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Wind energy developments and policies in India: A review

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Abstract:

Wind energy is the great spectacular, clean and economical energy source among all the renewables. Since last few years this energy has been most commercialized in the worldwide and many portion of the nations have begun their projections on this area. The nations like China, USA, Germany, India and Spain have leaded by the installation capacities of wind energy in the international markets. During the last decade, India shared the fourth highest wind energy capacities in the world. India government has been providing the attractive policies for the resident wind energy manufacturing companies with the developers. This paper presents an exhaustive compressive overview on current developments of wind energy, potentials. The contributions of wind manufacturers and developers, mismatching between the generating power and installed capacities, policies and its impacts and future prospectus of wind energy developments in India and worldwide has also been presented.

Keywords **—Wind energy, Wind energy developments, Wind energy policy.**

I. INTRODUCTION

As indicated by the estimations done by International Energy Agency (IEA), the worldwide energy demand is rising by 1.6% every year, with almost around 65% of increment from developing countries [1]. Also the demand scenario, the total energy consumptions will be increasing up to 75% from the year 2008–2035 [2].Since nearly 1985, fossil fuels have taken over the other energy sources however, it causes to grow up the carbon dioxides rates in the climate which reasons for the environmental pollutions. Over, the energy production from non-renewable energy sources are additionally going to reduces in everyday on the grounds that the deficiency of the sources according to the necessities. It follows that when choosing economically viable wind energy conversion system of very high power rating, one may wisely inspect the points of interest in perspective of the lessened number of units that should be introduced [3].

Wind energy is accessible for all intents andpurposes wherever on Earth, however there are wide deviations in wind power and stability. A wind turbine's blade change over kinetic energy from the blow of air into rotational energy; a generator at that point convert this rotational energy to electrical power. The wind energy that is accessible directly proportional to the dimensions of the rotor and to the cubing of the wind speed. Ideally, when the wind speed is doubled, the wind power increments by a factor of eight [4].

The three most important fundamentals of wind energy generation are the turbine type (vertical/horizontal-axis), establishment character-istic (onshore/ offshore) and grid connectivity (connected/ stand-alone). Most vast wind turbines are up-wind horizontal-axis turbines with three blade. Inventive plans for vertical-axis wind turbines are being uses in urban areas, especially in India [5]. With aerodynamic power loss of 50-60% at the blade and rotor, mechanical power loss of 4% at the gear apparatus, and a further 6% electromechanical power loss at the generator, generally generation efficiency is normally 30-40% [3].

One assessment recommends that there is 1 million GW of wind energy accessible from the total land space of the Earth, and if just 1% of this land was used at practicable productivities of useful energy this would take care of worldwide power demand (See fig.1). While most wind energy is presently obtained from onshore and offshore wind farms are becoming more prominent as a bigger asset territory with low natural effect [6].

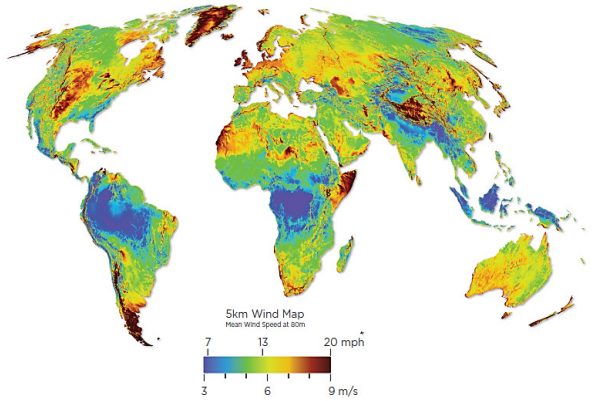

Fig.1: Global mean wind speed at 80 m [7]

Wind atlas is supportive to conclude the promising locations for large scale production of power through wind turbine [3].

II. Global Scenario

In our principle scenario, a 30% growth in worldwide energy demand to 2040 means an expansion in utilization for every single present day fuel, however the worldwide totals cover a large number of different patterns and significant exchanging between powers. Besides, hundreds of millions of people are still left in 2040 without essential energy facilities [8].

