

HOT AND INTELLIGENT TRENDS OF WIND ENERGY

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Abstract: Wind is a form and complimentary natural resources of solar energy. Winds are caused by the irregular heating of the atmosphere by the sun, the irregularities of the earth's surface, and revolution of the earth. Wind flow patterns are modified by the earth's terrain, bodies of water, and vegetative envelop. This wind flow, or motion energy, when harvested by contemporary current of air turbines, can be used to generate electricity for mankind.

Keywords: *Wind Energy, Wind turbine, commercial prospect*

1. Introduction

Nowadays, energy crisis is worldwide observable fact. As time goes on, natural assets and resources are ended monotonically. Wind energy is a source of renewable power which comes from air current flowing across the earth's surface. Wind turbines harvest this kinetic energy and convert it into usable power which can provide electricity for home, farm, school or business applications on small residential bulky utility scales. Wind energy is one of the fastest growing sources of electricity and one of the fastest growing markets in the world today. These wing trends can be linked to the multi-dimensional advantages associated with wind energy. There are constraints to wind energy's growth, however, and these are regulatory and political. Inefficient, discriminatory transmission rules and lack of transmission capacity make it currently infeasible to ship large amounts of wind power from the heartland to market. The largest single constraint remains the cycle of short-term extensions and then expirations of the federal incentive for wind energy, the production tax credit (PTC). A stable planning horizon, or in particular a long term extension of the PTC, is needed for businesses to plan for strategic growth in the years ahead and expand their wind energy operations on large scale. The benefit it's from such an expansion include not only lower costs but also electricity to power our homes and offices, new high-tech jobs, cleaner air, additional income to farms and rural communities- all from a vast, inexhaustible, domestic source: the winds flowing over this continent.

2. Green Power

The electricity generated from wind power is said to be uncontaminated because its generation creates no contamination or greenhouse gases. As both health

and environmental apprehensions are on the rise, clean and hygienic energy sources are a growing demand.

3. Sustainable and Affordable

Wind is a renewable energy source is inestimable and necessitates no fuel besides the wind that blows across the globe. This immeasurable energy supply is a safety that many users view as a established investment in our energy economy as well as in our children's' expectations Wind power is a charge competitive resource of electricity, fundamentally due to technological advancements, as well as economies of scale as more of these machines are manufactured and establish online around the human race. This section develops premeditated scenarios to travel around the degree to which wind can make a payment to low-carbon grid.

The wind system concept being promoted today is to publicize wind farms into the electric power grid. The grid needs to provide somewhere to stay fluctuations and provide power. When wind does not blow within this perception, there is a most advantageous wind dissemination the percent of standard stipulate that can be supplied by wind.

A natural logic of balance takes place when wind penetration is equal to average wind capability average wind generation divided by probable prices wind creation. An emblematic integer is 20 percent. Adding more wind turbines results in restriction, dumping power because it is not needed. Since the grid entails power when there is no wind, the grid is 80 percent dependent on. President of USA proposed a strategic goal for greenhouse gas emissions. 83 percent reduction of CO₂ emissions below 2005 levels by 2050. This is a good strategic goal, a good end state. Gigantic CO₂ emission reductions are mandatory if we are going to halt global warming. The target is technically viable. France has

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publicized that the nation could accomplish an 80 percent carbon-free grid in 40 years (2050) using nuclear power if the realm prefer to execute so. In the long run we would like to have an electric power grid that is substantially carbon-free and sustainable

4. Economic Enlargement

As well as being convincingly priced, wind power is a Locally-produced source of electricity that enables communities to maintain energy dollars or rupees in their monetary coordination. Employment creation and industrialized, service, construction, and maneuver and tax base augment are other economic development benefits for communities utilizing wind energy North Carolina's wind resources are mostly located along the coastal and mountain regions of the state and are an excellent opportunity for local energy supply.

It is desirable to see the Wind Maps for more details on wind resources at specific sites, and contact with wind if users would like an interactive wind map. The North Carolina Solar Center specialized on coastal wind opportunities and the Wind Program focuses on wind in the mountain constituency of the state. Both areas have scrupulous opportunities and confronts for both petite and hefty scale wind power.

