
Cycle 2 – Energy Research Grants (FY07/08)

Passive Solar Powered Earth Contact Heat Exchangers for Cooling Buildings

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ABSTRACT.

In many areas of the United States peak electrical use occurs in the summer. Building cooling is a major component in energy consumption. This project addresses a solution path that could contribute to reducing building cooling loads with a particular impact in agricultural livestock confinement structures and in the commercial building sector. The performance of earth contact heat exchangers, which consist of buried culvert pipe, have been computer simulated and have undergone testing at the Solar Energy Research Test Facility for several years. Recent tests have indicated promising results approaching a ton of air-conditioning for each 18 inch diameter culvert pipe 160 foot long and buried at 10 feet in depth. The project calls for a full scale demonstration which will mate this buried heat exchanger with a passive solar collector-chimney array. The goal is to develop, test and optimize this all passive coupled cooling system and to corroborate computer simulation models which have already been developed. Another goal is to develop a commercial model which employs conventional electrical fan driven systems in conjunction with the buried earth heat exchanger by pre-chilling incoming air as a first stage.