A Review on Power Generation From Wind Turbine Systems And Its Related Safety Measures

Praful Kumar[1], Raj Bharti[2]
[1]Dept of Health, Safety and Environment Engineering
[2]Assistant Professor, Dept of Mechanical Engineering
[1, 2] Shri Rawatpura Sarkar University, Raipur

Abstract- *As our global population increases at an exponential rate and our consumerism grows with it, a sustainable source of energy needs to be developed to meet our power requirements. At this stage wind energy conversion systems (WECS) cannot produce power to the same scale as coal or gas fuelled power stations, but they do however offer the ability to operate as stand-alone power generation systems, reducing the need for long distance power transmission lines. Stand alone WECS are suitable electricity suppliers for isolated communities, island communities or applications where the cost of grid connection exceeds the installation and maintenance cost of a WECS. This paper presents a review on Power Generation from Wind Turbine Systems and its related safety measures.*

Keywords- Renewable Energy, wind energy conversion systems (WECS), Risk management, Wind farm, Construction, Safety Measured

I. INTRODUCTION

Presently, electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy. This process reviles the sustainable energy resources without damaging the nature. We can give uninterrupted power by using hybrid energy system. Basically this system involves the integration of two energy system that will give continuous power. Solar panels are used for converting solar energy and wind turbines are used for converting wind energy into electricity. This electrical power can utilize for various purpose. Generation of electricity will be takes place at affordable cost. This paper deals with the generation of electricity by using two sources combine which leads to generate electricity with affordable cost without damaging the nature balance. Electricity is most needed for our day to day life. There are two ways of electricity generation either by conventional energy resources or by non-conventional energy resources. Electrical energy demand increases in word so to fulfill demand we have to generate electrical energy.

Now a day's electrical energy is generated by the conventional energy resources like coal, diesel, and nuclear etc. The main drawback of these sources is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages the nature. The nuclear waste is very harmful to human being also. The conventional energy resources are depleting day by day. Soon it will be completely vanishes from the earth so we have to find another way to generate electricity [2].

The new source should be reliable, pollution free and economical. The non-conventional energy resources should be good alternative energy resources for the conventional energy resources. There are many non-conventional energy resources like geothermal, tidal, wind; solar etc. The tidal energy has drawbacks like it can only implemented on sea shores. While geothermal energy needs very lager step to extract heat from earth. Solar and wind are easily available in all condition. The non-conventional energy resources like solar, wind can be good alternative source. Solar energy has drawback that it could not produce electrical energy in rainy and cloudy season so we need to overcome this drawback we can use two energy resources so that any one of source fails other source will keep generating the electricity.

Fig.1 Pictorial Description of Wind Turbine

Hybrid solar wind energy has become one of the most significant and promising sources of renewable energy, which requires an additional transmission capability and safer means of Maintaining system voltages and reliability. With a large number of distributed generation access, the impact of distributed generations of the grids' security, reliability and stability cannot be ignored. A renewable hybrid energy system consists of two or additional energy sources, an influence learning instrumentality, controller and an elective energy storage system. These hybrid energy systems have become common in remote space power generation applications as a result of advancements in renewable energy technologies and substantial rise in costs of rock oil merchandise. Analysis and development efforts in star, wind, and alternative renewable energy technologies are needed to continue for, up their performance, establishing techniques for accurately predicting their output and faithfully group action them with alternative standard generating sources. The aim of this paper is to review this state of the planning, operation and management demand of the complete PV solar–wind hybrid energy systems with standard backup supply i.e. diesel or grid.

II. PREVIOUS WORK

This section presents important contribution in the domain of research.

Chunhui Zhou et.al showed that wind power is a kind of clean energy promising significant social and environmental benefits, and in The Peoples Republic of China, the government supports and encourages the development of wind power as one element in a shift to renewable energy. In recent years however, maritime safety issues have arisen during offshore wind power construction and attendant production processes associated with the rapid promotion and development of offshore wind farms. Therefore, it is necessary to carryout risk assessment for phases in the life cycle of offshore wind farms. This paper reports on a risk assessment model based on a Dynamic Bayesian network that performs offshore wind farms maritime risk assessment. The advantage of this approach is the way in which a Bayesian model expresses uncertainty. Furthermore, such models permit simulations and reenactment of accidents in a virtual environment. There were several goals in this research.

Ian Prowell et.al disucssed various sources of risk exist for all civil structures, one of which is seismic risk. As structures change in scale, the magnitude of seismic risk changes relative to risk from other sources. This paper presents an introduction to seismic hazard as applied to wind turbine structures. The existing design methods and research regarding seismic risk for wind turbines is then summarized. Finally a preliminary assessment is made based on current guidelines to understand how tower moment demand scales as rated power increases. Potential areas of uncertainty in the application of the current guidelines are summarized.

