Prediction of wind energy-A survey

Introduction:

=> The increase in wind generation requires solutions to a number of research fields, which include market integration and design, real-time grid operations, interconnection standards, axillary service requirements and costs, power quality, transmission capacity upgrades, power system and dynamic stability and reliability.

=> The limit of wind power penetration in penal of Taiwan is an example. However, several factors could improve the attractiveness of wind energy:

*improvements in the modal accuracy of wind power forecasting

*Load management to better accommodate fluctuations in available wind power.

=> Several studies have indicated that wind energy will not cause the significant impacts on reserves if the technique of wind power forecasting can be improved. Accuracy forecasts of power generation are also importance to electricity transmission. As wind farms grow in capacity, the strain they place on the transmission grid may not be transmit all the wind power. Experience from the world has highlighted that accurate and reliable forecasting system for increasing wind penetration.

=> Under deregulated electricity markets, energy imbalance charges based on market prices would provide appropriate incentives for accurate wind forecasting. A good technology for wind power forecasting can help develop well-functional hour-ahead markets and adopt market designs that are more appropriate to weather-driven resources. In addition, most wind farms are built in remote areas, which could lead to transmission congestion. This is another reason for needing accurate wind power forecasts.

=> In *Europe,* a 4-year project ANEMOS[9] has launched by 22 partners from 7 countries including research

institutes ,universities, industrial company , utilities , TSOs and agencies. The aim of this 4-year project is to develop advanced wind power forecasting models including statistical, physical, and combined approaches. In the frame of the ANEMOS project, emphasis is given to the development of appropriate prediction models for the offshore. Furthermore, in order to estimate the benefit of forecasting in a model of the Nord pool electricity market, the WILMAR project supported by the European Commission has developed the market model for the simulation of wind power predictions. California ISO currently has a centralized wind forecasting program. One of the project targets it develop the high quality forecasts for the day-ahead and hour -ahead scheduling and real time forecasting for ISO operations.

Literature survey:

=> The forecasting results in energy generation can be used for energy can be used for energy reservation and energy generation can be used for energy reservation and energy scheduling and maintenance. Load forecasting can be used for operational planning.

=> It can be classified into three types: they are

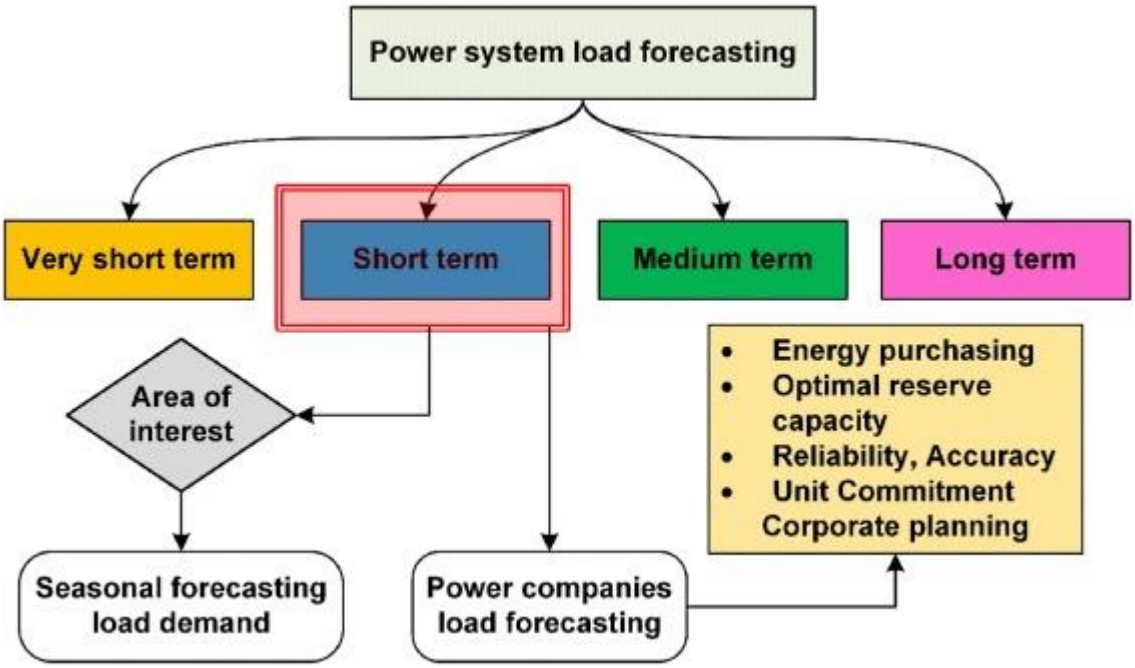
***Short term**
***Mid term**
***Long term**

