Wind Energy: India's market prospects

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Introduction

Wind energy uses kinetic energy of the wind to get converted into mechanical enegy to produce a clean form of energy without producing contamination or emissions. This energy can be used for specific tasks such as in power homes, businesses, schools, and the like; it supplies around only 0.1% of total global electricity.

Wind energy is being used for village electrification, water pumping, battery charging, small industries, etc. In India, however, the use of wind as an energy source is at a preliminary stage for decentralised energy generation. India has nearly 600,000 villages and has a large potential for decentralised energy (DE) systems while commercial energy consumption has been growing fast.

India depends heavily on coal and oil for meeting its energy demand which produce a toxic miasma that contributes to smog, acid rain and greenhouse gases' emission. Other source of energy is natural gas which is made up mainly of chemical called methane, a simple compound that has a carbon atom surrounded by four hydrogen atoms. Methane is highly flammable and burns almost completely. There is no ash and only very little air pollution forms. The use

of electricity has grown since it can be used in variety of applications as well as it can be easily transmitted. Though major energy sources for electrical power are coal and natural gas, the use of renewable energy like wind and solar is rising.

Wind energy is a clean, eco-friendly, renewable resource and is non-polluting to generate electricity. Unlike conventional power plants, wind plants emit no air pollutants or greenhouse gases. But the concerns are the noise produced by the rotor blades, aesthetic impacts, and sometimes birds have been killed by flying into the rotors. Most of these problems have been resolved or greatly reduced through technological development.

National Aeronautical Laboratory (NAL) was among first which developed a 4.9 m diameter conventional multi-vane wind mill in mid 1960s thereafter sail-type windmills under a project initiated by NAL during 1976-1977. In 1991, 'private power policy' commenced in wind power generation which ultimately led to successful commercial development of wind power technology and substantial additions to power generation capacity in the country.

In 1983, India initiated a national wind power programme with three components: wind resource assessment, demonstration projects and industry-utility partnership. The Indian wind industry was placed fourth in terms of total installed capacity in the world by the year 1993 but 1996 was the worst year for Indian wind energy market due to Minimum Alternate Tax (MAT) policy, and changes in government policies, which resulted in declination. To overcome the problem of falling profitability of private wind farm operations in the country, some states started supporting the wind power companies and investors with liberal policy initiatives. The wind energy situation started to improve in 1999 and the upswing is still continuing. Technological maturity and introduction of suitable machines for the Indian conditions resulted in overall higher capacity utilization.

Challenges

The major challenge to using wind as a source of power is that it is intermittent and it does not always blow when electricity is needed. Wind cannot be stored and the whole cannot be harnessed to meet the timing of electricity demands.

Market Prospects

Wind power has an expansive future according to experts. Wind energy has been the fastest growing source of electricity generation in the world in the 1990s. However, the majority of this growth has been in Europe, where government policies and high conventional energy costs favor the use of wind energy.

The future look very promising for wind energy market and it is going to see nearly double-digit growth in next 10 years. The future wind turbine will have bigger blades (50m to 65m) and average turbine capacity will be 1.5 MW to 2 MW.

India has been an electricity deficit country despite huge expenditures in the power industry, which provides ample room to wind developers to bridge the demand and supply gap. There are some considerations like good wind conditions, rapid economic growth and growing demand for energy which lead to immense wind energy market potential.

India's growth in wind energy is due to several incentives announced by the Indian government to promote this form of non-conventional energy in the country. The government has introduced a package of incentives which include tax concessions such as 80% accelerated depreciation, tax holidays for power generation projects, soft loans, customs and excise duty reliefs, liberalised foreign investment procedures, etc., and the industry expects similar support in future too. Indian Wind Energy Association (InWEA), sometimes ago, had made a formal submission to the Finance Ministry, requesting the introduction of a performance-based incentive system the indirect fiscal benefits provided as tax foregone be linked to performance. It proposed the introduction of tax credit certificates (TCCs), moving away from the current system of accelerated depreciation. The new system is expected to accelerate the growth of the wind energy sector in India.

