

Status of Renewable Energy in India

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ABSTRACT

The current population of India is 1,361,575,360 as of Saturday, January 5, 2019, based on the latest United Nations estimates. India ranks 2nd in the world population [1].World population is rising, meaning that energy consumption is also growing. Present enormity of energy cannot be denied. Energy is an essential input for economic development and improving the quality of life. on renewable and renewable sources are the different alternatives available for generation of electricity in India. India now generated around 1,160.1 billion units of electricity in 2017.India is the third largest producer and consumer of electricity power generated in the world. This review article briefly presents which type of renewable energy more produced electricity in which state and how much consumption of electricity in India in 2018.

1. Introduction

The Conventional Non renewable energy sources which require millions of years for formation. These are abundant and inexpensive but impossible to reuse. Which are dwindling because of high cost and Environmental damaging retrieval techniques? on renewable energy sources cannot be refused in a short period. They include fossil fuels such as oil, petroleum, natural gas and coal. Fossil fuels contribute to global warming. This global warming continuously playing its negative part in increasing the temperature of the planet and endangering the Living creatures. Therefore, cheap, natural and friendly environment production of Electricity resources are required. The importance of renewable resources has increased for it. Renewable energy sources are sources that constantly renew throughout the human lifespan. The major sources of renewable energy source are Solar, Wind, and Biomass Hydropower, Geothermal, and Tidal energy. India produced 1,160.10 billion units (BU) of electricity—one BU is enough to power 10 million households (one household using average of about 3 units per day) for a month—in financial year (FY) 2017. Electricity production stood at 1,003.525 BU between April 2017-January 2018, according to a February 2018 report by India Brand Equity Foundation (IBEF), India was the third largest producer and the third largest consumer of electricity in the world, behind China (6,015 BU) and the United States (4,327 BU).As of January 2018, India has installed power capacity of 334.4 Giga Watt (GW), making it the fifth largest installed capacity in the world after European Union, China, United States and Japan [2]. Over the last five years, India put up 99.21GW of additional capacity. Of this, 91.73 GW came from thermal sources, 5.48GW from hydro, and 2GW from nuclear sources [3].

2. Thermal Energy Status In India

Thermal power is the largest source of power in India. There are different types of thermal power plants based on the fuel used to generate the steam such as coal, gas, and Diesel, natural gas. About 71% of electricity consumed in India are generated by thermal power plants [4].India is the 3rd largest

coal producer in the world as of March 2018; India has a total thermal installed capacity of 222.90 GW. Almost 88% of the thermal power is obtained from coal and the rest is from diesel and gas [5].Thermal energy which includes coal, gas, and diesel based power plants accounted for 77% of the power generated in the country. Nuclear based (3%), Hydro-Power (10%),and Renewable energy (10%) power generated in 2018[6].

The top 5 states in India with highest Installed capacity (in MW) of thermal power utilities as on 31-1-2018, Maharashtra(30598.43), Gujarat(22089.58), Tamil Nadu(14986.07), Andhra Pradesh(13857.8) and Madhya Pradesh(12731.7)[7].

3. Hydro Power Status In India

India is one of the countries with the largest production of energy from renewable sources. In the electricity sector, renewable energy (excluding large hydro) accounted for 20% of the total installed power capacity (71.325 GW) as of 30 June 2018. Large hydro installed capacity was 45.29 GW as of 31 March 2018, contributing to 13% of the total power capacity [8].Thus; renewable energy including large scale hydro-power currently adds up to more than 33% of the total installed power capacity in India [9]. India is the seventh largest producer of hydroelectricity in the World. The top 5 states in India with highest Installed capacity (in MW) of Hydro power utilities as on 31-1-2018,Punjab(3781.65MW), Karnataka(3599.80MW), Maharashtra(3331.84MW), Uttar Pradesh(3231.03MW), Madhya Pradesh(3223.66MW).