North Carolina has copious wind resources, exclusive to the south-west India, and has an excellent opportunity to harvest this local source of power. Wind power can endow with electricity for home, farm, school or business applications on small residential- or large usefulness scales. Wind Energy Association (AWEA) expects 2005 to be a record breaking year for the industry, with up to 2,500 megawatts (MW) of new Wind energy generating capacity likely to be installed in the U.S

5. Wind Power Generation

The terms wind energy or wind power describes the process by which the wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks such as grinding grain or pumping water or a generator can convert this mechanical power into electricity to power homes, businesses, schools, and the like other places.

6. Wind Turbines

Wind turbines, like aircraft propeller blades, turn in the moving air and power an electric generator that supplies

an electric current. Minimally declared, a wind turbine is the contrary of a fan. Instead of using electricity to make wind, like a fan, wind turbines use wind to make electricity. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity.

7. Wind Turbine Types

Recent wind turbines fall into two elemental groups, the horizontal-axis variety, like the conventional farm windmills used for pumping water, and the vertical-axis design, like the eggbeater-style Darrieus model, named after its French inventor. Most large modern wind turbines are horizontal-axis turbines.

8. Turbine Components

Horizontal turbine components include the following aspects.

- Blade or rotor, which converts the energy in the wind to rotational shaft energy.
- A drive train, usually including a gearbox and a generator.
- A tower that supports the rotor and drive train, and
- Other linked equipment, together with controls, electrical cables, ground support apparatus, and suitable interconnection equipment.

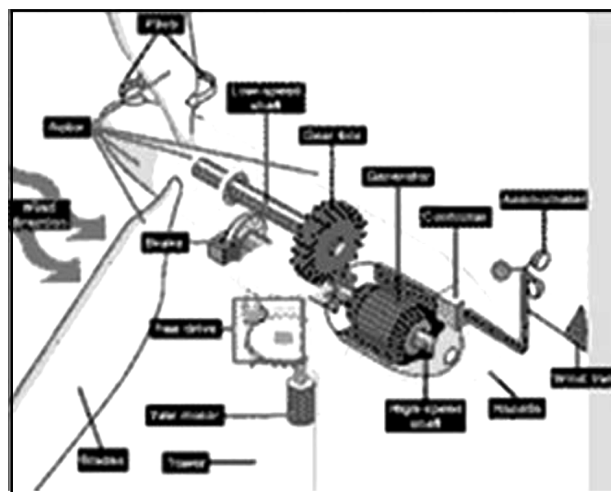


Fig.1. Common wind turbine assembly.

9. Turbine Configurations

Wind turbines are often grouped together into a solitary wind power plant, also known as a wind farm, and breed bulk electrical power. Electricity from these turbines is fed into a utility grid and distributed energy to customers, just as with predictable and conventional power plants.

10. Wind Turbine Dimension and Power Ratings

Wind turbines are available in an assortment of sizes, and therefore power ratings. The largest machine has blades that span more than the length of a football field, stands 20 building stories high, and produces enough electricity to power 1,400 homes. A small home-sized wind machine has rotors between 8 and 25 feet in diameter and stands upwards of 30 feet and can deliver the power needs of an all-electric domiciles or small business. Utility-scale turbines range in size from 50 to 750 kilowatts. Single small turbines, below 50 kilowatts, are used for homes, telecommunications dishes, or water pumping. Higher ratings are also accessible.

11. Wind Energy Resources in India

Wind energy is very abundant in many parts of India. Wind resources are characterized by wind-power density classes, ranging from class 1 (the lowest) to class 7 (the highest). Good wind resources, class 3 and above, which have an average annual wind speed of at least 13 miles per hour) are found in many locations). Wind speed is a critical feature of wind resources, because the energy in wind is proportional to the cube of the wind speed. In other words, a stronger wind means a lot more power.