The Government of India established Centre for Wind Energy Technology (C-WET), an autonomous R&D institution under the Ministry of New and Renewable Energy (MNRE), to serve as a technical focal point for wind power development in India. In fact, it is the only research institute in Asia, perhaps, among the countries in the south to promote and accelerate the pace of utilization of wind energy and the helping hand in growing wind power sector.

Presently, India is the fifth largest wind energy producer in the world with a total installed capacity of about 10,900 MW accounting 9 % of the global wind energy market, after United States, Germany, Spain and China. The 6,000 MW of wind power capacity is expected to be installed in two years.

Wind energy witnesses tremendous growth in India and is the fastest growing in the composites industry after FRP pipes & tanks market, which is attributed to India's growing energy need and initiatives by the government

to meet a part of this demand through renewable energy sources. National and local legislations were framed to promote private investments in renewable energy and is estimated that wind energy potential of the country would be at 45,000 MW.

Integrated Energy Policy has projected capacity addition of 30,000 MW from wind by the year 2032.

The wind energy market had golden era in 2005 and 2006 wherein the market was rocketing at 50 % annual growth rate thereafter the market has grown by 25 %. In 2009, the average growth rate was 14 % and market is grown by 30 % compounded average growth rate (CAGR) since 2004. Most probably this was due to government policy and initiative, awareness, technology advancement, high GDP, economic growth and macroeconomics. The trend scenario is depicted in Fig 1.

In global context, the USA is taking over number one position from Germany and China getting ahead of India for the first time, taking the lead in Asia. Approximately, 40 % market is captured by both USA and China and only five markets represented 80 % of the global wind energy market. Denmark is still a leading wind energy country worldwide.

