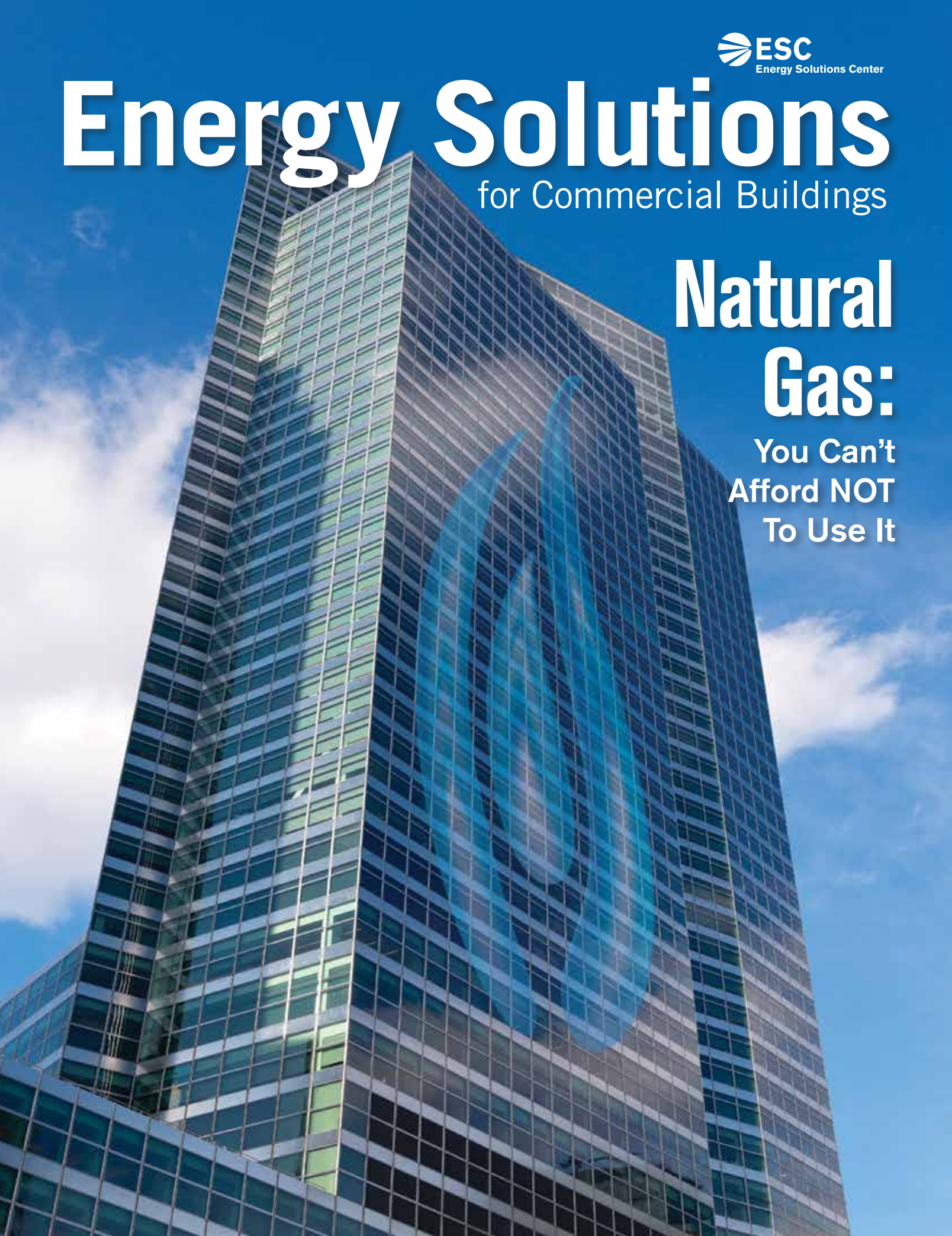


# Energy Solutions

for Commercial Buildings

## Natural Gas:

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## TABLE OF CONTENTS

- 2 Blowing Off Steam**  
Duke University plants blow off steam ... with natural gas
- 4 All in the Family**  
Multifamily buildings reap powerful benefits from CHP technology
- 6 CNG Conversion 101**  
The basics of converting fleets to Natural Gas Vehicles
- 8 Governments Seek Energy-efficient Solutions**  
Natural Gas provides environmentally sound and cost-effective solutions for energy needs
- 10 Warming up to Modular Boilers**  
Savvy commercial building owners seeing value of modular boilers

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# Blowing Off Steam

Duke University plants blow off steam ... with natural gas

*By Stephanie Anderson Forest*

**F**or decades, when Duke University students walked down Coal Pile Drive on the Durham, North Carolina, campus, they were greeted by heaps of, well, coal. But, these days, the black piles that used to fuel a coal-burning plant have given way to a natural gas-fired steam plant.

