

# Home Heating Hat Trick

**“Whatever type of heat pump you install will definitely save you money and get you off the roller coaster of fossil fuel prices.”**

by Tom Green

**I**N HOCKEY, A PLAYER SCORING THREE GOALS IN one game achieves a hat trick.

Electro Industries of Monticello, Minn., is now field testing the hat trick of home heating. The new NorAire air-source heat pump is a super-efficient unit that combines the benefits of a geothermal system with the lower costs and ease of installation found with an air-source heat pump.

“I think we’ve really scored a winner here. It’s a three output device – a total home comfort system,” says Bill Seefeldt of Electro Industries. “Not only is the NorAire an air-source heat pump that can operate at 150 percent efficiency at 30 degrees below zero, it produces a continuous supply of 120 degree hot water. That operates a hydronic [in-floor] heating system and meets all your domestic hot water needs. The only system that comes close to producing these types of results is an expensive geothermal unit.”

After initial runs of the unit in the laboratory and at an employee’s residential site proved successful, Electro Industries chose the home of a Northern Electric Cooperative, Bath, S.D., member for a full-scale independent field test of this cutting-edge unit. In February 2007, Eric and Stacy Sumption and their five children will feel the first waves of the NorAire’s heat blast through their registers.

“You could say I’m a fan of electric

heat pumps,” said Eric Sumption of rural Frederick, S.D. “We use electric heat in practically all of our shop buildings, my brothers all have heat pumps and I wanted to take advantage of the low heating rates for our new home. But it looked like a geothermal unit was out of our range. Doug [Hamilton] suggested we check out this new kind of heat pump. For us, it was the perfect play. The NorAire had nearly all the benefits of a geothermal unit at a fraction of the price.”

Regional power supplier East River Electric Power Cooperative in Madison, S.D., served as wingman on the project providing financial support to pay for the test. “Touchstone Energy® Cooperatives have always been looking for new and better ways for our members to heat and cool their homes,” said East River member service and marketing manager Tom Holt. “We want our member-owners to use electricity in efficient ways benefiting both themselves and the electric company they own. We’re investing in these tests to be on the leading edge of innovation in the home heating market.”

Hamilton, Northern’s member service director, is excited about the project. “It sounds funny for a guy who wants to sell kilowatts to get behind a unit that will use a lot less, but this will be a tremendous money- and energy-saving device for consumers,” he said. “Right now an air-source heat pump is 100 percent efficient down to about zero



degrees. A unit that can operate at 150 percent efficiency at temps 30 degrees below zero would be phenomenal. Plus it provides domestic hot water; this will greatly reduce home water heating costs.”

With the potential to still deliver more than 36,000 BTU of heat at unbelievably cold temperatures, Hamilton and Seefeldt believe the need for auxiliary or back-up heat in a home will be minimal or zero. Another notable feature to the NorAire heat pump is that the main unit and compressors are all designed to be located indoors. Only the fan portion sits outside exposed to the weather.

The company expects the units will be commercially available in three to five years. Seefeldt says Electro Industries is still doing modifications to the units based on the closely monitored results of each new test site. The Sumption’s new home is the third test site in operation.

“We want to be confident this is the best unit we can make before we release it to the public,” Seefeldt added. “We’ve set some aggressive goals for it and we’re continuing to see great results. The energy numbers and efficiency percentages have been very consistent. We expect this field test will confirm how well the NorAire is suited for the Northern region.”

East River’s Holt quickly pointed out that, even if the NorAire heat pump becomes the Stanley Cup winner of home heating, people in need of a new heating system don’t have to wait three years. Today’s current air-source and geothermal models are still great choices for cooperative members.

“Whatever type of heat pump you install will definitely save you money and get you off the roller coaster of fossil fuel prices,” he said. “As one of the first to introduce this technology to the region, Touchstone Energy Cooperatives have been heat pump believers for a long time. We’ve promoted them for more than 25 years and we will continue to encourage heat pump installations with incentives and special heat rates to get these energy-efficient products in the homes of our members.”

Heat pumps have had their detractors. geothermal heat pumps are expensive to install and require additional property space to accommodate underground loop fields or a well source. The knock on air-source heating systems was their inability to operate in below zero temperatures and reliance on back-up heating to keep a home comfortable.

Seefeldt expects the NorAire heat pump will be a major player combining the talents of both systems. “It costs more than a conventional air-source heat pump, but it delivers home heating and cooling better than a geothermal unit. We designed this to operate at maximum efficiency even in the harsh climate of the Northern region.”

In a little more than three years, the NorAire heat pump skated along surprisingly fast to reach this residential field test. Electro Industries even submitted two patents for the unit and a third patent application is underway. Specially designed coils, state-of-the-art compressors and a two-compressor refrigerant cycle are some of the unique features that allow the NorAire heat pump to complete a near impossible task: score heat out of thirty-degree below zero air.

“This is serious technology. We began developing this product in 2003, running simulations and designing the refrigeration cycle and compressor concepts,” Seefeldt said. “Based on our specifications, Purdue University built our first prototype in 2005. By January 2006, we’d contracted for two



**Above:** Northern Electric Cooperative Member Service Director Doug Hamilton checks the electrical wiring of the NorAire unit in the Sumption’s home near Frederick, S.D. The foreground of the photo shows the indoor portion of the heat pump (with the top of the unit removed). Behind Hamilton is the home’s air exchanger and Marathon water heater. **Top:** The Sumptions – Jonathon, 9; mom, Stacy; Hannah, 7; Haley, 11; Jacob, 3, dad, Eric and Maddie, 1 – move into their new home in February. The home will be heated by an innovative air-source heat pump. **Opposite:** The Sumption’s will move into their new home near Frederick in February. *Photos courtesy Tom Green*

more prototypes and installed our first field application at a home in Detroit Lakes, Minn. Our laboratory test station can simulate outdoor winter conditions, but we knew a true residential test is crucial to our product development.”

Hamilton agrees. “Nobody wants to be the ‘first’ to experiment with new technology. Field tests like this will prove the unit can and does work. We faced similar apprehension when we first started promoting conventional heat pumps back in the early 80s. Now, contractors are familiar with them, the members are comfortable with the concept and it’s beginning to be the first type of home heating system people consider when building a new home or replacing an existing unit.”

If the NorAire heat pump lives up to the promise, in five years it may be the first heating system people consider when they invest in an electric heat pump.