CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Ian G. Weiss

Project Number
J0223

Project Title
Our Roads, A Large Thermoelectric Power Generator

Abstract

Objectives/Goals
The objective of this study proves that heat from pavement can be converted into energy based on the Seebeck Effect. Solar radiation can heat water in pipes within the pavement, which then in turn can be harvested into useable energy by converting heat energy into electric energy.

Methods/Materials
I tested the useable energy with four thermoelectric plates by measuring the energy output with a multimeter. A pavement box with a pipe system was built and a solar pump system installed to circulate the heated water through a metal holding tank. The thermoelectric plates were attached to the tank.

Results
The testing was done over an 8 month period and all reading were taken during Solar noon. The setup produced consistent energy even during the lower temperature times and high production during peak hours on hot days.

Conclusions/Discussion
Maximizing the efficiency of a thermoelectric power generation system requires extensive engineering design. Trade-offs between total heat flow through the thermoelectric modules and maximizing the temperature gradient across them must be balanced. The design of heat exchanger technologies to accomplish this is one of the most important aspects of engineering of a thermoelectric generator. This results in electricity from otherwise wasted heat. Allowing this heat to be used this way also lowers the heat island effect.

Summary Statement
I engineered a thermoelectric energy system which can be installed under any pavement to harvest heat energy and reduce the heat island effect.

Help Received
None. I built the system by myself and tested the data as well as analyzed it alone.