Known as Duke's West Campus Steam Plant, the facility is part of the university's steam system, which provides high-pressure steam to the entire Duke University, hospital and medical center community by using natural gas and fuel oil. Steam is distributed through 35 miles of distribution piping and is used for space heating, hot water heating, dehumidification, hospital medical equipment sterilizing, dining services, pool heating, dishwashing and other process uses.

The West Campus Steam Plant burned its last load of coal in April 2011, marking the elimination of Duke's use of coal in steam plants campus-wide. After a 32-year hiatus, in 2010 Duke's East Campus Steam Plant re-opened following a renovation. Also discontinuing the use of coal, the renovated plant features 15 natural-gas powered Miura boilers, which require less water and time to produce steam. The switch to natural gas-fired steam plants marked an important step in Duke's plan to achieve carbon neutrality by 2024.

"Duke's move to natural gas-fired plants will dramatically reduce their emissions because they are such a big energy user," says Jerry O'Keefe, manager, large accounts, PSNC Energy.

Casey Collins, acting energy manager, Duke University agrees: "From a sustain-

Duke University's West Campus Steam Plant burned its last load of coal in April 2011, marking the elimination of Duke's use of coal in steam plants. The plant site underwent a conversion that included removing three coal fire-burning boilers and replacing them with natural gas-fired ones and restoration of the 33,000-square-foot facility's historic 1929 facade.

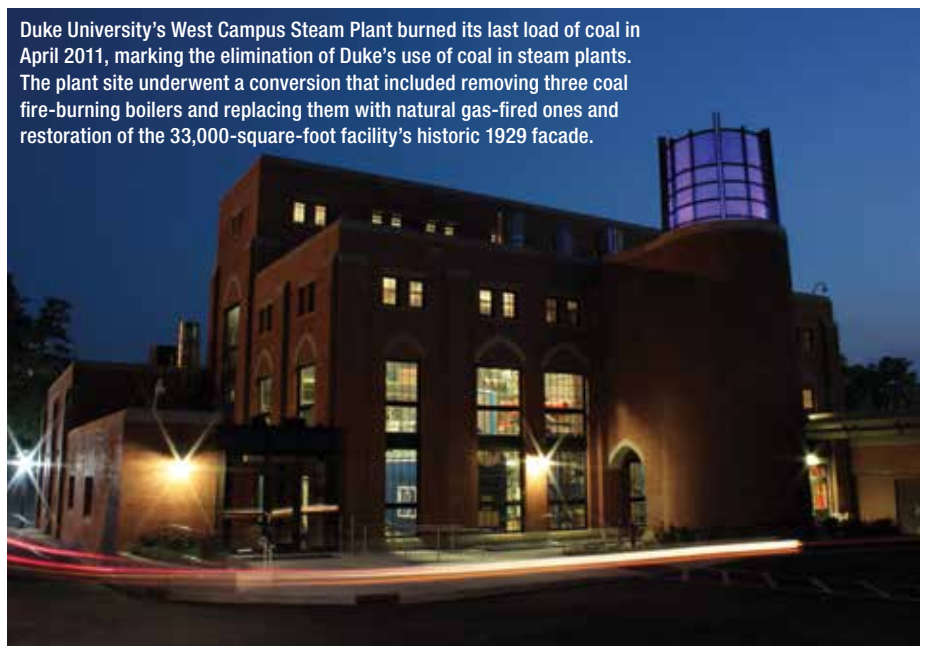


PHOTO COURTESY OF DUKE UNIVERSITY



ability perspective, supply-side measures like switching from coal to natural gas allow us to effect a carbon footprint reduction across 18 million-plus square feet of Duke campus-buildings. This localized change has far-reaching effects.”

Chris Silcott, Duke University, operations engineer, says the West Campus Steam Plant conversion included removing three coal fire-burning boilers and replacing them with natural gas-fired ones, along with new mechanical, electrical and control equipment. Additionally, the project’s scope included the restoration of the 33,000-square-foot facility’s historic 1929 facade.

