



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) H. Grace Prall	Project Number J0125
Project Title Unleash the Power of the Pinwheel!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if the orientation to the wind affects the amount of power generated by a wind turbine.</p> <p>Methods/Materials A wind turbine was constructed using an empty oatmeal canister weighted with heavy bolts to keep it grounded, a wooden skewer, a homemade rotor, two feet of thread, one end secured to the aft shaft and the other to five #1 size paper clips. Using a hair drier, wind was directed toward the rotor at the following angles; 0 deg., 45 deg., 90 deg., 135 deg., and 180 deg. The time to raise the load of paper clips to the base of the shaft was calculated in seconds, using a stopwatch, and the distance the paper clips were raised at each position was measured in inches, using a tape measure, but then converted into meters. After conducting three trials, times and distances were averaged to determine which orientation to the wind source created the most power.</p> <p>Results After testing all five angles three times, I've found that the 45 deg. angle generated the most power. It had taken it an average of 22.3 seconds to raise the paper clips 0.60960 meters. The total power generated was 0.000577 watts. I believe this angle generated the most power because the kinetic energy of wind at the 45 deg. angle caused a greater displacement of the rotor, resulting in the generation of more work. Whereas the 135 deg. angle generated the least amount of power, producing 0.000162 watts of energy.</p> <p>Conclusions/Discussion I've come to conclude that the 45 deg. angle generated the most power due to the larger surface area impacted by the wind source, causing a greater displacement of the rotor, resulting in the generation of more electrical energy. I've also noted that the horizontal axis wind turbines, such as the one I created, have a huge affect on today's society. These massive power sources generate power for thousands of cities. To do so, horizontal axis wind turbines must be at an angle which the wind is most powerful, in this case, a 45 deg. angle. Wind is also a renewable source of energy and the use of wind turbines could greatly reduce our dependence on foreign oil as well as aid in the creation of more job opportunities.</p>	
Summary Statement My project was to determine whether or not the different orientations of the rotor to the wind source effects the amount of power generated by the wind turbine.	
Help Received My mother assisted me in testing by operating the hair drier around the various angles of the rotor.	