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Soft Economy, Rising Energy Prices Spur Interest In Other Technologies

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The world is changing very fast. Big will not beat small anymore. It will be the fast beating the slow. That quote from media mogul Rupert Murdoch effectively describes what's happening in the world of HVAC. The soft economy and rising energy prices are leading manufacturers to develop alternative technologies that can offer better energy efficiency than traditional heating and cooling equipment. Those who are innovative and move quickly will reap the benefits of being first in the marketplace with the next break-through technology.

Contractors, too, must move quickly to adopt alternative technologies, in order to keep up with customer demand for more energy efficient options. This may include taking a second look at energy-efficient technologies such as geothermal systems, which have been available for years. It must also involve learning about new technologies that hit the marketplace, because chances are good that savvy customers will ask about them sooner rather than later.

Finding Religion In Geothermal

Joe Huck, president, Williams Comfort Air and Metzler's Mr. Plumber, Carmel, Ind., has been an advocate of geothermal systems for decades, but up until recently, he only sold a few systems a year. Last fall, Huck "got religion" in the geothermal business, investing more in the technology and promoting it heavily to his customer base.

The reasons for his conversion are many. First he believes that geothermal is by far the most efficient heating, cooling, and water heating option available and that it will become even more important as energy costs increase. Second, he saw a need in the marketplace for a contractor who is serious about geothermal systems and not just dabbling in the technology. To that end, he bought an excavator, became GeoPro certified through WaterFurnace, and now designs and installs the entire loop process in-house.

And third, he thinks it's the correct solution for the environment and everyone else involved. "It is the green thing to do," he said. "Green as in the environment, green as in it saves the client the most money in the long run, and green because we make darn good money installing geothermal systems. We even painted all our vehicles green, so when customers think of green, they think of Williams Comfort Air."

The investment has paid off, as the company will install over 100 geothermal systems this year. Customers continue to call for more information about the technology, and Huck's comfort consultants recommend geothermal to every homeowner who can benefit from this type of system.

“When customers tell me they never plan on leaving their house, that means they want advice for the long-term,” said Huck. “Geothermal makes a great deal of sense, because it is the cheapest heating and air conditioning system period. Initially, yes, it is the most expensive. But once we educate customers about measuring the energy savings over time, they realize that this system is going to be in the positive column on Day One. We see people who have fuel bills of \$4000 or \$5000 a year that go to under \$1000 with geothermal.”

There will probably be even more consumers interested in geothermal systems, due to the recently passed Energy Improvement and Extension Act of 2008. The Act offers a one-time tax credit of 30 percent of the total investment for residential ground loop or ground water geothermal heat pump installations, with a maximum credit of \$2,000 for a single residence.

As Huck added, “I believe the future of geothermal in our industry and in our company is very bright.”

Advantages Of All-In-One System

When Derek Trudgen, owner/operator, Trudgen Heating & Cooling Ltd., Blenheim, ON, Canada, heard about the energy-saving Matrix System from NY Thermal Inc., he knew he had to learn more about it. The all-in-one system that incorporates a condensing water heater, condensing furnace, condensing boiler, heat recovery ventilator, and is pre-wired for air conditioning sounded like it was too good to be true.

The integrated system can save the customer between \$2000 and \$5000 in initial costs, and it is also environmentally friendly, because it is one fired appliance instead of three. The company says that a two-ton reduction in CO2 emissions is realized every time a Matrix system is installed, which is equivalent to planting 280 trees. In addition, the Matrix requires less electrical energy to operate than other equivalent systems, and it uses a patented high-efficiency heat exchanger to reduce gas consumption by as much as 30 percent when compared to a conventional system.

“We have a lot of hybrid homes in this area, which means they have forced air heating and radiant in-floor systems,” said Trudgen. “Before the Matrix, we had to sell the homeowner a boiler and a furnace with an HRV built into it, as well as a plate heat exchanger or an indirect water heater. The Matrix includes all those pieces of equipment in one box. You just plunk it down and away you go.”

In addition to being easier to install than separate systems, Trudgen noted that customers will see terrific energy savings if they install a Matrix. “On forced air, it has an AFUE of 94 percent. The energy factor for domestic hot water is .85, and it can deliver 4.2 gallons of water per minute at a constant temperature of 120°F. With hydronic heating, the minimum efficiency is 92.7 percent, and if there’s a high-mass radiant system installed, that number will increase drastically.”