In India, Electricity Generation in Mega units (MU) and in Mega Watt (MW) Targets and Achievements for 2017-18.[7]

Sector	Target (2017-18)	Achievements
Thermal	1,042,028.00MU	90,563.62 MU
	72,340.00MW	91,730.45MW
Hydro	12,757,385.22 MU	6,613.49 MU
	10,897.00MW	5,479.02MW

Nuclear	40,972.00 MU	3,920.59 MU
	5,300.00MW	2,000.00MW

March 2018. In order to cumulative capacity, Karnataka (3657.2MW), Rajasthan (2317.11MW), Andhra Pradesh (2170.32MW), Tamil Nadu (1822.57MW) and Gujarat (1587MW) are the leading solar states in India.

4. Solar Energy Status In India

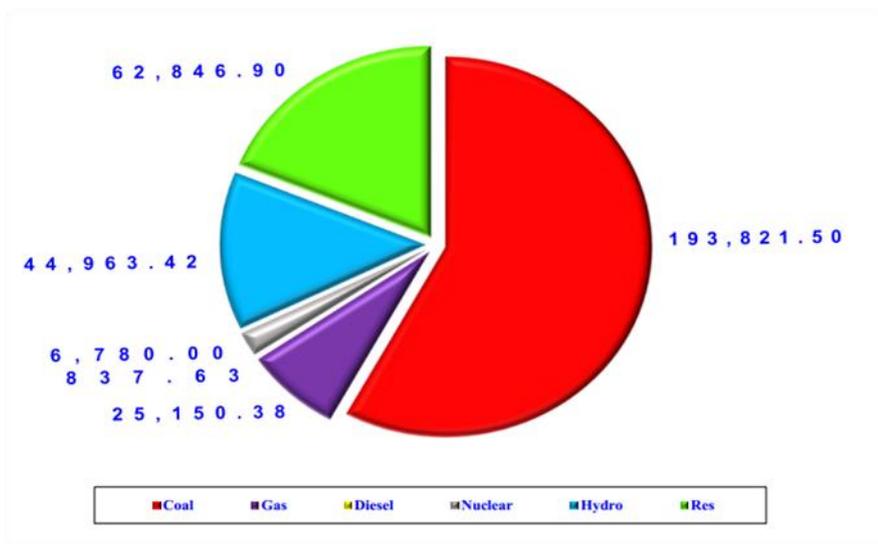
The world's largest solar power park is located in the Kamuthi in the Indian state of Tamil Nadu. Spread over 2,500 acres. It is estimated to make enough power for 750,000 people. India has set a new target of achieving 100 GW of solar power by 2022. Four of the top seven largest solar parks worldwide are in India including the second largest solar park in the world at Kurnool, Andhra Pradesh, with a capacity of 1000 MW. The world's largest solar power plant, Bhadla Solar Park is being constructed in Rajasthan with a capacity of 2255 MW and is expected to be completed by the end of 2018. Rajasthan is also home to the world's largest Fresnel type 125 MW CSP plant at the Dhirubhai Ambani Solar Park. Karnataka state is also witnessing the development of 2 GW Pavagada industrial solar parks, the second largest solar development currently under construction in the world [10]. The state currently holds 5 GW of solar capacity and 4.7 GW of wind capacity. The remainder includes small hydro, biomass, and heat and power cogeneration. It has a total installed capacity of 12.3 gigawatts (GW) and has generated 27 % of its power through renewable resources

5. Wind Energy Status In India

Wind power capacity was 34,046 MW as of 31 March 2018, making India is the 4th largest wind power producer in the world [11]. According to a report by the Institute for Energy Economics and Financial Analysis (IEEFA) Karnataka has improved its wind energy capacity and moved ahead of Tamil Nadu in that department this year. As of 30 June 2018 the installed capacity of wind power in India was 34,293MW, Mainly spread across Tamil Nadu (7,269.50MW), Maharashtra (4,100.40MW), Gujarat (3,454.30MW), Rajasthan (2,784.90MW), Karnataka (2,318.20MW), Andhra Pradesh (746.20MW) and Madhya Pradesh (423.40 MW) Wind power accounts for 10% of India's total installed power capacity. India has set an ambitious target to generate 60,000 MW of electricity from wind power by 2022. The Indian Government's Ministry of New and Renewable Energy announced a new wind-solar hybrid policy in May 2018. This means that the same piece of land will be used to house both wind farms and solar panels [12].

