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Recent Energy Trends in India

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Abstract

Today in the professional world energy consumption is the most important factor for a progressive and developed nation in the world. Presently India is the 3rd largest producer as well as consumer of power generation & one of the most powerful progressive nations in the world. Most of the countries in the world change their thinking in terms of power generation from conventional energy to renewable energy like Solar, Wind, Geothermal, Small Hydel power, etc. Recently in India, power generation from conventional types of energy like fossil fuel gradually decreased and power generation from renewable energy rapidly increased in the last few years. Now a day's every sector in India slowly increasing its dependency on renewable energy sources in concern of depleting conventional energy sources and protecting its climate.

Keywords: World Energy, Energy senerio, Natural Resources, Renewable Energy.

1. INTRODUCTION

India plays significant role in the global energy economy. Energy consumption has doubled since 2000, impelled upwards by a growing population earlier to be World's largest & a duration of quick economy growth. India's continued industrialization and urbanization will attain huge demands of its energy sector. Energy use on a per capita basis is well under half of the global average, & between rural and urban area. The affordability and reliability of energy supply are key concerns for India's consumers. The Covid-19 pandemic has disrupted use of energy due to lockdown in India so our energy consumption fall down of energy consumption in across the country. Now in India's energy uses rapidly growing in terms of renewable energy.[2]

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India ranks 2nd in terms of population (17% of the world) after China [5]. India is globally ranked 3rd in terms of installed capacity for power generation from renewable energy [1]. In this regard on 30th November 2015, at the 21st session of the United Nations Climate Change Conference of the Parties (COP-21) in Paris, France "**The International Solar Alliance**" (**ISA**)of 120 countries, initiated by India is formed, to achieve specific goals in terms solar energy utilization till 2030. Recently on 1st November 2021, at the 26th session of UN COP-26 in Glasgow, Scotland to reduce global emissions target that aligns with reaching the goal of net-zero by mid-century and achieve the 1.5ºC global warming limit [4].

1.1. India's Pledge for the Society: [4]

In COP-26,The prime minister of India gave the gift of '*Panchamrit*'to the World Community which includes:

(i) India will increase its non-fossil energy capacity to 500 GW by 2030.
(ii) India will fulfil 50 % of its energy consumption through renewable energy by 2030.
(iii) India will decrease net projected carbon emission by 1 billion tonsby 2030.
(iv) India will decreasethe carbon intensity of its economy by more than 45 % by 2030.
(v) India will become carbon neutral (net-zero carbon emission) by 2070.

1.2. Objectives for the utilization of Green Energy:

- Reduce the carbon footprint,
- Reduce the global warming gases,
- Accelerate the phase-out of coal,
- Curtail deforestation,
- Speed up the switch to electric vehicles,
- Protect and restore ecosystems,
- Stabilize the global energy crisis,
- Boost the public health,
- Become self-reliant in terms of power generation, etc.

2. Scope of Renewable Energy:

Presently India is 2nd populated country in the world after China but in terms of power production as well consumption it stands 3rd in the world after USA &China. The Population of India is increasing & will reach max in the world by 2026 [5].So to attain the above objectives along with the increasing energy demand, renewable energy resources has to be increased because of the following prospective reasons.

- Replacement of fossil fuels, Diesel, Petrol, etc.,

- Replacement of Conventional type of vehicles by Electric Vehicles,
- Requirement of huge amount of electric energy,
- Improve Climate conditions,
- Growing Indian Economy,
- To make self-reliant in energy production, etc.

3. Energy Scenario: [6,8]

- India Energy Outlook 2021 Report published by the International Energy Agency (IEA) says to explore the scope and challenges for the growing population of India as it seeks to assure reliable, affordable, and sustainable energy.
- India's energy consumption is expected to nearly double by 2040 as the nation's Gross Domestic Product (GDP) expands to an estimated USD 8.6 trillion.
- Before the global pandemic (COVID-19), India's energy demand was estimated to increase by almost 50% between 2019 and 2030.
- Total power generation capacity in India is 388.85 GW by 30 September 2021.

Table 1 Power generation in fossil fuel and non-fossil fuel

Power Generation	Fossil Fuel				Non-Fossil Fuel		Total
	Coal	Gas	Diesel	Hydro	Other Renewable	Nuclear	
In MW	208615	24900	510	46512	101533	6780	388850
In Percentage	53.65 %	6.4 %	0.13 %	12 %	26.1 %	1.74 %	100 %

