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# An energy-saving culture

Demand-control ventilation systems help restaurant meet environmental goals.

By Tonya McMurray

**F**or Shari's Restaurants, energy efficiency is an integral part of its recipe for success.

The chain of family dining restaurants is committed to being a good corporate citizen in the communities it serves, said Jodenne Scott, director, financial support services.

"We wanted to make sure we were doing our communities justice by reducing our carbon footprint without disrupting the guests' dining experience," she said.

In 2008, Shari's implemented an energy-management plan to look at how to reduce energy use across its 93 res-

taurants throughout the western United States. Since then, Shari's has initiated multiple energy-saving efforts, including LED lighting, more efficient motors for walk-in coolers and freezers, and water-reduction projects.

## Increasing kitchen efficiency

Shari's latest project was the installation of demand-control ventilation systems for kitchens in 78 of its restaurants.

Each of Shari's restaurants operates 24 hours a day. An energy audit showed that the kitchens' exhaust systems were running nonstop regardless of actual ventilation demands, Scott said.



Family dining chain Shari's Café and Pies is committed to ambitious energy-reduction goals as part of the U.S. Department of Energy's Better Buildings Alliance.

PHOTO COURTESY OF SHARI'S CAFÉ AND PIES



PHOTO COURTESY OF SHARI'S CAFÉ AND PIES

Shari's Café and Pies focuses on reducing its carbon footprint with initiatives such as LED lighting, demand control ventilation systems, energy efficient motors for coolers and freezers, and water-reduction efforts.

Shari's partnered with Cascade Natural Gas Corp., Energy Trust of Oregon Inc. and CaptiveAire Systems Inc. to retrofit its kitchens with demand-control ventilation systems that would modulate the exchange of fresh air with actual ventilation needs.

With Cascade Natural Gas' Commercial and Industrial Incentive Program, Shari's was able to identify rebates from the states of Oregon and Washington to offset project costs. In the state of Washington, those rebates added up to about \$18,000 to help offset the installation costs, said Kary Burin, energy efficiency supervisor, Cascade Natural Gas.

CaptiveAire created a priority list based on available rebates and local energy costs, so Shari's could start with restaurants that would deliver the most significant financial impact. Shari's phased in the project over three years, but the savings were immediate.

"We saw an instantaneous reduction in electrical usage," Scott said. "Within the first month, our use dropped 17 percent on average, and then we also saw a decrease in gas in winter months. The utility expense is the highest operating expense behind food and labor, so all of that money goes back to the bottom line."

"We saw an instantaneous reduction in electrical usage. Within the first month, our use dropped 17 percent on average, and then we also saw a decrease in gas in winter months. The utility expense is the highest operating expense behind food and labor, so all of that money goes back to the bottom line."

— Jodenne Scott, director, financial support services,  
Shari's Café and Pies

The project has had a significant impact on the restaurant's energy efficiency, Burin said.

"The custom project optimizes exhaust and ventilation airflow in the kitchens and has a deemed savings of more than 7,000 therms annually," she said. (A therm is about the energy equivalent of burning 100 cubic feet of natural gas).

The systems have also resulted in better temperature control, she said. Because of the continuous operation of ovens, it can be difficult to moderate temperature in the kitchen and, like many restaurants, Shari's found that its kitchen was often either too hot or too cold. With better modulation of air exchange, the kitchen thermostats operate more efficiently.

All of Shari's energy-efficiency efforts contribute to its overarching goal of better environmental stewardship. As part of the U.S. Department of Energy's Better Buildings Alliance, Shari's committed to reducing its energy use 20 percent by 2025. The company has already achieved an 18 percent reduction, Scott said.

"We've accepted the challenge to reduce our electrical and gas use," she said. "It's just part of our culture now." ▶

#### FOR MORE INFORMATION

CaptiveAire Systems Inc.:  
[www.captiveaire.com](http://www.captiveaire.com)



# Heating up

New technologies increase energy efficiency in multifamily buildings.

By Tonya McMurray

**M**eeting the space and water heating needs of hundreds of residents in multifamily units can

be a significant challenge. But innovative technologies are offering building managers new ways to efficiently and economically provide consistent and reliable heat and hot water for tenants.

## High-rise heating challenges

Because heated air rises, it creates a negative pressure that draws in more outside air, especially on lower floors. Heating systems then work harder to warm the incoming cold air.

Wind or solar exposure can make one side of a building significantly colder or hotter, said Dmitry Knyazev, president, K3D Inc., which offers a heat control system for multifamily buildings. Traditional systems work to heat the coldest units, which can overheat other units.

The challenge of uneven heat distribution is familiar to CityHousing Hamilton, which owns and operates more than 1,200 affordable housing properties in Hamilton,

Ontario, and the surrounding region.