He says the plant also received significant upgrades in auxiliary equipment, including the addition of a condensing economizer. This device, which allows for significant energy recovery from the boiler flue gases and maximizes plant efficiency, has saved Duke about \$480,000 since installation with the project.

Overall, Duke’s switch from coal-fired to natural gas-fired steam plants has

Overall, Duke’s switch from coal-fired to natural gas-fired steam plants has provided additional savings. Since 2008, steam system operations and maintenance costs have been reduced by 50 percent; a significant portion of this reduction has come from the transition of both East and West Campus steam plants to natural gas-fueled boilers.

provided additional savings. Since 2008, steam system operations and maintenance costs have been reduced by 50 percent; a significant portion of this reduction has come from the transition of both East and West Campus steam plants to natural gas-fueled boilers, says Collins.

In addition, he says, the switch from coal to natural gas has reduced campus steam system emissions by 38 percent.

#### Winning record

Duke’s West Campus Steam Plant coal-to-natural gas conversion project

recently won Engineering News-Record’s Award of Merit in the category of Renovation/Restoration. The award was based on the renovation/rehabilitation aspects of the project, which was significantly enhanced aesthetically. Key players participating in the project were:

- Lend Lease (construction management firm)
- RMF Engineering (design and commissioning services)
- Flad Architects (architects)
- Lappus & Havener (landscape architecture) ▶



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# All in the Family

Multifamily buildings reap powerful benefits from CHP technology

By Kristy Alpert

**W**hen the Apartment Investment and Management Company (AIMCO) decided to update three of its Philadelphia apartment complexes with the latest technology in eco-friendly living, it didn't come in the form of trendy bamboo flooring or futuristic motorized shades. Instead of expensive upgrades and high-tech gizmos, this eco-conscious company invested in one upgrade that was sure to attract savvy renters: green energy.

It was in late 2010 that AIMCO partnered with Aegis Energy Services to introduce Combined Heat and Power (CHP) technology solutions to the three multifamily high-rise apartment buildings located on the upper east side of Philadelphia. The results since then have included an increased electrical and thermal efficiency of 85 percent (up from 33 percent with traditional centralized electric power stations), a reduced load on the city's power grid, 2,500 tons of reduced carbon emissions, and a community of happy renters.

CHP is not a new technology but it is quickly becoming a preferred application for owners of multifamily buildings. A recent survey by Strata Research found that more than 77 percent of renters said it was important for them to rent from an eco-friendly building. With the proven results of CHP technology, it's easy to see why more building owners are turning to these systems.

"Combined Heat and Power, also known as co-generation, is an efficient, clean and reliable technology that simultaneously generates electricity and thermal energy from a single fuel source," explained Dale Desmarais, director of sales and marketing for Aegis Energy Services Inc.

Desmarais says he has noticed that more and more commercial sites are deploying CHP technology as awareness increases. "The market is maturing, and the people responsible for reducing energy costs in their buildings are getting positive feedback from others in similar roles that have deployed

CHP in their buildings and are seeing the results in their energy bills," he says. "As rate tariffs increase by 20 to 30 percent, the sites using the technology have secured a way to isolate themselves from these fast rising costs. In addition, state and government entities are now actively promoting CHP technology and even providing grants as large as \$2,000 per kW to install the technology."

## Powerful benefits

While grants issued by local governments and the U.S. Department of Energy have made a huge impact in offsetting the initial costs of installing CHP systems, the long-term benefits of being able to generate their own electricity and heat from a natural resource like natural gas have remained the biggest draw for multifamily building customers, says Kent McCord, director of marketing strategy for Doosan Fuel Cell America Inc.

Started in July 2014, Doosan Fuel Cell America has since become one of the biggest names in fuel cell technology. A fuel cell is a CHP device that generates electricity and heat through an electrochemical reaction without combustion, making for an extremely clean and efficient form of energy. Doosan offers a PureCell® fuel cell system that operates solely on natural gas, which results in an ultra-clean, reliable and affordable solution for generating its own electricity and heat.

"Multifamily buildings are good applications for our PureCell combined heat and power fuel cells because they have a large, steady demand for both electricity and heat," says McCord, who predicts this segment of the market will continue to grow as more building owners begin to understand the benefits of the technology for their specific purposes. "There is significant potential for growth in the multifamily community sector, but the key to successful multifamily applications is that they must be 'master metered' or 'sub-metered.'"

