

Electricity Generation by using Smart Ventilator

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Abstract— Wind energy is one types of renewable energy. Therefore, presently, there is the technological development of applying wind energy for the electricity generation. This paper describes about the modified smart ventilator that can generate electricity. The system is containing the combination of the DC generator, roof ventilator, solar charger, batteries and inverter. A DC generator was installed in 24-inch roof ventilator and carry around rotation of the generator by gear mechanism to the rotation of roof ventilator. The operational concept of the system is the load will use the energy from the batteries that charged using roof ventilator. The observed performances of system are the voltage and current of the roof ventilator, batteries and the load. The results of the study were found that roof ventilator would begin to generate a voltage of 12-24 volt at wind speed of 285-300rpm. When this electricity generation is use for small home appliances, such as radio, mobile phone charger, cinema hall, LED bulb etc.

Key words: Roof Ventilator, Wind Energy, Power, Electricity

I. INTRODUCTION

In todays, the world is talking about the green energy that can save the world from pollutions and green house effects. This wind energy is a renewable energy which can be adapted for many uses such as domestic air ventilation, and electricity generation because wind is clean energy without any pollution to environment. The main function of the free spinning roof top ventilator is to provide fresh air in roof space and living area of all year round 24 hours a day free of charge. The mechanics involved in the air movement is simple. In the energy crisis and the fast degradation of the natural environment, scientists have become increasing interested in the renewable energy. Kinetics in nature, there are some problems in the development of the clean energy power generator, such as high cost of construction, difficult maintenance, the power distribution and need to install in specific place etc. Therefore many countries we can now gradually begin to develop a small power station to improve such flaws. Long exposure to the sunlight and high room temperature make ventilation a necessity in the factory building. Therefore, the concept of ventilation without using electric energy has led to roof ventilators. When the air flow on the top of the roof or the heat air that under the roof, it turns the roof ventilator. The ventilator sucks the heat air in the building and top and throws it to the outside of the building, then the inside building temperature and humidity are not too high.

The hot air inside the shed tends to rise up. The ventilator blade is so designed that the wind from any direction and a small amount of wind is only needed for generation of optimum electricity. The hot air inside the shed tends to rise up. When the turbines rotate, they suck the warm air out through the vent, thereby, bringing out a drop in

temperature in the shed and allow supply of fresh air through doors and windows. They do not affect the environment. It has no operating cost plus they are maintenance free. The human being can not just enjoy the benefits of the better air ventilation in the house, but also have provide extra electricity supply for load appliances such as radio, mobile phone charger, LED etc. This technology is popularly installed on the roof in workshop's, industrial buildings, ware houses and also in residences. Therefore the rooftop ventilators are used for ventilation purpose because this ventilator is work on without using electric energy. Ventilator is located in tropical zone; air ventilation balls are installed at the roof of houses, buildings, and factories to release the air. Also, air ventilation ball can turn around at the lower speed. From the mentioned topics, there is a concept to study the probability to adapt the air ventilation balls on the roof to connect with Direct Current (DC) generator to generate electric current. The air ventilation balls will turn the wind energy into the kinetic energy to drive the generator. The obtained electricity will be tested with other electricity.

The concept is used in this project, the room temperature and outside wind is used. So the continuous rotation of ventilator can be achieved of energy in many countries of the world.

II. LITERATURE SURVEY

Many Research and designed have argued...that the reliance on standard 55 has allowed important cultural ,social and contextual factors to be ignored ,leading to an exaggeration of the "need "for air condition .Others have argued that allowing people greater control of indoor environments ,and allowing temperature to more closely track pattern in the outdoor climate. Natural ventilation –the uncontrolled air moment into building through cracks and small holes (Infiltration) and though vents such as windows and doors – is the traditional method of allowing fresh outdoor air. Nowadays, because of central heating and cooling as well as the desire for privacy, people tend to make little use of windows for ventilation so infiltration has become the principal mode of natural ventilation in home. Natural ventilation can save significant amount of fossil fuel based energy by reducing the need for mechanical ventilation and air conditioning. Form olden days we are using non -renewable sources of energy in excess mount for our needs.

Rooftop Ventilator is an indirect manifestation of wind energy. Wind is caused by differences in pressure. When a difference in pressure exists, the air is accelerated from higher to lower pressure. Advanced stack ventilated building have the potential to consume much less energy for space condition than typically mechanically ventilated or air conditioned building. This paper describes the how environmental design consideration in general and ventilation

considerations in particular, shape the architecture of advanced naturally ventilated building.

