GREEN E-GENERATOR

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Abstract - This project dwells with the implementation of a hybrid model of solar and wind turbine. The alternate configuration of wind turbine is proposed. Vertical Axis Wind turbine with the use of Magnetic Levitation Technology to optimize the performance. The system utilize the nature of permanent magnet as a replacement for ball bearings to levitate the turbine components and thus minimize losses in the energy while rotating, which is the major problem faced by conventional wind technology.

Key Words: Maglev VAWT, Hybrid System, VAWT, Vertical Axis Wind Turbine, Wind Solar Hybrid Model

1. INTRODUCTION

The popularity of renewable energy has experienced a significant upsurge in recent times due to the exhaustion of conventional power generation methods and increasing realization of its adverse effects on the environment. The exploration of renewable energy is the only approach to reduce our dependence on fossil fuels. Among the renewable energy sources Wind and Solar energy are the fastest growing renewable energy sources.

1.1 Wind Energy

The Indian Government in its 12th five year plan (2012-2017) has set a target of adding 18.5 GW of renewable energy sources to the generation mix out of which 11 GW is the wind estimation & rest from renewable sources like solar 4 GW & others 3.5 GW.

The wind potential in India was first estimated by Center of Wind Energy Technology (C-WET) at 50m hub height i.e. 49 GW but according to the new survey at 80m hub height, the potential grows as much as 102 GW. This figure was adapted by the government as the official estimate. However, Lawrence Berkeley National Laboratory (LBNL) has stated the potential is over 300-400 GW.

1.2 Solar Energy

In India the annual global solar radiation is about 5 KWh/sq m per day with about 2300-3200 sun-shine hours per year. Solar radiations represent the earth’s most abundant energy source. The perennial source of solar energy provides unlimited supply, has no negative impact on the environment.
Solar Panel

A solar cell is a device that converts the energy of sunlight directly into electricity by the photovoltaic effect. Sometimes the term solar cell is reserved for devices intended specifically to capture energy from sunlight such as solar panels and solar cells, while the term photovoltaic cell is used when the light source is unspecified. Assemblies of cells are used to make solar panel, solar modules, and photovoltaic arrays. Photovoltaic is the field of technology and research related to the application of cells in producing electricity for practical use.

3. Implementation of System

VAWT

The voltage will be generated by using the concept of induced emf. The neodymium magnets are placed on the rotor of the wind turbine & 8 coils of 500 turns of 26 gauge copper wire are connected in the series to get maximum voltage.

In the designed prototype, the stator and rotor are separated in the air using the principle of magnetic levitation. The rotor is lifted by a certain centimeters in the air by the magnetic pull forces created by the ring type Neodymium magnets. This is the principal advantage of a maglev windmill from a conventional one. That is, as the rotor is floating in the air due to levitation, mechanical friction is totally eliminated. That makes the rotation possible in very low wind speeds. Figure 6 illustrates the magnetic levitation in our prototype.
The blades used in this prototype are not of the conventional type. In this prototype, we have followed a blade structure known as Savonius type of wind blade. The blades are made of aluminum sheet. The height of the blade is 15cm. There is a cure made of 15 degree so that the rotor can move only in the one direction irrespective of the direction of the wind. As aluminum is light metal so the wind turbine can move at low wind speed also. The blade structure is shown in the figure.

4. Conclusion

This hybrid system is capable of generating more power as it is fusion of solar & wind turbine both. Both solar & wind turbine would produce power individually but as they share a single battery they will charge the battery in contributing way. Solar panels are as good as power supplies of an average of 12V in bright sunlight. The only problem is unregulated voltage due to variation in intensity of light.

The Maglev Vertical Axis Wind Turbine is more efficient than the normal VAWT. It produces more power than the normal wind turbine. At moderate wind speeds the power output of the generator satisfied the specifications needed to supply the LED load.

REFERENCES


