ISSN: 2349 - 4891

International
Journal of Recent Research and Applied Studies
(Multidisciplinary Open Access Refereed e-Journal)

Importance and Contribution of Renewable Energy in the Energy Scenario of India

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Received 20th March 2019, Accepted 1st May 2019

Abstract

There is a high potential for generation of renewable energy from various sources- wind, solar, bio-mass, small hydro etc. the total potential for renewable power generation in country as on 31.03.2017 is estimated as 10,01,132MW. This includes solar power potential of 649342MW, wind power potential of 302251MW, bio mass power of 18601MW etc. the importance of renewable energy depends on the diminishing rate of the availability of conventional sources of energy. The estimated total consumption of raw coal by industry has increased from 502.82MT during 2007-08 to 841.56MT during 2016-17.India is the fourth largest energy consumer in the world after the United States, China, and Russia. A number of factors are to boost the future prospects of renewable energy in India.

Keywords: Renewable Energy, Wind, Solar, Power, Industry.

Introduction

In recent years, India's energy consumption has been increasing at a relatively fast rate due to population growth and economic development.

The total installed capacity of grid interactive renewable power which was 42849.38MW as on 31.03.2016 had gone up to 57244.23MW as on 31.03.2017 indicating growth of 33.59% during the period. Out of total installed generation capacity of renewable power as on 31.03.2017, wind power accounted for about 56.39%, followed by solar power 21.47% and biomass power 14.29%. Tamilnadu had highest installed capacity of grid connected renewable power followed by Maharashtra and Karnataka mainly on account of wing power.

Of the total consumption of electricity in 2016-17, industry sector accounted for the largest share of 40.15%, followed by domestic of 23.68%, agriculture 17.69% and commercial sectors amounting to 9.25%

The Indian energy sector is going through a major transformation. The accelerated pace of generation capacity addition over past few years, has led to a situation where in electricity supply potential is greater than the economic demand. The study indicates that, electricity demand is likely to increase from 1115BU in 2015-16 to 1692BU in 2022 &3175BU in 2030. Going ahead it is sure that share of renewable in the generation mix will significantly increase.

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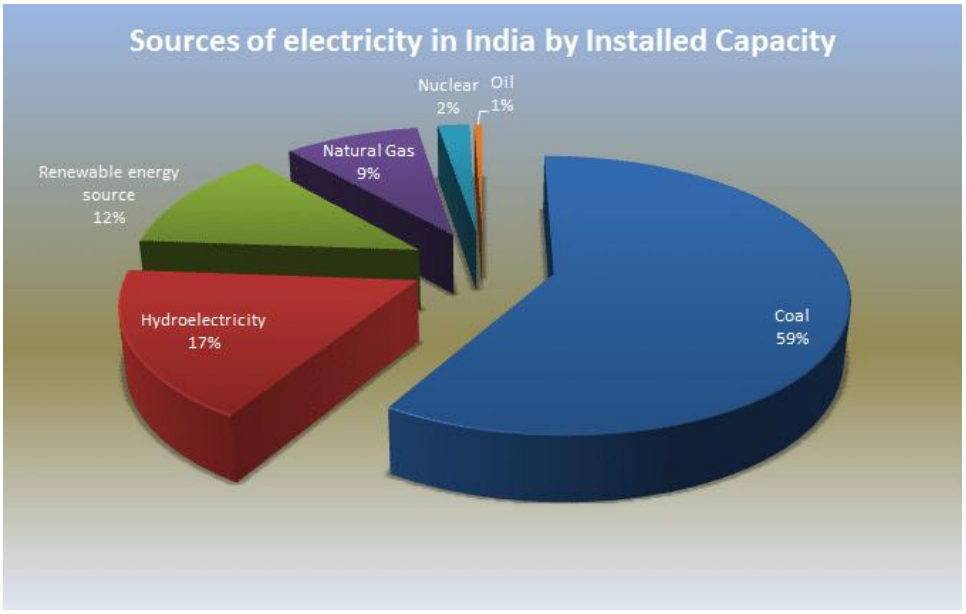
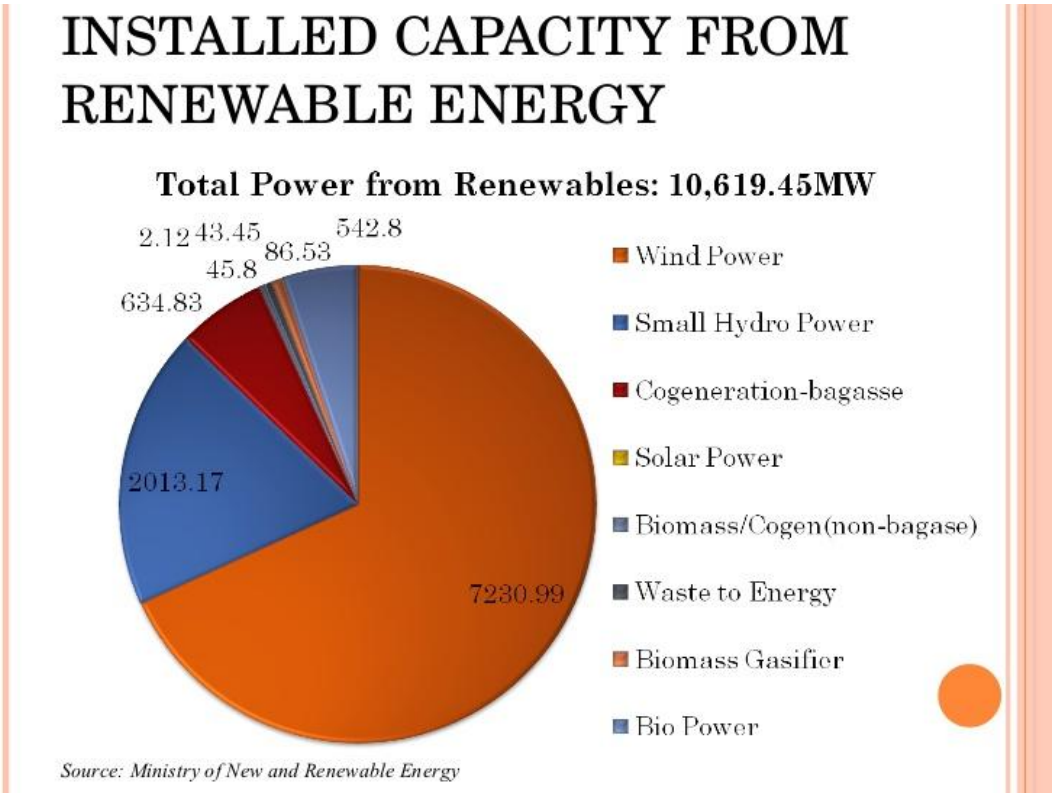
The capacity addition in various categories, especially renewables is expected to have a substantial impact on generation mix. Almost all the energy balance study look at the contribution of Renewable energy , other sources of energy put together and coal in meeting the assessed demand.