Compared with the period 2000-2015, when near 70% of overall supply speculation went to fossil fuels, this is signifies to important reallocation of capital, particularly given the desire of proceeded with cost decreases for key sustainable power source technologies. The power sector is the concentration of numerous Paris initiates: about 60% of all new power production ability to 2040 in our core situation originates from renewables, almost half of this from wind and solar PV, by 2040, the mainstream of renewables-based power generation is competitive without any subsidies. In the four largest power markets (China, the United States, the European Union and India), variable renewables energy become the largest source of power generation. The scenarios are defining in consultation with the specialists, and they represent conditions in which the specialists believe that there will be future changes in the civilization, technology changes, inside changes, and clear-cut preparations for energy storage technology option in the energy production [9, 10].

Rapidly development, especially in the power sector, is driven by a few elements, including the enhancing cost-competiveness of renewable technologies, committed policy activities, better access to financing, energy security and ecological concerns, developing interest for energy in creating and rising economies, and the requirement for access to modern energy. Therefore, new markets for both concentrated and conveyed renewable energy source are developing in all areas [11].

An estimated 147 gigawatts (GW) of renewable power capacity was included in 2015, the biggest yearly increment ever, while renewable heat capacity expanded by around 38 gigawatts thermal power (GWth), and aggregate biofuels creation also go up. This development happened despite reducing worldwide costs for every fossil fuel, progressing non-renewable energy source endowments and different difficulties confronting renewables, including the reconciliation of rising offers of renewable power generation, policy and political unpredictability, administrative obstructions and economic constraints [12].

Wind energy has turned into a standard source of energy in many places on the planet. This takes into consideration quick establishment and extension of the business. Onshore wind farms are regularly subject to a few confinements and protests like obstacles with structures, restricted accessibility of terrains, land utilize question, negative visual effect, noise etc. Be that as it may, the offshore wind farms does not have every issues. It has higher and more reliable wind speeds, and therefore, higher efficiency. In offshore, there is a strong potential advantage at higher tip speeds, and less acoustic outflow levels and its effect on society. Offshore

wind turbines are expensive than onshore wind turbines. . Only 1.5% of the total installed capacity in the global is offshore wind turbines [13].

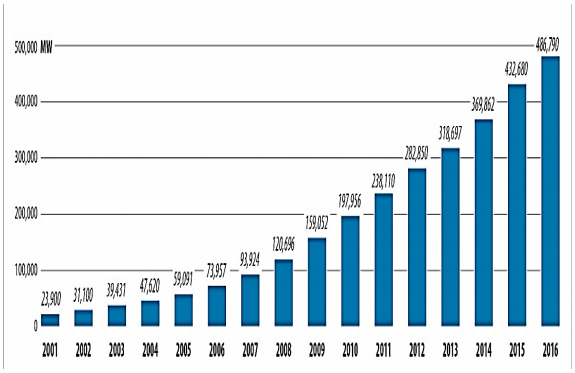

Fig.2: Global cumulative installed wind capacity includes all capacity, connected and not connected to the grid 2001-2016 [GWEC 2017] [14]

The worldwide wind capacity become 486'661 MW by the end of 2016, out-of-reach 54'846 MW were added in 2016. This signifies a growth rate of 17.2 % in 2015. All wind farms installed worldwide by the end of 2016 can generate around 5 % of the world's electricity power demand. The 23.4 GW in new installations figure in China powered this growth in large part. But also due to smaller than predictable markets in Brazil, Mexico, Canada, and Africa – South Africa in precise. However, most of these concerns are cyclical and we suppose to recovery in all those markets in 2017 [14].

Installations in Asia once again led global markets, with Europe in the second spot, and North America closing the gap with Europe, in third place. By the end of last year nine countries had more than 10,000 MW of installed capacity including China (168,732 MW), the US (82,184 MW), Germany (50,018 MW), India (28,700 MW), Spain (23,074 MW), UK (14,543 MW), France (12,066 MW), Canada (11,900 MW), Brazil (10,740 MW) and Italy (9,257).

China will cross the 200,000 MW mark in 2018, adding another innovative to its already extraordinary history of renewable energy development since 2005. This year it bound its position on the leader board.

