

TITLE

VERTICAL AXIS SAVONIUS-DARRIEUS HIGHWAY WIND TURBINE

ABSTRACT

The objective of the project is to design a wind turbine to recapture wind energy from vehicles on the highway. Wind energy is considered the fastest growing clean energy source however; it is limited by variable natural wind. Highways can provide a considerable amount of wind to drive a turbine due to high vehicle traffic. This kinetic energy is unused. The wind turbines are designed to be placed on the dividers therefore fluid flow from both sides of the highway will be considered in the design. Using all of the collected data, existing streetlights on the medians can be fitted with these wind turbines. The design of the turbines consists of blades, collars, bearings, a shaft, gears and a generator. Additionally, since the wind source will fluctuate, a storage system for the power generated was designed to distribute and maintain a constant source of power. Ideally, the turbine can be used globally as an unlimited power source for streetlights and other public amenities.

PROBLEMS IT SOLVES AND ITS BENEFICIARIES

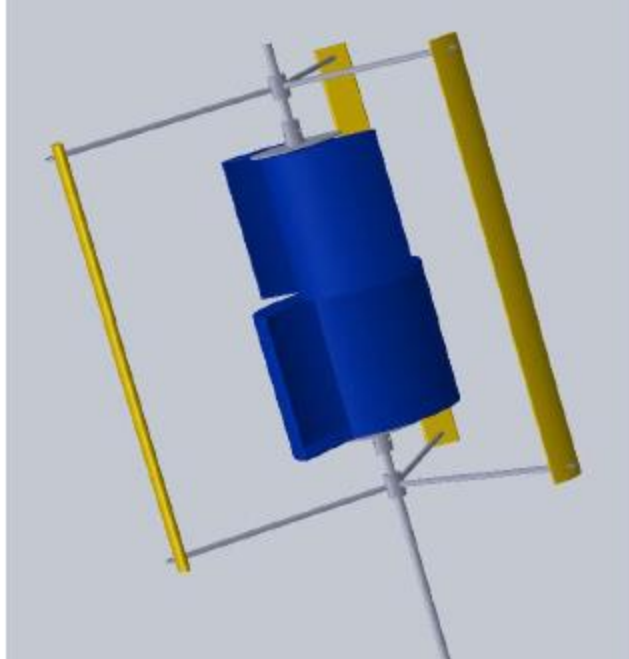
Wind turbines are traditionally employed in rural areas; the goal of this project is to design a wind turbine that can be used in cities. In particular, the turbines will use the wind draft created by vehicles on the highway to generate electricity. The idea is to offset the amount of pollution created by burning fossil fuels by introducing a potential source of clean energy.

Our wind turbine design can be used in any city around the world. It is environmentally friendly. Labels in various languages and manuals will be provided for each specific city. A dramatic increase in the employment of wind energy is predicted, globally.

TECHINICAL DETAILS

From preliminary research, it was clear that there would several challenges in completing the highway wind turbine design including costs considerations, variable wind placement and safety. Operational noise level and space are other important design considerations. The wind turbines have little negative impact on the placement location. Wind turbines are traditionally used in remote locations. This offers the additional challenge of having to transport the power generated to the location wherein it will be utilized. Fortunately, the wind turbine in this project is designed for use in high traffic areas where the demand for power is high.

The turbines must be placed in high traffic areas therefore, several safety provisions are incorporated into the design. These safety measures include stationary highway guards surrounding the rotating turbine blades and warning labels.



The turbine uses three H-rotor blades and four Savonius blades, stacked on top of each other at a 90-degree inclination. A permanent magnet alternator converts the rotational motion into electricity that can be used by the street lights. The Darrieus blades are lift based and have a higher efficiency while the Savonius blades are self-starting. Combining these two key elements, we obtain an optimum design.