- Economic:-ventilator has low ongoing costs, but a moderate capital cost. The marginal cost of Electric energy once a plant is constructed is usually less than 1 percent per kWh as rooftop technology improves, costs are coming down.
- Social: -Surveys of public attitudes across Europe and in many other countries show strong public support for power. In Germany, where rooftop ventilator has gained very high social acceptance, hundreds of thousands of people have invested in citizens' wind farms across the country.

The only types of problems involving the use of rooftop ventilator are the visual impact, by the rotation of the rotor and the death of some birds colliding with the blades. Therefore, ventilator can generate the electrical energy is clearly a step forward and a viable strategy in the future of energy generation.

III. SYSTEM DESIGN

A. Schematic Diagram of Our Project

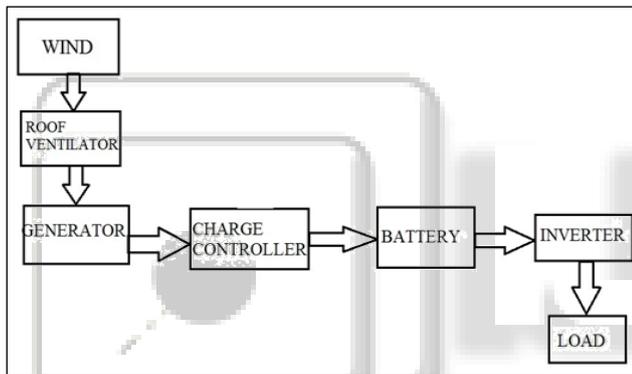


Fig. 1: Schematic Diagram

In this paper wind energy is used to generate electricity with the help of smart Ventilator. These Ventilators are made of GI sheets into specified shape. Here we are using the generator which is coupled to ventilator. This model mainly works on the principle of “Faradays law of electromagnetic induction”, which states that “Whenever a conductor is placed in a varying magnetic field (Or conductor is moved in a magnetic field) an EMF gets induced in the conductor. Ventilator starts to rotate with minimum speed, as ventilator are coupled to the generator, mecha3nical energy gets converted into electrical energy because of the fact that the generator consists of armature (magnet) and the field coil. An EMF is induced due to the relative motion between the rotating armature and magnetic field due to field coil. This resulted output is given to charge controller which control the voltage level of generator up to battery charging voltage level, also it prevents from reverse current analogy (battery to source) then the output of this is given to battery and is stored, then it is used to drive the load. The DC supply is converted into AC by using inverter circuit and feed to the AC load. Sometimes the output of generator is not sufficient that time battery will charge by auxiliary supply. Wind turbine ventilators are exactly as the name implies, they are a ventilator that is powered by the wind to create effective

ventilation for different industries. This product works on wind assisted ventilation. It will convert the kinetic energy from the warm air to the electricity for our usage. This free electricity has to use the battery charger to allow the charging process running. As they are installed on the top of the roof and would come in contact with rain and birds the ventilators are made to be rainwater and bird proof. The ventilators are also designed in a way that prevents leakage and down draft into the building allowing air entry from the side openings. Ultimately wind turbine ventilators are pleasant looking, and tend to enhance the architectural looks of the building.

The mechanics involved in the air movement is very simple. The hot air inside the shed tends to rise up. When the turbines rotate, they suck the warm air out through the vent. Thereby, bringing out a drop in temperature in the shed and allow supply of fresh air through doors and windows. The size, number and installation all depend on different factors which include wind velocity, temperature differential, environment conditions, and the size of the building. Turbine vents have been vastly used for many years in residential, agriculture, industrial buildings and warehouses. When it comes to roof top ventilators, they have several advantages which include that they do not need to be powered by electricity, they are located such that they exhaust the hottest air first, they do not cause any harm what so ever to the environment, they tend to save a lot of money because there is no operating cost plus they are maintenance free. The turbine is mounted on a tall tower to enhance the energy capture. Numerous wind turbines are installed at one site to build a wind produce more energy over the year.

Tall tower allows access to stronger wind in sites with wind shear and placement on uneven land or in offshore locations and most of them are self-starting. At the same time, it can be cheaper because of higher production volume.

