

OTEC Tests New Heat Pump

By Debby Schoeningh

From the time man first rubbed two sticks together and used fire to stay warm, he has been trying to harness that energy efficiently.

We have progressed from campfires to keep the cave warm to homes with woodstoves, and then using kerosene, oil, natural gas and electricity.

We have finally arrived at the era of heat pumps.

Except for the more expensive geothermal (ground-source) units, heat pumps have never operated well in below-zero temperatures. David Shaw of Hallowell International based in Maine, says the technology to create a unit that would have been possible for some time. But due to the low prices of fossil fuels, and lower initial equipment costs, furnaces and boilers have dominated the U.S. heating industry.

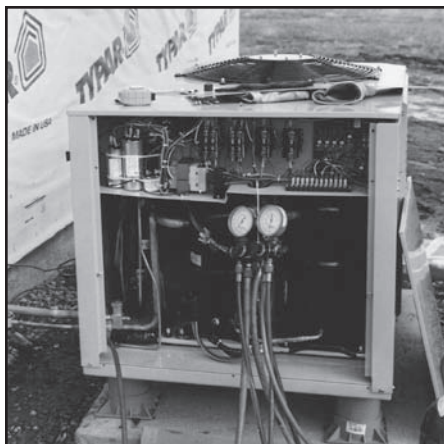
David began working on a new heat pump in the mid 1990s, anticipating a time when fuel prices would escalate enough to successfully market it. With David's All Climate Heat Pump (ACHP), Hallowell International believes that time has come.

While Hallowell's new heat pump may have received a big "Yabba dabba doo" from cartoon caveman Fred Flintstone, Oregon Trail Electric Co-op (OTEC) says it needs more testing before getting its seal of approval.

Partnering with the Cooperative Research Network (CRN), OTEC is testing one of 18 Hallowell ACHPs, which also have been placed in Colorado, Florida, Indiana, New Hampshire, Ohio and Pennsylvania.

Sites were chosen in a variety of climates to verify early findings that show the ACHP could save 25 percent to 60 percent in annual heating and cooling costs.

Unit is designed with an extra compressor to help in colder weather



OTEC bought this Hallowell heat pump to test its claims that it can provide heat in cold-weather climates, even to below-zero temperatures.

OTEC purchased the ACHP, which was installed in January at Dave and Carol Phillips' home near Baker City. The cost of monitoring its efficiency was picked up by CRN.

Testing required the heat pump to be placed in new construction, where the ductwork could be accommodated. Dave and Carol were building a home that met those requirements.

Scott's Heating and Air Conditioning of Baker City installed the two-ton unit. Russ Johnson with CRN attached computerized monitoring devices, which record data and send it to him through a phone line.

A process to determine the heat loss of a structure was performed before installation. The procedure tells how much heat needs to be put back into the home to keep it at the desired temperature, and is used to calculate the correct size of the heat pump.

Steve Schauer, member services manager of OTEC, says sizing

the heating system to the home is critical.

"If the heat pump is oversized it runs short cycles, just getting up to maximum efficiency, and then shutting off, and repeating the process several times," he says. "This uses more electricity than running longer cycles to maintain the correct temperature."

Another procedure was completed before installation of the heat pump to determine the proper duct sizing (supply and return) needed for the home. The ductwork was tightly sealed, so there would be no leaks, and insulated to R-10.

The ACHP is designed to heat a home in outdoor temperatures down to 10 degrees below zero without using any backup heat.

Like conventional heat pumps, the ACHP uses a refrigerant to absorb thermal energy from the air outside the home and moves it indoors using a compressor. A heat pump can supply about three times more heat than the energy it uses.

With conventional heat pumps, when the outside temperature nears freezing, the amount of heat that can be absorbed by the refrigerant decreases, causing the compressor to work harder. The backup electric-resistance heat built into air-source heat pumps turns on and the consumer sees decreased energy savings.

To counteract this problem the ACHP has a second compressor, which the manufacturer calls a booster compressor. The booster compressor is bypassed until temperatures drop. It can move more cubic feet of vapor per minute than the primary compressor.

During mild days, the ACHP uses stage one, which uses half of the energy of the primary compressor. For cold weather it kicks into stage two, using the entire primary compressor. In stage three, the booster comes on.



Above, the Hallowell heat pump is installed on the south side of Dave and Carol Phillips' home. Below, Mike Lane, left, and Rick Spellman of Scott's Heating installed the heat pump and ductwork. Photos by Steve Schauer.

If the desired indoor temperature is still not maintained, the electric heat strips will come on along with the compressors. The heat strips act as a built-in back up, operating independently in case of compressor failure.

The Hallowell ACHP is the only air-source heat pump currently on the market using this multi-stage operation.

Like other heat pumps, the ACHP reverses the process and works as an efficient whole-house air conditioner in warmer months.

So far, Steve says the results are impressive. The unit has been maintaining a steady temperature inside the Phillips home. He says monitoring data shows that in late February—when the temperature was 20 degrees—the heat pump adequately heated the home in the second stage, without using the booster.



“We are thrilled to have the opportunity to test this new heat pump,” says Steve. “It appears to be very efficient. We are quite pleased with the early results. However, we want to continue monitoring it through the 2007-2008 year before

making any recommendations.”

Steve says if it performs well enough to receive a thumbs up from OTEC, the utility probably will offer purchasing incentives to members.

The cost and installation of the ACHP is about 20 percent more than conventional heat pumps and depending on the size of the home and complexity of installation—especially if it is going into an existing structure.

Whether you are heating your home, business or cave, OTEC is staying abreast of the latest technology to provide consumers with information on the most energy-efficient, cost-effective products available on the market. ■

For more information on the Hallowell All Climate Heat Pump visit www.gotohallowell.com, or contact your local OTEC office.