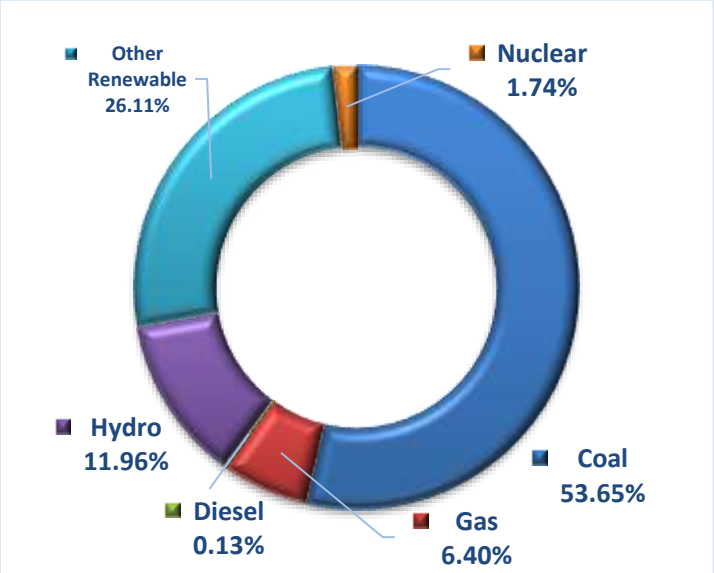

Figure 1. Electric energy production source

3.1. State-wise Power Generation from Renewable Energy Source: [9]

The maximum power generation state from renewable energy sources till June 2021 is Karnataka followed by Tamil Nādu while the Minimum power generated from renewable energy sources is by Lakshadweep followed by Dadar & Nagar Haveli.

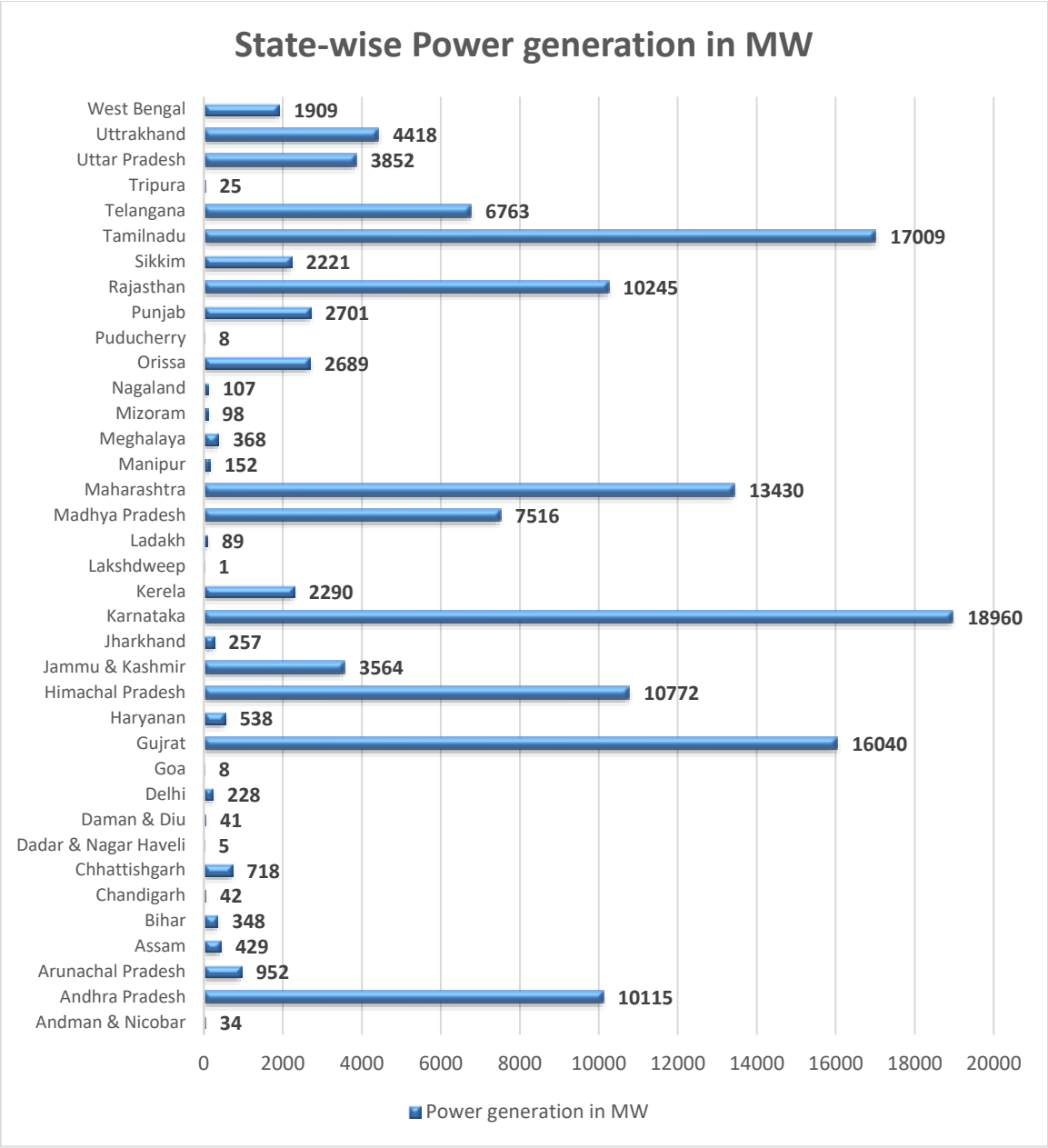

Figure 2. State wise power generation

Renewable Energy Growth: Power generation from Renewable Energy in India including hydel energy from December 1947 till March 2021 is given below. [7,8]