They also have to be strong and anticorrosive. Efforts to clear smoke, foul air and damp from dwellings, ships and factories have produced various designs of ventilators, sometimes fitted to assist draft through chimneys but more often mounted on roofs. Wind influenced roof ventilators such as cowls, swivelling elbows, and venture and turbine types compete with powered fans to clear spaces of vapour and foul air. A DC generator looks like the simple cartoon, with current loops turning inside the field produced by a fixed magnet. Most DC generators are essentially simple rotating-coil. The connection between rotating loop and brushes is a “split ring” that acts to reverse the direction of the current. Simple DC generator with rotating loop, brushes and splitting commutator. The although a DC generator makes current flowing only in one direction, it doesn't make constant current - the current still varies between zero and maximum, meaning that power produced will be jerky.

B. Wind Power Generation

Wind farms are erected based on the availability of atmospheric pressure of wind in a specific region. There are certain criteria's and design procedure to erect wind mills as discussed in .Our project is specially for highways, and there is always availability of wind due to the motion of moving vehicles. When a free moving air particle is disturbed by forceful object succeeding in its path a pressure is developed at the body of the object and it is delivered to the surrounding

near objects. Considering this phenomenon, wind turbine is placed just above the road having support on two extreme ends. The wind turbines are not placed in vertical path, but horizontally. Also, on highways vehicles move only in one direction along its particular lane. So these wind turbines are having blades specially designed for unidirectional rotational opposite to the vehicles motion.

IV. ADVANTAGES & APPLICATIONS

- It is a renewable energy.
- Its source of prime is easily or free available.
- Up to certain limit it provides cashless energy for user.
- Energy is available for 24 hrs. and 365 days.
- There is no need of costly fuel.
- It is pollution free.
- There is no complicated mechanical assembly.
- It has low maintenance.
- All parts are easily available in the market and have low cost.
- The electrical obtain from this is billing less.
- Only disadvantages is the electrical energy obtain from this is low.
- Industrial- in the most of industry they use ware house or storage house for storing purpose so they are using roof ventilator for reduction of temperature In ware house so we can easily implement this concept due which energy required for lighting purpose this can be easily utilize from this concept and finally energy conservation is done through this concept.
- Commercial- like industrial again we can easily implement this concept in commercial purpose like hospital, college, workshop for illumination with the help of low energy consuming illuminating devices like light emitting diode (LED).
- Majorly used for residential purpose.

V. RESULT

- Through this research program, applying Wind Turbine Ventilator type vertical axis for electricity generation
- We can glow at least 5 watt bulb.
- From the above system model we can store the 24 vdc in battery.

VI. FUTURE SCOPE

With advancements in technology, the systems can be made more user-friendly. We are using ac supply in industrial, commercial and residential zone, so again we need inverter for conversion of DC to AC, it will increases the overall cost of project. Normally an asynchronous generator is used and it is directly connected to the grid. For the variable-speed operation, maximum efficiency is obtained; the system is controlled to maximize the power extracted from the wind. Among all these configurations, the trend is to use variable-speed wind turbines because they offer more efficiency and control flexibility. Wind power is an affordable, efficient and abundant source of domestic electricity. It is pollution free and cost competitive with energy from wind tree plants in many reasons. The wind tree is located near to residential area

as well as buildings offices area. The wind tree is constructed where flow of wind is major such as besides the railway track where the flow of wind is very much greater. It is constructed on top of the building where wind pressure is greater. This type of tree used as a decorative purpose and it satisfy our energy need.

VII. CONCLUSION

From this paper our conclusion is that, after the objective and introduction of the rooftop ventilator and DC generator which we have used, one typical generator is practically design successfully. Afterwards the generator elements analysis, some of parameters of generator was calculated, after the electricity generation using rooftop ventilator is experimentally calculated.

When the air flow of heat air (Hot Air) present under the roof, it will help to rotate or turns the rooftop ventilator. When roof ventilator moves, motors get operated and hence electricity gets generated. Based on the practical experiments the results of the output voltage is at 18V with 70mA (series connection) and 4V with 270mA (parallel connection). The output power achieved at 5 Watt. For above results after fixing the ventilator on roof of buildings, it able to charge 24V battery. And this prototype is relatively small and no more expensive. After fabricating and testing of this prototype the system has been practically applicable.

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