One of Doosan's latest projects included being a part of one of Hartford, Connecticut's most historic green renovations to date. Doosan Fuel Cell

PHOTO COURTESY OF APARTMENT INVESTMENT AND MANAGEMENT COMPANY



Apartment Investment Management Company's integration of Combined Heat and Power (CHP) technology in its 360 State Street apartment complex increased efficiency by 85 percent.

PHOTO COURTESY OF DOOSAN FUEL CELL AMERICA INC.

A fuel cell CHP system was the perfect multi-family dwelling solution for the owners of the 777 Main Street apartments.



America was chosen by Becker + Becker, a sustainable development and architectural firm, to install a nearly \$3 million fuel cell as part of an \$85 million conversion project to transform the 26-story Hartford National Bank building into an eco-friendly, mid-century, modern, mixed-use apartment complex called 777 Main. Originally built in 1967, the historic building is now honored with a LEED Gold Design rating and is home to 285 apartments all heated and powered by a 400-kilowatt PureCell Model 400 fuel cell that is presumably going to be the key to

helping the building reach LEED Platinum status by the end of the year. Not only was the fuel cell the source of energy behind the project, but it also was the muscle behind eliminating more than 99 percent of particulate pollution from the project's carbon footprint.

The 777 Main Street project proved that fuel cell CHP systems can be retrofitted into nearly any building — even a historic building in the downtown of a major city. In addition to the breakthrough this project symbolized for CHP technologies, McCord notes that other multifamily building owners with vision and money to adopt new energy

solutions will continue to be ahead of the game if they take advantage of these fuel cell systems. With so many new consumers looking to save money and live green, the energy savings, energy security and environmental responsibility these systems offer is unparalleled, and is a win-win for both renters and building owners.

The Office of Energy Efficiency and Renewable Energy lists the benefits of CHP as capable of enhancing energy security, advancing climate change and environmental goals, improving business competitiveness, increasing resiliency of the energy infrastructure, diversifying the energy supply, and even improving energy efficiency by capturing what would be wasted heat. While those benefits are remarkable in themselves, they could apply to any building. The specific benefits for multifamily buildings include:

- **Continuous power.** Fuel cells can continue to operate in the event of a utility power outage, providing much-needed security to the building's residents. In other words, they can be a replacement or supplement to an emergency power generator as well as an energy savings solutions.
- **Reduced carbon footprint.** Not only does CHP act as an environmental solution by reducing CO<sub>2</sub> emissions, but in conjunction with natural gas, this ultra-clean, highly-efficient system works to both reduce the overall carbon footprint and increase the environmental efficiency of a building.
- **Locally sourced.** CHP is deployable throughout the United States, and, as a local power source, it has benefited the country by creating green jobs and relieving the overly congested electric grid to improve energy security across the country. ▾

## FOR MORE INFORMATION

- on CHP and its many benefits, visit
- [www.understandingchp.com](http://www.understandingchp.com)
  - [www.aegisenergyservices.com](http://www.aegisenergyservices.com)
  - [www.doosanfuelcell.com/en/solutions.do](http://www.doosanfuelcell.com/en/solutions.do)



# CNG Conversion 101

The basics of converting fleets to Natural Gas Vehicles

By Tonya McMurray

**In 2009, AT&T committed an investment of up to \$565 million to deploy about 15,000 alternative fuel vehicles over a 10-year period.** With one of the largest commercial vehicle fleets in the nation, AT&T Inc. estimated its sustainability program would result in a reduction of 49 million gallons of gasoline.

By 2014, AT&T had 10,628 alternative fuel vehicles – including one of the nation's largest natural gas vehicle fleets with 8,026 compressed natural gas (CNG) vehicles. During the first five years of the program, the company says it has saved 18.3 million gallons of gasoline.

Those are the kind of results that make conversion to compressed CNG an attractive proposition for fleet managers.

## Growing fleets

NGV America estimates there are more than 150,000 natural gas vehicles (NGVs) on U.S. roads. Of those, about 40,000 are heavy-duty vehicles – such as buses, refuse trucks, regional haul trucks and municipal vehicles – with another 26,000 medium-duty vehicles – such as package delivery, shuttle buses, and utility vehicles. The remaining are light-duty vehicles such as cars, SUVs, trucks and vans used by both commercial fleets and consumers.