“Our buildings are often overheated,” said Chris Shilton, senior project manager, energy initiatives, CityHousing Hamilton. “Residents may have thermostats turned down as much as possible and still find it too hot. When that’s the case, the only option they have is to keep windows open. That creates a lot of wasted energy leaving the building.”

Resident behavior — such as opening windows during the heating season — is another challenge for building owners because an open window in one unit can impact heating to other units.

To address the challenge of heating in its high-rise buildings, CityHousing Hamilton installed automated heat control systems in a few buildings in 2014 and 2015 before embarking on a major installation in 13 buildings in 2017 and early 2018.

## Greater control

The automated heat-control systems use proprietary algorithms to control heat allocation to individual units based on a variety of factors to deliver consistent and

even temperature throughout the building.

During the first heating season following its 13-building installation of automated heat control systems, CityHousing Hamilton saw significant cost savings, putting it well under budget for utility costs, Shilton said.

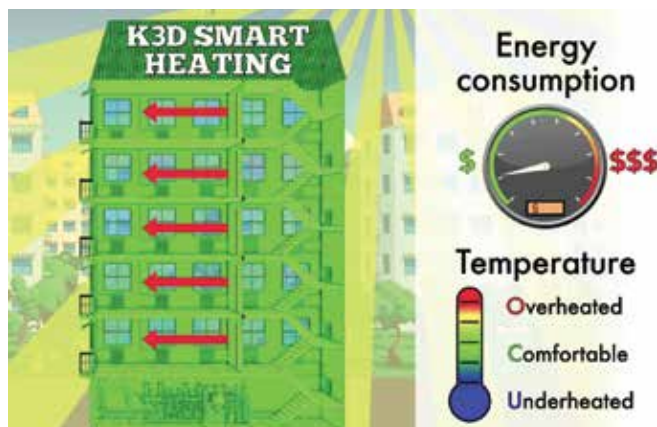
Knyazev said the K3D system can provide up to 72 percent energy savings for buildings using natural gas.

“With the K3D system, the goal is to keep boilers in the condensing mode 95 percent of the time, which boosts the whole heating system efficiency,” he said.

Automated heat control systems can efficiently address the challenges of heating multifamily housing units, said Mark Glasier, supervisor, energy efficiency delivery, Enbridge Gas Inc.

“Our first experience with K3D technology was in a Windsor location, and the savings proved to be significant,” he said. “Enbridge is pleased to work in conjunction with multifamily housing providers through our energy conservation program to save not only energy but also create more comfortable tenant conditions. We’re looking

GRAPHICS COURTESY OF K3D INC.



The K3D Inc. system uses a propriety algorithm to balance outside temperature, wind speed and direction, humidity, internal temperatures and other factors to determine the allocation of heat to individual units within multifamily units. The result is more even heat distribution and more comfortable temperatures throughout the building.

PHOTO COURTESY OF SPECIALIZED REAL ESTATE GROUP



Specialized Real Estate Group Inc.'s Uptown Fayetteville apartment complex uses The Teal System to provide unlimited hot water to tenants while reducing the energy required to fuel hot water for the multifamily building.

for many more opportunities across our franchise to promote building automation systems such as K3D."

### Cloud-based hot water

Providing hot water in a multifamily

building has a different set of issues.

"Small units have very little extra space, and any extra space wants to be used as storage for the tenants and not filled with plumbing equipment," said Sarah King, director, marketing and community out-

reach, Specialized Real Estate Group Inc., a northwest Arkansas firm that focuses on developing residential properties within city centers to combat urban sprawl.

Another challenge to providing hot water in a multifamily building is that demand peaks in the mornings and evenings, impacting both cost and availability of hot water.

"You have to design for those peak loads with the size of the hot water system," King said. "If you are using traditional tank-type water heaters that water is being kept warm all day even though no one is using it."

To address these challenges, Specialized Real Estate Group installed The Teal System in two of its newest properties.

The Teal System eliminates the need for individual water heaters, relying instead on a central natural gas boiler system. The boiler equipment is in one dedicated room in or near the building and connected to each apartment through a network of piping. A cloud-based system monitors performance 24/7 to identify and troubleshoot any problems.

*(continued on page 15)*

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# Just chilling

Companies welcome natural gas-smart technology as a cooling solution.

By Drew Robb

**N**atural gas has a reputation as the go-to fuel for heating and cooking. However, its versatility means it is

equally valuable as a way to cool facilities and commercial properties. Companies such as Broad U.S.A. Inc. and Yanmar Co. Ltd. have brought innovative, environmentally friendly and affordable natural gas-cooling solutions to the marketplace.

