A Review of Renewable Energy Scenario in India

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ABSTRACT- *Energy being a strategic commodity plays a significant role in social as well as economic development of any country. Renewable energy sources can play a vital role to fulfill the requirement of energy. Most of the power generation in India is carried out by conventional energy sources, like coal and mineral –based power plants which contribute heavily to greenhouse gases emission. This paper reviews the recent renewable energy scenario of India.In this paper, the status of renewable energy, National Policies on Renewable energy, different challenges & issues are discussed in detail.*

Key words: Renewable energy, Solar, Wind, Policies, Challenges

INTRODUCTION:

India was the first country in the world to set up a ministry of non-conventional energy resources, in the early 1980s. India is running one of the largest and most ambitious renewable capacity expansion programs in the world. India is one of the countries with the largest production of energy from renewable sources. The government target of installing 20 GW of solar power by 2022 was achieved four year ahead in January 2018, through both solar parks as well as roof-top solar panels. India has set a new target of achieving 100 GW of solar power by 2022. Four of the top seven largest solar plants worldwide are in India including the second largest solar park in the world at Kurnool, Andhra Pradesh, with a capacity of 1000 MW. Newer renewable electricity sources are projected to grow massively by nearer term 2022 targets, including a more than double India's wind power capacity and an almost 15 fold increase in solar power from April 2016 levels. India set a target of achieving 40% of its total electricity generation from non-fossil fuel sources by 2030.

Indian Renewable Energy status & Growth:

India is one of the countries with the largest production of energy from renewable sources. In the electricity sector, renewable energy accounted for 20% of the total installed power capacity (69.02 GW) as of 31 March 2018.[1] Recently renewable energy sector in India has emerged as a significant player in the grid connected as power generation capacity. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs. Renewable energy has to play a vital role in achieving energy demand in the years ahead and to resolve the issue of being dependent only on fossile fuels.

There has been a visible impact of renewable energy in the Indian energy scenario during the last five years. Renewable energy sector landscape in India has, during the last few years; India has tremendous changes in the policy framework with a long term vision and ambitious plans to increase the contribution of renewable energy. India also enlarging the scope of the Jawaharlal Nehru National Solar Mission symbolizes both, and indeed encapsulates the vision and ambition for the future. This transformational change is, perhaps, the highlight of the last five years of activities under the Mission. In addition, the launching of Renewable Energy Certificate (REC) mechanism helps in the creation of a Pan-India renewable energy market.

RENEWABLE ELECTRICITY GENERATION:

Total renewable energy which includes large hydro with pumped storage generation is nearly 17.5% of total utility electricity generation in India during the year 2017-18 are as under.[source:MNRE]

Source	2015-16	2016-17	2017-18
Large hydro	121,377	122,313	126,134
Small Hydro	8,355	7,673	5,056
Solar	7,450	12,086	25,871
Wind	28604	46,011	52,666
Total power	1,168,359	1,236,392	1,302,904
%Renewable	16.02%	16.52%	17.50%

[Source: MNRE website]

Over the years, renewable energy sector in India has emerged as a significant player in the grid connected power generation capacity. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy access. There has been a visible impact of renewable energy in the Indian energy scenario during the last five years. Renewable

energy sector landscape in India has, during the last few years, witnessed tremendous changes in the policy framework with accelerated and ambitious plans to increase the contribution of solar energy. There is a perception that renewable energy can now play a significant role, as also, there is a confidence in the technologies and capacity to do so. Enlarging the scope of the National Solar Mission symbolizes both, and indeed encapsulates the vision and ambition for the future. This transformational change is, perhaps, the highlight of the last five years of activities under the Mission. 1.5 The Government of India has taken several initiatives during the last two years such as introduction of the concept of solar parks, organizing RE-Invest 2015—a global investors' meet, launching of a massive grid-connected rooftop solar programme, earmarking of Rs.38,000 crore for a Green Energy Corridor, eight-fold increase in clean environment cess from Rs.50 per tonne to Rs.400 per tonne, solar pump scheme with a target of installing 100,000 solar pumps and programme to train 50,000 people for solar installations under the Surya Mitra scheme, no inter-state transmission charges and losses to be levied for solar and wind power, compulsory procurement of 100 per cent power from waste to energy plants, and Renewable Generation Obligations on new thermal and lignite plants, etc. The Ministry of New and Renewable Energy (MNRE) has taken several steps to fructify Government's dream of clean energy. The largest renewable capacity expansion programme in the world is being taken up by India. The government is aiming to increase share of clean energy through massive thrust in renewable.