Once companies decide to join the growing number of fleets using NGVs, they have three options for converting their fleets to CNG:

- Purchase CNG vehicles directly from the automaker
- Purchase new gas or diesel vehicles

and have them converted to CNG by a third-party upfitter

- Retrofit existing vehicles

For new vehicles, the choice between purchasing from the dealer and working with an upfitter will depend on the make of car a company chooses. Chevrolet, GMC and Dodge all offer NGVs directly, while Ford works with select qualified upfitters to convert standard vehicles to CNG.

Companies that opt for after-market conversion can find options on the NGV America website ([http://www.ngvamerica.org/pdfs/Certified\\_Aproved\\_Conversions\\_LD-HD\\_15.01.01.pdf](http://www.ngvamerica.org/pdfs/Certified_Aproved_Conversions_LD-HD_15.01.01.pdf)) and ([http://www.ngvamerica.org/pdfs/Certified\\_Approved\\_Conversions\\_HD-Engines\\_15.01.01.pdf](http://www.ngvamerica.org/pdfs/Certified_Approved_Conversions_HD-Engines_15.01.01.pdf)).

State and federal laws require that CNG conversion kits meet or exceed the same emission standards as the original vehicle, so it's critical that companies work with experienced and reputable conversion companies, says Rob Minton, director of sales for VNG Co. LLC. In addition, vehicle and engine conversions must meet safety standards set by the National Highway Traffic Safety Administration.

## Counting the cost

CNG conversion typically costs between \$7,000 and \$10,000 for light- and medium-duty vehicles, and can cost up to \$35,000 for heavy-duty vehicles with multiple tanks, says Mike DeArmond, account manager for Atmos Energy Corp.

While the initial outlay can be significant, companies can quickly recoup conversion costs and begin to benefit from a more energy-efficient and economical

PHOTO COURTESY OF VNG



VNG CNG fueling station

PHOTO COURTESY OF ATMOS ENERGY CORP.



With fuel savings of 50 percent or more, converting fleets from gasoline to compressed natural gas (CNG) can have a significant impact on the bottom line.

fuel source, including fuel savings of 50 percent or more.

Many variables determine the precise payback time for fleet conversion, but Minton estimates most companies will begin to see savings within two and a half years of the conversion.

DeArmond says companies can get a rough idea of payback time by looking at the number of miles driven by their fleet each year, vehicle miles per gallon, and the cost paid for gas or diesel fuel. Companies can then compare that to the cost of CNG fuel. CNGNow, an educational website for NGVs and CNG, offers an online conversion tool ([www.cngnow.com/vehicles/calculator/Pages/information.aspx](http://www.cngnow.com/vehicles/calculator/Pages/information.aspx)) to help fleet managers calculate fuel savings and estimate payback times.

Many states offer incentives, rebates, tax credits and grants that can offset as much as half the conversion cost, Minton says, thus, significantly reducing the payback time.

"The key factor for most fleets is the fuel cost savings," says Minton. "Fuel is the single biggest operating expense for most fleets, so the savings can be substantial."

At the beginning of June, CNGNow reported the average CNG price across the United States was \$2.11 per gallon. During that same time period, the average gasoline cost was \$3.39 per gallon, and the average diesel price was \$3.89 per gallon.

The fuel savings varies as gas prices fluctuate, but the relatively stable price of natural gas means that investment in conversion to CNG will continue to pay off over the long term, says DeArmond.

"When gas reached highs of \$4, many companies began looking at CNG," he says. "With the drop in gas prices, some people are taking a wait-and-see approach. But we all know gas will eventually go back up, so many companies are saying 'we've made a commitment to do this, and we're going to move forward.'"

Not only is CNG a more economical fuel source, but it is also a cleaner burning fuel, reducing greenhouse gas emissions by 20 percent to 30 percent when compared with diesel- and gas-fueled vehicles.

"For companies with sustainability goals, that reduction can be really important," says Minton. "CNG can help companies meet those goals while they're also helping their bottom line."

### Making the trade

CNG doesn't come without trade-offs – the primary one being loss of cargo space.

"CNG tanks are large," says Minton. "In a pick-up truck, the tanks typically go in the bed, so you lose some of that space. In a cargo van, it goes inside the cargo area, so you lose space there. To get a decent tank with a good range, you are going to lose some cargo space. Since fuel is usu-

ally the single biggest expense for fleets, the cost savings is usually compelling, but there is a trade-off in space."

Companies also have to consider the availability of CNG fueling stations within the driving radius for their fleets. Some companies opt to build their own CNG fueling stations rather than relying on public stations.