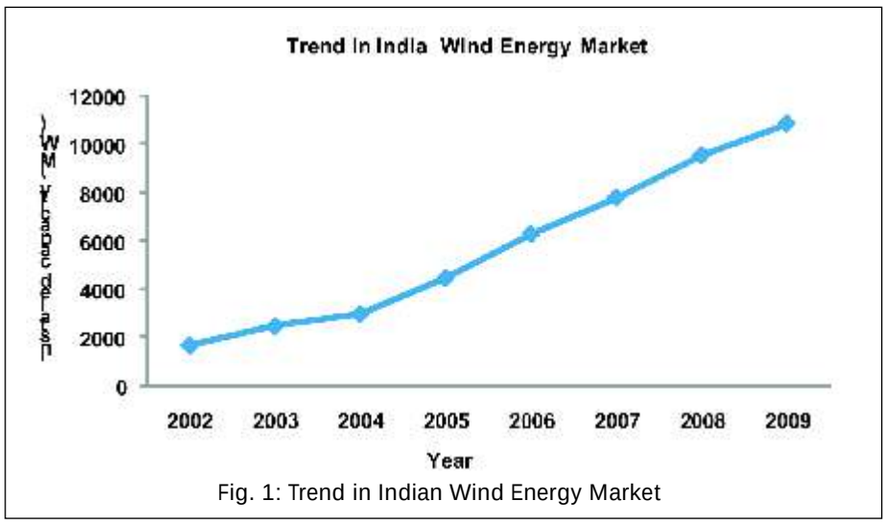

Fig. 1: Trend in Indian Wind Energy Market

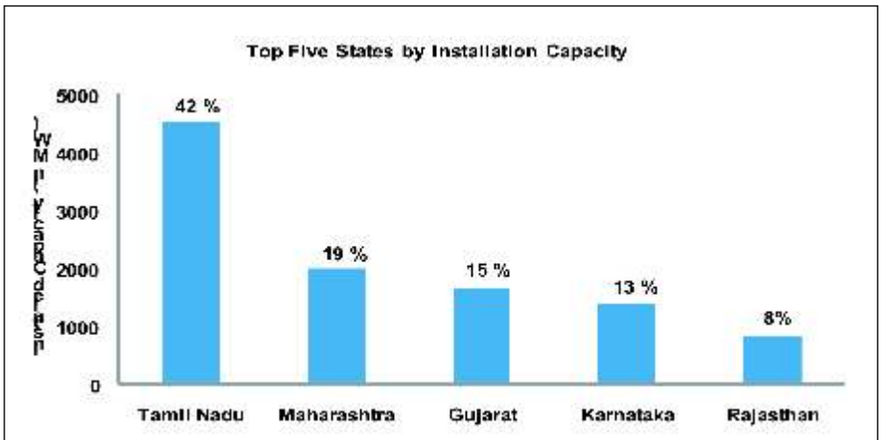

Fig. 2: Top Five States by Installation capacity in 2009

As of 2009, India's installed capacity of wind power in different states is aggregating to 10,900 MW. Tamil Nadu retains first position with 42% of total market share, thereafter Maharashtra, Gujarat, Karnataka and Rajasthan stand with second, third, fourth and fifth positions with 19%, 15%, 13% and 8% of total market share respectively, as illustrated in Fig.2. In the coming year, Karnataka will surpass Gujarat state in installation capacity due to more projects inflow. In eastern India, Orissa has good wind power potential; currently, it is less than 2 MW capacity. As per Centre for Wind Energy Technology (C- WET) estimation, the gross wind power potential in Orissa is to be 1700 MW, out of which about 800 MW power generation is technically feasible and it has so far identified sites with 255 MW potential so that Orissa government is exploring new locations including coastal areas like Chandbali and Gopalpur for setting up of wind power projects in the state. For the moment, the government has started wind resource management project in eight locations. They are Nawarangpur, Brahmagiri, Damanjodi North, Dhamara, Chandipur, Chhatrapur and Paradeep. This potential will surely attract private investors and fabricators and the Union ministry of non-renewable energy (MNRE) is extending financial support for such effort and is providing assistance to the tune of Rs 3.9 crores for a 2 MW demonstration unit.

The Indian wind energy market has grown by 23% on an average per year since 1994. The high growth rate in wind energy sectors has attracted several foreign players to invest in booming wind energy market. Some prominent players are manufacturing wind power turbines and components, either in joint venture or by license production from international collaborators. They include Suzlon, Enercon RRB Energy, Vestas Wind (NEGM), GE Wind Energy, Elecon and others. Wind electric generators ranging from 55 to 750 KW rating

have been developed and manufactured in the country by using the latest technologies. State-of-the-art wind power technologies are now indigenously available in India. Wind electric generators up to 750 KW unit capacities are now being manufactured along with blades, a crucial component of wind turbines, in India. It is estimated that roughly 100, 000 MW of power can be produced in India from only small wind turbines of 10-500 KW capacity.

The tremendous Indian wind energy market also has fuelled growth for resins and fibres' manufactures along with fabricators. As a result, Owens Corning added a second glass fibre knitting line at the OCIL plant in Taloja to increase production of multiaxial glass fibre fabrics. Reichhold and Ashland have started resins manufacturing plant in India. Danish based wind turbine blade maker LM Glassfiber also opened a third plant to increase its blade production in India in response to the strong growth in the region's wind energy market.

India is seen as a sourcing hub of key wind energy components for export operations. GE Wind Energy, which has an assembling unit in Chennai, is exporting components including blades to China and other European markets. Enercon India is exporting wind turbine generators to Germany. Vestas and RRB energy are also exporting components, generators and blades produced in India for overseas markets. The main reason for the trend is the lower costs in India and the availability of skilled persons.

Suzlon Energy Limited, based in Mumbai, holds around 42% of market share in India's wind energy market with 4,492 MW wind turbine generator capacity and has captured close to 9% of global wind turbine sales currently.

Enercon (India) Limited is the Indian subsidiary of Enercon GmbH, the renowned gearless turbine manufacturer. It has started commercial operations in India in 1995. Since its inception Enercon has installed more than 2000 energy converters in India with total installed capacity exceeding 2,008 MW. It has presence in 7 high wind potential states - Karnataka, Maharashtra, Tamil Nadu, Rajasthan, Gujarat, Madhya Pradesh and Andhra Pradesh and has four manufacturing plants at Daman, Sadodar, Gujarat and Shirhatti (near Hubli) in Karnataka.

