



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Olivia G. Petty	Project Number J0121
Project Title Powerful Wind: Which Wind Turbine Design Is Most Efficient?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this investigation was to determine which wind turbine design, of four, is the most efficient.</p> <p>Methods/Materials I tested four types of wind turbines for which I built small plastic models. To build the models I used various plastic pieces such as PVC pipes, small propellers, and some parts I had 3D printed. I conducted three trials for each of the four turbines to determine efficiency according to when they stopped turning upon decreasing wind speeds. For each trial, I had a 14" fan on its highest setting and set the turbines in front of it starting at 24 inches away. I then moved the turbines away from the fan in two foot intervals until the turbines stopped turning, recording the distances and wind speed with an anemometer at each interval .</p> <p>Results The results of the experiment data showed that design three was much more efficient than the other three designs. It stopped turning at an average of 160 inches away from the fan at 0.6 MPH wind speed. Design four was the second best design which stopped turning at an average of 141 inches and 1.4 MPH wind speed. Design two was third which stopped turning at an average of 62 inches and 4.5 MPH wind speed and design one was the least efficient type which stopped turning at an average of only 29 inches and 5.8 MPH wind speed.</p> <p>Conclusions/Discussion The wind turbine that proved to be the most efficient of the four tested was my experiment design three, the Modern HAWT (horizontal axis wind turbine) which is the three-bladed propeller-like turbine and the most commonly used. Design four was a little less efficient. Designs one and two were far less efficient than the other two but work fine with adequate wind speeds. They are easy to build yourself with common materials so would be a good option for generating electricity for those who do not have access to or cannot afford produced turbines.</p>	
Summary Statement As measured by the wind speed at which four types of wind turbines stopped turning, I determined that the Modern HAWT is most efficient.	
Help Received My father helped me build my models based on my research, otherwise I designed and conducted the experiment myself.	