



# Electro technology report

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## Heat Rave

**R**ichard Watson, the president of Solid State Heating Co. in Old Saybrook, Conn., frequently has to take time to explain to people why heat falls from his Enerjoy® radiant ceiling panels—an innovative and intriguing form of electric heat.

Most laymen, of course, are accustomed to the notion—however false—that heat always rises. In fact, this occurs only because the most common method of heating homes, office buildings, schools and hospitals is via convection, in which energy warms the adjacent air. The warm air expands, then rises (because it is less dense than the cooler air which surrounds it), and eventually it raises the ambient temperature of the room. Hence, in convective heating systems, warm air is usually forced into a room at or near ground level. As it rises, it fills and heats the room.

But Enerjoy heat panels are typically installed on the ceiling. Thus, it often takes a bit of explanation and perhaps a hands-on demonstration—before some people are ready to consider using these thin, lightweight rectangular panels, which consist of a graphite-based heating element on a base of fiberglass insulation. For this reason, Watson says, most of the 100,000 Enerjoy panels in use today were shipped directly from his factory in Old Saybrook, or through a network of distributors. Retail outlets typically don't have a knowledgeable sales force, he says.

But seeing Enerjoy panels—or, more aptly, feeling them—is believing. And people who've experienced radiant heat quickly become believers.

With radiant heat, the object, whether a person or pet, is warmed first, rather than the air in between. The heat then reradiates from the person to the surrounding air. Perhaps the best analogy is sunlight itself, which can make people feel warmer regardless of the ambient air temperature. To test the science, all you have to do is step out of the shade of a tree into sunlight. You'll feel 10° F. warmer, even if there's no difference in the air temperature from one spot to the other.

"They're ideal for zone heating or as a supplement to conventional HVAC systems," Watson says. Many users, which Watson says include people in all regions of the United States, install them in kitchens, dens, or

bathrooms at home, and over desks and workstations at the office. Many people also install them above pet sleeping areas.

## Natural Like Sunlight

The analogy with natural sunlight, in fact, is particularly apt, because Enerjoy panels are used today by a number of zoos and aquariums—including Washington Park Zoo in Michigan City, Ind., which uses them to heat camels and zebras; the Chaffe Zoological Gardens (formerly Fresno Zoo) in Fresno Calif.; the Tennessee Aquarium; and Hubbs Seaworld Institute in San Diego.

"People who care for animals try to replicate [the animals'] natural environment, which is heat from

Roland G. Ludlow, owner of RAM Network, a Reseda, Calif. (north of Los Angeles) company that markets infrared heating systems for the animal market, swears by them. Ludlow has sold nearly a thousand Enerjoy panels since he began distributing them eight months ago. He likes the fact that they're flexible and can be sized to fit the need. He's hung them from barn rafters to keep horses warm; inside reptile enclosures, where heat lamps can't be used because they might bum the turtles or lizards; and even in a research submarine. The submarine's crew needs a heat source that doesn't produce sparks when the vessel is 1,000 feet below the ocean surface and the crew is breathing nearly pure oxygen.

## No Getting Burned



"You can touch Enerjoy panels without getting burned," Ludlow notes. "It's a real advantage around animals or kids."

For many years, in fact, radiant heat was better understood in the animal heat market than in the human market, says Watson, who in addition to being an entrepreneur is also chairman of the ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) Technical Committee on Radiant Heating.

But that is now beginning to change as a result of a growing body of research results explaining how radiant heat is transferred, why it works as well as it does, and its potential for saving

energy. Last year, for example, Enerjoy panels received a big boost in a study by the National Association of Home Builders (NAHB), which compared them with an airsource heat pump at a house in Washington, D.C. The NAHB found that homeowners who use Enerjoy panels can reduce their energy use by 33

percent if they remember to turn them down after they leave the room—something many people habitually do with electric lights. Watson says people are even more likely to turn down their Enerjoy panels, since the incentive to do so, in terms of potential savings, would be larger. They heat up to operating temperature in four minutes or less, he says.

Meanwhile, several electric utilities, their interest piqued by the NAHB study, are taking a closer look at Enerjoy heat panels.

Connecticut Light & Power, for example, recently completed a test of Enerjoy heat panels in 17

condominium units at the Heritage retirement community in Southbury, Conn., where some residents were complaining about the high cost and low comfort levels of their 25-year-old, embedded heat panels—an older electric technology in which wires are embedded inside gypsum board. In fact, the local gas company was trying to convince the 2,800-unit Heritage complex, one of the top 20 retirement communities in the United States, to retrofit to gas heat, even though most of the all-electric condos are built on slabs. Conversion to gas would have required the installation of ductwork in the attic—a difficult and expensive proposition.

