



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Weston R. Kramer	Project Number J0111
Project Title Wind Energy and a Better Blade	
Objectives/Goals The objective is to determine what number and angle of windmill blades can produce the most energy.	
Abstract Methods/Materials 1. I constructed the windmill stand and blades with pine and balsa wood. 2. I used an erector set motor and reversed it into a generator. 3. I connected the turning part of the motor to the windmill shaft, and then connected the motor to a volt meter to measure the energy output. 4. I used a small house fan as a wind source to maintain a constant wind speed. 5. First I tested a windmill with 2 blades at angles of 0, 15, 30, 45, 60, 75 and 90 degrees. 6. With each combination I took volt measurements from the volt meter. Then I did the same with 4 and 8 blades.	
Results The 2 bladed windmill produced the least amount of energy, the 4 bladed windmill was in the middle in energy output, and 8 blades produced the most. The 15 degree angled blade was best.	
Conclusions/Discussion The 8 bladed windmill at a 15 degree angle was the best of all I tested. My hypothesis of 8 blades at a 45 degree angle was partially incorrect. While 8 blades did turn out to produce more volts, the 15 degree angle had the highest output. I think the 15 degree angle had more surface area for the air to hit but it also had an escape route so that the air could flow through and turn the blade. Then I wondered why windmill farms had 3 blades instead of 8. I found out that it is a cost and safety issue (it would turn too fast with 8 and cost more), and it is the blade length that really impacts the energy output.	
Summary Statement For my project "Wind Energy and a Better Blade" I wanted to figure out what different types of windmill blades (angle and number) would produce the most energy (in volts).	
Help Received My dad helped me build the stand that the windmill turns on. He supervised my use of power tools. Greg at Radio Shack suggested turning a motor into a generator since I couldn't buy a generator.	