National Policies & Initiatives taken by Government to encourage Renewable Energy:

There are so many initiatives are taken by the Government to increase the dependency on renewable energy.

Major Initiatives taken by Ministry are as under.

1. Solar Power

➔Under National Solar Mission, the target for setting up solar capacity increased from 20 GW to 100 GW by 2021-22. Target of 10,000 MW, set for 2017-18 which will take the cumulative capacity over 20GW till 31st March 2018.

➔ Capacity of the scheme for "Development of Solar Parks and Ultra Mega Solar Power Projects" has been enhanced from 20,000 MW to 40, 000 MW.35 solar parks of aggregate capacity 20,514 MW have been approved in 21 States.

➔Kurnool Solar Park in Andhra Pradesh with 1000 MW capacity has already been commissioned and is operational. With commissioning of1000 MW capacity at single location, Kurnool Solar Park has emerged as the World's Largest Solar Park.

➔650 MWcapacity commissioned in Bhadla Phase-II Solar Park in Rajasthan.

➔250 MWcapacity commissioned in Phase –I of Neemuch Mandsaur Solar Park (500 MW) in Madhya Pradesh.

➔3 new solar parks have been approved in this year at Rajasthan (1000 MW), Gujarat (500 MW) and Mizoram (23 MW) after issue of Guidelines for Enhancement of capacity from 20, 000 MW to 40, 000 MW under Solar Park Scheme.

➔Solar tariff has declined to lowest level of Rs 2.44 /kWh.

2. Solar Rooftop

Ministry is implementing Grid Connected Rooftop and Small Solar Power Plants Programme which provides for installation of 2100 MW capacity through CFA/ incentive in the residential, social, Government/PSU and Institutional sectors.

Under the programme, central financial assistance up to 30% of bench mark is being provided for such projects in Residential, Institutional and Social sectors in General Category States and up to 70% of the benchmark cost in Special Category States. For Government sector, achievement linked incentives are being provided. Subsidy/CFA is not applicable for commercial and industrial establishments in private sector.

3. Amendments in Tariff Policy to promote Renewable Energy

- Enhancement in Solar RPO to 8% by March 2022.
- Introduction of RGO for New coal/lignite based thermal plants after specified date.
- No inter-state transmission charges and losses to be levied for solar and wind power.
- Further, pursuant to the revised tariff policy, the Ministry of Power on 22ndJuly 2016 has notified the long term growth trajectory of RPO for solar and non-solar energy for next 3 years 2016-17, 2017-18 and 2018-19 are as under.

LONG TERM TRAJECTARY	2016-17	2017-18	2018-19
NON SOLAR	8.75%	9.50%	10.25%
SOLAR	2.75%	4.75%	6.75%
TOTAL	11.50%	14.50%	17.00%

[Source: MNRE website]

4. IREDA

Indian Renewable Energy Development Agency (IREDA) has been awarded Mini Ratna Status and the authorised capital of IREDA is increased from Rs.1000 Cr. to Rs.6000 Cr.

5. Green Energy Corridor

Intra-State Transmission System is being implemented by eight renewable rich States (Tamil Nadu, Rajasthan, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Himachal Pradesh and Madhya Pradesh) with total project cost of Rs. 10141 crores, with funding mechanism consisting of 20% State Equity, 40% Government of India Grant (total 4056.67 crores) and 40% Kwh loan (500 million EUR).[6] The purpose is to evacuate approx. 20,000 MW of large scale renewable power and improvement of the grid in the implementing States.

6. LEADING ROLE PLAY IN RENEWABLE ENERGY

India is taking a leading role in the International Renewable Community and was a leading country along with France in formation of International Solar Alliance (ISA), an international body of 121 countries lying between Tropic of Cancer and Tropic of Capricorn. 47 countries have signed the Framework Agreement and 18 countries have ratified it within 1 year of opening of Framework for signature. Accordingly, ISA became a legal entity on 6.12.2017, with its headquarters in India.

7. FDI

Foreign Direct Investment (FDI) up to 100% is permitted under the automatic route for renewable energy generation and distribution projects subject to provisions of The Electricity Act, 2003.

In order to achieve the targets, various initiatives have been taken by the Government which interalia include:

- Announced a cumulative target of 175 GW renewable energy based electric installed capacity of 100 GW solar power installed capacity;
- Issued guidelines for procurement of solar and wind power through tariff based competitive bidding process;

Challenges Ahead for Renewable Energy:

There are some challenges also ahead for renewable energy as far as India is concern. Some major issues related to it mention below.

Intermittency: Renewable energy is as an intermittent source of electricity. **Intermittency** can mean the extent to which a power source is unintentionally stopped or unavailable, but intermittency is frequently used as synonym of variability, which is the extent to which a power source may exhibit changes in output.

