy (15.9 MW) were also installed.

Conclusion

The study concludes that among the potential of renewable energies in Tamil Nadu wind power is received a higher amount of potential as compared to other sources. In the source wise installed capacity of grid-interactive renewable power is observed that the wind

power (8594.39 Mw) is accounted major part as compared to other sources. The trend of overall performance and utilization of renewable energy has been increasing. Moreover, wind power has plays a major role in Tamil Nadu for utilization and generation of electricity.

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