DeArmond points out a company-owned fueling station can be ideal for fleets that operate within a relative short-range and return back each night. In that case, vehicles leave in the morning for their routes, return in the evening and are refueled overnight, ready to go again in the morning.

Fleets that travel longer ranges and don't return back to the company each night will likely need to rely on public fueling stations. Depending on its geographic location, that could be a significant factor in whether a company converts to CNG.

The number of public stations is growing, especially in larger metro areas. DeArmond notes the Dallas/Fort Worth metropolitan area, for example, has about 25 public CNG stations with several more being built and set to come online by the end of the year.

Truck stops and convenience stores that depend on travelers are rapidly expanding public stations along highways and major travel routes. DeArmond notes Love's Travel Stops and Clean Energy Fuels Corp. are rapidly building stations, and with their build-out, drivers will soon be able to find CNG fuel stations in about 200-mile intervals along major travel corridors.

"Within three years, it's likely you'll be able to drive across the country and not have tank anxiety," says DeArmond. Once that happens, one of the major impediments to CNG conversion for long-range fleets will be gone.

Both DeArmond and Minton predict that commercial fleets will continue to convert to NGVs at increasing rates. And those that make the conversion will likely see quick payback on their investment and begin to enjoy reduced costs with a cleaner and more energy-efficient fuel. ■

# Governments Seek Energy-efficient Solutions

Natural Gas provides environmentally sound and cost-effective solutions for energy needs.

By *Tonya McMurray*

**L**ike most institutions in the market for a new hot water system, the Jackson County Courthouse wanted to make

sure its new system would minimize downtime for hot water. But unlike many institutions, the courthouse views quickly available and abundant hot water as a matter of civil rights.

The Jackson County Courthouse, located in Black River Falls, Wisconsin, includes a jail annex. For correctional institutions, minimizing hot water downtime is not just a preference; it's a necessity so the institution can ensure inmates' rights to hot showers and clean laundry.

Built nearly 140 years ago, the Jackson County Courthouse is one of the town's oldest buildings. When the county was ready to update the courthouse complex' aging hot-water system, it sought out a high-efficiency system that would both reduce utility costs and help maintain maximum hot water availability.

With 11 showers for inmates, an on-site laundry with two washing machines, two kitchen sinks, five utility sinks and 23 standard lavatory sinks, the jail annex requires the most hot water of all the courthouse facilities. And supporting all of that hot water use in a way that makes the best use of energy throughout the complex is critical.

The county had already replaced two older hot water boilers with a condensing boiler a few years before.

"Our domestic hot water system's storage tank was nearly 30 years old and

had a couple of pinholes in it, so it was certainly time to replace it," says Mike Kutcher, maintenance manager for Jackson County Courthouse.

The building's outdated system consisted of a 2 million BTU boiler with a 740-gallon storage tank. The county opted to replace the system with six Rinnai Energy Star-qualified condensing tankless water heaters, which offered both higher energy efficiency and longer life expectancy. The tankless units were fueled with natural gas, a cleaner and cheaper fuel source than electricity.

Condensing tankless water heaters are ideal for facilities that use large volumes of water. The water heaters capture latent heat from exhaust gases and use it to preheat incoming cold water. By reducing the amount of heat lost through the vent system, the heater achieves greater energy efficiency. The system also matches the Btu level to the hot-water demand, generating only the exact amount of Btus needed so utility costs are reduced.

Because of the importance of readily available hot water to the jail, the county incorporated a hot water recirculation system with a timer, allowing the facility to use the recirculation when needed to help further reduce energy costs.

All of this helped the courthouse complex meet its hot water needs while also helping improve its energy efficiency.

## Becoming good energy stewards

For governmental institutions across the country, energy efficiency is critical



PHOTO COURTESY OF RINNAI

Energy Star-qualified tankless water heaters provide on-demand hot water for 11 showers, an on-site laundry, two kitchen sinks, five utility sinks and 23 standard lavatory sinks at the Jackson County Courthouse in Black River Falls, Wisconsin.

to maximizing use of taxpayer dollars and finding ways to cut costs in ever-tighter budgets. The federal government is the nation's largest energy consumer, with more than 350,000 buildings and 600,000 road vehicles requiring energy. The U.S. Department of Energy's (DOE) Federal Energy Management Program (FEMP) promotes energy efficiency and renewable energy resources.

