



## Contractor Network Boosts Naturals

*NASRC's Natural Refrigerants Service Network is up and running*

BY RON RAJECKI  
THE NEWS STAFF

Refrigeration contractors who are looking to promote their companies' expertise in the growing natural refrigerants market can get a boost from a network

sponsored by the North American Sustainable Refrigeration Council (NASRC). The Natural Refrigerants Service Network is up and running and can be accessed at [www.nasrcnetwork.org](http://www.nasrcnetwork.org). It's designed to provide prospective customers and end users with information about

contracting firms in their areas that are trained and knowledgeable in installing, maintaining, and servicing equipment that uses natural refrigerants.

The global market for natural refrigerants, including ammonia (R-717); carbon dioxide (CO<sub>2</sub>, R-744);

and hydrocarbons, such as propane (R-290) and isobutane (R-600a), is forecast to reach \$1.4 billion by 2020, growing at a compound annual growth rate (CAGR) of 11.5 percent between 2015 and 2020, according to a report

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## Alexa, Fire Up the Boiler

BY JOANNA TURPIN  
THE NEWS STAFF

The use of voice-enabled speakers, such as Amazon Echo and Google Home, is continuing to gain popularity as more people become comfortable with the technology. Indeed, according to the research firm, eMarketer, almost 36 million Americans used these devices at least once a month in 2017, which is a jump of almost 129 percent over 2016.

As prices continue to drop on these so-called digital assistants, expect even more homeowners to embrace the technology and also demand additional functionality. Instead of just asking Alexa or Google to play a long-forgotten tune from the 1980s, users will likely want to ask them to turn off the lights or turn up the heat. On the latter request, boiler manufacturers are already poised to make that happen.

### SMART OPTIONS

In the near future, smart boilers will be compatible with numerous devices

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### INSIDE: Hydronics Upgrades

Regular maintenance is crucial to ensuring boilers keep operating as efficiently as possible. But, there are additional ways to optimize their performance. To find out more, turn to Page 13.



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# Optimizing Commercial Boiler Systems Can Be Easily Achieved

*Strategic upgrades can increase efficiency and comfort*

BY JOANNA TURPIN  
THE NEWS STAFF

According to the U.S. Energy Information Administration, heating accounts for roughly one-third of the total energy consumption in U.S. commercial buildings, with boilers supplying heat to about 33 percent of total floor space. Keeping these boilers operating at peak performance is the goal of most commercial building owners and managers, who typically want to minimize energy costs and maximize comfort.

Regular maintenance is crucial, of course, to ensuring boilers keep operating as efficiently as possible, but there are other ways to optimize their performance. Installing variable-speed pumps, lowering the return water temperature, and keeping the system free from impurities are just a few of the ways to improve efficiency. And when combined with brand new condensing boilers, commercial owners and managers can expect to see even greater energy savings — and comfort.

### TOTAL SOLUTION

One way to improve energy efficiency in an existing commercial boiler system is to replace the existing boiler plant with new, highly efficient, modulating, condensing gas boilers coupled with electronically commutated motor (ECM), variable, primary boiler pumps, said John Packer, president and chief operating officer, FIA Inc., a manufacturer's representative for Bell & Gossett. That's because modulating condensing gas boilers are capable of supply water temperature reset to match the building load, deep part-load operation (turndown), and can include variable-speed primary boiler pumps.

"Smart ECM pumps like Bell & Gossett's Ecocirc XL leverage intelligent controls and communication capabilities, like proactive self-monitoring, reducing system downtime for maximum efficiency, and lower operational costs," said Packer. "This is a new twist on



**OPTIMIZED BOILERS:** Often the simplest way to optimize energy efficiency in condensing boilers is to lower the return water temperature to the point the system is operating in condensing mode. PHOTO COURTESY OF CLEAVER BROOKS INC.

**“Self-sensing pumps respond to the demands of the system and can be configured to deliver a constant temperature differential across the boiler(s) at variable flows.”**

— Richard Medairos,  
senior systems engineer and trainer,  
Taco Comfort Solutions

traditional primary/secondary applications. Variable-speed boiler pumps match production with load, keeping boiler return temperatures low and boiler efficiency high, while the condensing operation is

maximized. ROI [return on investment] can be realized quickly when utility rebates and improved plant operations are considered. In fact, FIA had one property management customer that experienced ROI

less than one year after making improvements to the building's boiler system."

Nate Warren, business development manager for Bradford White Corp., agreed there is a strong case to be made for replacing older, less efficient boilers with modulating condensing boilers.

"Modulating the boiler output to match the heating needs can improve the comfort and efficiency of the heating system," he said. "In most cases, these condensing boilers can be equipped with onboard variable-speed pump controls that make it easier for contractors to integrate variable-speed boiler pumps and provide additional boiler and electrical efficiencies."

