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# Growth of the Renewable Energy in India

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**Abstract**

*The United Nations Environment Program's (UNEP) 'Global Trends in Renewable Energy Investment 2016' report ranks India among the very best ten countries at intervals the globe investment in renewable energy. The Renewable Energy sector has told the most effective alternative energy and energy capability addition over the last a pair of years. The world's largest alternative energy plant was established in state on 2016. Thirty four solar parks of combination capability of 20,000 MW are sanctioned for twenty one states. 356.63 crore rupees have been given to Solar Energy Corporation of India by the GOI for the proper functioning. 31,472 solar water pumps were place in 2015-16. 501 MW grid connected star top side comes area unit place in at intervals the country. 100% FDI is allowed beneath automatic route for comes of renewable power generation subject to provisions of "The Electricity Act, 2003".*

**Keywords:** Renewable energy, Solar energy, Wind energy.

## 1. Introduction

India is one in every of the countries with the most important production of energy from renewable sources. Within the electricity sector, renewable energy (excluding giant hydro) accounted for 20 percent of the entire put in power capability (71.325 GW) as of June 2018. The Giant hydro put in capability was 45.29 GW as of the March 2018, contributive to thirteen percent of the entire power capability. Not like most countries, India doesn't count giant hydro power whereas accounting for renewable energy targets because it comes below the older Ministry of Power rather than Ministry of recent and Renewable Energy. Thus, renewable energy together with giant scale hydro-power presently adds up to quite thirty three percent of the entire put in power capability in India.

Wind power capability was 34,046 MW as of the March 2018, creating India the fourth-largest wind generation producer within the world. The country includes a robust producing base in wind generation with twenty manufactures of fifty three totally different turbine models of international quality up to 3 MW in size with exports to Europe, the USA and different countries. Wind or Solar PV paired with four-hour battery storage systems is already price competitive, while not grant, as a supply of dispatch able generation compared with new coal and new gas plants in India.

The government target of putting in 20 GW of solar energy by 2022 was achieved four years before schedule in Jan 2018, through each solar park also as roof-top star panels. India has set a replacement target of achieving 100 GW of solar energy by 2022. Four of the highest seven largest solar parks worldwide are in India together with the second largest solar park within the world at Kurnool, province, with a capability of one thousand MW. The world's largest solar energy plant, Bhadla solar Park is being made in Rajasthan with a capability of 2255 MW and is anticipated to be completed by the top of 2018. Total renewable energy which incorporates giant hydro with wired storage generation is sort of 17.5% of total utility electricity generation in India throughout the year 2017-18. Solar, wind and run of the watercourse hydro being should run power generation and setting friendly, base load coal dismissed power is reworking in to load following power generation. Additionally, renewable peaking hydro power capability conjointly caters peak load demand on every day. The year wise renewable energy generation is given in the table-1.

Table-1

| **Year wise renewable energy generation (GWh)** | | | | |
|---|---|---|---|---|
| **Source** | **2014-15** | **2015-16** | **2016-17** | **2017-18** |
| **Large Hydro** | 129,244 | 121,377 | 122,313 | 126,134 |
| **Small Hydro** | 8,060 | 8,355 | 7,673 | 5,056 |
| **Solar** | 4,600 | 7,450 | 12,086 | 25,871 |
| **Wind** | 28,214 | 28,604 | 46,011 | 52,666 |
| **Bio mass** | 14,944 | 16,681 | 14,159 | 15,252 |
| **Other** | 414 | 269 | 213 | 358 |
| **Total** | **191,025** | **187,158** | **204,182** | **227,973** |
| **Total utility power** | 1,105,446 | 1,168,359 | 1,236,392 | 1,302,904 |
| **% Renewable power** | 17.28% | 16.02% | 16.52% | 17.50% |

Biomass power from biomass combustion, biomass chemical process and pulp co-generation reached 8.3 GW put in capability as of March 2018. Family kind biogas plants reached 3.98 million.

Renewable energy in India comes below the scope of the Ministry of recent and Renewable Energy (MNRE). India was the primary country within the world to line up a ministry of non-conventional energy resources, within the early Eighties. Solar energy Corporation of India is chargeable for the event of alternative energy business in India. Electricity is run severally by the Ministry of Power and not enclosed in MNRE targets.