TABLE I
TOP10 COUNTRIES BY TOTAL WIND INSTALLATIONS [WWEA-2017] [15]

Position 2017	Country/region	Total capacity (MW)	% Share
1	China	168,690	34.7
2	United States	82,184	16.9
3	Germany	50,018	10.3
4	India*	28,700	5.9
5	Spain	23,074	4.7
6	United Kingdom	14,543	3.0
7	France	12,066	2.5
8	Canada	11,900	2.4
9	Brazil	10,740	2.2
10	Italy	9,257	1.9
	Rest of the world	75,577	15.5
	Total	486,749	100

III. NEED AND POTENTIAL TO BE EXPLORED

The wind power market can be separated into large wind onshore (422 GW, around 210,000 machines), small wind onshore (less than 1 GW installed end 2015, more than 800,000 machines), and offshore (around 12 GW installed end 2015, around 4,000 machines). Large onshore and offshore wind turbines are usually arranged in a wind farms. The largest wind farms exceed 1 GW in size, such as Gansu Wind Farm in China, Muppandal Wind Park in India or Alta Wind Energy Center in USA.

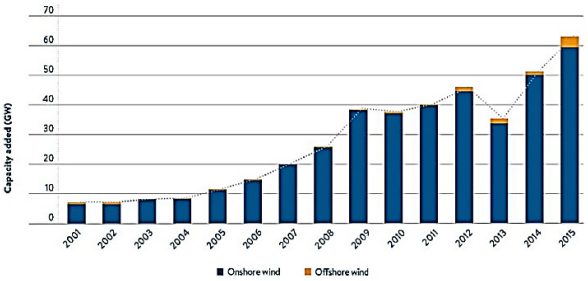

Fig. 3 Onshore and offshore wind turbines are usually projected in a wind farms yearly [16]

A. Global Onshore Wind Capacity

Onshore wind is one of the low expensive renewable wind energy sources in Australia, Brazil, Germany, Mexico, New Zealand, South Africa and Turkey. Worldwide weighted average installed costs of onshore wind turbine have basicallyreduced from US$4,766 per kW in 1983 to US$1,623 per kW in 2014, which means this a decrease in the cost of two-thirds annually [6].

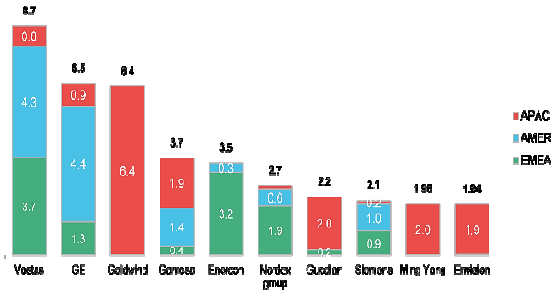

Fig.4: Top 10 onshore turbine manufacturers, 2016 (GW) [17]

B. Global Offshore Wind Capacity

However, offshore wind farms is quiet in its preliminary stages as associated to onshore wind, with total installed capacity having extendedto 12 GW at the end of 2015. The next generation of advanced large offshore wind turbines farms, reduced costs for foundations and more efficient project development performs could reduce the levelised cost of electricity (LCOE) of offshore wind from US$19.6 cents per kWh in 2015 to roughly 12 cents per kWh in 2030 [6].

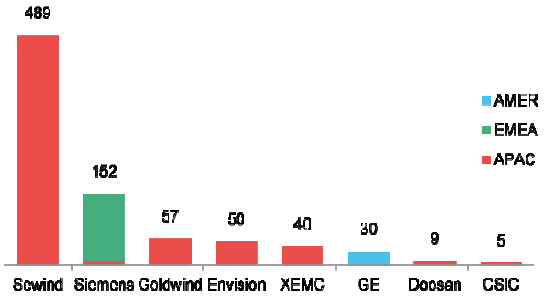

Fig.5: Top 10 offshore turbine manufacturers, 2016 (GW) [17]

