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OUTLINES OF WIND POWER SCENARIO IN INDIA

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Abstract - *As energy consumption rises with increase in population and living standards, the need to develop new techniques of harnessing energy is growing as is the awareness of the environmental costs. In order to meet the needs of these demands, concerted efforts are being implemented towards increasing the energy capacity potential in India. In this paper, the status of wind energy is explored in Indian context. The Indian wind industry is nearly thirty years old, and now holds the 4th position in terms of wind power generation capacity. India has a vast supply of renewable energy resources and it has one of the largest missions in the world for utilizing renewable energy products and systems. In this paper, efforts have been made to summarize the availability, current status and major achievements, energy potential, barriers, and future prospects are discussed in detail.*

Key Words: **Wind Power, Renewable Energy, Current Status, Challenges**

1. INTRODUCTION

The growth of the industrial sector has resulted in a phenomenal increase in the demand for power generation. Hence, the gap between the demand and supply of power is increasing. The exponential growth in the rate of energy consumption is the main cause of energy shortage, as well as energy resources depletion worldwide. Wind energy is one of the low-investment and high-yield groups of power generation for India.

India has a current population of about 1.34 billion, out of which about 300 million have no access to electricity. According to the Central Electricity Authority (CEA), the consumption recorded till June 2017 was 3, 29,231 MW. The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country. According to MNRE, the total installed wind power capacity in India accounts for about 65.09 % of the total installed renewable energy sector.

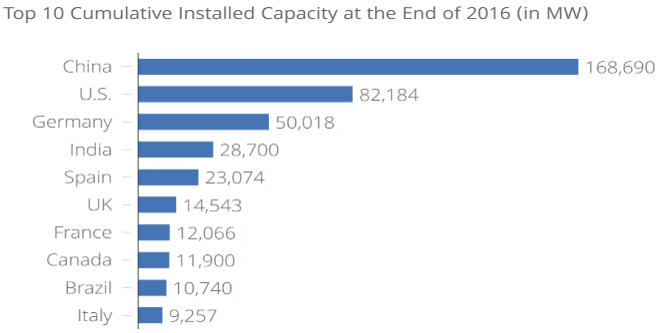
The motive behind wind power expansion has come increasingly from the urgent need to combat global climate change. From a longer-term perspective and keeping in mind the need to maximally develop `domestic supply options as well as the need to diversify energy sources, renewables remain important to India's energy sector.

Other major objectives of the wind power projects include enhancement of energy security, to reduce import dependency, solve the problem of fuel price instability, global warming et cetera. Carbon di-oxide emission reduction is another objective of the projects held.

According to the National Action Plan on Climate Change (NAPCC), the target is to the increase renewable energy share in total energy generation up to 15 % by 2020.

1.1 INDIAN WIND ENERGY STATUS AND POSITION

Wind energy program was commenced in India by the end of the 6th five yearly plan during 1983-84 and in the last few years it has increased considerably. The main objective of the program was the expansion of wind energy production, support research and development, back new wind projects and to create awareness among people.



2016 was a record year for India with 3.6 GW of new installations, consolidating its position as the world's fourth-largest wind energy market. The five main wind power countries are China, USA, Germany, India and Spain and they together represent a share of 73 percent of the global wind capacity.

2. RENEWABLE ENERGY POTENTIAL IN INDIA

Numerous renewable energy sources are available in India. Amongst all, wind energy has emerged as most successful renewable energy option and the fastest renewable technology for generating grid connected power. Many agencies have been established and numbers of programs have been laid by Government of India for facilitating and promoting the rapid development of wind power technology.

Table -1: STATE WISE ESTIMATED POTENTIAL

State	State wise Estimated Potential (% Renewable Energy)
Rajasthan	14%
Karnataka	8%
Madhya Pradesh	7%
Andhra Pradesh	8%
Tamil Nadu	6%
Telangana	2%
Uttar Pradesh	2%
Maharashtra	10%
Gujarat	13%
Odisha	3%
Himachal Pradesh	3%
Jammu & Kashmir	10%
Others	14%

The geographic distribution of the estimated potential of renewable power as on 31.03.2016 reveals that Rajasthan has the highest share of about 14% (167276 MW), followed by Gujarat with 13% share (157158 MW) and Maharashtra with 10% share (119893MW), mainly on account of solar power potential.

3. RENEWABLE ENERGY CAPACITY STATISTICS 2017

Table -2: SHARE IN TOTAL INSTALLED CAPACITY

Renewable Energy Sector	Share of Installed Capacity
Hydropower	52.44%
Wind Energy	31.82%
Solar Energy	10.90%
Bioenergy	10.12%
Biogas	0.21%
Solid Biofuels and Renewable Waste	9.92%

Historically, hydropower has been dominating renewable energy technology across the world. Till date, it holds the highest share of installed capacity in renewable energy. However, hydropower sector is slowing down. Its compounded annual growth rate of installation for the last 10 years has been a little over three per cent. As compared to 2015, there was only 30 GW of additional capacity in 2016, a slight 2.8 per cent increase.

