

# POWER GENERATION THROUGH WIND CREATED BY MOVING TRAIN

Sujata M. Tupe<sup>1</sup>, Dhanashri P. Chavan<sup>2</sup>, Chhaya P. Avhad<sup>3</sup>, A. K. Pathak<sup>4</sup>

<sup>1</sup> Sujata M. Tupe (B. E.), Electrical Engineering, AVCOE, Sangamner, Maharashtra, India

<sup>2</sup> Dhanashri P. Chavan (B.E.), Electrical Engineering, AVCOE, Sangamner, Maharashtra, India

<sup>3</sup> Chhaya P. Avhad (B.E.), Electrical Engineering, AVCOE, Sangamner, Maharashtra, India

<sup>4</sup> Prof. A. K. Pathak (Assistant Prof.), Electrical Engineering, AVCOE, Sangamner, Maharashtra, India

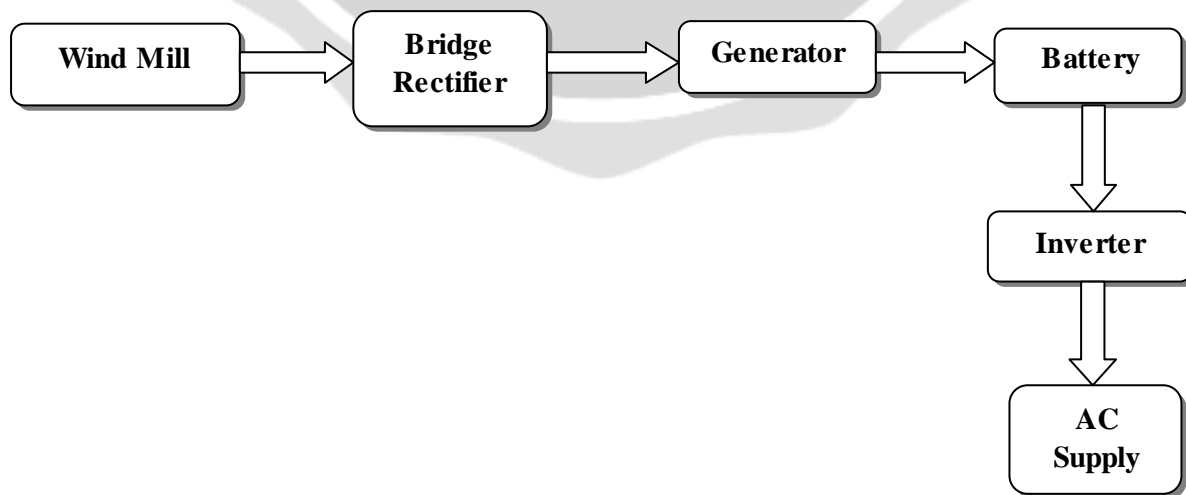
## ABSTRACT

Many areas aren't windy and having intermittency behavior of wind is one of the big obstacle to the world wide application of wind power generation. This paper attempts to explain the method of generating energy through moving train by using windmill. The method for generating electricity is by tapping wind pressure generated by moving train through windmill. The turbine converts wind energy into mechanical energy and this mechanical energy is converted into electrical energy by using generating device. It will be helpful to fulfill the increasing demand of electricity.

**Keyword :** - Renewable energy, wind turbines, wind.

## 1. INTRODUCTION

In developing countries energy requirement is increasing tremendously. The three basic needs of human are shelter, cloth and food. Demand of electricity rises up day by day. So we can say that electricity will become fourth important basic need of human. Electricity performs a crucial role in domestic as well as industrial application, without electricity life become somewhat cumbersome. Nowadays electricity generation is mainly through conventional sources like fossil fuels, petroleum etc. But they are on the way of depletion because of huge use of energy source in different areas. Therefore to make human life comfortable electricity generation through nonconventional sources is the main invention for future. The present system is the best option for this problem. As stated that mechanical energy (wind) converted into electrical energy and stored in battery as DC power. Inverter converts DC to AC for various AC applications.



**Figure 1. Block Diagram**

## 2. ENERGY REQUIREMENTS

80% of global population lives in developing areas as regards energy consumption 16% of global population in the OECD countries would consume more than 40% of energy by the year 2030. No doubt in the period of 2005-2030 the rate of growth of energy consumption in non-OECD countries would be higher than OECD countries & providing access to adequate energy to their people is really a challenge for developing country. In the profile of energy sources, coal in India has dominant position. Coal constitutes about (51%) of India's primary energy resources followed by oil (36%), natural gas (9%), nuclear (2%) and hydro (2%). There is shortage in all energy segments. Indian target of (9%-10%) economic growth rate is sustainable over next 10 to 15 year.

To address the issue concerning energy consumption and more particularly the need for enhancing supply. India has accorded appropriate priority to the renewable energy source. Adequate availability of energy would be generated by moving train from wind power generating source. Wind turbine power generation achieved sustention success.

## 3. FIELD OF INVENTION

The main object of this proposed system is to provide the constant and continuous generation of electricity according to human requirement by using wind generated by moving train. In wind mill source of generation, the wind is dependent on wind direction as well as force of wind. But wind is having intermittency in nature. So there exists huge need of source of generating electricity from wind generated by moving train. Therefore this system overcomes the problem for generation of electricity in continuous manner.