All offshore wind installations are in European waters but governments outside of Europe have set motivated targets for offshore wind and development is preliminary to take off in China, Japan, South Korea, Taiwan and the US. This will be extremely valuable for the technology, reducing market risk, increasing the supply base and allowing revolutions to develop [18]. However, 2017 is expected to top the 2015 numbers, with Europe alone scheduled to contribute with 3GW of new offshore wind capacity throughout this year. Looking at 2016, Europe once again contributed the most to the overall number, with a total of 1,567MW of commissioned offshore wind capacity spread across a total of seven wind farms [19]. Germany added 813MW of new capacity, the Netherlands 691MW, and the UK 56MW. A 2MW floating pilot project was decommissioned in Portugal in 2016. In Asia, China added further 592MW worth of commissioned offshore wind farm capacity, bringing the country's total to 1,627MW as of the end of 2016. South Korea commissioned further 30MW and now has a total of 35MW of installed offshore wind capacity, and Japan added 7MW of new capacity, bringing its total to 60MW. North America also contributed to the global offshore wind installed capacity with the commissioning of the 30MW Block Island wind farm off Rhode Island, USA [20].

C. Global Small Wind Statistics

According to Stefan Gsänger, WWEA Secretary General the small wind turbine can contribute significantly to the power supply in many countries of the worldwide. There is an extensive variety of small scale wind turbines from 'micro SWTs' evaluated at under 1 kW, to 'mini SWTs' up to 100 kW. SWTs are regularly utilized as stand-alone electricity power systems and habitually connected in remote areas where the main grid is not available. Assumptions were made that there is a strong support and determination by the government to encourage wind energy in the country, and supporting policies have been accepted in this respect [21]. Integrated wind-diesel power generation system can improve the stability of electricity supply in rural and off grid areas, while diminishing the expenses for fuel and fuel transport by using the current diesel-based producing foundation. However, small wind offers lower load factor and higher capital cost per kW than greater wind farms, and additionally high arranging costs per installed unit. Significant difficulties of small wind incorporate the evaluation of the wind resource and the diminishment of turbulence's negative impacts on the wind resource at the tower's height. High towers lessen the negative effects of turbulence in the wind resource affected by obstructions in the environment, yet they increment the cost of small wind turbines [20].

World market reached 945 MW in 2015, 14 % growth, almost 1 million units installed. As of the end of 2015, a cumulative total of at least 990'000

small wind turbines were installed all over the world. China accounts for 43 % of the global capacity, the USA for 25 %, UK for 15 % and Italy for 6.3% [22].

IV. THE POLICY ATTENTION CHANGES TO INTEGRATION FOR WORLDWIDE

In this study, an adaptable wind development policy will describe, where the measure of the wind energy generation that the operator can use is communicated as a fraction of the forecasted wind energy generation. This part is mentioned to as the wind planning policy aspect through this paper. An online policy by explaining a two-organize scenario based stochastic dispatch and reserve scheduling problem based on the short-term wind farm generation forecast [24].

The IEA's New Policies Scenario (NPS) depends on an appraisal of current guidelines and intentions of both national/international energy and climate policy, despite the fact that they may not yet have been consolidated into formal choices or authorized into law. Cases of this would incorporate the emissions reduction targets received in Paris in 2015, the different responsibilities regarding renewable energy source and efficiency at national and local levels, and commitments by governments in such opportunities as the G-8/G-20 and the Clean Energy Ministerial [23]. The New Policies situation is presently at the centre of the IEA's World Energy Outlook analysis; and we have extrapolated it out to 2050 for correlation purposes [24].

Policy-makers are becoming progressively aware of the fact that a high percentage of variable renewable energy generation in the combination will require various categories of balancing. What is less clear is how costly this will be. There is a wide range of approximations in the market. BP, for instance, said last year that taking into account the "integration costs" of wind and solar in North America would add between $8 and $30 per MWh to their levelised cost of electricity (LCOE) [25].

Governments have started to provide reasons for such flexible power generation plants to remain open, particularly those in the UK and France, via their "capacity market" auctions [26]. The first two UK auctions, in 2014 and 2015, ended up providing contracts, denominated in pounds per kW per year, for a mixture of technologies, including existing coal power stations, new and existing gas-fired plants, demand response and interconnectors. Storage was allowed to bid, too, but has so far been unsuccessful at winning contracts [25]. Cost reductions for renewables power, all alone, won't be sufficient to secure an effective decarbonisation of power supply. Auxiliary changes to the design and operation of the power system are expected to guarantee sufficient motivators for investment and to incorporate high shares of variable wind and solar power project [27].