12. Advantages and Disadvantages of Wind-Generated Electricity

A Renewable Non-Polluting Resource Wind energy is a free, renewable resource, so no matter how much is used today, there will still be the same supply in the future. Wind energy is also a source of clean, non-polluting, electricity. Unlike conventional power plants, wind plants emit no air pollutants or greenhouse gases. According to the U.S. Department of Energy, in 1990, California's wind power plants offset the emission of more than 2.5 billion pounds of carbon dioxide, and 15 million pounds of other pollutants that would have otherwise been produced. It would take a forest of 90 million to 175 million trees to provide the same air eminence and tremendous quality.

13. Cost Issues

Even though the cost of wind power has dwindled dramatically in the past 10 years, the technology requires a higher preliminary venture than fossil-fueled generators. Approximately 80% of the cost is the

machinery, with the balance being site groundwork, installation and commissioning. If wind generating systems are compared with fossil-fueled schemes on a life-cycle cost basis counting fuel and operating expenses for the life of the generator however, wind costs are much more cutthroat with other generating technologies because there is no fuel to procure and nominal operating expenses.

14. Environmental Concerns

Although wind power plants have comparatively little crash on the atmosphere put side by side to fossil fuel power plants, there is some apprehension over the noise produced by the rotor blades, aesthetic (visual) impacts, and birds and bats having been killed (avian/bat mortality) by flying into the rotors. Most of these problems have been resolved or to a great extent reduced through technological improvement or by appropriately meeting wind plants.

15. Supply and Transport Issues

The major challenge to using wind as a source of power is that it is intermittent and does not always blow when electricity is needed. Wind cannot be stored (although wind-generated electricity can be stored, if batteries are used), and not all winds can be harnessed to get together the timing of electricity demands. Further, good wind sites are often located in remote locations far from areas of electric power demand (such as cities). As a final point, wind reserve expansion may try to win with other uses for the land, and those alternative uses may be more extremely esteemed than electricity generation. However, wind turbines can be located on land that is also used for grazing or even farming.

16. Bringing Wind Energy to Market

The U.S. Department of Energy estimates that approximately 600 gigawatts (GW) of wind energy, enough to easily provide 20% of U.S. power supply, are cost-effective at the wind plant bus bar that is, the point at Which the wind farm connects to utility transmission lines) when natural gas prices exceed \$4 per thousand cubic feet (MCF). Most experts survey gas prices staying above that level in the foreseeable potential. Why then isn't even more wind energy rushing to market today?

In addition to the improbability about the availability of the centralized production tax credit, a discriminatory

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transmission system restrictions wind energy's growth. The nation's power markets are governed by a patchwork of rules and conditions for entrance to, and bring into play of, the transmission network. Some charge philosophical, iniquitous penalties against new market entrants or technologies with different operating characteristics. The result: artificially high costs and inefficient markets. Under the Western Area Power Administration's old-style rules, for example, the cost for wind to use the network is about 2 cents per kilowatt-hour, a huge obstacle.

In California, where the California Independent System Operator (Cal-ISO) has replaced inefficient, discriminatory penalties with a innovative requirement that wind generators provide forecasts for their power deliveries, the costs are 10 times lower. The Federal Energy Regulatory Commission (FERC), which oversees wholesale electric power markets in the U.S., is promoting reforms to ensure fair access for all technologies so that customers can reap the benefits of competition. Where such reforms are in place, they are already helping confiscate barriers to market ingress for wind. The bureau is also standardizing utility system interconnection agreements and procedures for the entire electric industry, including wind energy. AWEA supports the proposed standards and procedures for wind with a detailed Guide on Wind Energy for the wind energy industry and for transmission owners/operators and utilities. Wind turbines meeting the fresh standards can travel through system faults, donate reactive power and active voltage control, and communicate.