## Government contractors turn to natural gas-cooling

The STAE group of contractors and estimators is primarily focused on federal projects. The company has partnered with Yanmar on several natural gas-cooling projects at government facilities across the country. Based on the success of this work, STAE implemented Yanmar's Variable Refrigerant Flow (VRF) technology at its new office near

Auburn City in Lee County, Alabama.

STAE deployed one, 12-ton natural gas-powered, VRF system which was connected to three 4-ton air handlers for both heating and cooling.

"Our natural gas-powered VRF technology with dual scroll compressors provides the flexibility to use ducted or ductless indoor fan coil units, while also providing easy comfort control, increased efficiency and reduced utility and operational costs," said Rhoda Washington, channel development manager, Yanmar. "These systems are reliable and durable with maintenance only needing to be performed at 10,000 run hours."

VRF is a heating, ventilation and air conditioning (HVAC) technology where the refrigerant is circulated within a building to multiple indoor fan coil units which distribute hot or cold air. One

advantage is the ability to have multiple zones, each with their own thermostat control to manage the occupant's desired comfort better.

"Our natural gas, engine-driven system reduces the need for electric power to operate mechanical systems as compared to conventional all-electric systems," Washington said. "As well as reduced utility and maintenance costs, it offers quieter operation (only 56 decibels when 3 feet away) and reduced environmental impact through the use of a clean-burning natural gas fuel source."

Her advice to others considering implementing a natural gas cooling and heating system is to look at the lifecycle value of natural gas systems, which come out ahead of electric heating and cooling.

Griffin McNeill, commercial development manager, Spire Inc., agreed. He said natural gas cooling systems are

PHOTO COURTESY OF YANMAR CO. LTD



The STAE group of contractors deployed one, 12-ton natural gas-powered, VRF system which was connected to three 4-ton air handlers for both heating and cooling.

PHOTO COURTESY OF YANMAR CO. LTD



The Yanmar Co. Ltd. chiller provided an office in Alabama with lower utility and maintenance costs, quieter operation and reduced environmental impact through the use of clean-burning natural gas.

PHOTO COURTESY OF YANMAR CO. LTD



STAE implemented Yanmar's Variable Refrigerant Flow (VRF) technology at its new office near Auburn City in Lee County, Alabama.



PHOTO COURTESY OF BROAD U.S.A. INC.



The Jordan Furniture facility is cooled and heated by 739-ton and 537-ton, direct-fired absorption chillers by Broad U.S.A. that burn natural gas and convert it to chilled water for air conditioning.

already very competitive. However, when you view the total lifecycle costs of owning and operating these units, it can lead to incredible energy savings for the end-user. Yanmar estimates 30 percent to 70 percent energy savings depending on local utility rates. These benefits are on top of the reduced emissions experienced when using natural gas as the primary energy source.

"Utilizing a natural gas engine delivers comfortable cooling with the low, steady cost of natural gas," McNeil said. "This reduces grid dependency and eliminates the surcharges for operating during peak electrical consumption hours."

Additionally, the heat pumps are around 140 percent efficient in heating mode compared to conventional heating efficiency of about 80 percent. Even high-efficiency, electrical-based heating systems can only achieve proficiency levels in the mid-90s.

## Cool furniture

Jordan Furniture in Reading, Massachusetts, is more than a furniture store. It includes a 500-seat IMAX 3D theater

and a playground. All of this is cooled and heated by a Broad U.S.A. chiller system, which also provides hot water.

The system comprises 739-ton and 537-ton, direct-fired absorption chillers that burn natural gas and convert it to chilled water for air conditioning. Absorption chillers have a proven history of providing low-cost, reliable cooling as well as offering a service life of up to two decades before the first major overhaul.

Kevin Fu, vice general manager, Broad U.S.A., explained that this technology enables users to maximize energy savings during periods of peak electric demand. When there is a peak load for air conditioning in a building, about 20 percent of the total electric power consumption is due to the air conditioning system. Electric chillers consume 70 percent of this power draw, which amounts to 14 percent of total electrical power consumption.

"Natural gas absorption chillers do not overload the power supply, even in times of peak demand," Fu said. "They consume only 5 percent to 10 percent of electric power, which means about 13 percent of the electric power consumption in the Jordan Furniture building was saved by using an absorption chiller."

Further benefits include reduced noise and vibration as there are no electric motor-driven compressors. The natural gas chiller also reduces the equipment footprint by about 40 percent compared with a system composed of an electric chiller and boiler. ▮

## FOR MORE INFORMATION

Broad U.S.A. Inc.: [www.broadusa.net](http://www.broadusa.net)  
GasAir Conditioning:  
[www.gasairconditioning.com](http://www.gasairconditioning.com)  
Yanmar Co. Ltd.: [www.yanmar-es.com](http://www.yanmar-es.com)



The Jordan Furniture complex includes a 500-seat IMAX 3D theater and a playground. Broad U.S.A. went on-site to train personnel on system operation and maintenance.