Installed capacity (MW)			
Source	**Existing**	**Anticipated**	
	2016	2022	2027
Solar	6763	100000	150000
Wind	26867	60000	100000
Other RE	9220	15000	25000
Coal	185172	248513	248513
Gas	25503	29969	29969
Nuclear	5780	9580	14380
Hydro	42801	58131	70131

Current Energy scenario

India became the world's third largest producer of electricity in the year 2013 with 4.8% global share in electricity generation. Despite growth in electricity generation, India continues to face energy deficit. As the economy grows in coming years the electricity demand will further rise as there is strong correlation between rise in energy consumption and economic growth.





Renewable energy

Renewable energy is derived from natural processes that are replenished constantly, the main ones being biomass, biogas, sun, wind, geothermal, tidal and small hydro power. India's electricity sector is amongst the world's most active players in renewable energy utilization.

Need of Renewable Energy

The current and foreseeable coal crisis at the domestic front, coupled with green house gas emission which are responsible in the atmosphere for trapping heat radiation from Earth's surface and ultimately raising the surface temperature. The increasing global temperature and energy requirement in the end, shift India's need to sustainable and economically efficient renewable energy resources along with improved energy efficiency measures.

Major Sources of renewable energy

Biomass: Wood is still our largest biomass energy resource. Other sources of biomass can be used including plants, residues from agriculture or forestry and the organic components. Plants and animal matters are used for production of fibres chemicals or heat. A total capacity of 9.54 GW of grid connected bio-power has been installed in the country as on October 2018 against a target of 10 GW bio-power by 2022. This includes 8.73 GW from bagasse cogeneration, 0.68 GW from non-bagasse cogeneration and 0.13 GW from waste to energy.

Biogas: Biogas is a mixture of methane, carbon dioxide, hydrogen and hydrogen sulphite, the major constituents being methane. Biogas is produced by anaerobic degradation of animal and plant wastes in the presence of water.

Tidal Energy: Tidal energy can be generated in two ways, tidal stream generators or by barrage generation. It is similar to the wind energy. Tidal energy is the only form of energy that derives directly from the motions of the Earth-Moon system.

Wind Energy: Wind energy is a conversion of wind energy by wind turbines into a useful form, such as electricity or mechanical energy. The country currently has the fourth highest wind installed capacity in the world with total installed capacity of 34.98 GW as on October, 2018.The recent assessment conducted by National Institute of Wind Energy (NIWE) indicates a gross wind power potential of 302 GW in the country at 100 meter above ground level.

Geothermal Energy: Geothermal energy is the heat from Earth. It's clean and sustainable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface and down even deeper to the extremely high temperatures of molten rock called magma. The steam or hot water comes out of the cracks in the Earth and when it doesn't find any way to come out, holes are drilled with pipes in it to gush the hot water out due to high pressure which turn the turbines of a generator to produce electricity.