## 4. DESCRIPTION OF INVENTION

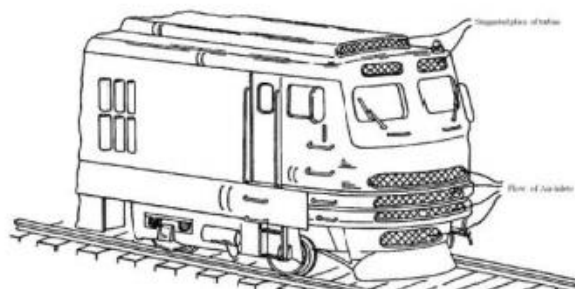
### 4.1 Capturing and routing wind induced by moving vehicles

The running train produces the unique alternative form of energy which does not depends on any natural resources. Sufficient amount of electricity can be generated by directing the wind properly towards turbine. The required direction or channeling of the wind can be obtained by one truncated cone or pyramid shaped housing converging towards the blades of the wind turbine.

### 4.2 Converting wind energy into electrical energy

#### A. Converting kinetic energy of wind to mechanical energy

Blade is a rotating component. It converts kinetic energy into mechanical energy. Blade is design aerodynamically to work on the principle of lift and drag to convert kinetic energy of wind into mechanical energy through shaft. There are two important reasons why wind turbine blades are able to spin in the wind: Newton's Third Law and the Bemoulli Effect.



**Figure 2. Typical Train model**

Newton's Third Law states that for every action, there is an equal and opposite reaction. In the case of a wind turbine blade, the action of the wind pushing air against the blade causes the reaction of the blade being deflected, or pushed. If the blade has no pitch, the blade will simply be pushed backwards (downwind). But since wind turbine blades are set at an angle, the wind is deflected at opposite angle, pushing the blades away from the deflected wind. This phenomenon can be viewed on a simple, flat blade set at an angle. If you push the blade with your finger from the direction of the oncoming wind, the blade will deflect away from your finger.

The Bernoulli Effect tells us that faster moving air has lower pressure. Wind turbine blades are shaped so that the air molecules moving around the blade travel faster on the downwind side of the blade than those moving across the upwind side of the blade. This shape, known as an airfoil is like an uneven teardrop. The downwind side of the blade has a large curve, while the upwind side is relatively flat. Since the air is moving faster on the curved, downwind side of the blade, there is less pressure on this side of the blade. This difference in pressure on the opposite sides of the blade causes the blade to be "lifted" towards the curve of the airfoil.

### **B. Converting mechanical energy into electrical energy**

Generator is the unit of wind turbine that converts mechanical energy into electrical energy. Generator is the next state in the supply of energy from the wind turbine to the electrical grid. Wind turbine may be connected to an electricity generator. The generated electricity may be stored in batteries. From which energy may be used as per application.

These turbines have been design to small power unit like providing electricity to controlling the railway station and L. T. consumer.

## **5. POWER PRODUCTION**

- The kinetic energy of wind

The kinetic energy of the wind is the source of the driving force of a wind turbine. That kinetic energy can be depicted by the formula

$$E = f \cdot m_{spec} \cdot v^3$$

In this formula:

E = the kinetic energy

$m_{spec}$  = the specific mass (weight) of air

v = the velocity of the moving air (the wind)

f = a calculating factor without any physic meaning [1].

The power in the wind is proportional to:

- a) the area of windmill being swept by the wind
- b) the cube of the wind speed.
- c) the air density - which varies with altitude.

The formula used for calculating the power in the wind is shown below:

Power = (density of air x swept area x velocity cubed)/2

$$P = \frac{1}{2} \rho A V^3$$

Where,

P is power in watts (W)

$\rho$  is the air density in kilograms per cubic meter (kg/m<sup>3</sup>). A is the swept rotor area in square meters (m<sup>2</sup>) & V is the wind speed in meters per second (m/s). [1]

## 5. OBJECTS OF INVENTION

The main object of proposed system is to give the system for generating electricity with the help of wind created by moving train. The other object of proposed system is to provide the system for generating electricity with the help of high wind pressure generated by moving train. The seasonal wind mill power generation source is having obstacles like wind direction, speed, pressure and it is having intermittence in nature at the time of generation.

## 6. ADVANTAGES

- There are approximately 14,500 trains running daily. Indian Railway (IR) has about 63,208 routes Km of track. This method would be capable to generate 1,481,000 megawatt (MW) of power in India alone.
- Wind produced by moving train is an inexhaustible source of energy and virtually limitless resources .
- Wind mill generators do not emits any emission that can lead to acid rain or greenhouse effect
- Like solar energy and hydropower, wind power taps a natural physical resource.
- There are some specially designed wind turbines. Traditionally wind turbines have three-blade, 'open rotor' design. A common method of this design is that even small turbines require a fast wind before they start operating. Small turbines can be used to generate more power and can be used for commercial applications as we store the retrieved energy in batteries.

## 7. CONCLUSIONS

There are huge potential for producing electricity from renewable sources. The achievement so far is about 10406.69 MW, as against global installed capacity of approximately 200000 MW of renewable electricity generation. In this method, the whole unit can be supplied with electricity for railway station lighting, fans etc.

## 8. ACKNOWLEDGMENT

We are highly thankful to our guide Prof. A. K. Pathak as well as Prof. S. S. Kadlag (HOD) department of Electrical Engineering, AVCOE, for guiding us to get through the bottleneck encountered during the work and Principal Dr. G. J. Vikhe who is responsible for inspiring us in the field of power generation .

## 9. REFERENCES

- [1] S. Bharathi, G. Balaji, and M. Manoj Kumar, "A Method for Generating Electricity by Fast Moving Vehicles".
- [2] Rekhi, Bhupindar, Singh, "A method for generating electricity by capturing tunnel induced winds".
- [3] C.J. Baker "Train Aerodynamic Forces and Moments from Moving Model Experiments", Journal of Wind Engineering and Industrial Aerodynamics, 24(1986), 227-251.
- [4] G. Prasanth and T. Sudheshnan, "A renewable energy approach by fast moving vehicles", U.G Student/Department of Electrical and Electronics Engineering Angel College of Engineering & Technology, Tirupur-641 665, December 8-10, 2011.