LM Glassfiber is the world's leading manufacturer of blades for wind turbines. In India, LM Glassfiber supplies blades to Vestas Wind Systems, GE Energy, Suzlon and NEPC. LM has two factories for manufacturing blades in India and it opened a new R&D centre in Bangalore recently joining its existing R&D centres in Denmark and the Netherlands, and will specialize in finite element method (FEM), computational fluid dynamics (CFD) and computer-aided design (CAD) for product development.

The Indian wind energy market is forecasted for double-digit growth over the next decade and has laid down ample opportunities for competing companies which brings with them the major challenges associated with managing rapid growth and adjusting capacity to suit the evolving needs of the market. Wind energy industry has proven track record in India after having increased the annual production output by a double digit since 1990s.

Wind energy industry is very cost-competitive and sensitive to volumes scale; typically a rotor blade for a 0.75 MW turbine has a length of 80 ft to 85 ft and weighs approximately 2,360 kg. By this configuration, blades are estimated to cost about INR Rs. 2.7 lakhs each, or INR Rs. 8.1 lakhs for a three-blade set (This is a standard price calculation but bear in mind that price will vary accordingly with matrix, reinforcement, core materials and manufacturing processes).They are designed for a life of 20+ years and operate automatically.

Major Investment in Indian wind energy market (Current Year)

India is aiming to rely more on renewable sources in coming years as part of the global push for clean energy. The Central Electricity Regulatory Commission, India's power regulator, recently introduced renewable energy certificates in a bid to reward clean energy producers.

During the 1990s, India had to depend on imported turbines but since the last 15 years, India's local manufacturing capacity has improved tremendously and now they are exporting, although large turbines are also manufactured in the country and keep pace with developments in the world as a whole by maintaining its present 5th position. Off-shore wind has so far remained an unexploited resource in India. India's long coast-line is likely to offer a large potential; proper assessment and development of this potential would offer challenges and new opportunities to Indian wind energy industry. The success in wind energy was largely due to well coordinated efforts by all major stakeholders, e.g. MNRE, C-WET, IREDA and the private sector.

The installed capacity of wind power has been rapidly increasing during recent years which is strongly demonstrated by investment in wind energy market. The country's installed capacity of wind energy was 10,900 MW as of calendar year 2009 and around 2,000 MW wind energy capacity is expected to be added in 2010-11 whereas India has nearly 17,000 wind energy generators.

The PSU, National Thermal Power Corporation (NTPC) has planned to

install 1,000 MW wind power across Karnataka, Gujarat and Andhra Pradesh over the next few years.

The Bharat Forge Limited (BFL), the flagship company of Kalyani Group, is set to enter the wind energy business. The company will supply critical components for wind turbines for Tata Power's upcoming 10 MW power plants in Maharashtra.

BP, the biggest oil producer in the United States, owns 100 MW of wind energy capacity in India from two plants and has existed from India's renewable energy market meanwhile the private equity arm of India's Infrastructure Development Finance Co brought BP's wind energy unit.

Siemens AG plans to invest INR Rs1, 800 crore over the next three years in India, mainly in the renewable energy market; out of this INR Rs500 crore will be invested to build high end technology wind turbines for the Indian market. The first of these turbines is scheduled to be shipped in 2012.

Siemens, based in Munich, Germany plans to make India a major centre for value-priced products by establishing six new hubs in India, responsible for the design, development, production and sale of these products for India and the world market.

Conclusion

It is estimated that wind energy will develop faster in India compared with other renewable energy technologies (RETs) due to government back up and well-established manufacturing base and technology. National Aeronautical Laboratory (NAL) was among first

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which developed a 4.9 m diameter conventional multi-vane wind mill in mid 1960s thereafter Sail-type windmills under a project initiated by NAL during 1976-1977. In 1991, 'private power policy' commenced in wind power generation which ultimately led to successful commercial development of wind power technology and substantial additions to power generation capacity in the country.

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