CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
J0715

Project Title
Which Is More Efficient: Fuel Cells or Solar Cells?

Abstract

Objectives/Goals
The objective in this science fair project is to determine which #green# power source is more efficient: fuel cells or solar panels.

Methods/Materials
Materials:
Fuel Cell Experiment Kit (Thames & Kosmos, Solar panel),
Hydrogen fuel cell, Resistors (4.7, 10, 20 Ohms, Cables and Connectors, Syringe,
Multi-meter (1st), Multi-meter (2nd),Sunlight ,Desk lamp with a 60W incandescent light bulb, Distilled water, Stop watch

The solar cell power efficiency was calculated by the maximum power output divided by the light power input. The maximum power output was determined by the voltage-current plot over different resistors. Both the sun and a 60W light bulb were used as the input light source. In both experiments solar cell efficiency was about 15%. Then fuel cell efficiency was obtained by fuel cell electrolysis experiment followed by dissipation experiment. Fuel cell electrolysis generated hydrogen and oxygen by splitting water with electricity to fill up the gas tanks of oxygen and hydrogen. Then fuel cell dissipation experiment determined total energy output. The fuel cell efficiency was about 40%.

Results
The solar cell efficiency is 15.33% under a 60 watt incandescent light bulb, and is 15.13% under the sun. The fuel cell efficiency is 36.32% with dissipation after electrolysis under a 60W light bulb and is 40.04% with dissipation after electrolysis under the sun.

Conclusions/Discussion
The fuel cell was about 2.5 times more efficient than the solar panel.

Discussion:
We are running out of fossil fuels quickly. Green power sources do not use fossil fuels and don#t pollute the environment. Green power sources such as solar cells and fuel cells need to be efficient to be practical. Solar cells are already in use as secondary power generators, while fuel cells are about to be used in #non-polluting# cars. There are already places that use either one of these power sources, but they do not produce enough power to provide on a city level basis.

Summary Statement
The project experiments with the efficiencies of two green power sources, the Fuel Cell and Solar Pannel

Help Received
My mom helped me with the board, and my dad helped explain the electrical theories.