Table 2 Power generation Capacity in MW

S.No.	Year of Generation	Installed Generation Capacity in MW
1	31 Dec. 1947	508
2	31 Dec. 1950	560
3	31 March 1956	1061
4	31 March 1961	1917
5	31 March 1966	4124
6	31 March 1974	6966
7	31 March 1979	10833
8	31 March 1985	14460
9	31 March 1990	18307
10	31 March 1997	22560
11	31 March 2002	27897
12	31 March 2007	42414
13	31 March 2012	63493
14	31 March 2017	101138
15	31 March 2018	114315
16	31 March 2019	123040
17	31 March 2020	132427
18	31 March 2021	140642

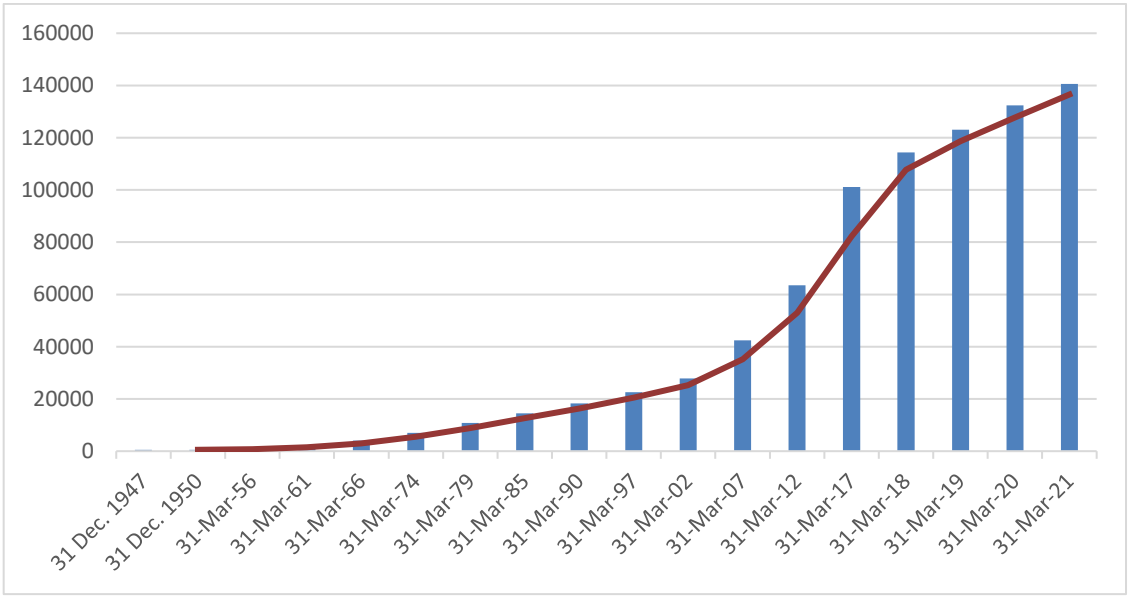

Figure 3. Growth of energy demand in India

Renewable energy scenario in the World: Till 2020, 29% of total energy production in the world is renewable energy (including Hydel power): [10]

Table 3 Source and their installed capacity

S.No.	Name of Source	Installed Capacity in GW
1	Hydropower	1211
2	Wind Energy	733
3	Solar Energy	714
4	Bio-energy	127
5	Geothermal Energy	14

