



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Sidney E. Wilcox	Project Number S0328
Project Title Comparing Horizontal and Vertical Axis Wind Turbines in a Wind Farm Situation	
Abstract Objectives/Goals The goal of this experiment was to determine the optimum wind farm configuration for each axial configuration and determine the overall most efficient turbine at different wind speeds. Methods/Materials I built six turbines, three HAWTs and three VAWTs, and a circuit with a 1000 ohm resistor and a multi-meter to measure the amperage produced. In addition, an anemometer was used to measure the wind speeds coming from the wind source and control them. Three HAWTs were mounted on a board with five possible configurations and a second board had three VAWTs mounted with the same configurations. The configurations were quantified by assigning each of the configurations an unobstructed frontal area exposed to the wind. Results The higher wind speeds produced a higher amperage in all trials. The more unobstructed frontal area for the configuration, the higher the amperage produced for all wind speeds and axial configurations. The HAWTs produced a higher amperage than the VAWTs in all situations. Conclusions/Discussion Higher wind speeds produce a higher amperage because there is more energy available in the wind to be harnessed by the turbines. More unobstructed frontal area corresponds to more amperage produced because the wind flow is more laminar and therefore generates more electricity. The HAWTs were more efficient than the VAWTs because the VAWTs had a higher initiation energy and had more drag than the HAWTs.	
Summary Statement This project compares horizontal and vertical axis wind turbines in different wind farm configurations in order to determine which axial orientation is most effective for generating electricity.	
Help Received Father helped with the building; Mother helped with the display	