PHOTO COURTESY OF BROAD U.S.A. INC.



# CHP makes fiscal sense

Simple economics power CHP growth.

By Drew Robb

**I**n countries such as Denmark, Finland and the Netherlands, combined heat and power (CHP) generates more than 30 percent of all electric generation. At 8 percent, the United States is far behind. But as more facilities adopt the technology, the gap is expected to close rapidly.

A study by the U.S. Department of Energy, for example, found that more than 240 GW of additional power could be added via CHP. The DOE champions CHP because it is a clean energy solution; improves U.S. competitiveness by reducing operating costs; raises energy efficiency; reduces greenhouse gas emissions; enhances energy infrastructure; heightens energy security and resiliency; and grows the economy. Because of its many advantages, the number of facilities specifying CHP is on the rise.

"The CHP market as a whole is experiencing steady growth," said Brett Feldman, senior research analyst, Navigant Research. "In light of concerns about grid reliability, demand for electricity and green-

house gas emissions, policymakers, utilities and building owners are becoming more interested in commercial CHP systems."

According to Navigant, the commercial CHP market is expected to be worth more than \$14 billion annually worldwide by 2024. A good portion of that growth is happening in the U.S.

Take, for example, Inspira Medical Center Mullica Hill in southern New Jersey, which is in the middle of installing a new natural gas-fired CHP unit.

"Our CHP system will save the campus \$1 million per year in energy costs by producing power from natural gas, and it will have a payback period of less than six years," said Brandon Bardowsky, vice president, facilities, design and construction, Inspira Health Network Inc.

This 1.1-megawatt CHP system will be operational later this year. It will power 583,000 square feet of campus, which includes a 210-bed facility, a cancer center and a medical office building. As well as electricity, the waste heat from the natural gas-fired CHP plant will be used to heat water.

The new medical center will be about 25 percent more energy efficient than other hospital facilities within the region. During a power outage or emergency, CHP can provide almost all the power required to operate the entire campus.

Bardowsky recommends that facilities considering CHP hire a knowledgeable engineering firm to consult with on finding an optimum system design. Due diligence ensures that the equipment isn't over or undersized and that it interfaces well with other facility systems. In most cases, a natural gas system will prove to be the ideal option.

## Embracing CHP

Retirement communities, too, are embracing CHP. Take the case of Cathedral Village, a Presbyterian Senior Living community and a nonprofit, non-denominational and multicultural continuing care retirement community in Philadelphia, Pennsylvania. It has 203 apartments with an additional 133-bed skilled nursing and rehab center. The facility opened in 1979 and recently identified the need for a sustainable energy makeover. It decided to replace failing equipment with the latest in natural gas CHP technology. Cathedral Village worked with clean energy infrastructure developer Blue Sky Power to design, engineer, construct and finance the project.

"This natural gas CHP infrastructure will not only enhance the lives of our residents by providing a more comfortable environment, but also allows us to reinvest the savings into the community to ensure we're always providing the most advanced, highest quality care," said Steve Proctor, CEO, Presbyterian Senior Living.



PHOTO COURTESY OF INSPIRA HEALTH

Inspira Medical Center Mullica Hill in southern New Jersey is installing a new natural gas-fired CHP system that will save the campus \$1 million per year in energy costs.



PHOTO COURTESY OF BLUE SKY POWER



**Cathedral Village replaced failing equipment with a high efficiency 265 kW natural gas engine by ENER-G Rudox to provide heat and electricity.**

A high efficiency 265 kW natural gas engine by ENER-G Rudox provides heat and electricity, with future expansion to include an additional 265 kW engine. The addition of CHP at Cathedral Village provides the resiliency required for a stable system with almost no blackout time.

A \$500,000 state clean energy grant

made it possible to develop the project at no cost to Cathedral Village. Due to offsetting grid-supplied electricity with natural gas-powered, on-site generation, Cathedral Village reduced its carbon footprint by 350 metric tons over 20 years, offset its electricity consumption by 1.16 million kW, and achieved

\$146,000 in annual energy savings.

"The economics of natural gas-fired CHP at Cathedral Village worked well," said John Murray, major accounts executive and program specialist, Philadelphia Gas Works. "With their CHP unit, they are producing power on-site for approximately \$0.05/kWh, which is about half of what they were paying previously."

Facilities with substantial heating and cooling loads such as in senior living, collegiate housing, health care and manufacturing are prime candidates for CHP. This efficient technology engenders lower and more stable energy costs by decreasing energy usage, which also eliminates significant carbon emissions.

