Statement No. 25

Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 08/24/2010 | **PROJECT AREA:** Construction

TITLE: Passive Deicing/Anti-icing System for Bridges Using Solar Thermal Energy

PROBLEM STATEMENT:

Arkansas experiences sub-freezing temperatures. The freezing temperature forms ice on bridge surfaces. This leads to hazardous conditions for drivers. Every year AHTD spends money through man power and equipment to apply de-icing solvents manually. However, a sustainable solar energy system through novel construction in the bridge may eliminate or reduce these expenses.

From our current research experience on storing solar thermal energy in concrete and solar cooker development, a novel construction in a bridge is proposed to melt the ice. On both sides of the walkway of the bridge a passive flat plate glass solar collector system will be installed and the collected heat will be transported into bridge deck to store the heat to prevent ice accumulation. This technology is similar to a solar cooker and does not need much maintenance once it is constructed. These technologies are evolving because of our current project on melting ice and snow for airport pavements using a solar-PV system.

OBJECTIVES:

1. Survey current de-icing and anti-icing systems in use and the cost involved every year to keep the system.
2. Develop an efficient flat plate solar collector system to transport heat into the bridge deck.
3. Build and test the performance in a laboratory environment to validate the technology.
4. Develop a methodology to implement the technology at a new bridge site for full scale testing.
5. Compare cost of the proposed technology to the existing technology

Form of Research Implementation:

The passive solar heating technology to melt the ice on the bridge deck will improve highway safety during poor weather conditions while incurring minimal maintenance costs.

Total Estimated Cost and Project Duration: **$** 200,000 **and** 24 **months.**

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