

Generation of Electricity by mounting Wind mill on moving vehicles for safe Food and Medicine Transfer by using wind energy conversion system.

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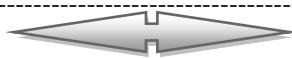
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ABSTRACT

In this fast world the demand for energy is ever increasing. With increase in energy production. There is heavy increase in pollution and depletion of fossil fuels they are going to extinct very soon, So the best way to save our nature and increase energy production is by using renewable energy. In this paper I am going to discuss about production of electricity through wind turbine mounted over a moving vehicle. We are implementing a very advanced H-Bridge converter for this conversion of alternate current produced by permanent magnet moving generator to direct current. The main reason for this paper is to explain about utilization of wind energy on a moving vehicle which is being wasted and to extract electricity without any fluctuations.

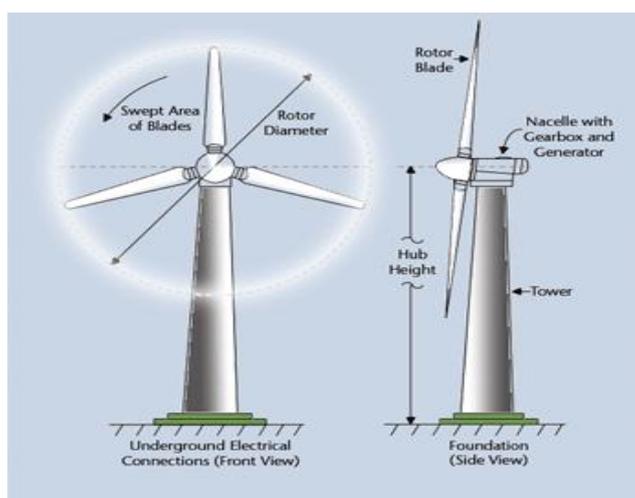
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I. INTRODUCTION



Drawing of the rotor and blades of a wind turbine, courtesy of ESN

fig-1.0 normal model a large wind mill

Wind, Solar and Hydel energy sources are some of the gifts of the nature to mankind which does not have any limit or cause any harm to the nature. Wind is one of the source which is abundantly available in the nature. It is one of the unlimited source of energy in nature. Production of electricity from wind energy is through conversion of mechanical energy in wind to electrical energy by employing a turbine and generator. As we know energy can neither be created nor destroyed it can be only converted from one form to another. Here we are converting the kinetic energy in wind to rotational energy by implementing a turbine and further into electricity by using a generator. WIND energy is increasingly gaining the focus of the world due to the rapid depletion of the limited fossil fuel reserves, rising global energy consumption and pollution. As it also has great potential to create employment, wind power has emerged as a viable and cost-effective option for power generation. A large scale of wind energy power plants are being established all over the world. But the main problem with wind energy production is its massive structure and un-reliability of wind. Can we get wind continuously at constant speed and reliability? It is not possible as wind speed is not constant.

II. IMPLEMENTATION

Wind turbines can be employed where wind speed is constant. When wind speed is constant we get continuous reliable power output. Let us assume a moving vehicle, there will be wind coming continuously in opposing direction to the movement of vehicle. The speed of the wind will be the speed of vehicle in opposite direction plus the normal speed of wind. Wind speed will be constant as long as the vehicle is moving with constant speed. Electricity is needed in any vehicle to run devices in it like air conditioner, lights, gps etc all these needs are run through power supply from generator connected to a shaft. The generator will be extra load on engine. We can replace the energy to all these equipment by mounting a wind turbine on the moving vehicle and connecting output to a battery. In this generation system we can use permanent magnet synchronous generator and later its output can be converted into DC by using H-Bridge converter.

When we keep our hand out of a vehicle from window we can feel the force of air hitting our hand, It is opposition or resistance of a vehicle due to wind coming in opposite direction similarly the vehicle also faces this opposition due to wind. Now let us employ a wind turbine over this vehicle which rotates due to the force of wind coming in opposite direction.