The quick arrangement of technologies with low short-run costs, for example, most renewables, improves the probability of sustained times of low discount electricity power costs. A cautious audit of market principles and structures is required to guarantee that generators have approaches to recoup their cost, and thatthe power system canwork with

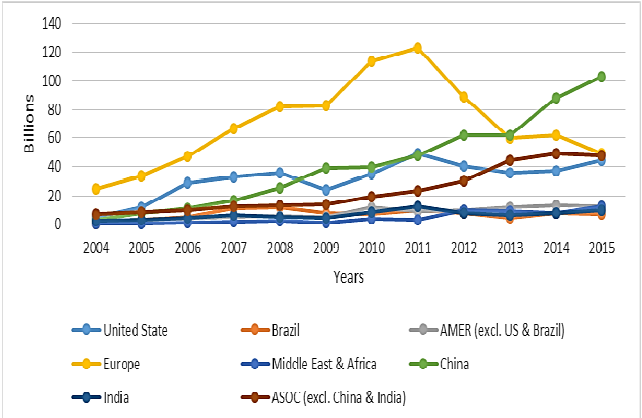

Fig.6: The new investments of renewable energy by geography basis (2004-2015)

the fundamental level of flexibility. Establishment the grid, boosting system well-disposed organization of wind and solar based, and guaranteeing the accessibility of power plants prepared to dispatch at short notice can proficiently suit the fluctuation of wind and solar power output, up until the point when they achieve an offer of

around one-quarter in the power blend [28]. After this point, demand response and energy storage become essential to avoid wind and solar power establishments having their operations shortened in times of abundant generation [29].

Wind control profits by government support schemes. The type of support varies by nation. Feed in tariffs, encourage in sustainable portfolio gauges in mix with auctions, and generation tax credits are among the support schemes that are deployed. Aside from the financial support wind power is typically allowed special get to and extra cost for grid administration caused by wind inconstancy are normally not borne by the wind electricity generators. Direct subsidies for new wind generation are falling as the cost of wind electricity power is today on par or below those of fossil and nuclear power generation [30].

With the sudden fall in costs for onshore wind, governments are reconsidering their policy provision format for the technology. Policy uncertainty in Europe and the United States in 2013 was largely responsible for the fall in net capacity additions in both markets for that year. However, it has been observed that high levels of reasons are no longer required for onshore wind farms, though their economic attractiveness still depends on adequate regulatory frameworks and market design [31].

With the sensational reduction in costs for onshore wind, governments are re-considering their policy provision structures for the innovation. Policy uncertainty in Europe and the United States in 2013 was largely responsible for the fall in net limit augmentations in both markets for that year. Even so, it has been remarked that large amounts of impetuses are not any more important for onshore wind, however their financial appeal still depends on adequate regulatory management and market design [6].

V. INDIAN SCENARIO

India's electricity power sector is amongst the world's most energetic performers in renewable energy sources utilization, particularly wind energy [13]. As on end of March 2017, India had an introduced limit of around 32.17 GW of wind energy. India right now suffers from lack of electricity power generation capability, however it is the world's fourth biggest energy consumer after United States, China and Russia [32]. Fig.7 shows wind power density map of India at 80m level.

India continual to be the second largest wind energy power production in Asia, proposing plenty forecasts for both international and domestic performers. The Indian wind sector has struggled over the years to repeat the strong market performance of 2011 when over 3 GW was installed.

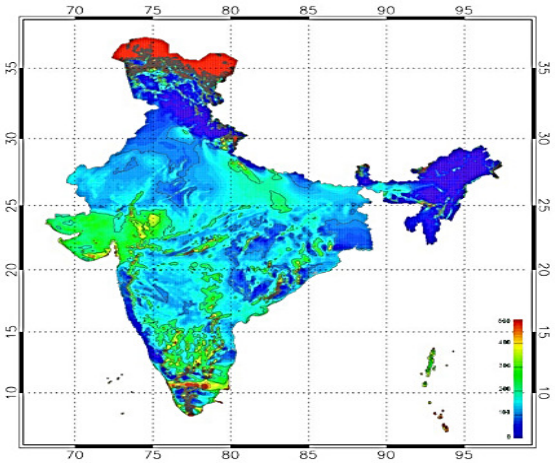

Fig.7: Wind power density map at 80 m level [33]

However 2016 saw India ascend to its potential given the administration's desire to address a portion of the auxiliary bottlenecks in the power sector [34].

