Name(s)

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Project Number

J0219

Project Title

What Is the Best Wind Turbine for a Consumer in an Urban Environment?

Abstract

Objectives/Goals

My goal of this project was to determine the best consumer wind turbine for the urban environment.

Methods/Materials

To make this project very reliable I decided to test 4 turbines that cover the main classes. The first one is from the horizontal axis wind turbine (HAWT) category. This is the standard four rotor design that is used a lot in wind farms. The second from that same category is the HAWT with an augmentor. These are experimental wind turbines that, according to their independent tests, produce 2 to 5 times the electricity as the standard ones. The next set of turbines are from the vertical axis wind turbine (VAWT) family. These are the Savonius turbines and the Giromill turbines. With all of the turbines I have chosen, they should cover all of the main families and groups of turbines. To test these, I made an artificial wind tunnel out of my hallway. This would allow me to precisely control the amount of wind being produced and eliminate any unwanted variables. The variables that I was attempting to address was not only the types of turbines, but the angles the wind was blowing at them from, as well as different speeds. This would allow me to stimulate an urban environment in order to find the best turbine for that specific situation. In order to find the best turbine I would average all of the scores.

Results

Out of all the wind turbines that I tested the HAWT with an augmentor performed far better than any of the other competitors. The only down fall to this turbine was that it couldn't perform nearly as well when it was exposed to different wind directions. The one turbine that was able to do this was the Savonius turbine. The reason this one wasn't able to perform the best is because it was not able to get rotating fast enough to come close to the highest output of the horizontal axis turbine with the augmentor meaning that it's average was lower.

Conclusions/Discussion

keeping in mind that the horizontal axis turbine with the augmentor performed the best I think that the turbine that has the most potential is the Savonius turbine. The main reason for this is that any HAWT has a very difficult time making up for wind in other directions, somthing that doesn't effect the VAWT turbines. In an urban environment this could be expessually meaningful. As a result I believe that with slight modifications the Savonius could be the best for an urban setting.

Summary Statement

In this project I built turbines in order test and see which type would be the best in an urban environment

Help Received

I received no help during this project. I built, tested, and made the improved design all by myself.