

Product News & Reviews

Innovations in Solar Air Heating Systems

Solar air heating can be a low-cost, effective way to lower heating bills in warehouses, schools, and other commercial buildings, and particularly in applications that demand a lot of fresh air, like factories and other industrial facilities. Two new transpired solar air-heating systems—Enerconcept Technologies' Lubi and Matrix Energy's MatrixAir TR—are available in the U.S. Both products use perforated panels, but there are fundamental differences between the two.

Transpired solar air heating was developed by Conservall in the mid-1980s and sold as the SolarWall. These systems typically use dark-colored, perforated metal panels, or collectors, installed a few inches away from an exterior wall (usually facing south) on non-residential buildings, forming a gap that acts as a plenum chamber for air distribution. When the sun hits the collectors, air on the surface is heated.

The building's air intake pulls that heated air in through the holes and into the plenum, where it can be used to preheat incoming ventilation air. In summer, dampers are closed so the hot air is vented up and out through holes.

Enerconcept's Lubi

Enerconcept's Lubi Perforated Glazing Technology (PGT) is a transpired system that uses perforated UV-resistant polycarbonate panels rather than metal collectors. (Polycarbonate, while durable and effective in this function, unfortunately uses the endocrine disruptor bisphenol-A). Lubi's polycarbonate allows light to pass through where it heats the wall of the building (which is usually a

dark color) and the air in the plenum. With metal collectors, much of the heat that is gained radiates off the surface of the metal before it can be pulled into the plenum, and these losses are exacerbated in windy conditions. But according to Christian Vachon, president of Enerconcept Technologies, Lubi does not lose heat

off the surface of the polycarbonate, and the Solar Rating and Certification Corporation (SRCC) even rates Lubi as insensitive to wind. "To generate heat in front of a metal panel you need a dark color and 3-4 cfm [cubic feet per minute] of air coming through the wall or else heat escapes into the environment," he said. The Canadian Standards

Association (CSA), supports these claims, giving the Lubi a performance factor of 1.18, better than the SolarWall's rating of 1.0 and MatrixAir TR (see below) at only 0.85. Vachon claims that new test data show an even higher performance factor of 1.20.

Because the Lubi system relies on the building's exterior to absorb the solar heat and transfer it to the air, the amount of heat generated by the Lubi system will vary depending on the building. The Lubi performs well with a variety of claddings, though, says Christian Vachon. If you compare a traditional black transpired system with black cladding behind the Lubi, the Lubi is 20% more ef-

ficient. When comparing a white transpired system to a white Lubi, the Lubi is 58% more efficient. Black works better, but the Lubi works reasonably well with light colors, offering design options for architects who want a transpired system but don't want a black metal cladding.

Marc Vachon, no relation to Christian, of Soudure Thetford in Thetford, Québec, has the Lubi system installed on the southeast wall of his company's welding shop. The building requires a significant amount of ventilation and has 22-foot-high ceilings that make heating a challenge. His company's Lubi system has sensors on the collector and in the shop that monitor the air temperatures and adjust the heat in a mixing chamber to provide ventilation air at a preset temperature. "In the beginning of March, when it was 35°F outside, it would go to 85°F in the wall," he said. "We set it at 65°F, and the controller takes over."

MatrixAir TR

The MatrixAir TR is a metal transpired system and available with either galvanized steel or aluminum collectors. It has a key difference from the traditional SolarWall collector, however, as well as the

Lubi: it draws air out of the plenum from the *bottom* of the exterior wall rather than the top. MatrixAir is also angled slightly, to 88 degrees, whenever possible to make it more efficient at gathering solar radiation.



Matrix claims that removing the air toward the base of the system is effective, since hot air can get trapped at the top. The lower intake also minimizes heat from penetrating the damper into the building in summer. Matrix also uses perforated vertical support members to help agitate the air and improve heat transfer between the collector surface and air in the plenum.

The CSA performance factor shows MatrixAir is less efficient than either SolarWall or Lubi, but Brian Wilkinson, founder of Matrix En-

ergy, contends that "efficiency does come at a price, and at the end of the day it is the return on investment that counts." He suggests the ROI on the MatrixAir system is around five years without subsidies. Christian Vachon estimates the Lubi system costs \$22-\$25 per square foot, compared to only \$15-\$20 for the MatrixAir or SolarWall metal transpired system.

Though transpired solar air heating technology is not very complicated, these systems require careful communication among the architect, engineers, and mechanical systems

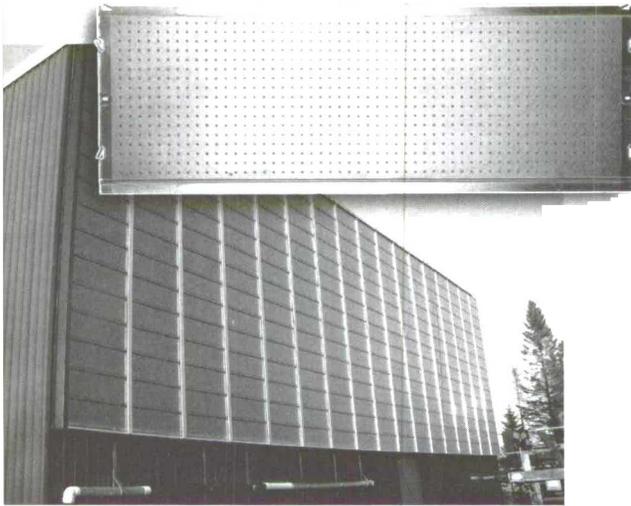
installers. "It's quite a challenge bringing these people together," said Christian Vachon. In some cases, such as retrofit projects, Enerconcept simplifies the process by offering turnkey systems that include collector, ventilation system, ducts, dampers, and controls.

- Brent Ehrlich

For more information:

Matrix Energy, Inc.
866-630-5630
www.matrixenergy.ca

Enerconcept Technologies, Inc.
866-829-1690
www.enerconcept.com



Photo

Enerconcept Technologies

Lubi's perforated glazing technology uses polycarbonate panels (inset) rather than metal; polycarbonate minimizes heat loss from wind and convection and still functions at low airflow rates.