

An Innovative Thermo-Energy Harvesting Module for Asphalt Roadway Pavement Dataset

Dataset available at: https://digitalcommons.lsu.edu/transet_data/120

(This dataset supports report **An Innovative Thermo-Energy Harvesting Module for Asphalt Roadway Pavement**)

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The related final report **An Innovative Thermo-Energy Harvesting Module for Asphalt Roadway Pavement**, is available from the National Transportation Library's Digital Repository at <https://rosap.ntl.bts.gov/view/dot/61763>.

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Abstract: The importance of green technologies for generating renewable energy and sustainable development is widely accepted. Road surfaces are exposed to solar radiation that generates thermal gradients and heat flow in the pavement layers. The heat stored can be harvested providing an untapped source of renewable energy. This report presents the design, construction, and assessment of an improved thermoelectric energy prototype for harvesting heat energy from roadway pavements. To accomplish this, various prototype designs were simulated using Finite Element (FE) analysis, followed by design construction and laboratory testing of the most promising prototypes to evaluate their power harvesting capabilities. The main design components of these prototypes are a heat collector/transfer plate, thermoelectric generators (TEG), and a cooling module consisting of a heat sink, phase change material, and an insulation box. The results suggest a direct relationship between thermal gradients and power generation and point out the importance of the cooling module in maintaining the efficiency of the harvester. An optimum harvester design would generate an average power output of 29 mWatt or 835 J over 8 hours per day in South Texas. Extrapolating this output for an installation that covers a length of 1 kilometer of a roadway could produce an average of 23.2 kWh/day, which appears to be a promising independent source of power for roadside signage and sensors.

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Dataset description:

This dataset contains 1 file described below.

Temp_data_P_plate_heat_fulx_4_26_2020__Autosaved_.xlsx:

The .xlsx and .xls file types are Microsoft Excel files, which can be opened with Excel, and other free available software, such as OpenRefine.

National Transportation Library (NTL) Curation Note:

As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (<https://ntl.bts.gov/public-access>) Section 7.4.2 Data, the NTL staff has performed *NO* additional curation actions on this dataset. NTL staff last accessed this dataset at https://digitalcommons.lsu.edu/transet_data/120 on 2022-05-23. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.