

Example of essay on wind energy

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The wind is a clean and plentiful source of renewable energy that is currently being explored worldwide. It offers a reliable alternative not only for non-renewable sources of energy but also renewable energy including solar energy (Thomas 119). Wind energy is used for various purposes including sailing vessels, powering factory machinery, pumping water as well as grinding grain. Turbines are used to generate wind energy in a process called Wind power. Wind power is widely recognized for its ability to generate power that can be utilized feasibly and economically in large quantities. It is an environmentally friendly process since it produces low carbon in the atmosphere. This study looks at how wind energy is generated through the turbine, the collection system, interconnecting to the grid, transmission, and distribution and all the way to the consumer for domestic use.

Wind power Process

The process begins when the wind turbine collates and collects the blowing wind into the system. Large turbines that can generate approximately hundreds of megawatts (MW) are installed in clusters referred to as wind farms (Heier 4). The turbine is comprised of a tower that is enclosed on top by a nacelle. It is fixed to a rotor that looks like a propeller and is connected to the nacelle. The nacelle contains an electrical generator, power control equipment as well as other mechanical equipment, which are connected to the rotor blades. Thomas (120) asserts that whenever the wind hits the rotor blades, it causes the rotor to spin creating mechanical energy. The spinning blades, which are attached to the nacelle and low-speed shaft, turn in tandem with the rotor blades. The low-speed shaft is connected to a gearbox

that is linked to a high-speed shaft on the opposite of the box. The high-speed shaft is linked to an electrical generator. As the intensity of the wind increases, the mechanical energy in the rotor is converted to electrical energy within the generator. The spinning takes place at the rate of between 11 to 20 times per minute (Heier 5). At the collection system, the voltage of the electricity produced by the turbines is increased by a transformer. The electricity goes through other substations within the collection system while the voltage continues to increase to a threshold that makes it possible to be fed in the electricity grid.

At the grid, the electrical energy is transmitted through cables to substations. The energy from the wind power is then converted to high voltage. The voltage is upgraded by transformers to a higher voltage of around 115 kV to 765 kV AC for long distance transmission (Heier 19). The upgrade is necessary so as to reduce the energy losses during the transmission process. It also increases efficiency of transmitting electricity through the power lines. If a fault is noticed in the grid that results to a decrease in the voltage, the connected windmills will detect the fault and increase its rate of working depending to the extent of the fault.

At the substation, the transformer makes power to be produced at low voltage of approximately 2.3 kV and 30 kV. The low voltage power is then distributed to commercial and residential customers. However, the distribution process is accomplished by combining a sub-transmission of 33 kV to 132 kV and distribution of 3.3 to 25 kV (Thomas 121). At the customer's place, the voltage is further lowered to protect personal electrical gadgets. Each turbine is capable of generating a maximum of 1.5 MW of

electricity. This power is enough to supply electricity to more than 500 residential homes.

Safety measure is a fundamental aspect of Wind power as it ensures operation predictability of the transmission system. Failure to comply with safety measures may result to massive loss both at the grid as well as at the customers' places. Various measures have been put in place to handle any eventuality. At the transmission level, the transmission system is fitted with generators, switches, circuit breakers, and loads. In the case of any mishap in the system, the circuit breakers will break the circuit to stop the transmission process (Heier 22). At the turbine level, the turbines are installed with maximum wind speed called survival speed beyond which they cannot operate. When the wind exceeds the maximum point, the turbines' internal brake will lock preventing them from operating faster beyond the survival speed. This attribute protects the turbines from breakdown during extreme windy conditions.

Conclusion

Wind energy has become a critical component of energy system worldwide. Its natural availability and renewable feature make it worthy of consideration by all stakeholders in the energy sector worldwide. It currently accounts for over 10000 MW of wind power in circulation worldwide. Countries such as Germany and France are the major users of wind energy with 3500MW produced between them. The Wind power has attracted the attention of researchers and industrial communities at large. There are plans in place to manufacture advanced turbine generators in a bid to increase wind power production, reliability, and cost effectiveness. Advanced technology will also

reduce the amount of noise that is produced by turbines to lower levels than it is currently. Wind energy will turn out to be the most efficient and environmentally friendly source of energy worldwide in the near future.

Work Cited

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