Established in 1973 through a mandate to encourage effective energy management in the federal government,

*(continued on page 11)*



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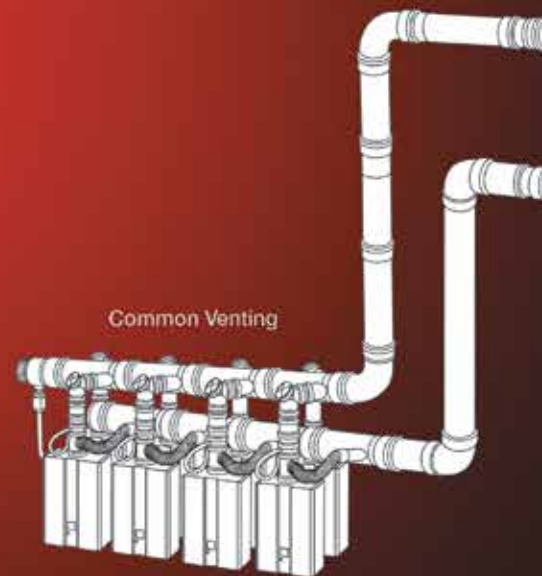
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# Warming up to Modular Boilers

Savvy commercial building owners seeing value of modular boilers

By Kristy Alpert

**A**t first glance, the 140-year-old mill in Providence, Rhode Island, seemed like the perfect contender to

house The Providence Center, a nonprofit behavioral health care organization. Built in 1875, the solid brick building had been meticulously maintained and preserved by its former tenants, and it looked like very little work would be needed to transform this 72,000-square-foot facility into a 21st-century headquarters for the largest community mental health center in Rhode Island.

But, looks can be deceiving. Although the building had won a coveted spot on the prestigious National Historic Register, the renovation team quickly realized the structure wasn't about to win any energy awards in its current state.

"When we moved in, the building was heated by four oil-fired boilers operating beyond their life expectancy at 60 percent efficiency," says Bob Pritchard, director of facilities and projects at The Providence Center, which serves 13,000 clients in 28 facilities. "We were consuming 18,000 gallons of oil on average per heating season. The boilers were 40 years old and

had become a challenge to maintain due to their age and availability of parts."

Pritchard and his team knew they needed to make a change. But with so much history at stake, they wanted to make sure the new system wouldn't take away from the building's architectural beauty or structure.

With energy savings in mind, the team turned to Victory Heating, Air Conditioning and Plumbing to design a new minimally invasive, multi-zone system. The goals for the project were to replace the failing equipment, modify the system to allow better climate control in all areas of the building, reduce the facility's energy expenses by converting to natural gas, and decrease the building's carbon footprint.

To fulfill their objective, Victory and Pritchard's renovation teams decided to install an Emerson Swan-manufactured modular boiler system with a 94 percent efficiency rating.

"We are very happy with the performance and reliability of this technology, and the design, installation, and operation of the system have been seamless and trouble-free," says Pritchard.

He says the organization is on track with a 4.8 percent return on investment, saving \$60,000 per year in energy costs.

"Since the installation of the modular boilers, we have been better able to control the temperature in the building by using a multi-zone approach instead of one single-zone design of the old system," Pritchard says. "This has helped to alleviate the challenges of evenly heating an old four-story mill building with a poor envelope. We now have a reliable system that allows us to control when and how the system operates, even from satellite

locations. The system communicates issues via email to staff allowing us to respond to a no-heat condition that could result in pipe freeze-ups and subsequent damage to the building."

## It boils down to . . .

Modular boilers consist of a series of smaller boilers working in tandem with one another that are then operated as a single-boiler system by one master controller to provide varying amounts of steam. The concept of the modular boiler was conceived not only to confront the issue of space, but also to add value to a boiler that can now operate at peak effectiveness and efficiency.

As the steam requirements of the facility rise and fall rapidly, the modular boiler system quickly turns on and off to eliminate wasteful energy and water consumption. These systems also reduce harmful emissions because boilers are not running unnecessarily. And, since each section (or module) has its own burner that works independently of the other sections, modular boilers are able to operate with oil, gas or propane interchangeably.

"Over the years, technology has moved from large, single boilers with very imprecise load matching capabilities to multiple, smaller boilers operating as one steam system that match the precise steam requirements," explains Doug MacMaster, vice president of U.S. operations, Miura America Company Ltd., the largest boiler manufacturer in the world and a leader in technological advancements in smart boiler technology. "Better communication systems, remote monitoring through the Internet and phone lines also allow for reduced labor dollars onsite

PHOTO COURTESY OF  
THE PROVIDENCE CENTER



Manufactured by Emerson Swan, a local manufacturer, the modular boiler system at The Providence Center operates at 94 percent efficiency.



as the service providers can keep an eye on the equipment and can recognize operational needs remotely.”