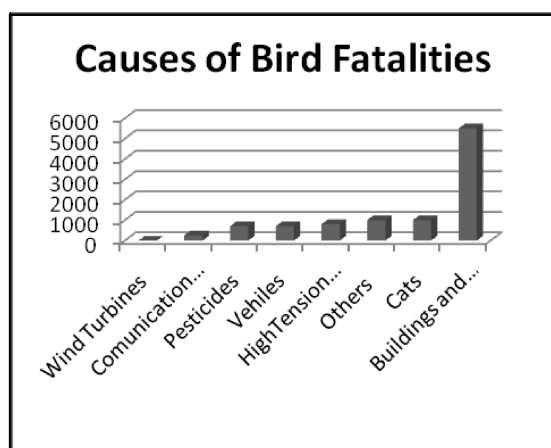


Fig.2

With grid operators—and thereby make the electricity transmission system more reliable. Strategic

upgrades to existing lines and investment in new transmission lines are also needed to tap the country's vast wind energy potential. Lines that have long been bottlenecks are now being upgraded in Minnesota and California, and such successful precedents may spur similar action in other areas where they are needed. However, the nation has yet to see the development of a national energy policy that includes, as a strategic goal, transmitting large amounts of wind energy from the windy heartland to fast-growing demand centers. Such a strategy would reduce dependency on natural gas imports and branch out the nation's energy portfolio with a safe, clean, abundant, domestic resource.

The escalating and volatile price of natural gas — a fuel that at the present accounts for a number of 20% of U.S. electricity generation — has placed a damper on the rate of investment in natural gas power plants. Building innovative coal plants that meet contemporary pollution abatement standards is pricey and comes with the risk of new or tightening regulations to restrain emissions of carbon dioxide and fatal green house gasses the leading gas associated with global warming, and of mercury and other contaminants. Utilities seeking to manage such costs and risks are finding that wind energy is a pretty preference to new generation.

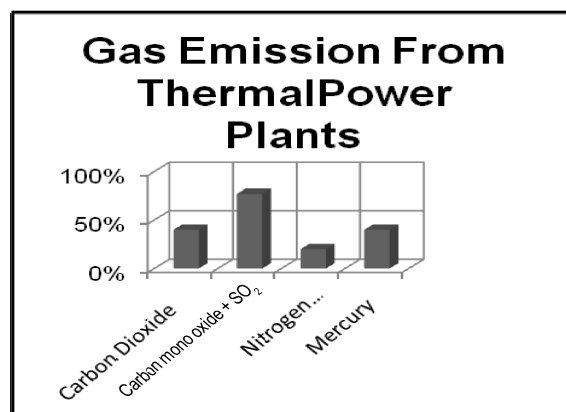


Fig.3

This fig.3, states that green house emission is coming from the power plants but wind energy farm does not produce any green house gases for air pollution. Wind energy can generate power eco-friendly. The Fig.2 and Fig.3 can be pictured and described as wind energy in perspective. Wind energy is a cost-competitive resource that helps diversify our power-supply portfolio and reduce the risk to our customers from a volatile short-term energy market.

17. Rolling Back Constraints to Growth

The wind energy industry is calling on Congress to extend the federal production tax credit (PTC) this year as soon as possible and for minimum of five years, so that businesses can plan for growth, put more people to work, and deliver more clean, safe power to the American economy. Record-breaking installations are planned or under construction across the country following renewal of the credit in October 2004. However, the short duration of the extension — only until December 31, 2005 — did not give manufacturers adequate lead time to make available enough turbines, and will spell another boom-and bust cycle forth industry, unless Congress moves quickly this year to extend the valuable incentive. Wind helped to diversify the economy. It's another reap we can harvest, and it facilitates block up gaps in the county financial avowal.

18. Wind Farm Buys Local Economy

Countryside and many counties such as Sherman County, Oregon, are reaping the wind and, along with it, an economic windfall. Sherman County is a one-crop county in Eastern Oregon that relies on dehydrated land wheat farming. The county ranks last out of the state's 36 in per capita income, and has unemployment Rate of 11.9%. During its first year of maneuver, the local 24-MW Klondike wind farm generated. Klondike is being expanded by an additional 75 MW in 2005, with the community's inclusive support.

19. Conclusion

Global energy demand is growing high-speed. The International Energy Agency (IEA) estimates that by 2030 some 4,800 gigawatts (GW) of new power

generation capacity will be needed. Wind energy can help meet that demand without an increase in fossil fuel consumption it is a clean, high-tech energy source with which to power the 21st century.

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