



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Andrew A. Asper	Project Number J0101
Project Title What Variables Are Needed to Efficiently Produce the Most Electrical Output from a Darrieus Vertical Axis Wind Turbine?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine which design and angle of blades produces the most electrical output from a Darrieus vertical axis wind turbine, using 2, 3, or 4 blades. I believe that blade style #4 rounded front edge tapering to a thin point, at an angle of 90 degrees with 4 blades, will produce the most electricity.</p> <p>Methods/Materials First, I designed and built my own Darrieus vertical axis model. Then I made hubs for the blade mounts and made sure the mounts were drilled at 15, 45, and 90 degrees (the angles being tested). Next, I made a template of 4 different blade designs in order to shape my balsa wood blades to the specific design. The blades were then sanded and weighed. After that, I designed and built my own wind tunnel for testing the turbine. I tested using a fan for the wind power. I recorded the amount of electricity produced by using a voltmeter wired to a motor on the tower of the wind turbine, and I also tested the RPM. I ran 3 trials for each blade style, angle and number of blades to insure accuracy of results.</p> <p>Results The 2 blade, style #2-rounded front edge with a concave underside, tapering to a thin point, at an angle of 90 degrees was the most efficient at producing electricity. Blade style #4 (described in my objective) produced the most electricity overall (between all tests involving that style). The unmodified blade style #3 was the worst overall at producing electricity.</p> <p>Conclusions/Discussion My conclusion is that blade style needs to be aerodynamic in order to produce the greatest amount of lift, which is necessary to generate electricity. Also, the data suggests that engineers need to find the best combination of variables that work together to produce the most amount of lift and the least amount of drag, in order to efficiently produce the most electricity. Perhaps engineers/scientists should investigate my #2 blade design as well. The answer to the energy crisis isn't blowing in the wind. It is the wind.</p>	
Summary Statement My project is about trying to determine which variables will efficiently produce the most electrical output from a Darrieus vertical axis wind turbine in an effort to harness the wind's power.	
Help Received My dad let me use his equipment , mom proofread my report , and my sister took the photographs. I also had an engineering student from Dolhousie University give me a few suggestions by e-mail. Finally, I had the encouragement and support of two middle school science teachers.	