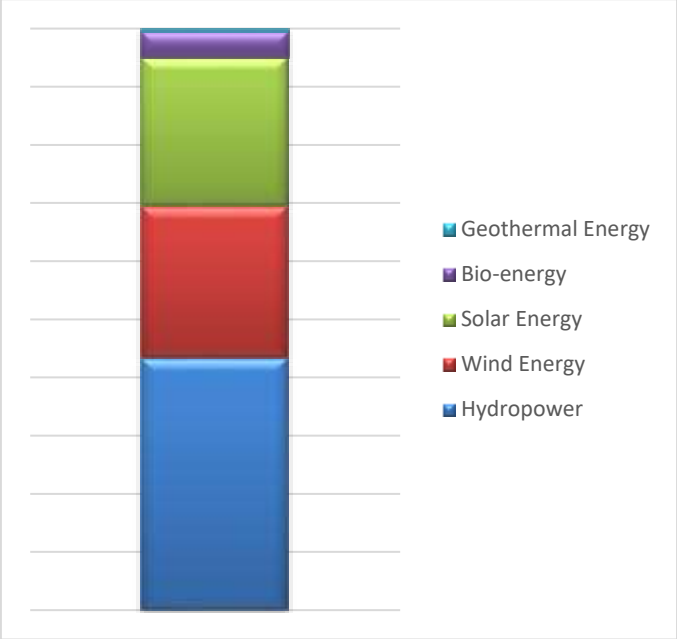

Figure 4. Uses of renewable energy

4. Greenhouse Gas Emission:

According to WRI CAIT, India's GHG emissions increased by 2,060 MtCO2e (180%) from 1990 to 2014. Energy emissions grew by 1,563 MtCO2e (246 percent) between 1990 and 2014, according to WRI CAIT. According to statistics from the International Energy Agency, overall energy production increased fourfold between 1991 and 2014, with coal accounting for a growing percentage and hydropower accounting for a declining part. Coal produced 74% of the nation's power in 2014, followed by natural gas (5%) and hydro (11%), biofuels (2%), wind (3%), and nuclear (3%). As the third biggest power generator in the world, India has among of the lowest per-capita energy consumption rates. Industries use 42% of the power produced, followed by agriculture and forestry (15%), homes (26%), businesses and public institutions (10%), and other 1% each (8 percent). The number of industries more than doubled between 2000 and 2014, resulting in a 406% increase in industrial fuel use. [11]

Table 4 Gas emission in different sector

S.No.	Different Sector	Emission(MtCO2e) At FY2014	In Percentage
1.	Energy	2198.71	68.7
2.	Agriculture	626.86	19.6
3.	Industrial Process	193.19	6
4.	Deforestation	122.50	3.8
5.	Waste	61.05	1.9

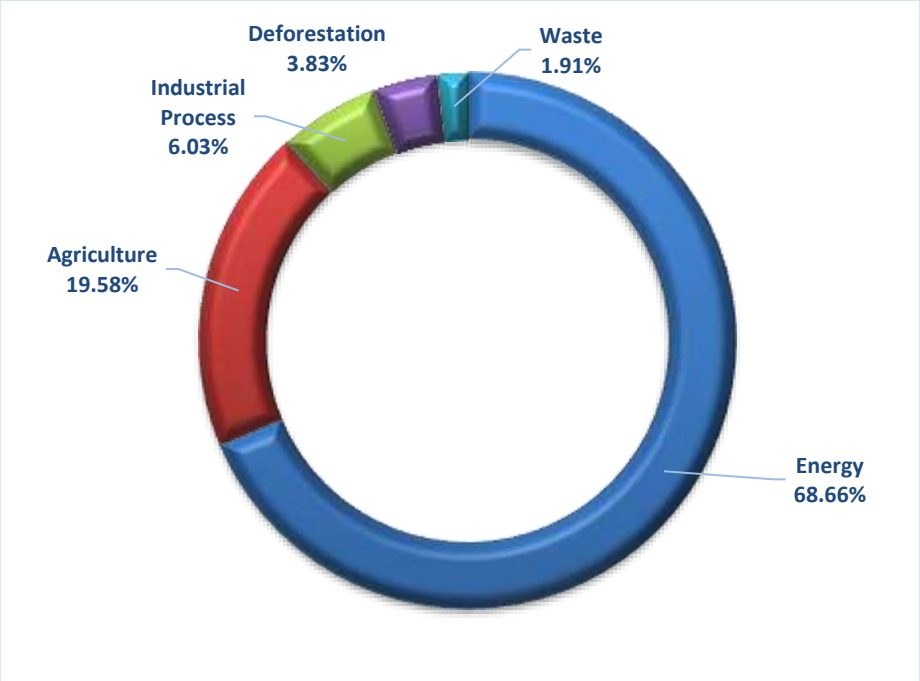

Figure 5. Greenhouse Gas emission in different sector

5. Emission related to Gross Domestic Product (GDP):

GDP in India grew by 357 percent between 1990 and 2014, according to WRI CAIT statistics. GHG emissions rose by 180 percent. In 2014, India released more GHGs per capita than any other country in the world. With that said, the Indian government has made major measures toward implementing a low carbon economy across multiple sectors and vowed in its Intended Nationally Determined Contribution (INDC) to cut GDP emissions intensity between 33 to 35 percent by 2030 from 2005 levels.[11]

Author thoughts: India is the most growing country in the field of renewable energy utilization in the world. It will be the great allies of self-reliant India to achieve the goal of one of the largest economies in the world.

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