The technology has come a long way over the years, boasting smarter controls, and more efficient burners and boilers. The benefits have only increased with the new developments and greater applications in commercial buildings. Benefits for commercial applications include:

- **Improved efficiency.** With a modular system, four 200BHP [(total 800BHP) boiler horsepower] boilers can provide enough steam even when one boiler is offline for maintenance.
- **Smaller footprint.** Modular boilers can be installed where traditional boilers cannot, due to size and weight. The systems and number of boilers can be designed and installed based on the precise needs of the customer, with no unnecessary oversizing to allow for redundant backup systems.
- **Lower utility costs.** On average, customers save up to 20 percent on energy costs with these systems and can

generate the same amount of BPH in 50 percent to 60 percent of the space of competing systems.

- **Longer equipment life.** With a modular system, each section can be rotated throughout the year during periods of medium- to low-loads, greatly reducing the wear on each section while allowing maintenance staff to perform maintenance without shutting down the entire system.
- **Ease of maintenance.** Modular boiler designs have been referred to as “plug-and-play systems” due to the ease of maintenance and self-diagnostic controls.

### Modular boilers in the office

Modular boilers are an ideal application for commercial buildings, especially in terms of maintenance, comfort control and energy savings. Savvy commercial building owners are taking advantage of the more intelligent controls that are available today with these systems, and even using those controls to determine the building heating load and decide how many modules are needed to meet the building load.

“Each section of the modular system is typically integrated into the building’s building management system (BMS),” explains Peter Grealish, senior representative of channel sales, National Grid, the largest distributor of natural gas in the northeast United States, serving about 3.6 million customers in New York, Massachusetts and Rhode Island. “The BMS monitors and controls the need for heat throughout the building. On a demand for heat, the BMS will determine how many sections of the modular system are needed. This is determined by the monitored outdoor air temperature and the amount of load the building is calling for. A commercial energy customer should be installing these types of systems to take advantage of the energy savings that can be achieved.”

And, with many local utility companies offering financial incentives for installing these highly efficient and effective systems, the time may be right for more commercial building owners to warm up to modular boilers. ▶

*(continued from page 8)*

FEMP provides information, tools and assistance in meeting and tracking energy-related requirements and goals. By working with key individuals within organizations, the program brings both project and policy expertise to address energy goals.

Over the last three decades, the federal government has reduced energy use by 31 percent overall, with a 35 percent reduction in facility energy use and a 28 percent reduction in transportation energy use.

Natural gas has been an important part of the drive to increase energy efficiency, accounting for nearly 13 percent of energy used by the federal government, according to the DOE’s Office of Energy Efficiency and Renewable Energy. Most of the natural gas consumed in the United States is produced domestically, creating a stable energy source. And abundant shale gas reserves ensure that it will continue to be a stable, affordable and

efficient fuel source.

Across the country, government entities continue to look to natural gas as part of an energy-efficient mix.

### Turning trash to treasure

When New Jersey’s Woodbine Developmental Center began a renovation of its heating and cooling system, it combined natural gas with methane gas from a nearby landfill to help create a more energy-efficient system for the production of steam and chilled water. Woodbine Developmental Center, a residential facility founded in 1921, serves about 700 men with intellectual and other developmental disabilities.

Located on 250 acres in Woodbine, New Jersey, the center had been using boilers fueled by heating oil. For the renovation of the system, the state decided to use landfill gas to create steam to power several two-stage steam chillers. Landfill gas, produced when microorganisms break

down organic material, is about 60 percent methane and 40 percent carbon dioxide. When collected for use as a fuel source, the methane can significantly lower energy costs while reducing greenhouse gases emitted into the atmosphere.

The Cape May County Municipal Utilities Authority transported the collected methane gas to an underground pipeline that led to the Woodbine Developmental Center. The methane and natural gas are used to fuel Broad USA absorption chillers that produce simultaneous heating and cooling, achieving up to 85 percent energy efficiencies.

“The ability to use both landfill gas and natural gas was less expensive than using grid power,” says Doug Davis of Broad USA. “Woodbine was able to lower both their carbon footprint and operating costs.”

For government facilities across the country, natural gas is a key part of an energy mix that helps to meet efficiency goals and make better use of public resources. ▶





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