Some building owners may be reluctant to replace an aging boiler system before it fails, added Warren. However, the

combined energy efficiencies of condensing boilers with integrated variable-speed pump controls can greatly reduce utility and operating costs, which helps justify the investment well before the existing system fails.

For buildings that already have condensing boilers installed, optimizing energy efficiency can be achieved by lowering the return water temperature back to the boilers to the point the system is operating in condensing mode (below 130°F), said Catie VanWormer, product sales manager of ClearFire® boilers, Cleaver-Brooks Inc.

"This often means lowering the supply temperature year-round or implementing supply temperature reset, which can help improve boiler operating efficiency in the shoulder seasons when higher temperatures are not necessary to heat the space," she said.

Indeed, where condensing boilers are concerned, return water temperature is one of the most important parameters for efficiency and energy savings, said Kyle Bottorff, product manager, Fulton Heating Solutions.

“Installing a VFD [variable frequency drive] pump to open up the delta T across the boiler will help lower return water temperatures, thereby increasing thermal efficiency and condensing potential,” he said. “Additionally, better control systems designed specifically for condensing boilers can stage boilers more effectively for additional utility savings and less wasted energy by reducing the number of purge cycles.”

### COST-EFFECTIVE UPGRADES

If total replacement is not an option and a building’s mid-efficiency boilers are still in good shape, then adding even one modulating condensing boiler can help reduce operating expenses over time, said Chuck O’Donnell, director of marketing, Laars Heating Systems.

“These hybrid systems operate the modulating condensing boiler first when there’s a call for heat, which allows for the majority of the heating load to be satisfied by the most efficient boiler,” he said. “The mid-efficiency boilers come online only during the coldest days of the year. By installing a hybrid system, building owners can save money on upfront installation costs and still enjoy much of the savings of a complete modulating condensing boiler system.”

Other ways to improve the efficiency of an existing boiler can include burner retrofits or controls upgrades as well as changing lead/lag staging parameters to help minimize excessive cycling, noted VanWormer.

“Implementing variable-speed pumping, either by adding variable-speed drives to existing pumps or replacing pumps, can also reduce pumping energy consumption as well as help to maintain the design delta T,” she said.

The power consumed by pumps can be substantial, which is why variable-speed pumping is becoming so popular, according to O’Donnell.

“Variable-speed drives, such as Laars Heating Systems’ Vari-Prime, which can be used with MagnaTherm and NeoTherm condensing boilers, match a variable-speed pump’s flow rate with that of the boiler’s modulation rate,” he said.

“When the boiler modulates down, so will the variable-speed pump. Over time, this can significantly reduce a building owner’s electrical bills.”

Variable-speed pumps with integrated controls, such as Grundfos’s Magna3 unit, which uses an ECM motor and has built-in control functions designed specifically for variable load heating loop applications, can significantly reduce energy consumption, said Michael Madsen, district sales manager, Grundfos Pumps Corp.

“An ECM motor is more efficient than a conventional motor, and typical energy savings of 25-35 percent can be obtained with this improvement alone,” he added.

The Magna3 has several built-in control modes that will adjust the pump’s performance based on the load in the system, explained Madsen.

“For example, as more radiators are calling for heating water, the pump will automatically pump more, and when fewer are calling for heating water it will pump less,” he said. “The unit’s control mode, Auto Adapt, allows it to automatically adjust to actual system conditions and optimize performance and energy savings.”

Self-sensing pumps are another option that building owners and managers should consider when looking to improve efficiency, said Richard Medeiros, senior systems engineer and trainer, Taco Comfort Solutions.

“Self-sensing pumps respond to the demands of the system and can be configured to deliver a constant temperature differential across the boiler(s) at variable flows,” he said. “This is an advantage, because it ensures that the boiler operates at its highest efficiency.”

Self-sensing pumps can be used in both constant and variable-flow systems, explained Medeiros.

In a constant-flow configuration, these pumps can accurately deliver precise flow to each boiler in the system, while in variable-flow configurations, they provide consistent variable flow, or variable primary flow, ensuring a match between boiler capacity and system load. In an existing constant flow configuration, the ROI of a self-sensing pump can be realized within one or two years. Several major pump manufacturers offer self-sensing pumps with integrated VFDs, said Medeiros. These pumps do not require sensors to be installed in



**JUST ADD ONE:** If total replacement is not an option and a building’s boilers are still in good shape, then adding even one modulating condensing boiler can help reduce operating expenses over time. PHOTO COURTESY OF LAARS HEATING SYSTEMS



**BOILER INSTALL:** Technicians from Rymes Propane & Oil, Concord, New Hampshire, complete commissioning of a light commercial Laars NeoTherm boiler installation at Shoals Marine Laboratory on Appledore Island, New Hampshire.

the pipes and come with the VFD factory tuned to that specific pump and preprogrammed for sensorless variable flow pumping. “Quite literally, these pumps

need only be installed and activated,” he said. They’re programmed to sense what flow is needed, and they provide it immediately.”