India is running one in all the biggest and most formidable renewable capability growth programs within the world. Newer renewable electricity sources are projected to grow massively by nearer term 2022 targets, together with a quite doubling of India's giant alternative energy capability and an

virtually fifteen fold increase in solar energy from Apr 2016 levels. Such formidable targets would place India among the planet leaders in renewable energy use and place India at the centre of its "Sunshine Countries". International solar Alliance project are promoting the expansion and development of solar energy internationally to over one hundred twenty countries. India set a target of achieving forty percent of its total electricity generation from non-fossil fuel sources by 2030, as explicit in its supposed across the country Determined Contributions statement within the Paris Agreement. A blueprint draft revealed by Central Electricity Authority comes that fifty seven percent of the entire electricity capability are going to be from renewable sources by 2027. Within the 2027 forecasts, India aims to own a renewable energy put in capability of 275 GW, additionally to 72 GW of hydro-energy, 15 GW of energy and nearly 100 GW from "other zero emission" sources. Over the years, renewable energy sector in India has emerged as a big player within the power generation capability. Power is one in every of the foremost crucial elements for the economic process and welfare of states. The existence and therefore the development of adequate power sector are important for property growth of the Indian economy. India's power sector is one in every of the foremost varied within the world. Sources of power generation vary from typical sources like coal, lignite, gas, and oil to viable non- typical sources like wind, solar, hydro and nuclear. The demand for the electricity within the country has augmented quickly and is anticipated to grow additional within the returning years. So as to satisfy this increasing demand for electricity within the country, large addition to the put in generating capability is needed. There has been an evident impact of renewable energy within the Indian economy throughout the last 5 years. Renewable energy sector in India has practiced tremendous changes within the policy framework throughout the previous few years. Mainly, the solar energy and Wind energy sectors are experiencing accelerated and bold plans to extend the contribution of those sectors out of the full energy contribution in India. India ranks third among forty countries in Renewable Energy Country Attractiveness Index 2016, with sturdy focus by the govt. on promoting renewable energy in India.

India has a calculable renewable energy potential of regarding 900 GW from sources like Wind – 102 GW, Bio-energy – 25 GW, little Hydro – 20 GW and solar energy – 750 GW. Renewable energy enjoys 15.90% shares in total put in capability in India. As of March 2017, renewable energy put in capability totaled to 57,260 MW. Renewable energy has been witnessing over 20 percent growth within the last 5 years. From the full renewable power put in capability of 14,400 MW at the start of 2009, it's exaggerated to the capability of 38,822 MW at the top of December, 2015 to 57,260MW by March, 2017. Wind energy continues to dominate India's renewable energy business accounting for 29151.29 MW by March, 2017 from 25,088 MW by December, 2015.

Renewable power put in capability has steady accrued over the time. Wind generation in truth holds the dominant position in current put in capability in total renewable power put in capacities. There has been a continuing growth within the capacities in Republic of India throughout the twelvemonth

2007-15, starting from 9389 MW in 2007 to 34,351MW in 2015. Wind generation and alternative energy dominates the full renewable energy potential in Republic of India taking the states altogether. Estimates of wind energy potential indicate that its potential is way higher across Gujarat and province. Whereas, the solar power potential indicate that it's potential is way higher across Jammu and Kashmir area and Andhra Pradesh.

**2. Developments**

According to information discharged by the Department of Industrial Policy and Promotion (DIPP), FDI inflows within the Indian non-conventional energy sector between Apr 2000 and June 2018 stood at US$ 6.84 billion. Over US$ 42 billion has been endowed in India's renewable energy sector since 2014. Within the half of 2018, investments in clean energy in India reached US$ 7.4 billion.

Some major investments and developments within the Indian renewable energy sector are as follows:

- ✓ Inter-state distribution of alternative energy was started in August 2018.
- ✓ In the primarily India put in one MW of solar capability each hour.
- ✓ With twenty eight deals, clean energy created up twenty seven per cent of US$ 4.4 billion merger and acquisition (M&A) deals that passed in India's power sector in 2017.
- ✓ In March 2018, Renew Power finalized a deal calculable at US$ 1.55 billion to accumulate Ostro Energy and build it the biggest renewable energy company in India.
- ✓ World's largest solar park named 'Shakti Sthala' was launched in state in March 2018 with the investment of Rs 16,500 crore (US$ 2.55 billion).
- ✓ Solar sector in India received investments of over US$ 10 billion in CY 2017.
- ✓ Private Equity (PE) investments in India's wind and alternative energy have redoubled by forty seven per cent in 2017 (January one to September 25) to US$ 920 million, across 9 deals, as compared to US$ 630 million returning from ten deals throughout the corresponding amount in 2016.

**3. Government Initiatives**

Some initiatives by the govt. of India to spice up the Indian renewable energy sector are as follows:

- ✓ A new Hydropower policy for 2018-28 has been written for the expansion of hydro comes within the country.
- ✓ The Government of India has proclaimed plans to implement a US$ 238 million National Mission on advanced ultra-supercritical technologies for cleaner coal activity.
- ✓ The Ministry of New and Renewable Energy (MNRE) has set to supply custom and excise duty edges to the star upper side sector, that successively can lower the price of fitting likewise as generate power, so boosting growth.

- ✓ The Indian Railways is taking accrued efforts through sustained energy economical measures and most use of fresh fuel to chop down emission level by thirty three per cent by 2030.