India saw new wind energy installations reach 3.6 GW by the end of 2016, for a total of 28.7 GW, a record for the Indian market. It also kept the Indian wind power market inflexibly in the top five rankings globally [35]. The total grid connected renewable energy installations in the country crossed the 50 GW mark at the end of the year.

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aggregate of 28.7 GW, a record for the Indian power sector. It additionally kept the Indian wind power sector inflexibly in the top five rankings worldwide. The whole grid connected renewable energy plant establishments in the nation crossed the 50 GW at the end of the year. Overall, according to global wind 2016 report expect power in the Asian market to add 154 GW in the next five years, for a total of 357 GW by the end of 2021 from the wind energy.

Indian business line passed a report quoting the Chairman of the Indian Wind Turbine Manufacturers' Association, Sarvesh Kumar that wind power project installations in 2016-17 would cross approx. 5 GW. As quoted in the statement, wind power developers have rushed to complete the projects so as to be able to avail themselves of the 'generation based incentive' s. Wind industry observers feel that 2017-18 will be good too. In addition to the demand from the eight windy states, the central government has initiate auctioning capacity, buying the power to wholesale additional to states without wind potential growing the power sector. Already, 1,000 MW capacity has been auctioned [36].

The top-five Original Equipment Manufacturer (OEMs) in terms of cumulative installed capacity in India are Suzlon (35.4%), WindWorld (18%), Gamesa (10.1%), Vestas (7.6%), Regen (7.3%) and Inox (5.68%). LM Wind Power set up its second blade factory in Vadodra, Gujarat. Senvion, an established European player, started up its operations in India and acquired the Kenersys manufacturing facility. Gamesa set up new factory at Nellore in Andhra Pradesh; Acciona entered the market last year, and Envision and Sany Global are expected to enter the market soon. Vestas opened their blade manufacturing unit in Gujarat. The current manufacturing capacity in the country is around 10 GW [24].

TABLE IIIII
LIST OF INDIAN MANUFACTURERS OF WIND TURBINE WITH ITS INDIVIDUAL CAPACITY AT OCT. 2016 [33]

S. No	Indian Manufacturers	Collaboration/Joint Venture	Capacity
1.	Acciona wind power India Pvt. Ltd.	Acciona wind power, S.A., Spain	3000 KW
2.	Gamesa Renewable Pvt. Ltd.	Gamesa Renewable and Technology,S.L., Spain	850 KW and 2000 KW
3.	Garuda Vaayu Shakthi Ltd.	None	700 KW
4.	GE India Industrial Pvt. Ltd.	GE Infrastructure Technology International, LLC, USA	1600 KW, 1700KW and 2330 KW
5.	Global Wind Power Ltd.	Guangdong Ming Yang Wind Power Industry Group Co. Ltd., China	1500 KW
6.	Inox Wind Ltd.	AMSC Austria GmbH, Austria	2000 KW
7.	Kenersys India Pvt. Ltd.	None	2000 KW, 2400 KW and 2625 KW
8.	Leitwind Shriram Manufacturing Ltd.	WindFin B.V, The Netherland	1500 KW, 1800 KW and 3000 KW
9.	NuPower Technologies Pvt. Ltd.	W2E Wind to Energy GmbH Germany	2050 KW
10.	Para Enterprises Pvt. Ltd.	None	750 KW and 250 KW
11.	PASL Wind Solution Pvt. Ltd.	None	1500 KW and 1050 KW
12.	Power Wind Ltd.	None	900 KW
13.	Regen Powertech Pvt. Ltd.	VENSYS Energy AG, Germany	1500 KW and 2800 KW
14.	RRB Energy Ltd.	Technological co-operation with Vestas Wind System A/S, Denmark	500 KW, 600 KW and 1800 KW
15.	Suzlon Energy Ltd.	None	2100 KW
16.	Vestas Wind Technology India Pvt. Ltd.	Vestas Wind System A/S, Denmark	1800 KW, 200 KW, 2100 KW and 200 KW
17.	Wind World (India) Ltd.	Enercon GmbH, Germany	800 KW
18.	Winwind Power Energy Pvt. Ltd.	WINWIND OY, Finland	1000 KW