What Trudgen likes most about the Matrix is how it controls and optimizes heating. “It’s a boiler-based unit, so it’s a fully modulating, fully condensing boiler. It only burns what it needs to satisfy a specific load. The potable water is prioritized over everything else, so if there’s a tap calling for hot water, it shuts down whatever heat is being delivered and focuses all its energy on the potable water. Once that load is satisfied, it flips over to its next priority which is forced air, then the next priority is the hydronic load.”

It would seem as if the controls needed to analyze the home environment and produce only the energy needed would be complicated, but Trudgen insists they are not. “The controls are easy to

manipulate,” he said. “There are just two controllers: One for the boiler operation and one for the forced air side of things. And the HRV is included.”

Even though the Matrix has only been available for three years, customers are very excited about the new technology. The reason for this, noted Trudgen, is that the system offers an unbeatable combination of comfort, energy savings, small footprint, one fired appliance, ease of installation, and low operating costs. “Since the Matrix has been available, I have not sold a system with a separate boiler, forced air furnace, and indirect water heater. Customers rave about the Matrix.”

Let The Sun Shine

A new technology from Lennox Industries that utilizes solar power will definitely be of interest to both contractors and homeowners looking for better energy efficiency. Developed by Lennox’s engineering team, led by Dutch Uselton, the SunSource™ is the industry’s first integrated solar-assisted residential heating and cooling system. For three years, the team has worked to incorporate renewable energy into the company’s residential products, and the resulting SunSource integrates solar power by using a single 190-watt solar panel to reduce electric usage of the outdoor condenser fan motor.

“The motor is an integral part of the system and directly affects the performance and operation of a heat pump or air conditioner,” said Bill Cunningham, product manager – cooling, Lennox Industries. “In the smaller tonnage units, peak solar power allows us to achieve fan speed above the normal operating range, allowing us to gain even greater efficiency from the freely available resource.”

The system also reduces peak demand. Lennox has found in lab and field tests that the full benefit of the solar provided energy is often achieved in late afternoon, when the air conditioner or heat pump is being used most often and when the utility struggles to maintain adequate electric supply. The close match of the demand, available solar energy, and peak power consumption on the electric grid makes this product a perfect fit to help reduce electric grid consumption at a time when it is most important, said Cunningham.

The company estimates the SunSource will experience a reduction of 6 to 8 percent in electric usage on the heat pump unit.

For those who think that only certain areas of the country could benefit from SunSource, think again; the Solar Energy Industries Association publishes a solar radiation map that illustrates just how much of the country could make use of solar radiation. Basically the vast majority of the U.S. has adequate solar radiation during the year to make use of a partial load product such as this, and most of the major U.S. markets could benefit.

Contractors will benefit as well, as SunSource gives them an opportunity to broaden their business. “We see this as an opportunity for contractors to add solar installation and service as a subset to their business,” said Cunningham. “With many contractors focusing on whole home energy efficiency, we feel that solar installation is a logical fit for many of their businesses. Just as many HVAC contractors have turned to attic insulation, low-energy windows, and radiant barriers, we believe this could be a great opportunity for them to get into the growing market of renewable energy.”

The SunSource is expected to cost around \$3,000 to \$4,000 more than a current high-efficiency system, and most of the additional cost is associated with the solar panel. (That cost should

decline as the cost of PV panels comes down.) The payback will depend on the area of the country, electric rates, and total cost of installation, which will vary greatly across the U.S. Additionally solar tax credits and rebates could reduce the additional cost, further reducing the payback period. SunSource will be available in the first quarter of 2009 and will initially be available in a split heat pump configuration only.

Comfort And Energy Savings Cubed

Earlier this year, Hallowell International took the industry by storm when it introduced the Acadia™, an air-source heat pump manufactured for northern climates. Designed to keep a home's indoor temperatures comfortable even when outdoor temperatures reach as low as -30°F, the Acadia can also reduce home heating and cooling costs by up to 70 percent.

