Project Summary/Abstract

Project Title: Radiant In-Slab Solar Sustainability Project		
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NEO ADV RENEW. PROJECT SUMMARY/ABSTRACT

PROJECT APPLICANT, DIRECTOR AND PRINCIPAL: Dave DeBoer

DESCRIPTION: The radiant in-slab solar sustainability project is designed to use solar energy to heat a building located in Fort Calhoun, Nebraska. This project uses a series of new-generation evacuated tube solar collectors to provide space heating with a radiant floor system. The system uses stored water and concrete mass as a medium to hold and radiate the energy during non-sunny periods. A data logger will be used to track system temperature and energy generated.

Evacuated tube solar designs are the most recent generation of solar collectors. These designs are commercially available but underutilized in Nebraska buildings. The collectors use cylindrical shaped tubes that are connected in series. Different than flat plate collectors, the 360 degree tubular design inherently tracks the sun and collects energy even during cloudy Nebraska days. The sealed evacuated tube contains a copper heat pipe that is attached to an absorber plate. The vacuum enables liquid to boil at lower temperatures than at normal atmospheric pressure. During sunny periods the liquid in the tube vaporizes and rises to the top of the pipe. Each tube is connected to a manifold that transfers heat to circulating water. The fluid in the heat pipe condenses and flows back down the tube. The process continues, as long as the sun shines.

OBJECTIVES: The primary objective of this project is to develop new-generation evacuated tube solar collectors as means to further expand advanced technologies in renewable energy in Nebraska buildings. This project will generate energy and reduce building dependence for grid-based electricity. In addition this project will provide a significant reduction of greenhouse gas emissions.

BENEFITS: Evacuated tube technologies provide some of the lowest installed costs for solar heating. These systems have the best opportunity for additional installations and the creation of new jobs. This sustainable solar project will generate up to 43% of the heat energy requirement and reduce carbon emissions by 4273 lbs/yr.