19.	Shriram EPC Ltd.	TTG Industries Ltd.	250 KW
20.	Siva Windturbine India Pvt. Ltd.	None	250 KW
21.	Southern Wind Farms Ltd.	None	225 KW

The MNRE declared India's Offshore Wind Policy in October 2015. India's NIWE was designated as the nodal agency for employing the policy and creating the essential eco-friendly for the power sector [38]. The first inclusive assessment of offshore wind potential in two key seaside states is being carry out by the FOWIND (Facilitating Offshore Wind in India) project. FOWIND is commission the first offshore wind resource measurement in the Gulf of Kham hat, off the seaside of Gujarat [37].

Offshore energy has excessive potential in India. Shortage of land, rising land costs and hurdles of getting huge starches of land due to people's strike are some of major hurdles in the development of onshore wind farms in India [39].

TABLE IVII
STATE WISE % OF WIND POTENTIAL UTILIZED (AS ON 31.03.2016) [40]

S. No	State	Cumulative Wind Power Installed Capacity operational at the end of 2016 (MW)	Total Wind power potential at 100 meter above ground level (MW)	Percentage of Wind Power potential utilized
1	Andhra Pradesh	2,092.5	44229	3.24%
2	Gujarat	4,441.5	84431	4.68%
3	Karnataka	3,154.2	55857	5.14%
4	Kerala	43.5	1700	2.56%
5	Madhya Pradesh	2,288.6	10484	20.42%
6	Maharashtra	4,666.1	45394	10.25%
7	Rajasthan	4,216.6	18770	21.28%
8	Tamil Nadu	7,694.3	33800	22.53%
9	Telangana	98.7	4244	1.83%
10	Others	4.3	3342	0.13%
	Total	**28,700.4**	**302251**	**8.86%**

Centre for Wind Energy Technology (CWET) has conducted an inspection to discover the possibility of location up on offshore wind turbines in Bay of Bengal and Indian Ocean region. Tata Power is the first private sector company to submit an official request to the government of Gujarat and Gujarat Maritime Board for approval of an off-shore project in India [13].

IV. LATEST POLICY DEVELOPMENTS IN INDIA

The State Electricity Regulatory Commissions decide the tariff for wind projects. Even so, the Central Electricity Regulatory Commission comes up each year with a tariff policy for the whole nation in light of wind power density in five zones. To address grid connection challenges, the government has launched the Green Corridor programme. The objective is to improve relation between India's local grids with its national grid. This will help regional transmission programme [41].

The administration's 'Green Energy Corridor' activity to encourage the exchange of power from the high renewable energy power source establishment states to different parts of the nation, comprises of 765 kV and 400 kV high voltage transmission lines and a related 765/400kV substation and related hardware; and four HVDC (high voltage direct current) terminals a major aspect of the expanded between territorial availability between India's western and southern local power networks. [14]. 2016 saw various new policies for advancing wind power project containing the draft 'wind- solar integrated policy',

TABLE VV
WIND POTENTIAL STATES ARE PROVIDING PROMOTIONAL TARIFF FOR WIND POWER PROJECTS [43]

State	Tariff per Rs./kWh
Andhra Pradesh	4.84
Gujarat	4.19
Karnataka	4.50
Madhya Pradesh	4.78
Maharashtra	3.82-5.56
Rajasthan	5.76 & 6.04
Tamil Nadu	4.16

Strategies for Development of Onshore Wind power Projects, Guiding principle for Prototype Wind turbines, and the Suggestion for Estimation of Small Wind turbine Energy and integrated Projects [42].

