



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Josh S. Dhaliwal</b>	<b>Project Number</b> <b>J0108</b>
<b>Project Title</b> <b>How Efficient Is Your Wind Turbine?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project was to determine the most efficient design of a wind turbine (based on the amount of voltage produced) using a combination of different blade materials, a different number of blades, and different speeds of the wind. My hypothesis is that the most efficient wind turbine will have three triangular balsawood blades at a pitch of 45° and a wind speed of 8 miles per hour (mph).</p> <p><b>Methods/Materials</b> A model wind turbine was assembled using a KidWind Energy Kit. Triangular blades (8# long and 3# wide) were cut from balsawood, coroplast, plexiglass, and zinc metal. A 20# oscillating fan with three speed settings (high, medium, and low) was used as a source of wind. A homemade anemometer was used to measure the approximate speed of the wind in mph. The first portion of the experiment was conducted by installing two blades at a pitch of 45° at various wind speeds. The second portion of the experiment was conducted by installing three blades at a pitch of 45° at various wind speeds. The voltage produced by the wind turbine was recorded using a simple Multimeter.</p> <p><b>Results</b> My hypothesis partially matched with the results. A wind turbine with three blades produced more voltage than a wind turbine with two blades when the blade material and wind speeds were identical. A wind turbine with three plexiglass blades at a pitch of 45° and at the high wind speed setting of 8 mph produced the most voltage of 3.4 volts, followed by balsawood, coroplast and zinc metal. The most voltage produced by a two-bladed plexiglass wind turbine was 3.01 volts at a speed of 8 mph.</p> <p><b>Conclusions/Discussion</b> A wind turbine with three plexiglass blades at a pitch of 45° and a wind speed of 8 mph was the most efficient. For a wind turbine with two blades, the best combination was the same as a turbine with three blades. Overall, plexiglass performed the best for all experiments.</p>	
<b>Summary Statement</b> How different blade materials, number of blades, and the speed of the wind impact the voltage produced by a model wind turbine?	
<b>Help Received</b> My parents purchased materials from the Internet and local stores; they also helped in cutting zinc and plexiglass blades and attaching them to dowels using a glue gun; proofreading my project documents; reviewing the graphs, charts, and tables; and pasting them onto the display board.	