N. Booij et.al showed that a third-generation numerical wave model to computer random, short crested waves in coastal regions with shallow water and ambient currents (Simulating Waves Near shore (SWAN)) has been developed, implemented, and validated. The model is based on an Eulerian formulation of the discrete spectral balance of action density that accounts for refractive propagation over arbitrary bathymetry and current fields. It is driven by boundary conditions and local winds. As in other third-generation wave models, the processes of wind generation, white capping quadruplet wave-wave interactions, and bottom dissipation are represented explicitly. In SWAN, triad wave-wave interactions and depth-induced wave breaking are added. In contrast to other third-generation wave models, the numerical propagations scheme is implicit, which implies that the computations are more economic in shallow water. The model results agree well with analytical solutions, laboratory observations and (generalized) field observations.

Mahmood Shafiee et.aldiscussed the failuremode and effects analysis (FMEA) has been extensively used by wind turbine assembly manufacturers for analyzing, evaluating and prioritizing potential/known failure modes. However, several limitations are associated with its practical implementation in wind farms. First, the Risk-Priority-Number (RPN) of a wind turbine system is not informative enough for wind farm managers from the perspective of criticality; second, there are variety of wind turbines with different structures and hence, it is not correct to compare the RPN values of different wind turbines with each other for prioritization purposes; and lastly, some important economical aspects such as power production losses, and the costs of logistics and transportation are not taken into account in the RPN value.

Maria A. Kougioumtzoglou et.al discussed the renewable sector and particularly offshore wind energy is a fast developing industry over the last few years. Especially activities related to the Installation, Operation and Maintenance (O&M) of offshore wind turbines becomes a challenging task with inherent risks. This paper assesses the risks related to the above stages of a wind farm lifecycle using the FMECA (Failure Mode, Effects and Criticality Analysis) and HAZID (Hazard Identification) methods. The full-scale offshore installation and O&M tasks are considered together with the wind turbine main components. An integrated risk analysis methodology is presented addressing personnel

Safety (S), Environmental impact (E), Asset integrity (A) and Operation (O).

Josua Kirsch et.al envisaged the design and implementation of a small wind turbine for electric power generation: 1-5 kW. The project encompasses the mechanical design of the wind blades, tower, gearbox, and choice of the proper electricity generator. The ability to provide a feasible and reliable electrical supply shall be emphasized. Connection to electricity networks with the associated proper frequency and voltage requirements and the involved technical modifications is described and discussed. The wind turbine shall be tested under local conditions in Toowoomba and Ipswich.

III. SAFETY MEASURES

For a systematic self-sustaining Health, Safety and Environment Management System, IWISL adopts a comprehensive Health, Safetyand Environment Management Framework, which shall serve as the strategic level guidance for the Company for planning for safety and health in the operational environment. By investing in workplace safety and health IWISL expects to reduce fatalities, injuries, and illnesses. This shall, in return, will result in cost savings in a variety of areas, such as lowering workers' compensation costs and medical expenses, avoiding legalpenalties, and reducing costs to train replacement employees and conduct accident investigations. A reputation of a poor safety record may result in lower customer trust. A poor safety record is a reflection of how well a business is managed, and that may result in customers questioning how well other fundamentals of the business are managed such as quality, reliability, and ability to plan, schedule, and meet deadlines. The Company also believes that improvement in workplace's safety and health result in significant improvements in the employees' morale and engagement, organization's productivity, financial performance and Company's reputation as a good corporate citizen and an 'employer of choice'.

Periodic audit

All Sites shall undertake HSE Audit at periodic intervals. Such audit shall be as per the below schedule

1. Annual Site HSE audit – Such audit shall be organized by the Corporate HR function to reviews all the aspect of HSE Management and compliance to all HSE Guideline.
2. Quarterly safety audit will be done by external agency.
3. Half yearly cross audit –interstate internal safety audit by site safety personals.
4. Periodic Specific Audit – Such audit shall include the following and shall be conducted by external agencies
5. Ambient air testing once in 6 months
6. Noise Test once in 6 months
7. Fauna audit once in 6 months

IV. CONCLUSION

It can be concluded that Periodically reviewing Job Hazard Analysis ensures that it remains current and continues to help reduce workplace accidents and injuries. Even if the job has not changed, it is possible that during the review process you will identify hazards that were not identified in the initial analysis. It is particularly important to review Job Hazard Analysis if an illness or injury occurs on a specific job. Based on the circumstances, you may determine that you need to change the job procedure to prevent similar incidents in the future. If an employee's failure to follow proper job procedures results in a "close call," discuss the situation with all employees who perform the job and remind them of proper procedures.

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