

Road Turbine Vehicle Vortex

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Abstract:- The main purpose of the road median turbine project is to increase number of EV charging stations as the main drawback in setting up EV charging is the lack of power source. From this project we can directly power the charging stations without the dependence on renewable energy.

I. INTRODUCTION

In this modern era our daily life is highly dependent on electricity. Due to global warming and other hazardous issues the use of eco-friendly vehicles and production of non-renewable source of energy has attracted the interest of many organizations and also that of youngsters. Use of electric vehicles has significantly raised since 2019. The major factors affecting the bloom of EV is due to the process of setting up charging station and supplying them with electricity produced from non-renewable sources. This paper has a solution to such problem. A major problem in EV is the efficiency in usage of energy, it is affected by many factors and one such factor is the aerodynamic drag due to which a significant amount of energy is being wasted.

II. VEHICLE VORTEX

This energy wasted by the EV's due to vehicle vortex can be harnessed to harvest electricity. When a vehicle travels at a minimum speed of 40kmph it creates a vortex with a minimum speed of about 19 – 20kmph and this relation between the vehicle speed and vortex speed increases exponentially resulting in higher vortex speeds. Thus placing roadside vertical wind turbines with the following specifications would help us harvest energy with maximum efficiency by harnessing the vortex created by vehicles. This modeled turbines in mainly built based on the situation in the cities.

III. TURBINE MODEL

The most efficient model in wind turbine is the Darrieus-Savonius wind turbine, vertical turbines are generally made in this model with few changes to increase the energy production efficiency. These turbines yield high amount of energy than any other turbines utilizing the same swept area. However the turbine used in this project does have a lot of modification than that of a traditional Darrieus-Savonius.

A. Blades and its arrangement

- Blades play an important role in making capturing the wind and making the energy harvesting process more

efficient. Using lightweight materials to create blades can make it spin easily.

- Blades must be placed closer to increase the capture of wind. These blades must be arranged with a rim at the top and bottom. While the bottom rim must be equipped with a magnet so that the blade keeps rotating even at a lower wind speed.
- The height of this blade must be equal to 0.75times the total height of the frame in order to capture more wind.
- Unlike traditional Darrieus-Savonius wind turbine the blades in this turbine do not have complete c shaped blades and also it does have many blades which makes it different from that of traditional ones.



Note: The blades in the image are meant to be even thinner on the inner side of the rim

B. Framework

- An important factor that has to be taken into consideration is the swept area mainly in cities the road separators mostly have a width not more than 0.75m and considering this the frame must occupy little space and also it must be energy efficient.
- For this, the diameter of the rim must be 0.65 times that of the width of the whole frame. And also the whole set of controllers and generators must be placed in this space.
- And with the following adjustments we can easily tackle this issue.

C. Generator

- Considering the space and the time span for replacement all the parts must be simple and removable. Thus these turbines are designed with built-in generators.
- Unlike traditional generators this built-in generator are so simple that the shaft is not present in these generators. This is the special feature that can solve the problem of both space and time for replacement.
- Since there is no shaft the energy is not wasted in the mechanical process and also the cost of maintenance also drops rapidly.

IV. TRANSPORTATION OF PRODUCED ELECTRICITY

Since these separators are present in the middle of the road, transportation of produced electricity is a serious matter of concern. The generator is connected to a series in which current produced from every generator flows. Later this current is collected at charging station for later use. Since this project is mainly created to power charging stations for EV's.

V. EASE OF REPAIR

Since these turbines are specially designed for busy city roads the time for replacement and maintenance of the turbine must not be more than 5mins. Every single element in this setup must be replaceable for which the connection must be simple. This setup is more or less like that of a Legos, which serves as another special feature of this turbine.

VI. SPECIAL FEATURES

- It is estimated produce electricity at
=> Minimum speed: 23kmph
=> Minimum speed with magnet: 15kmph
- It can withstand wind with a maximum speed of about 150kmph
- It has an Output range of about 105.3kvh on average.
- The expected lifetime of this turbine is estimated to be around 50 years.
- Due to its simplicity, the cost of maintenance and repair is also low.

VII. CONCLUSION

The project of road median turbine is mainly aimed to provide free energy to the charging stations. By this method we can attain a huge profit as there is no money spent on the production of electricity and also it would have a greater impact in the future of EV's. which would eventually decrease global warming. The power production can further be increased by increasing the number of turbines.

ACKNOWLEDGMENT

My idea for the creation of this project was mainly inspired by the most intelligent man ever lived Nikola Tesla. His thirst to create more methods to harvest electricity non-renewably inspired me in doing this.

REQUEST TO FELLOW READERS

While going through this paper if you do find anything skeptical (like the removal of shaft in the generator part) don't hesitate to reach me. Both your doubts and ideas are appreciated. Your help in initiating this protocol would definitely be welcomed.

REFERENCES

The following websites were used were used as references for this project of Road Median Turbine.

- [1]. <https://www.ecohome.net/guides/3605/small-wind-turbines-for-homes-which-are-best/>
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