On the other hand, for the wind sector, the compounded annual growth rate has been around 18 per cent. Around 50 GW of wind capacity was installed in 2016, which was a dip in comparison to installation of over 65 GW in 2015. Onshore wind saw the bulk of installation as off-shore farms are still comparatively expensive.

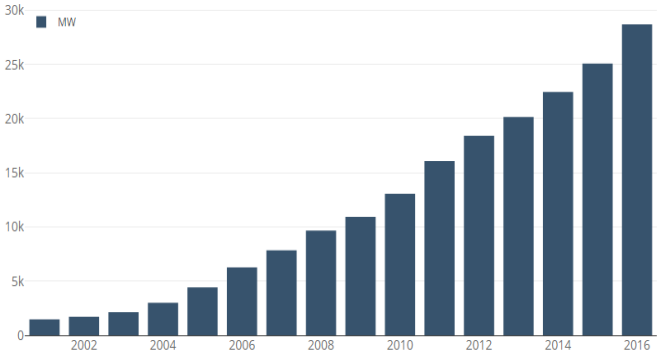


Fig -1: CAPACITY VERSUS YEAR

India added a record 5,400 megawatts (MW) of wind power in 2016-17, exceeding its 4,000 MW target. Of about 50,018 MW of installed renewable power across the country, over 55% is wind power.

During 2016-17, the leading states in the wind power capacity addition were Andhra Pradesh at 2,190 MW, followed by Gujarat at 1,275 MW and Karnataka at 882MW. In addition, Madhya Pradesh, Rajasthan, Tamil Nadu, Maharashtra, Telangana and Kerala reported 35 MW, 288 MW, 262 MW, 118 MW, 23 MW and 8 MW wind power capacity addition respectively during the same period.

At the Paris Climate Summit in December, India promised to achieve 175GW of renewable energy capacity by 2022. This includes 60GW from wind power, 100GW from solar power, and 10GW from biomass and 5GW from small hydro projects.

4. CHALLENGES FACED BY WIND POWER SECTOR

Technical issues: Majority of wind power farms in India have reached their commissioned period and hence require maintenance and repowering. As a result, wind power possesses a low plant load factor compared to fossil fuels. Absence of proper government policies and framework is another major factor due to which companies are not willing to repower their plants which is essential to tackle this issue. Infrastructural: Due to non-availability of proper grid infrastructure the amount of energy produced in wind farms is not transferred effectively to consumers which results in wastage of energy.

Economics: Project financing methodology for majority of wind energy projects are conceived with 70:30 debt equity ratio with high interest rates which creates expensive debt under difficult macroeconomic conditions of India.

Other barriers faced by the wind sector are availability of land for wind farm erection, withdrawal of accelerated depreciation, implantation of revised tariff as per CERC guidelines.

5. OVERVIEW OF WIND BASED ENERGY COMPANIES

Suzlon is ranked among the top five manufacturers of wind turbines worldwide. It is a Pune-based MNC and a market leader in Wind energy industry in India. Suzlon was formed in 1995 and has a global presence with operations in more than 30 countries and installation capacity of 23,000 MW.
Wind World India is a Mumbai-based company formed in 1994. Wind World is involved in the manufacturing of concrete and steel Wind Turbine Generators which are manufactured at facilities located in Daman whereas concrete towers are manufactured at Karnataka, Tamil Nadu and Gujarat employing more than 5,000 people.

ReGen is a wind turbine manufacturer operating from Chennai. Established in 1994, ReGen has its manufacturing facility located in Tada, Andhra Pradesh. ReGen offers various wind power generation related services which includes manufacturing, consultancy, supply, erection, operations, commissioning and maintenance.
Denmark-based Vestas is the largest wind turbine manufacturer in the world. Vestas was founded in 1945 in Aarhus, Denmark. Vestas started running operations in India in 1979 in the manufacturing and development of wind energy farms. Established in 1979, the company is a market leader in Wind energy generation.

Enercon is a wind Energy Company founded in 1983 and has a power generation capacity of around 28 GW. Based in Germany, the company offers services such as Power Generation, Technical and Business Support, Process & Industrial and New Plant Services.

Gamesa was formed in 1976 and is a global manufacturer of wind turbines and a market leader in construction and development of wind farms. Headquartered in Zamudio (Spain), it is ranked fourth largest manufacturer of wind turbines in the world. Gamesa has its wind projects located in Karnataka and Tamil Nadu.

6. CONCLUSION AND FUTURE SCOPE

Wind power could not have reached the present level of capacity without the incentives and promotional measures put forward by the Government of India. It has been observed that wind energy has already surpassed the target set up by five year plan but the target of 15 per cent of renewable power by 2020 can be achieved only if wind sector is allowed to grow without brakes and policy withdrawals. Policies should be carefully structured, must be long term comprehensible stable policies to bolster wind energy production. World class wind turbine generator manufacturers, enterprising developers, risk taking financial institutions, and investors supported by a government committed to power production from renewable sources will definitely lead the Indian wind power industry to new heights and glory. The growth trends of wind power development in the six Indian states indicate that more than 90% of wind energy potential in India can be exploited by 2030. Wind power will definitely be one of the most successful clean and non-polluting power generation technologies in the coming years- not only in India, but worldwide.

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