***SHORT TERM*: The short term load forecasting neural networks are used on historical load and temperature as input data, also day, time, humidity, wind velocity, and season are choose as input in many paper for short term forecasting. Genetic algorithm along with neural networks are used with propagation for short term forecasting. While it is observed that for speeding up the computation and increasing the forecasting genetic algorithm is used.**

=> Time is divided into eight triangular membership functions for short term load forecasting using fuzzy algorithms where input data taken is time and temperature. If wind energy

speed data are always available we have the ability to forecast and estimate sequences. Of second's scale power output from wind speed only? The theoretical and mathematical background Related to application in neural networks in wind power generation.

***MID TERM*: A streamlined enclosure called a nacelle houses key turbine component–usually including the gears, rotor and generator–are found within a housing called the nacelles are large enough for a helicopter to land on. In a meteorological condition is considered to some extent via multi-scale periodic pattern explored basing on historical energy data. This work is an exploration for medium term wind power forecasting that can well adapt to existing conditions. Where the power timing curves are difficult to obtain under current technical conditions. For one thing Numerical models for simulation and prediction of atmospheric flows are unrealistic solutions. The theoretical upper limit of deterministic weather forecast is almost equal to the level of natural variability.**



***LONG TERM*: A wind power forecast corresponds to an estimate of the expected production of one or more wind turbines. Wind energy could cover more than one-third of global power (35%),becoming the world's foremost generation source .To fulfil this aim, the world's installed wind power capacity must reach 6000 gig watts-over 10 times the current level-by 2050.**

Significance for different classifications:

Periods considered for classification - statistical significance

- **Long term - 0.835**
- **Medium term - 0.002**
- **Short - 0.08**
- **Long-Medium - 0.01**
- **Medium-Short - 0.006**
- **Long-Short - 0.354**
- **Long-Medium-Short - 0.048`**

Applications of wind energy:

=> Wind energy is used in various industrial purposes like, food processing, textile processing, production of inorganic chemicals like chlorine, bromine etc.

=> Wind power pump can be used to desalinate water.

=> Wind power pump can be used for irrigation purposes.

=> In an aqueduct system, large scale wind driven units can provide power for the pumping sources.

Conclusion:

=> India is a land of unlimited potential, but the potential is not getting used in an effective manner. Wind energy is a great source to fulfil India's energy needs as well as develop its economy. Future and development of India depends upon many factors: one of them is being self-dependent for its energy demands. It will free India from its dependency on other countries for nuclear energy generation.

=> Although the Government's plans look ambitious now, it certainly aims to be self-reliant. Of all the major renewable sources they are primarily focusing on wind (generation and distribution).

=> But, there are some limitations with implementation of this technology that must be considered .Wind turbines cannot set up in many of the unused areas because it requires a huge amount of capital investment .Therefore, cost of wind turbines should be less so that they can be easily planted in more areas .Many research and development centers should be opened for the further enhancement and progress of wind power. Subject regarding to the wind power technology and other renewable energy technologies must be introduction in colleges and schools which may increase in scope in future tremendously.

=> In India, metros network can be great source of wind power generation as it will need lighter equipment than conventional wind turbines to harness the wind generated by commute of metro trains .In some cities metro rails are already running and in several other cities government is planning to run it .So, lighter wind turbines can be installed at sites of the metro tracks so without much extra investment wind energy can be generated. Right now India's headed on increasing graph with a slower slope than before .It will have to keep the slope of this growth rate sleeper if it wishes to achieve its targets in energy sector.