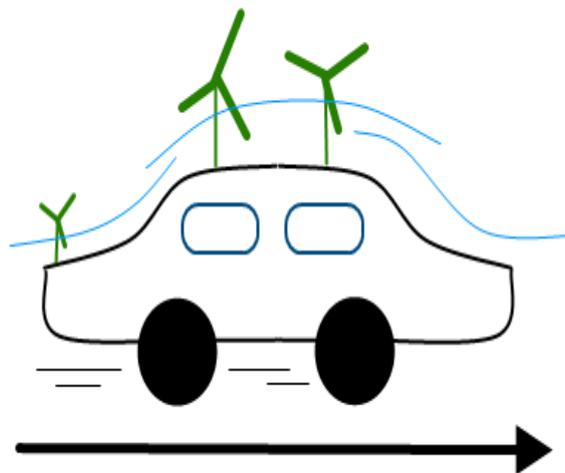


Fig2.0 streamline flow of wind and position of will mill

We can streamline the vehicle in such a way that instead of wind opposing the vehicle it moves in a particular direction. Now by placing a wind turbine in a particular place where there is high wind energy and use it to generate energy. By placing a wind turbine exactly in this place we get the required rotational motion.

Now we got rotatory motion which should be further converted into electrical energy. Now we place a permanent magnet synchronous generator which is coupled to wind turbine. we can convert that rotational energy into electricity through this generator. But still we have a bit fluctuation in speed variation due to different speeds at different places. Hence we employ a WECS (wind energy conversion system)

III. CIRCUIT DESIGN

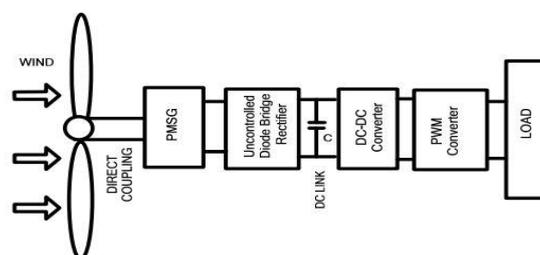


Fig3.0 Block Diagram of WECS

wind energy conversion system employees a permanent magnet synchronous generator which works over a wide range of variable speeds and gives out a constant DC output source by converting AC from synchronous generator.

The amount of out-put power (PM) from the wind turbine is given by

$$P_M = \frac{1}{2} \rho A C_p V_w^3$$

The mechanical torque(TM) in (N-M) is given by

$$T_M = \frac{P_M}{W_M}$$

Where:

A =Wind turbine rotor swept area (m²).

VW=Speed of wind (m/s).

WM=Mechanical speed of wind turbine (rad/sec).

CP = Turbine power co-efficient.

P = Air density in kg/m²

IV. WORKING

Now this mechanical torque acts on PWSG (Pulse Width Synchronous Generator) which is connected to uncontrolled diode bridge rectifier. In this uncontrolled diode bridge rectifier the alternate current is converted into direct current and further passed through PWM (Pulse Width Modulator) converter. Now the current is passed to the load.

Instead of passing it to the load the output can be connected to a dc battery which gets charged when the vehicle moves. The wind mills supplies all the electric needs of the vehicle such as air conditioner, bulbs and the excess current will be stored in the dc battery source. So when the vehicle is at rest the energy stored in the battery can be used and it automatically gets re-charged when the vehicle again starts moving. In this way the free wind moving around the vehicle can be used to produce energy and we can save plenty of fuel in generating this energy. In this way millage of the vehicle can also be improve.

The same method can be implemented to trucks which carry food and medicines for long distance, Those trucks have very heavy freezer to maintain very low temperature and preserve these things from not getting spoiled. Energy needed by this freezer is initially taken from the engine but if we can replace it with this wind mill, It can transport these food products or medicines for a very long distance with more convenience.

V. ADVANTAGES

- Free energy production from free source.
- Saves a lot of fuel and increases millage of vehicles.
- We get a constant wind speed in this type of energy production which is totally reliable
- Reduction in pollution as we are using less fuel for more distance with increase in millage of vehicle.
- Reduced size of wind turbine as speed and torque of the wind are very high.
- Helps in easily transporting food, medicines and food products for a long distance.

VI. Acknowledgement

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VII. CONCLUSION

At present age there are no wind mills which work continuously as there is no reliability of continuous wind. A new technique where we can get continuous wind at constant speed is described in the paper above. This new technique helps us to reduce pollution and to improve efficiency of vehicles. This project helps in designing new type of vehicles with freezer containers which help in increasing the distance of transport...

REFERENCE

- [1] <http://www.worldairco.org/IJCEEE/December2013Paper117.pdf>
- [2] https://en.wikipedia.org/wiki/Renewable_energy
- [3] http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=5698653&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxppls%2Fabs_all.jsp%3Farnumber%3D5698653
- [4] https://books.google.co.in/books?id=7LX3yrVEgCMC&printsec=frontcover&dq=renewable+energy&hl=en&sa=X&ved=0CC0Q6AEwA2oVChMI-dbPi_jPxwIVDE6OCh2J7gM2#v=onepage&q=renewable%20energy&f=false

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