"The combination of efficiency, sustainability and resiliency makes CHP a smart choice for most facilities," said Ben Parvey, CEO, Blue Sky Power. ■

#### FOR MORE INFORMATION

Understanding Combined Heat and Power:  
[www.understandingchp.com](http://www.understandingchp.com)





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# Fuel of choice

Hospital chooses natural gas for reliable and affordable heating.

By Tonya McMurray

**M**ore than 43 million U.S. adults experience mental illness every year, and more than 10 million

of those people also struggle with addiction. Like other parts of the country, rapidly growing Sussex County in Delaware has many citizens who struggle with mental health and substance use disorders.

"The southern Delaware region has a lot of problems with opioid addiction and overdoses just like many other parts of the country," said Jared Shelton, commercial and industrial account manager, Chesapeake Utilities Corp., which recently partnered with SUN Behavioral Health, a nationwide network of psychiatric hospitals, on the opening of a new facility in Georgetown, Delaware.

"The community has so welcomed it be-

cause it's addressing a real need," he said.

Located about four hours from metropolitan areas in New York, New Jersey, Pennsylvania and two hours from Washington D.C. and Baltimore, Sussex County is one of the fastest-growing areas in the country. SUN Behavioral Delaware's new 90-bed facility provides

hospital has programs targeted to children, adolescents, adults and seniors.

## A clean fuel option

SUN Behavioral Delaware chose natural gas to fuel heating, hot water and cooking needs of its new, state-of-the-art facility.

**"We like to use gas in our projects for heating and cooking because it's clean and easier on the equipment."**

— Lawrence Newman, vice president, facilities and construction, SUN Behavioral Health

the area's residents with comprehensive inpatient treatment, partial hospitalization, and intensive outpatient mental health and substance use disorder services. The

"We like to use gas in our projects for heating and cooking because it's clean and easier on the equipment," said Lawrence Newman, vice president, facilities and construction, SUN Behavioral Health.

Natural gas is generally cheaper than other fuel sources, and its cost is relatively stable. Oil prices, for example, can vary significantly from year to year, averaging between 30 percent and 50 percent more than natural gas prices each year for the last 15 years, according to the Energy Information Administration.

Not only is natural gas an excellent value for the pocketbook, but it also is one of the best energy options for the environment. Natural gas is the cleanest of all fossil fuels, producing half as much carbon dioxide as electricity generated by coal, according to the U.S. Environmental Protection Agency. Because it is a clean-burning fuel source, maintenance costs are usually lower for natural gas equipment.

"Natural gas is the fuel of choice in this region because it is reliable, efficient, affordable and available," Shelton said.



SUN Behavioral Delaware's new 90,000-square-foot facility uses natural gas to fuel heating, water heating and cooking.

PHOTO COURTESY OF SUN BEHAVIORAL HEALTH



Newman said SUN Behavioral Health wanted a heating system that provided good control while being easy to operate and maintain. To meet those needs, the company chose a system that incorporated natural gas package rooftop units and a traditional natural gas-fueled boiler.

Natural gas is a popular solution for heating, Shelton said. Since heating costs are typically one of the most significant energy expenses for businesses, the lower cost of natural gas can mean significant savings for companies.

"There are a lot of technologies available, including renewable technologies," Shelton said, "but SUN went with a more conventional boiler plant with natural gas boilers for space heat as well as for their hot water. It makes sense for both cost and energy savings and also from a resiliency standpoint."

For its kitchens, the hospital selected the same natural gas equipment it has used with success in other facilities, Newman said. Natural gas is often preferred for cooking because it offers superior temperature control with almost instant warm up



PHOTO COURTESY OF SUN BEHAVIORAL HEALTH

**SUN Behavioral Delaware provides inpatient and outpatient mental health and addiction treatment to children, adolescents, adults and seniors throughout southern Delaware.**

and cool down times as well as the ability to control the intensity of the heat.

### Boosting fuel savings

Construction of the Delaware facility began in late 2016 and the hospital opened in August 2018. While the already low cost of natural gas has been a benefit

during its first year of operation, the hospital is looking to save even more money on its fuel costs over the next few years by contracting with a third-party supplier.

For SUN Behavioral Delaware, like many companies, natural gas is an easy choice that offers a clean, reliable and affordable heating source, Shelton said. ▶

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# Fleeting success

Companies embrace CNG to lower cost and gas emissions.

By Drew Robb

**T**ruck and bus fleets across the nation are switching from diesel or gasoline to compressed natural gas

(CNG). Why? It makes sense both economically and environmentally. CNG fleets are cheaper to run and better for the environment than traditional commercial vehicles.

"Natural gas lowers emissions for fleets, reduces operating costs and provides fuel price stability," said Dan Gage, president, NGV America. "Today's natural gas trucks reduce harmful criteria pollutants by more than 90 percent compared to new diesel trucks. They eliminate diesel particulates without the use of costly and cumbersome emissions after-treatment systems."

