IJRD International Journal of Research & Development Organisation

ISSN-4567-7860

Journal Of Electrical And Electronics Engineering

SMART WAY OF GENERATING ELECTRICITY IN METRO POLITIAN CITIES

Kapil Gandhi 1
Email- kapilkiet@gmail.com

Ashutosh Dwivedi 2
Email- ashudwivedi92@gmail.com

1. Assistant Professor,MIT Moradabad,Uttar Pradesh , India
2.Assistant Professor,MIT Moradabad,Uttar Pradesh , India

ABSTRACT

This present paper seek to generate the electricity in the metro Politian cities by using vertical axis wind turbine at height of 150 meter from the ground which situated at the top of the building.

INTRODUCTION

As the population of India is increasing day by day our electricitydemand is also increasing as we know non-renewable energy resources are limited in the nature and very costly. Now the time has come to use renewable energy resource i.e. Wind energy in the metropolitan cities may be in Delhi, Mumbai, Kolkata, and Bangalore etc. As there is Huge demand of electricity in urban areas are responsible for the scarcity of electricity in rural areas so if we implement the vertical axis wind turbine at the top of the building in urban areas, we will be able to provide sufficient electricity in rural areas.

VERTICAL AXIS WIND TURBINES (VAWT)

Vertical axis wind turbines, as shortened to VAWTs, have the main rotor shaft arranged vertically. The main advantage of this arrangement is that the wind turbine does not need to be pointed into the wind. This is an advantage on sites where the wind direction is highly variable or has turbulent winds.

With a vertical axis, the generator and other primary components can be placed near the ground, so the tower does not need to support it, also makes maintenance easier. The main drawback of a VAWT generally create drag when rotating into the wind.

Fig-: 1 vertical axis wind turbine

It is difficult to mount vertical-axis turbines on towers, meaning they are often installed nearer to the base on which they rest, such as the ground or a building rooftop. The wind speed is slower at a lower altitude, so less wind energy is available for a given size turbine. Air flow near the ground and other objects can create turbulent flow, which can introduce issues of vibration, including noise and bearing wear which may increase the maintenance or shorten its service life. However, when a turbine is mounted on a rooftop, the building generally redirects wind over the roof and this can double the wind speed at the turbine. If the height of the rooftop

mounted turbine tower is approximately 50% of the building height, this is near the optimum for maximum wind energy and minimum wind turbulence.

ADVANTAGES OF VERTICAL AXIS WIND TURBINE

There are some of the advantages of Vertical Axis Wind Turbine are as follows

1) A VAWT can be located nearer the ground, making it easier to maintain the moving parts.
2) VAWTs have lower wind startup speeds than the typical the HAWTs.
3) VAWTs may be built at locations where taller structures are prohibited.
4) VAWTs situated close to the ground can take advantage of locations where rooftops, mesas, hilltops, ridgelines, and passes funnel the wind and increase wind velocity.

GRAPH BETWEEN OUTPUT POWER & WIND SPEED (VAWT)

Whether constructing a wind turbine is economically viable at your home or farm depends most strongly on the quality of your wind resource. Generally, average annual wind speeds of at least 4.0-4.5 m/s (14.4- 16.2 km/h; 9.0-10.2 mph) are needed for a small wind turbine to produce enough electricity to be cost-effective. A very useful resource for evaluating a site for its wind energy potential is a wind resource potential map.Wind speeds are always higher at the top of a hill, on a shoreline, and in places clear of trees and other structures and also Check with the local government for any other bylaws and regulations about zoning.

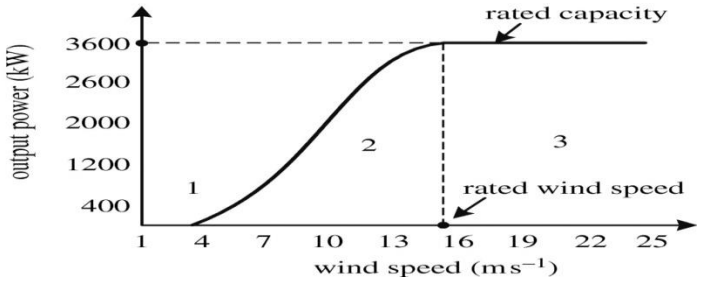

Fig-: 2 Graph b/w output power & wind speed (VAWT)

REQUIRED WIND SPEED ROTATE (VAWT)

The peak output of 1.5kW is achieved at wind speed of 12m/s. Cut in speed is shown at around 3.5m/s. Furthermore, the manufacture notes that the predicted energy yield per day for differing wind speeds is as follows:

1. 4m/s = 8kWh/day
2. 5m/s = 12kWh/day
3. 6m/s = 20kWh/day

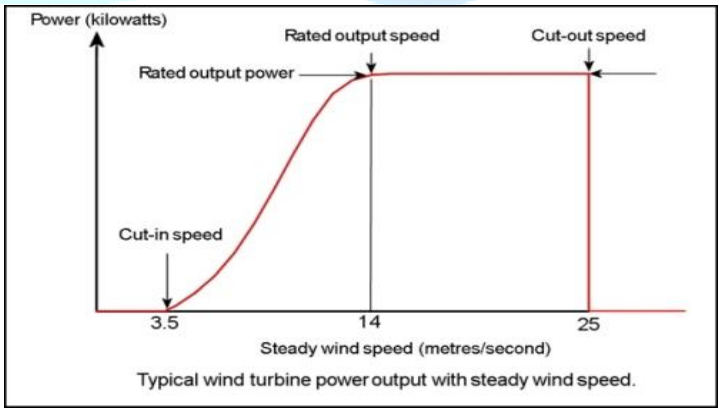

Fig-:3 Required wind speed rotate (vawt)

Graph between Wind Speed & Height Above Ground

On the ground, the wind is strongly braked by obstacles and surface roughness. High above the ground in the undisturbed air layers of the

goestrophic wind (at approx. 5 km above ground) the wind is no longer influenced by the surface. Between these two extremes, wind speed changes with height.