Solar Energy: The sun offers an ideal energy source, unlimited in supply, expensive, which does not add to the earth's total heat burden and does not produce air and water pollutants. The country currently has the fifth highest solar installed capacity in the world with total installed capacity of 24.33 GW as on October, 2018.

Environmental impacts of renewable energy sources

Wind energy: In a large scale production, noise from the gear box or generator may cause problems. The noise created by a single turbine at a distance of 40m is around 55 – 65 db.

Solar energy: greenhouse gas emissions from 50MWsolarpowerplantis 7.8gCO_2/KWhe. The elements that are used in solar modules can also affect, but in a minute way.

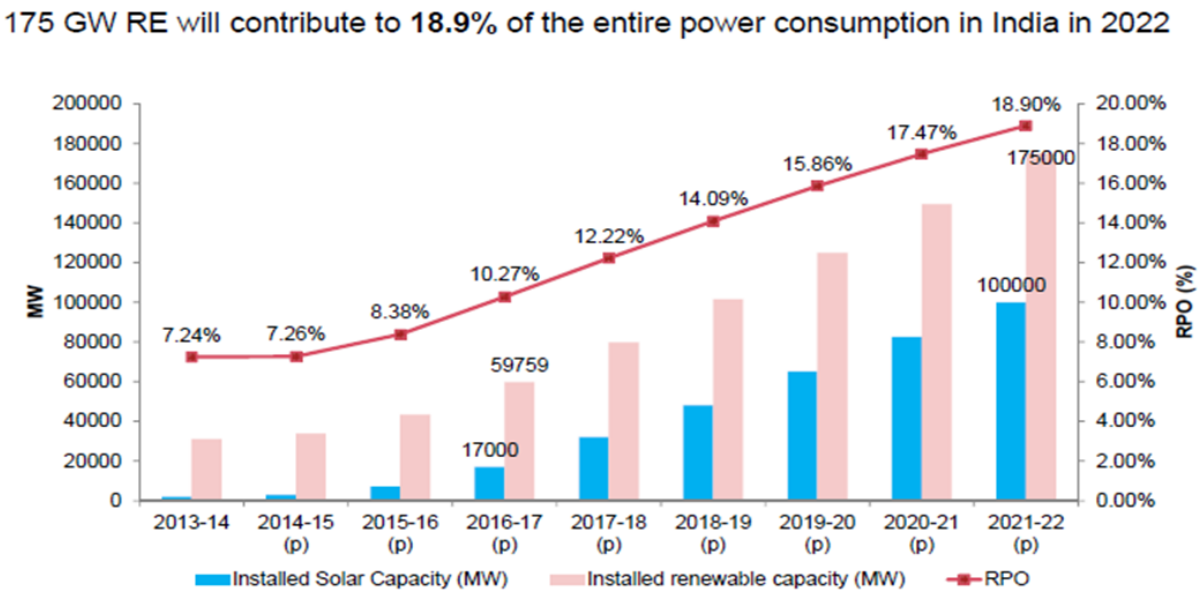
Geo-thermal energy: Here no fuels are combusted. But can cause contamination to ground water which in turn can affect while digging wells. Also the used water is injected back to ground.

Biomass energy: Burning of biomass releases carbon dioxide (CO2), a greenhouse gas. However, the plants that are the source of biomass capture a nearly equivalent amount of CO2 through photosynthesis while they are growing, which can make biomass a carbon-neutral energy source.

Benefits of Renewable Energy:

a) The high cost involved in the transmission process is avoided.
b) The fuel cost is nearly zero
c) Energy needed for basic things can be made available with reduced costs

Impact of renewable energy consumption in future energy scenario.



Share of Renewable Energy in current energy status

As per the yearend review of MNRE 2018, India attains global 4th and 5th positions in wind and solar power installed capacities; India now at 5th global position for overall installed renewable energy capacity. The Share of Renewable Energy in overall installed capacity in the country as on 31.10.2018 is given below (Source: MNRE Yearend review).

Source	Installed capacity (GW)	Percentage
Thermal	221.76 GW	63.84
Nuclear	6.78 GW	1.95
Hydro	45.48 GW	13.09
Renewable	73.35 GW	21.12
Total	**347.37**	100%

A total of around 73.35 GW of renewable energy capacity has been installed in the country as on October, 2018 from all renewable energy sources which includes around 34.98 GW from Wind, 24.33 GW from solar, 4.5 GW from Small Hydro Power and 9.54 GW from Bio-power.The cumulative renewable energy installed capacity has increased from 35.51 GW as on 31.03.2014 to 73.35 GW as on 31.10.2018 (increase of around 106% during last four &a half years).

Conclusion

For supporting and sustaining the economic growth and energy security, the energy consumption needs to increase in years to come. To meet the growing energy demand which is now dependable on coal and other sources, will become very difficult in view of availability as well as the environmental impacts these are causing. Thus the importance and dependence on renewable energy will grow steadily and rapidly in the future. Finally, renewable energy will play vital role not only in the generation mix but also the future power supply deficits.

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