Natural gas is a proven transportation resource with a rapidly growing number of public-access fueling stations available to fleets. Virtually all main-line manufacturers offer a variety of factory-



PHOTO COURTESY OF CITY OF RALEIGH, NORTH CAROLINA

The City of Raleigh, North Carolina, has converted 17 city buses to CNG, opened its first CNG station, and has another 23 CNG buses being added.

built natural gas trucks and buses. This includes refuse, work, short-haul and regional trucks as well as transit buses.

Gage said CNG retails nationally for an average of about 68 cents less than diesel on an energy equivalent basis. In California, he said, the difference can be as

high as \$1.50. As a result, natural gas use displaced more than 600 million gasoline-gallon equivalents in transportation in 2018 alone in the United States. That number is expected to rise sharply in 2019.

## Viable option

Dominion Energy North Carolina Gas operates 10 public fueling stations across the state and already has 35 percent of its fleet running on natural gas.

"Compressed natural gas will continue being attractive and viable due to its environmental benefits, plentiful domestic supply, growing fueling infrastructure and lower cost," said Mike Kasopsky, large accounts representative, Dominion Energy. "CNG makes good business sense and is great for the environment."

Other organizations in North Carolina are following suit by beginning the process of converting their vehicles to natural gas and building their own fueling stations. The City of Raleigh, for example, has converted 17 city buses to CNG to



PHOTO COURTESY OF SOUTHERN CALIFORNIA GAS

Food Express Inc. recently added 11 new, ultra-low emission natural gas trucks to its fleet with 35 more trucks on order.

PHOTO COURTESY OF AMERICAN NATURAL GAS LLC



**CNG fueling options are available for light and medium-duty use, heavy-duty and transit vehicles.**

date, opened its first CNG station, and has another 23 CNG buses scheduled to go online this summer.

"The switch to CNG is a component of Raleigh's sustainability goals for reducing emissions and greenhouse gases," said David Eatman, assistant transportation director, City of Raleigh. "The new station has just opened, but we expect substantial savings over diesel due to lower cost and the stable pricing of natural gas."

### Fleeting success

Potato chips and savory snacks manufacturer Frito-Lay (a division of PepsiCo Inc.) is a leader when it comes to natural gas-fueled transportation use. Its CNG truck fleet has logged more than 100 million miles across the United States since it first began leveraging the technology in 2011 on 16 vehicles. From those humble beginnings, Frito-Lay now has a CNG fleet of more than 500 strong.

Frito-Lay is the major customer at 16 CNG public fueling stations around the country. In addition to the snacks giant, these stations offer fuel to other companies running CNG vehicles in the

**"Natural gas lowers emissions for fleets, reduces operating costs and provides fuel price stability. Today's natural gas trucks reduce harmful criteria pollutants by more than 90 percent compared to new diesel trucks. They eliminate diesel particulates without the use of costly and cumbersome emissions after-treatment systems."**

**— Dan Gage, president, NGV America**

region. Since it made a firm commitment to sustainability and CNG, Frito-Lay has reduced its diesel fuel use by more than 30 percent.

Michael O'Connell, vice president, supply chain, Frito-Lay, said that increasing the fleet's efficiency has been a key component of achieving PepsiCo's overall goal to reduce greenhouse gas (GHG) emissions.

"Having a national infrastructure for alternative fuel is critical to the continued expansion of Frito-Lay's CNG fleet and for other companies currently using or considering this technology," he said.

The company just added a fast-fill CNG fueling station in Lynchburg, Virginia. It is operated by American Natural Gas LLC (ANG), a company that develops and operates scores of CNG stations in the country. The station is located within a mile of the intersection of Lynchburg/Northwest Expressway (US-501) and US-221. The fast-fill station includes fueling options for light-, medium- and heavy-duty and transit vehicles. It is de-

signed to accommodate high-capacity, large-volume users.

### On the rise

The market for CNG continues to grow. Even with oil prices falling in recent years, Andrew West, founder and CEO, ANG, said CNG usage is rising 20 percent or more each year. And, with oil and diesel becoming expensive once again, he expects to see a more substantial increase in CNG's use.

"CNG is the cleanest burning alternative fuel in the market," West said. "Companies making the switch see cost and massive environmental savings in the form of reduced GHG."

Those gains are likely to magnify as CNG technology continues to evolve. West noted a near-zero, 12-liter natural gas-engine is entering the market from Cummins Westport Inc. Once engines like these become widely available, the steady uptick of fleets converting to CNG is likely to increase dramatically. ■



**Frito Lay just added a fast-fill compressed natural gas fueling station in Lynchburg, Virginia, operated by American Natural Gas LLC.**

PHOTO COURTESY OF AMERICAN NATURAL GAS



# Meeting clean energy goals

Electrification means high cost for minimal impact.