**4. Achievements in the Sector**

- ✓ Solar capability has magnified by eight times between FY14-18. India has got another record of 11,788 MW of renewable energy capability in 2017-18.
- ✓ A total of forty seven solar parks with generation capability of 26,694 MW are approved in India up to 2018, out of capability of 4,195 MW has been commissioned.
- ✓ Inter-state distribution of wind generation was started in August 2018.
- ✓ Power generation from renewable energy sources (excluding massive hydro) in India reached record one hundred and 1.84 billion units in FY18 and has reached eighty 1.15 billion units between Apr-Oct 2018.

**5. Growth Drivers**

The government of India through Ministry of New and Renewable Energy (MNRE) is enjoying a proactive role in promoting the adoption of renewable energy resources by giving varied incentives like generation-based incentives (GBIs), capital and interest subsidies, viability gap funding (VGF), concessional finance, commercial enterprise incentives etc.

The National Solar Mission aims to market the event and use of alternative energy for power generation and different uses, with the last word objective of constructing alternative energy vie with fossil-based energy choices.

The objective of the National Solar Mission is to scale back the price of solar energy generation within the country through semi permanent policy, giant scale readying goals, aggressive R&D and therefore the domestic production of vital raw materials, parts and merchandise.

The government has created a liberal atmosphere for foreign investment in renewable energy comes. The institution of a zealous institution – the Indian Renewable Energy Development Agency (IREDA), makes for revived impetus on the promotion, development and extension of monetary help for renewable energy and energy conservation comes.

Renewable energy is changing into more and more cost-competitive as compared to fossil fuel-based generation, just like the costs of star modules have declined by 80 percent since 2008.

Reserve Bank of India (RBI) has revised the rules for all scheduled business banks as well as renewable energy within the classes priority sector, additionally to existing classes creating vital inroads for renewable energy within the priority sector disposal, additionally bank loans for star upside systems to be treated as a region of home loan/ home improvement loan with succeeding tax edges.

Focus on ability development of workforce: "SuryaMitra Scheme" launched in could 2015 to make zero.05 million trained personnel in five years (2015-16 to 2019-20). About 6653 SuryaMitras are trained beneath the program as of February, 2017 and making job opportunities for at leisure youth.

**6. Sector Policies**

- The Target of the Solar Energy Corporation of India:

The mandate of the SECI permits wide-ranging activities to be undertaken with overall read to facilitate the implementation of the National Solar Mission and also the accomplishment of targets set in that. The SECI has the target of developing renewable energy (RE) technologies and guaranteeing comprehensive RE power development throughout Asian nation.

- National Offshore Wind Energy Policy, 2015:

Under this Policy, the Ministry of New& Renewable Energy (MNRE) has been approved to explore and promote preparation of offshore wind farms within the Exclusive Economic Zone (EEZ) of the country and also the National Institute of Wind Energy (NIWE) has been approved because the Nodal Agency for development of offshore wind energy within the country and to hold out allocation of offshore wind energy blocks, coordination and allied functions with connected ministries and agencies. It'd pave the approach for offshore wind energy development together with, fitting of offshore wind generation comes and analysis and development activities, in waters, in or adjacent to the country, up to the seaward distance of two hundred transport Miles (EEZ of the country) from the bottom line. The policy can offer a level taking part in field to all or any investors/beneficiaries, domestic and international. It's planned to line up the primary offshore wind generation project off the Gujarat coast before long.

- The Policy for Grid connected star Roof-top Projects:

Joint Electricity restrictive Commission (JERC)/State Electricity restrictive Commissions (SERC) of twenty nine States/UTs particularly Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Meghalaya, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, state, Uttarakhand, province, Andaman & Nicobar and Lakshadweep Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, city and Pondicherry have notified regulations/tariff order for grid connected star top side comes.

- State Initiatives:

State Electricity restrictive Commissions in Andhra Pradesh, Haryana, Punjab, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Gujarat, Kerala, Punjab, Orissa and province have declared discriminatory tariffs for purchase of power from wind generation comes.

- New Solar Policy in 2016 – Delhi, Himachal Pradesh and Haryana.

- New Solar Policy in 2015 – Telangana Jharkhand, Gujarat, and Andhra Pradesh.

## 7. Conclusion

The UN Environment Program's (UNEP) 'Global Trends in Renewable Energy Investment 2016' report ranks India among the highest 10 countries within the world investment in renewable energy. The Renewable Energy sector has experienced the best solar energy and alternative energy capability addition over the last 2 years. The world's largest solar energy plant was established in state on 2016. 34 solar parks of combination capability of 20,000 MW are sanctioned for twenty one states. INR 356.63 crores has been provided to Solar Energy Corporation of India for the outcomes. 31,472 solar water pumps were put in 2015-16. 501 MW grid connected star upper side comes are put in within the country. 100% FDI is allowed underneath automatic route for comes of renewable power generation subject to provisions of "The Electricity Act, 2003".

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