### KEEP IT CLEAN

Peak performance starts with a clean boiler, and regular maintenance, as outlined by the manufacturer, will help



**CONSTANT CONDITIONS:** Self-sensing pumps can help improve efficiency by responding to the demands of the system and delivering a constant temperature differential across the boiler(s) at variable flows. PHOTO COURTESY OF TACO COMFORT SOLUTIONS



**ATTRACTIVE FILTERS:** Adey's MagnaClean filters use very strong magnetic cores to collect and retain damaging sludge without causing pressure drop.

ensure boiler systems operate as designed, said Packer.

“Boiler systems should be kept free of oil and other impurities, which can cause short cycling, wet steam, and waste energy,” he said. “Basic recordkeeping is also essential, and contractors should keep a preventive maintenance log to evaluate system performance and spot trends that may be affecting boiler operation. This sets a baseline for later maintenance and service calls.”

Keeping the boiler clean involves proper water treatment,

which usually consists of chemical inhibitors combined with some kind of mechanical filtration.

Taco air separators, for example, remove air and dirt from the system to prevent problems, such as reduced heat transfer, loss of efficiency, pipe corrosion, pump damage, noise, and increased energy consumption.

“Within the air separator enclosure, water moves through pall rings to cleanse the fluid of microbubbles, sand, dirt, and rust,” said Medeiros.

Where hydronic heating

systems utilize iron pipe, scale and iron oxide sludge (magnetite) make up most of the system debris. Because of its small particle size, magnetite can be very damaging to system components. It can accumulate in low-flow areas, forming sludge and combining with scale to create a hard enamel-like coating on the inside of pipework and the heat exchangers.

“This can lead to expensive failures due to overheating and blocked water ways as well as causing a significant reduction

in boiler efficiency,” said Tom Tonkins, director of US business development, Adey Professional Heating Solutions.

Adey's range of MagnaClean Commercial dirt filters utilize strong rare earth magnets to collect and retain damaging sludge consisting of magnetite and scale, regardless of particle size.

“MagnaClean can boost system efficiency by up to 30 percent, greatly improving performance and restoring equipment back to its original ratings,” said Tonkins. “And while ROI will

depend on the condition of each system, in general, payback — including the cost of installation — should be achievable within six to eight months.”

As evidenced, there are numerous ways in which boilers can be optimized to increase efficiency and comfort. Many of these upgrades are relatively easy to implement, and they are not costly, which should make them attractive to commercial building owners and managers who are looking for ways to reduce operating costs. **N**

## ALEXA

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the end user and contractor can control in a variety of ways, predicts Dan Moffroid, director of product management, Bosch Thermotechnology.

“The smart home system will allow one device to control numerous smart features in the home, and the heating system is part of that,” he said. “Voice-controlled thermostats are already entering the market and will continue to grow as part of a smart home ecosystem.”

The smart control Bosch currently offers is the CT100, which is specifically designed to

control its Greenstar condensing boilers. It is essentially a thermostat integrated into the intelligence of the boiler through a wired connection. The CT100 can modulate the boiler and maintain the correct temperature, thus optimizing the entire system, which saves money and energy, said Moffroid.

All the data from the CT100 is kept locally in the system, allowing homeowners to have control over the information. This is important, noted Moffroid, because one of the biggest challenges in designing smart and Internet of Things (IoT)-enabled boilers is data protection. With this smart

control already available, Bosch plans to offer IoT-enabled boilers in the near future.

“For residential boilers, homeowners tend to interact with the thermostat to control the boiler more so than interacting with the boiler itself, but we are working on bringing the interaction of the IoT onto the boiler,” he said.

In response to the increasing popularity of IoT-enabled devices, Navien recently launched its NaviLink™ system, which includes a Wi-Fi module, power supply, and a cable connecting the Wi-Fi module with the boiler control panel. The free NaviLink app gives users wireless control

of their home heating products, including Navien's NPE series tankless water heaters, NCB series combi-boilers, and NHB series boilers.

“NaviLink was primarily designed to enable homeowners to turn the boiler on and off, control temperatures, access usage data, activate recirculation system on NPE-A tankless water heaters, and receive alarm notifications for all Navien products,” said John Kopf, boiler product manager, Navien Inc. “However, service technicians also benefit from having access to historical data, alarm notifications, and unit diagnostics.”

Using an open protocol, NaviLink could easily integrate with Google Home, Apple HomeKit, and Amazon Echo smart devices, noted Kopf.

“I think the Amazon Echo platform is quickly becoming the smart home hub that can link other devices into a single system,” he said. “In fact, Amazon launched a software development kit (SDK), which allows developers to create voice-controlled applications that can encompass a number of functions, including home security, lighting, doors, etc. NaviLink could be one of those many applications available for interaction with Alexa.”