By Tonya McMurray

**F**rom the Green New Deal to countless state and local initiatives, proposals to reduce greenhouse gasses are

plentiful. One that has gained momentum is electrification – using only renewable sources to generate electricity and then converting residential and commercial energy applications to electricity.

While that idea may seem simple, it is likely to be quite costly and eliminate consumer choice without generating the hoped-for energy savings, according to natural gas industry experts.

“The concept of electrification has not yet been given broad public exposure or

scrutiny,” said Jody Morehouse, director, gas supply, Avista Corp. “In many instances, electric utilities will have to more than double their current generation supply resources to replace the energy demand currently met by the local natural gas distribution system.”

The significant infrastructure investment required to double electricity generation would likely be passed onto residential and business consumers.

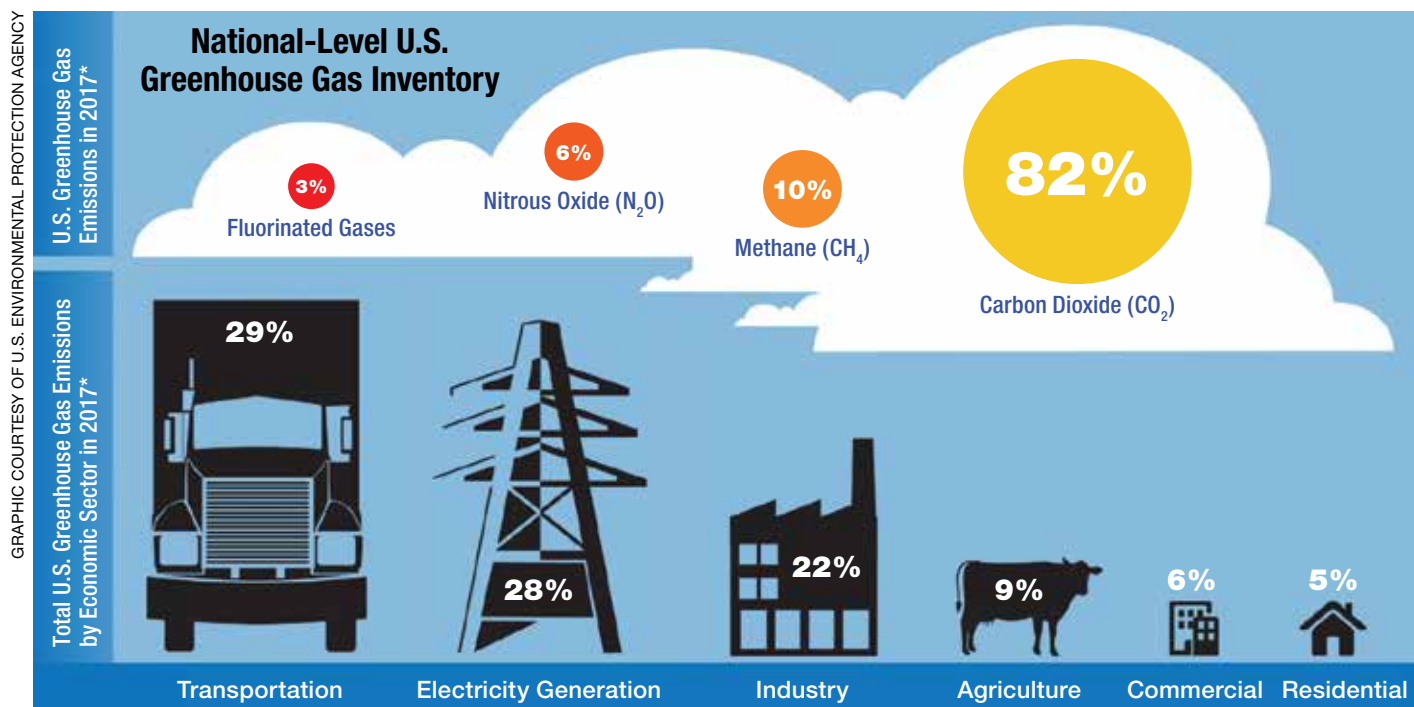
“Other impacts to consumers would include replacing gas appliances as well as upsizing electrical panels and rewiring homes and businesses,” Morehouse said.

Currently, electricity costs two to five

times more than natural gas on a BTU equivalent basis. Today’s electric demand is expected to double if all existing residential and commercial gas loads were to convert to electric equipment.

Doubling the current electric demand means there will be a need to add a lot more renewable power generation to the current grid while converting the remaining fossil fuel-based power to cleaner alternatives and installing massive battery farms to handle loads at times when the sun isn’t shining and wind isn’t blowing, said Eric Burgis, director, commercial and residential markets, the Energy Solutions Center.

