



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Sonya A. Mital	Project Number J2219
Project Title Saving Energy: Measuring True Efficiency of CFLs vs. Incandescents in "Real Life" Conditions Using a Homemade Photometer	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine if CFL bulbs are as efficient as generally proclaimed when subjected to real life conditions. The hypothesis was that CFL bulbs are NOT as efficient as claimed under real life conditions by factoring human perception of light, use of shades and measuring illuminance at various angles.</p> <p>Methods/Materials Materials: 2x1 lb blocks of paraffin wax, aluminum foil, cardboard box, CFL bulbs (40, 60, 75, 100 equivalent Watts), incandescent bulbs (40, 60, 75, 100 Watts), 3 lamp shades (cloth, paper, brown parchment), 2 light fixtures (110-130v), multi-meter/voltmeter, the Joly photometer, electronic photometer Method: Measured relative illuminance of bulbs using Joly Photometer for CFLs and incandescents each of same labeled wattage. Recorded results and applied inverse square law then verified results using digital photometer. Measured light of different wattages, under different shades and at different angles for both types of bulbs.</p> <p>Results</p> <ol style="list-style-type: none">1. CFLs of the same wattage generally had a higher relative illuminance.2. CFLs emitted the most light at 45 degrees.3. Incandescents emitted the most light at 0 degrees.5. Paper shades transmitted the most light. Cloth shades were second best. Brown parchment shades transmitted the least.6. CFL bulb manufacturers emphasize wattage and not brightness in lumens in their labeling.7. The homemade Joly Photometer readings were accurate and extremely close to the digital photometer throughout the experiment. <p>Conclusions/Discussion</p> <ol style="list-style-type: none">A. CFLs EMITTED more light: When tested at various angles, CFLs of the same labeled wattage emitted on average 49% more light than incandescents.B. CFLs TRANSMITTED more light: CFLs transmitted 18% more light than CFLs through shades. Thus, inside a shade, a consumer can replace a 75 watt incandescent with a 40 watt CFL instead of a 75 watt CFL and actual power consumption would go from 75 watts to 9 watts - a whopping savings of 88%.C. The homemade Joly Photometer was as accurate as the digital photometer.D. Initial hypothesis was proven false.	
Summary Statement Testing the efficiency of CFLs under real life conditions showed that they are actually much more efficient than believed and their widespread use would result in a dramatic reduction in use of fossil fuels and emission of greenhouse gases.	
Help Received Mother helped with board and father helped with Excel and apparatus setup.	