At CL&P's suggestion, Heritage's managers invited a presentation from Watson, who offered to design Enerjoy panels for 17 demonstration units, representing 14 different condo styles and sizes. In each demonstration unit, the various existing heating sources (i.e., ceiling, baseboard and bathroom heat/light combos) were disconnected and replaced with more-efficient Enerjoys.

In the largest demonstration condo, for example, Watson disconnected or removed heating sources representing a total of 17,100 watts. The Enerjoys which replaced them draw a total of only 8,000 watts, including a special, 400-watt bathroom heating panel which has an aperture opening in the middle large enough for a powerful-but-quiet exhaust fan. The Heritage installations were completed in December 1994. Testing has been taking place since then.

## Saving Energy

Preliminary data from tests conducted during the 1994-95 heating season are promising, says Todd Fitz, CL&P's director of marketing. At one of the condos, the inhabitants reduced their energy use by nearly 40 percent—even though no effort was made to weatherize the poorly-insulated unit. At the other end, a couple of units achieved energy savings amounting to only a few percent. But Fitz says followup investigations suggest the small savings in these instances are probably misleading.

"In one condo unit, where the occupants' energy use declined only 4 percent, we found that they had raised their comfort level considerably," Fitz explains. "The previous year, they were scared to death of the heating bills. They had lived in only two rooms, leaving the other rooms in their condo cold. But this year, after installing the Enerjoy panels, they heated all of the rooms; and the bills were very reasonable."

What's more, Fitz notes that at 33 other Heritage condos, which weren't part of the demonstration, residents went ahead on their own and installed Enerjoy panels in one or more rooms. "The nice feature about this system is that it's so flexible," Fitz says. "You can use them in just one room or many."

Top: Bathroom heat panel with aperture for fluorescent light. Center: Enerjoy panel on ceiling in turtle cave at San Diego Zoo, and the cave's owner. Above right: Cut-away of Enerjoy panel. Bottom: Condo at Heritage community in Southbury, CT.

Testing at the Heritage complex will continue during the upcoming 1995-96 heating season, Fitz says. However, this year the condos will be weatherized to reduce energy losses. This should make even greater energy savings possible, he says.

Meanwhile, Fitz has seen enough to convince him that Enerjoy heat panels can be an effective answer to competition from natural gas companies seeking to encroach onto the heating market in CL&P's service area, which includes Connecticut, Western Massachusetts and parts of New Hampshire. "We expect them to outperform gas heat," he says. "And they're cheaper to install as retrofits."

Enerjoy heat panels connect to existing electrical circuits, which makes them as easy to install as a light fixture. At Heritage, for example, there was no need to tear out the old embedded panels, sheet rock and all, nor install new ductwork or vents.

CL&P isn't the only electric company taking a close look at Enerjoy panels, either. Dayton Power & Light, for example, featured an Enerjoy panel at its recent Home-a-rama, a three-weekend showcase of demand-side-management and electrotechnologies that drew nearly 65,000 visitors.

Walt Hibner, an energy specialist at Dayton P&L's two-year-old Energy Resource Center, says he's looking at them as a spot heating system to supplement conventional heating and as a safe alternative to kerosene heaters.

"We're definitely interested in them," he says.

Indeed, one of the most enthusiastic backers of Enerjoy panels is San Francisco architect Peter Brice, who recently installed 16 of them in a 2,246-squarefoot, demonstration energy -efficient house in Glen Ellen, Calif. Brice calls them "a sensational product in every way." They were less costly to install, and are projected to operate for lower cost, than conventional, gas-fired forced-air heating, he says.

"Like anything else, new home builders are skittish because they don't want to be the trial balloon," Brice says. "But once these things are turned on, you've got them forever," he says.

Meanwhile, Watson plans to expand production capability "significantly" at SSHC's factory in Old Saybrook in anticipation of greater market demand. "We're increasing our advertising and trade show participation. We're also adding representatives, dealers and distributors and we're trying to work with electric utilities and their trade allies," he says.

**-Robert Livingston**

### **Aesthetic Appeal**

Many consumers, meanwhile, may like them for their aesthetic appeal. They fit nicely onto an existing ceiling or into a suspended ceiling grid. Because of the coating applied at the factory (which looks like textured paint), they blend right into the ceiling. Customers can even pick the color, Watson says.