



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Sherry Y. Xu	Project Number 34953
Project Title Light It Up: The Energy Efficiency of Light Bulbs	
Objectives/Goals The objectives of my project was to compare the energy efficiencies of incandescent, compact fluorescent (CFL), and name brand and generic LED light bulbs. I hypothesized that LEDs would be the most efficient, and out of name brand LEDs and generic LEDs, the name brand LEDs would be 10% more efficient than the generic LEDs. Abstract Methods/Materials A transmitting end (light bulb, Kill-A-Watt electricity meter, light dimmer) and a receiving end (3-volt series DC circuitry with a fixed resistor and light sensor variable resistor, whose resistance responds inverse linearly to the amount of light illuminated) were placed on opposite ends of a table. By measuring power consumption (watts), resistance (ohms), and voltage (volts) of the fixed resistor, and total voltage (volts), and using Ohm's Law, relative energy efficiency was calculated. Three trials were conducted for each of the four light bulbs. Results When comparing the incandescent light bulb, CFL, and LED, the LED was the most energy efficient; when not dimmed, the energy efficiency of the LED was 5.1 times as that of the incandescent light bulb, while the CFL was only 3.75 times. When comparing name brand LED and generic LED, the name brand LED and generic LED had the same energy efficiency when not dimmed. Conclusions/Discussion My first hypothesis was proven true: LEDs are the most energy efficient type of light bulb at all dimness levels. My second hypothesis was proven false: name brand LEDs and generic LEDs have very similar energy efficiencies at all dimness levels. Therefore, when looking to purchase an LED light bulb for energy efficiency purposes, one should consider purchasing a generic LED for similar energy efficiency to a name brand LED, while at almost half the price.	
Summary Statement By developing an original procedure, I calculated (and then compared) the relative energy efficiency of different kinds of light bulbs at minimal cost.	
Help Received Father explained Ohm's Law and taught PivotTable in Excel	