All India installed capacity in Mega Watt(MW) on 31-1-2018.

Thermal				Nuclear	Hydro	Renewable Energy sources	Grand Total
Coal	Gas	Diesel	Total				
193821.50	25150.38	837.63	219809.51	6780.00	44963.42	62846.90	334399.83



Total Installed Capacity-334399.83MW

Renewable Energy sources all India as on 31-12-2017 is given below in MW[7]

Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total Capacity
		BM Power/Cogen.	Waste to Energy		
4418.15	32848.46	8413.80	114.08	17052.41	62846.90

US-based Institute for Energy Economics and Financial Analysis (IEEFA) said that, Karnataka is the new national leader in renewable energy generation. It has overtaken Tamil Nadu that had long been India's top renewable market. With a population of more than 60 million, Karnataka has a total of 12.3 gigawatts (GW) of renewable capacity installed till

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March, after having added five GW in 2017-18 alone, it said IEEFA's report "Karnataka's Electricity Sector Transformation", talks about a trend driven by state and national energy policies that have encouraged less reliance on imported energy and how declining costs have helped build momentum around the uptake of renewable, especially solar. The report notes that solar tenders in Karnataka have seen near record low bids of Rs 2.82-3.06 per kilowatt-hour (kWh) materially less than the average Rs 3-5/kWh for domestic thermal power tariffs and the Rs 5-6/kWh tariffs required for imported coal fired power. And it points out that in June, Karnataka introduced reverse auctions for wind-powered electricity, with an upper cap of Rs 3.45/kWh, following the success of similar auctions in Gujarat and Tamil Nadu in 2017, when tariffs fell by as much as 50 per cent to as low as Rs 2.43/kWh[12]. Renewable will account for 23 GW or 60 per cent of capacity (43 per cent of generation), up from 12.3 GW or 46 per cent in 2017/18. Hydro, which accounts for 3.6 GW or 13 per cent of current capacity, continues to provide much-needed dispatch able energy to balance the state's growing, but variable wind and solar.

Thermal power's market share, currently at 10 GW (38 per cent of capacity and 49 per cent of enervation), will remain steady, but "needs to better incorporate more flexible, peaking capacity". IEEFA conducts research and analyses on financial and economic issues related to energy and the environment [13].

6. Conclusion

It can be said that the India is going to find an excellent place in the world in the area of renewable energy and recently held International Solar Alliance summit in New Delhi is the proof of the same. India now generates around 1,160.1 billion units of electricity in financial year 2017. India has set an ambitious target to generate 60,000 MW of electricity from wind power by 2022. The Indian Government's Ministry of New and Renewable Energy announced a new wind-solar hybrid policy in May 2018. This means that the same piece of land will be used to house both wind farms and solar panels. The increased use of indigenous renewable resources is expected to reduce India's dependence on expensive imported fossil fuels. The Government of India has set a target of 175 GW renewable power installed capacity by the end of 2022. This includes 60 GW from wind power, 100 GW from solar power, 10 GW from biomass power and 5 GW from small hydro power [14]. The main reason to choose Renewable energy sources not only translates into low cost but also saving energy over the long-term and it will also help to protect the environment from the risks of fossil fuel emissions. To be able to provide resources for subsequent generations, people need to be aware of them in a safe way. Social media needs to play a major role in this. Has been introduced as a special, compulsory subjects in college and universities, to educate and teach awareness and use of energy conservation .

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