CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S0905

Project Title
Solator: A Static Photovoltaic Solar Concentrator

Abstract

Objectives/Goals
The objective is to demonstrate an economical 50 percent increase in photovoltaic produced power through use of short focal length, static, cylindrical Fresnel lenses.

Methods/Materials
Approximately 20 linear centimeters of photovoltaic cells were placed beneath cylindrical Fresnel lenses with the long axes of the lenses oriented in an east-west direction. The cells were less than one focal length below the lenses and were connected to a resistive load. Output of the array was recorded every 40 seconds through an automated data logger. The power output of a second array, the control group with similar photovoltaic cells but without the Fresnel lenses, was recorded on a second channel of the data logger. The power output was integrated over the course of several days to compare energy production of the two arrays.

Results
Greater than a 50 percent increase in power production was achieved, in accordance with the objective.

Conclusions/Discussion
The Solator demonstrates that the power output of expense photovoltaic cells can be significantly increased through the use of low cost Fresnel lenses. Further, this is achieved without requiring any tracking mechanism or moving parts, and in a very low profile manner by innovative use of short focal length lenses.

Summary Statement
Demonstrated significant photovoltaic efficiency gain using low profile non-tracking cylindrical Fresnel lenses.

Help Received
Father assisted with soldering.