The company plans an even more exciting introduction in 2009, when it rolls out the Hallowell Cube, which is essentially a geothermal heat pump without the ground loop, said Duane Hallowell, president and CEO, Hallowell International. "In its current configuration, the Cube is a great application for fan coil units and radiant floor applications running lower water temperatures. It will be released next year as a reverse cycle chiller, as well as a heating-only system that will be able to produce higher water temperatures to allow baseboard heating to be used."

The Cube is an air-to-water split system that has basically the same configuration as a geothermal heat pump, with the outside exchange coil attached through a precharged line set. The outdoor fan and coil are housed in an attractive box that can mount to the side of a home or on a free-standing base. The size of the outdoor unit varies with the capacity, which ranges from 2 to 4 tons. "From smallest to largest it's 24 inches high and about 96 inches long. It's long and narrow," said Hallowell. "We're designing it so it can be mounted to the side of a house, underneath a window, and optimized for defrost."

Speaking of defrost, the Cube and the Acadia will both be beneficiaries of new advanced technology next year. "Our new defrost logic was a very pleasant surprise," said Hallowell. "The Acadia was known to defrost approximately 80 percent less than a standard unit. The Cube it looks like over 90 percent. It's pretty remarkable."

Advanced technology is utilized throughout the Cube and includes boosted compression, which is also part of the Acadia heat pump. This patented technology allows efficient operation that keeps COP and Btu at rated capacities without ever having to use resistance heat. An innovative design was also used to mitigate vibration, and the compressors are triple isolated to lower the decibel rating.

A desuperheater was engineered into the Cube for domestic hot water capability, so that it functions as one with the condensing coil. "On all models, the Cube has 6,000 Btu domestic hot water capabilities to supplement or in many cases, to provide full output through the use of a buffer tank. From our initial tests, the unit achieves a 3.2 COP at 0°F and can maintain a 2.7 COP at -30°F," noted Hallowell.

Acadia dealers are excited about the upcoming release of the Cube, and so is Hallowell. "I lose sleep at night thinking about how fantastic this system is. I've been dying to release the Cube."

Expansion Valve Saves Energy

A new silicon expansion valve (SEV) from Microstaq is expected to reduce energy consumption in air conditioning systems worldwide by 25 percent. The silicon microvalve provides computer control to fluid movement, simplifies design of A/C control systems, and dramatically extends the life and durability of compressors in A/C systems.

“The SEV is an electronic flow control device that very precisely meters refrigerant into the evaporator in an air conditioning system, replacing standard mechanical thermal expansion valves (TXVs),” said Rachid Kaina, general manager--HVACR, Microstaq. “The SEV works in conjunction with pressure and temperature sensors and control electronics specifically developed to monitor low-side pressure and temperature and calculate evaporator superheat. Based on system designer’s specifications, the SEV then meters refrigerant into the evaporator to maintain a precise target superheat.”

According to Kaina, controlling superheat translates into a lower load on the compressor, which translates directly to less electricity consumed by the compressor. “Lower superheat means that the compressor works less to re-compress gas-phase refrigerant for circulation through the rest of the air conditioning system. Real-time lower superheat control also optimizes the heat exchange process in the evaporator and allows the refrigerant condensation to happen at lower pressure. The combination of these effects enable the air conditioning system to operate at higher energy efficiency.”

The maintenance-free SEV can be used in commercial and residential applications and is suitable for air conditioners, heat pumps, and refrigeration equipment. It can be used in new equipment and also retrofitted into existing systems.

“The SEV and the accompanying controller are a self-tuning system, and cooling contractors do not have to adjust the expansion device in the field,” said Kaina. “Converting to the SEV will simplify the charging process by providing real time feedback from the electronic controller. This system also offers the capability of adding diagnostics to the air conditioning units, which will significantly help with troubleshooting.”

A number of leading OEMs from the U.S. and Asia are currently testing the SEV in field trials, and products will be introduced into the market in 2009.

The up side to the tough times we’re in right now is a flurry of exciting new innovations in the HVACR industry. Keeping abreast of all the new technology will be a challenge for contractors, but offering alternative energy-saving equipment is a sure way to differentiate your business from the competition. And that makes good sense no matter what the economy is doing.

For more information, contact WaterFurnace at www.waterfurnace.com, NY Thermal at www.ntimatrix.com, Lennox at www.lennox.com, Hallowell International at www.gotohallowell.com, and Microstaq at www.microstaq.com.