Further, in November 2016, the Ministry of New and Renewable Energy (MNRE) issued Guiding principle for a straightforward offering process for

1000 MW of wind, to be associated with the interstate transmission network [44]. The outcomes were reported in March 2017. Latest policy for developments wind energy projects in India as follows:

A. Generation-Based Incentive

The motivation behind this subsidy/incentive was to move the appliance of payment from establishment based to generation-based techniques for rewarding wind farms. However, even before the GBI was presented, tax benefits as quickened deterioration were made accessible to the wind farm designers. In any case, this component neglected to inspire the wind projects to deliver more power. GBI is an approach to support improvement of more effective wind farms [42]. Likewise, it was felt that the financial motivators set up were not adequate to meet the RPO focuses under the National Action Plan on Climate Change (NAPCC). The GBI was announced to act as a booster to the capacity addition [45, 46].

B. State Wise Tariff for Wind Power

The government has launched its initially wind energy mission to give a lift to the wind energy segment and placing it in an indistinguishable class from the prominent solar based mission. The National Wind Energy Mission (NWEM) has been launched. This may give an awesome encouragement to the wind energy division, which is encountering decreasing since 2011 consistently [47].

C. Renewable Energy Certificate Scheme (REC)

Renewable energy source is encouraged by the Ministry of New and Renewable Energy (MNRE), the central authority for all policies, controls, and approvals concerning with renewable energy source. It is maintained by the Ministry of Power and the Central and State Electricity Regulatory Commissions (CERC and SERCs). CERC manages the national grid and interstate exchange/exchan-gings of power, while SERCs supervise provincial transmission and distribution. These assume a key part in the advancement of renewable energy source as they have the sole authority to discover the feed-in tariffs and other policy matters, such as, the Renewable Portfolio Standard (RPS). Energy Development Agencies (EDAs) declare to the MNRE at the state level. Their main purpose for existing is to evaluate and encourage renewable energy source structures for individual states and to prompt the MNRE, state governments, and SERCs [48]. IREDA advise money related help for renewable energy source and energy efficiency projects in India. The cost of REC would be resolved in control trade. REC would be traded power exchange inside the self-control cost and floor cost determined by CERC every once in a while [45].

D. National Clean Energy Fund (NCEF)

In various regions of the nation, the pollution level has achieved disturbing extents. While it must be guaranteed that the rule of "polluter pays" remains the essential controlling foundation for pollution management, there ought to likewise be a positive pushed for advancement of clean energy. What's more, to expand on the reason for the NCEF, the government of India proposed to exact a clean energy prepare on coal delivered in India at an apparent rate of Rs.50 per ton, which will likewise be relevant to imported coal [49]. Before the finish of March 2012, NCEF was worth rupees 3,864 crore. The most recent monetary review uncovers that the government hopes to gather rupees 10,000 crore under the Clean Energy Fund before the end of 2015. A designation of rupees 200 crore from the reserve was proposed for an ecological remediation program and another rupees 200 crore for the Green India Mission in 2013–14 [46].

E. Land Allocation Policy

The government of India changed the Wind Power Policy 2012, with a point of drawing in more sponsor and offering boost to renewable energy source. The government needs to guarantee a simple procedure for allocation of land and different customs for setting up wind power projects [45].

V. CONCLUSIONS

The Indian government has been presenting distinctive appealing subsidies for the region and outsider developing renewable energy power plant. Both valuing and non-estimating policies are played important parts for the advancements of wind

energy abilities. The evaluating policies gives more accentuated to the resident developers also makers for encouraging to the wind energy improvements in the nation. Without innovative directions for characteristics of wind turbines, a large portion of developers are incorporating the lower characteristics of wind turbines to the grid which are making a few difficulties. In the other hand, actually, there are different issues and difficulties for the wind energy developments because of expanding of limitations of wind energy combinations with the weaker grid arrangements. The integrations of wind energy powers with the current grid may influences the power qualities and grid reliabilities. The over the top dissipates of wind forces may influence to coming to of the goals and financial aspects of the nation. Thus, upgrading of policies, power managements, co-ordinations, co-appointments, planning, technologies and encouraging of governments are required for the developments of wind energy in Indian nation. The development of wind energy improved the power sector as well as the economic growth rates.

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