OFFICE OF POWER TECHNOLOGIES

Success Stories

Transpired Solar Collectors

This simple, low-cost solar technology preheats ventilation air for commercial buildings

The Office of Power Technologies is part of the Office of Energy Efficiency and Renewable Energy

Most industrial and commercial buildings require large quantities of ventilation air to maintain a healthy work environment. In many regions, this ventilation air needs to be heated throughout the fall, winter, and spring to provide a comfortable work environment. Transpired solar collectors, developed jointly during the last decade by researchers at the National Renewable Energy Laboratory (NREL) and engineers at Conserval Systems, Inc., are a reliable, low-cost technology for preheating building ventilation air. With simple payback periods ranging from 3 to 12 years and an estimated 30-year life span, transpired collector systems offer building owners substantial cost savings.

As the system schematic on the next page shows, the simplicity of the transpired collector design is striking. In a typical application, a large portion of a building's south-facing wall is clad with dark-colored, perforated metal sheeting, which performs as a large solar collector. The sheeting is mounted to the building's structural wall, creating a 4- to 6-inch gap between the two. As outside air is drawn through the collector's perforations by ventilation fans, its temperature increases by as much as 40°F (22°C). The heated air flows to the top of the wall, where it is distributed to the building's interior through conventional ductwork.

Highlights

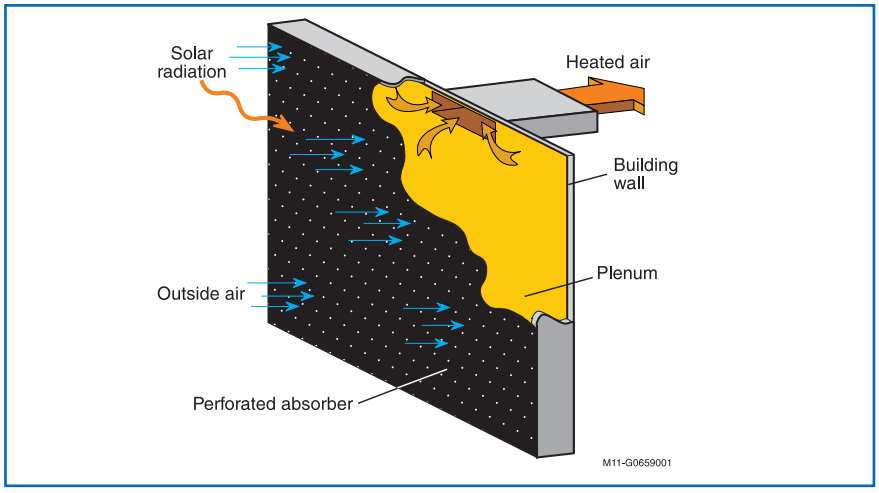
- *Converts as much as 80% of available solar radiation to heat*
- *Ideal for use in sunny climates with long heating seasons*
- *Installed cost: $6 per square foot in new construction; $10 in retrofit applications*
- *Payback periods range from 3 to 12 years depending on climate and type of fuel being displaced*
- *Estimated 30-year system life*
- *More than 200 systems installed since 1992.*

NREL/PIX 05560

The 5000-square-foot transpired collector on the Federal Express Company building in Littleton, Colorado, was installed in June 1996. The technology is ideally suited to sunny locations that have long heating seasons.

Transpired Solar Collectors

Transpired collectors provide the most reliable, best performing, and lowest cost solar heating for commercial and industrial buildings available on the market today.



With the exception of the fans, the transpired collector has no moving parts and requires no maintenance.

Scientists at NREL and engineers at Conserval independently developed the transpired collector concept in the late 1980s. With funding from the U.S. Department of Energy (DOE), NREL researchers conducted fundamental investigations into the collector's heat-flow characteristics, determining optimal airflow rates, plenum depth, and perforation size and spacing. As a result, the transpired collector is one of the most efficient solar collectors, converting as much as 80% of the solar energy striking it into usable heat. Conserval markets the technology as the Solarwall™ and has installed more than 35 systems since 1992. Ford, General Motors, Federal Express, and McDonnell Douglas are on the growing list of industrial users of this technology.

Transpired collectors have also caught the attention of the research community. In 1994, NREL and Conserval were jointly awarded *R&D Magazine's* prestigious R&D 100 Award for their work developing the technology, and *Popular Science* magazine assessed the transpired collector as one of the 100 most important technology advances of 1994.

Project Partners

U.S. Department of Energy

Conserval Systems, Inc.

National Renewable Energy Laboratory

For More Information:

Visit DOE's Solar Buildings Program Web site at:
www.eren.doe.gov/solarbuildings

or contact:
Energy Efficiency and Renewable Energy Clearinghouse (EREC)
P.O. Box 3048
Merrifield, VA 22116
(800)-DOE-EREC
www.eren.doe.gov/consumerinfo/
email: doe.erec@nciinc.com

Federal Technology Alerts:
Transpired Collectors (Solar Preheaters for Outdoor Ventilation).
DOE/GO-10098-528 April, 1998.
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DOE/GO 10098-558, 1998
www.nrel.gov/docs/fy99osti/24499.pdf

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