In addition to new power generation,



Energy use by residential and commercial users accounts for a small amount of greenhouse gas emission, accounting for a fraction of the emissions produced by transportation and electricity generation.

\*Percentages may not add to 100 percent due to independent rounding and the way the inventory quantifies U.S. territories (not shown) as a separate sector.



electrification would also require upgrading the infrastructure to support the new electric demand, which would require new larger wires and new larger transformers across the entire grid.

"The cost to build out the new all-electric clean power grid will be passed on to consumers in the form of higher electric rates," Burgis said. "So, with a fully electrified energy system, current electric costs could double or more from today's costs. Energy consumers need to ask how much it will cost to convert to electric, and what will electricity cost versus natural gas today and what might that cost look like in the future."

While the cost of electrification could be significant, the resulting reductions in greenhouse gas emissions would likely be minimal.

### Expensive proposition

Natural gas use in commercial buildings accounts for just 3 percent of annual U.S. greenhouse gas emissions, according to the American Gas Association.

"An initial shift of gas equipment to electric equipment in commercial build-

ings would have minimal impact on overall carbon emission since two-thirds of our power is currently generated with fossil fuels," Burgis said.

For electrification to succeed, utilities must have a cost-effective and viable storage method that allows electricity to meet daily changes in electric usage requirements, and that does not currently exist, Burgis added.

"Unless a viable large-scale battery storage device is developed that can supply power to the nation for multiple days in the event of lack of wind or sun to charge up those batteries, we will rely on fossil fuel to meet the daily electric power swings," he said. "The long-term fossil fuel, power generation mix will certainly impact the amount of potential carbon dioxide that could be saved from the 3 percent of greenhouse gases from natural gas use in this sector today."

Morehouse agrees. "Solutions for carbon emission reduction might be better served by zeroing in on getting the biggest reductions possible for every dollar spent," she said. "Getting rid of natural gas distribution for consumers will be an expensive

solution that yields little relative carbon-reducing benefit. Consumers will not be getting the biggest bang for their buck."

Even without mandated electrification, the electric grid is already becoming less carbon-intensive with increasing use of renewable resources and natural gas replacing coal for electricity generation.

In addition, innovations in the natural gas industry are helping to achieve clean energy goals. Renewable natural gas captures methane produced by wastewater treatment plants, landfills and other sources, and injects it into existing natural gas pipelines.

"A near-zero emission natural gas engine offers an alternative for heavy-duty trucking, directly addressing one of the most significant causes of greenhouse gas emissions," Morehouse said. "And, innovative natural gas technologies have improved the efficiency of residential and commercial appliances by up to 50 percent."

Those innovations can have as much, or more of an impact, than electrification, she said, offering a better way to achieve clean energy goals. ▀

*(continued from page 5)*

Because the boiler is fueled by natural gas, it is both cost effective and energy efficient. The Teal System estimates that property managers can reduce energy costs by up to 50 percent while providing residents unlimited hot water.

"Providing a natural gas water heater solution for apartments in the south is often quite challenging and requires innovative thinking," said Marshall Moody, business development manager—Arkansas, Black Hills Energy. "That's what we found in working with Specialized Realty Group. Their owners not only talk about environmentally-friendly energy technologies but put their words into action."

### A benefit to owners

The energy savings was attractive to Specialized Real Estate Group, a regional leader in LEED (leadership in energy and

environmental design)-certified multifamily communities.

"Specialized Realty Group owners were sold on Teal during a conversation about source-based emissions," Moody said. "They realized that the majority of electricity in Northwest Arkansas comes from coal-fired generation; therefore, their electric water heaters were not environmentally friendly. We mentioned the Teal System and the high-efficiency natural gas boilers that produce the hot water. Teal has many advantages but reducing emissions with Teal's unlimited hot water system closed the sale."

The developer installed The Teal System in its Uptown Fayetteville apartments, which opened in 2017, and its Brick Avenue Lofts, which opened in the spring of this year.

The system contributes to Specialized Real Estate Group's LEED goals with reduced energy use and the elimination of

hot water heaters — and the associated leakage potential — from individual living spaces, King said.

The Teal System's unlimited hot water is also an advantage to property owners, King said.

"We advertise 'hot water that never runs out' to prospective tenants," King said. "That touches a pain point that everyone has felt. No one wants that sudden chill when the hot water runs out."

For property owners looking to reduce energy use and costs, technology such as The Teal System and K3D heat-control systems can provide efficient, high-tech solutions to help deliver a positive tenant experience. ▀

### FOR MORE INFORMATION

K3D Inc.: [www.k3d.ca](http://www.k3d.ca)  
The Teal System: [www.tealsystem.com](http://www.tealsystem.com)



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