Solar Energy: Intermittency inherently affects solar energy, as the production of electricity from solar sources depends on the amount of sunlight at a given place and time. Solar output varies throughout the day and through the seasons, and is affected by dust, fog, cloud cover, frost or snow. In the absence of the sun it cannot produce power in night or bed weather conditions.

Wind Energy: Wind based power is a variable resource and the amount of electricity produced by the plant will depend on wind speeds, air density, and turbine characteristics. If wind speed is too low (less than about 2.5 m/s) then the wind turbines will not be able to make electricity, and if it is too high (more than about 25 m/s) the turbines will have to be shut down to avoid damage. While the output from a single turbine can vary greatly and rapidly as local wind speeds vary, as more turbines are connected over larger and larger areas the average power output becomes less variable.

Renewable can be integrated into the grid by taking measures like renewable energy generation forecasting; co-ordinated project development; grid planning and grid strengthening; reducing the variability and uncertainty of RE generation through aggregation over broader geographic regions; creating flexible capacity, spinning reserves and ancillary services market; and properly defining RE grid integration standards and regulations.

High cost of financing: Renewable energy technologies have high capital costs but very low operating costs .However the cost of finance (currently ranging from 12–14%) forms a significant component of the power tariff from these sources.. Financing costs depends on the risk perceived by funding institutions and higher perceived risks result in more stringent financial conditions. The relatively high cost and low availability of debt in India has significantly increased the cost of renewable energy projects which is a major barrier to the expansion of the renewable sector.

Off taker risk: The credibility of the distribution companies is a critical issue and plays an important role in determining the bankability of a PPA (Power Purchase Agreement). Very few discoms are in good financial health. When discoms have poor financial health, the risk of off-taker default and delayed payments is high. Weak financials of discoms will keep them from meeting commitments and affects the effectiveness of instruments that have been put in place for deployment of renewable. RPO must take a strong action for proper functioning the renewable sector. It will encourage the renewable energy.

Permits and Land acquisition: There is a need to streamline and accelerates well as standardize the acquisition of land permits, clearances, and other administrative hurdles that the developer must cross. These relate particularly to land acquisition and environmental permitting. Acquisition of land is a critical aspect for infrastructure development and the approval processes and inability of the state governments to provide an effective single-window clearance to developers has caused considerable challenges. Due to lack of inter department coordination like revenue department, state pollution control board, Electricity provider company has led to time and cost overruns resulting in high transaction costs. So system must be developed like one single window to complete the whole process very easily for permission and land acquisition.

Financing for off grid power:

- With less than 1% of solar PV financing in India invested in the off-grid segment, it has a very small share of the total market. Current financing for the segment is a patchwork of international donor grants, debt from international development finance institutions and owner equity. These sources are at best able to provide early stage funding for players.
- Additionally, due to high distribution and customer acquisition costs and the weak payment capacity of off-grid customers, margins for players across the segment are typically very low at less than 5%, with many failing to breakeven.
- There have been a number of barriers preventing scaling up of the subsidy mechanism for encouraging investment in the off-grid energy sector. There is a large paperwork require to reduce the cost of renewable to get subsidy from the Government so this process must be streamline and make it as simple as possible so subsidy will be get as soon as possible and company will get attracted towards the renewable in the welfare of the society.
- Companies can face interest rates of 13-18% in the domestic market which are very high and foreign loans can also only be used on a project basis according to regulations. Most banks are not willing to lend even at higher interest rates because sizes of loans are considered too small.
- Finally, Renewable energy making enormous progress in India, but it must not be driven by targets, Govt supports and economics rather than a consumer push. So it's our responsibility to march towards clean source of energy and making India shine in the world by taking leadership in this sector.

CONCLUSION:

- There is an urgent need for transition from petroleum-based energy systems to renewable resources to decrease reliance on depleting reserves of fossil fuels and to mitigate climate change. The investors are also seeing a great opportunity as India is emerging as a leader in emerging green economy. Renewable energy has the potential to create many employment opportunities at all levels, especially in rural areas. India is a nation in transition considered as an "emerging economy" in the world.
- With increasing focus on renewable projects, the renewable energy market is expected to grow significantly. Some of the programmes like the National Solar Mission, National Mission for Enhancement Energy Efficiency, National Mission for Sustainable Habitat, National Water Mission have been widely successful to promote renewable energy technologies in the country. Renewable energy has brought significant changes in the Indian energy scenario. With increasing focus on renewable energy India will definitely become world leader in renewable energy.

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