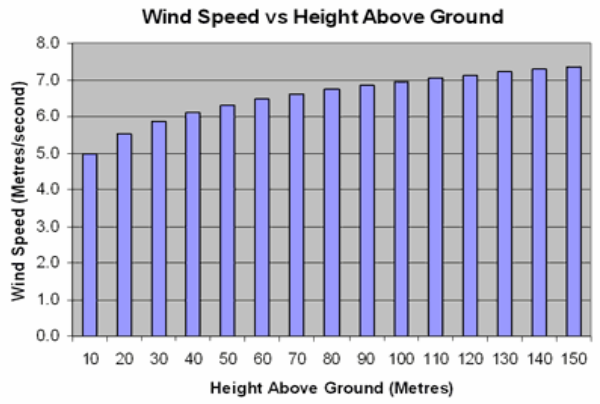

Fig-: 4 Graph b/w wind speed & Height above ground

Surface friction forces the surface wind to slow and turn near the surface of the Earth, blowing directly towards the low pressure, when compared to the winds in the nearly frictionless flow well above the Earth's surface.[7] This layer, where surface friction slows the wind and changes the wind direction, is known as the planetary boundary layer. Daytime solar heating due to insulation thickens the boundary layer as winds at the surface become increasingly mixed with winds aloft. Radioactive cooling overnight decouples the winds at the surface from the winds above the boundary layer, increasing vertical wind shear near the surface, also known as wind gradient.

INDIA'S TOP TEN TALLEST BUILDING

This lists ranks buildings in Indiathat stand atleast 150 meter basedon the standard height measurement. This include spiresand architectural details but does not include antenna mastsonly completed buildings and under construction buildings that have been topped out are included .

	Building	Architectural Height
1	The Imperial (two towers)	254m each
2	Lodha Bellissimo A, B & C	222m each
3	Orchid Enclave 1 & 2	210m
4	Kohinoor Square	203m
5	Vivarea 1, 2 & 3	200m each
6	Ashok Towers D	193m
7	The Ruby	191m
8	Orchid Woods 1, 2 & 3	190m each
9	Urmi Estate	182m
10	Planet Godrej	181m

Fig-: 5 Top ten tallest building

COMPARISON BETWEEN RESIDENTIAL AND COMMERCIAL BUILDING

The electricity consumption in residential building is less as compare to commercial building as shown in figure below.

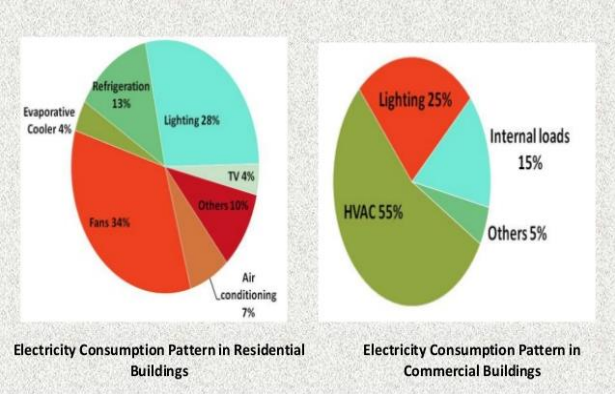

Fig-: Pie chart between residential and commercial building

CONCLUSION AND FUTURE ASPESTS

Through discussion of above cases we can conclude that cut in speed of vertical axis wind turbine is **3.5 m/s** and the rated speed of vertical axis wind turbine is **14 m/s** and cut out speed is **25 m/s** .

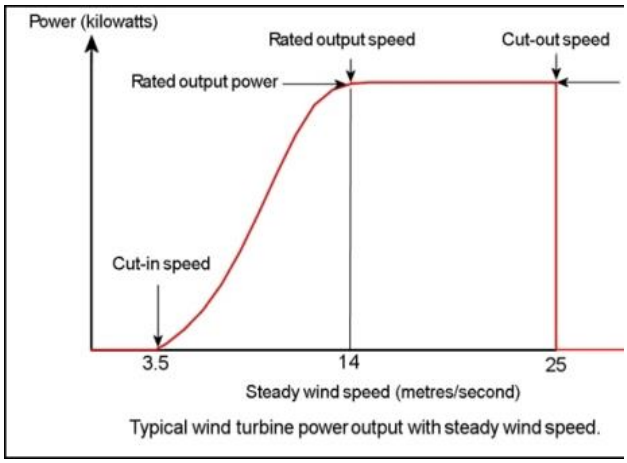

Fig-: 6 Required wind speed rotate (vawt)

Speed of air at the height of **50 meter** will be **6.25 m/s** as height of building increases speed of air increases hence these condition are satisfied to install in metro politian cities .

REFERENCES

[1] Zavadil, Robert. Nicholas Miller, Abraham Ellis, and Eduard Muljadi. "Making Connections." IEEE Power and Energy magazine, Vol. 3, Number 6, Nov./Dec. 2005. [2] Piwko, Richard. Dale Osborn, Rob Gramlich, Gary Jordan, David Hawkins, and Kevin Porter. "Wind Energy Delivery Issues." IEEE Power and Energy magazine, Vol. 3, Number 6, Nov./Dec. 2005. [3] American Wind Energy Association. "Legislative Action Site" http://www.awea.org/legislative/ policy_priorities.html [4] American Wind Energy Association. "State-Level Renewable Energy Portfolio Standards (RPS)" http://www.awea.org/legislative/pdf/RPS_Fact_ Sheet.pdf