ESC
Energy Solutions Center

Energy Solutions
for Commercial Buildings

Economic Realities

Increased building efficiency helps reduce energy consumption, costs and pollution.

ESC Energy Solutions Center

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Developing Better Buildings

The federal government challenges multifamily home developers to reduce energy use over the next decade.

The energy needed to operate the buildings where we live, work and socialize costs approximately $200 billion each year. About 30 percent of that energy is wasted, according to the federal government, which has challenged companies, universities and local governments to address that waste in building design and management.

More than 120 organizations have joined the Better Buildings Challenge, agreeing to reduce energy use by 20 percent or more over the next decade.

And now, the Department of Housing and Urban Development (HUD) has joined with the Department of Energy (DOE) to expand the challenge to the multifamily sector. Leaders in market rate (unsubsidized) multifamily housing, public housing authorities, low-income housing tax credit properties and HUD-assisted multifamily properties are among those who have signed up for the challenge.

The Better Buildings Challenge, part of President Barack Obama's Climate Action Plan, recognizes the role that increased building efficiency plays in reducing energy use and carbon pollution. The challenge also seeks to create a forum where successful solutions can be shared broadly. Participants agree to showcase the solutions they develop to help spur new investment and savings.

Organizations committing to the Better Buildings Challenge agree to conduct an energy efficiency assessment and set an organization-wide energy savings goal. Several financial institutions have committed almost $2 billion in private-sector money to support energy improvements. On average, participants have improved energy use by 2.5 percent a year, saving more than $300 million since the challenge began. If that rate of energy savings continues, the government estimates that cost savings will total more than $80 billion per year when the challenge wraps up in 2020.

The government offers participating organizations technical assistance and help in creating systems to track energy performance of a company's portfolio of buildings. Organizations agree to share information about the implementation of tools, processes and technologies used to meet their pledge goal. DOE and HUD will recognize those organizations that achieve program milestones and improve energy efficiency.

Executives and building owners and managers can learn more about the challenge at energy.gov/betterbuildingschallenge.

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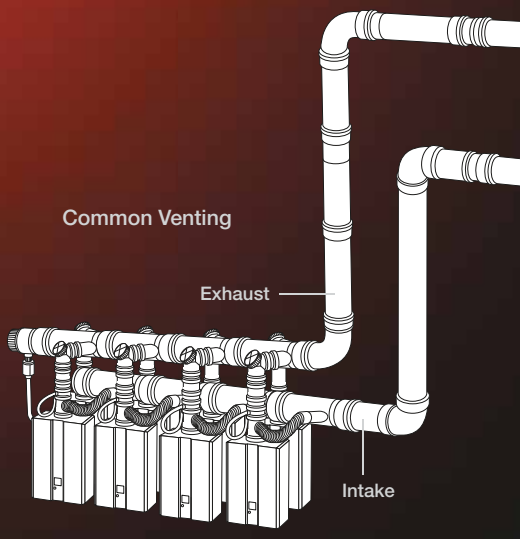

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Economic Realities

Stable pricing and abundant supply help drive the long-term value of natural gas.

An old English proverb advises people not to be "penny wise and pound foolish." It's the same advice that investment professionals give to their clients – focusing on short-term gains often means losing out on bigger returns in the future.

Those rules apply to decisions about energy sources, too. If you evaluate only the immediate costs of a fuel source, you might make a decision that costs more over time.

Converting to natural gas from another fuel source can often seem overwhelmingly expensive because of up-front equipment costs; however, the savings from natural gas often offset those initial costs in the long term.

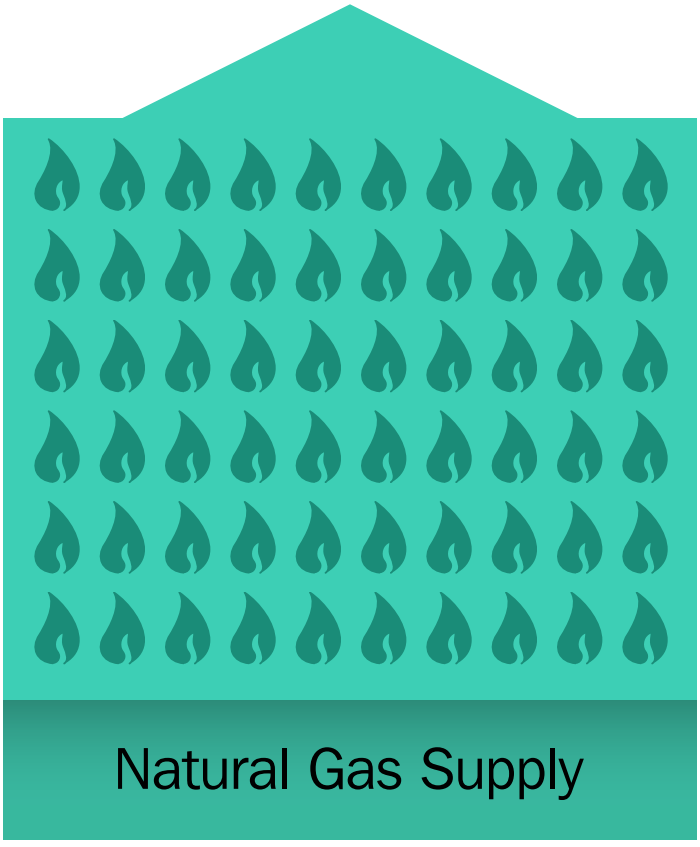
One reason natural gas is often a good long-term fuel investment is projected stability of cost.

Over the last decade, discoveries of large shale formations thousands of feet below the earth's surface have vastly increased the amount of natural gas available in North America. And, technological advances have made it more efficient and cost effective to extract natural gas.

The combination of increased supply and better technology have drastically reduced cost from a 2006 peak of $12/MCF (one thousand cubic feet) to a low of just $2/MCF a few years ago, notes University of Illinois at Chicago professor Dr. William Ryan.

"That low was clearly unsustainable, as it drove drilling rates from a high to a 30-year low, but the energy industry goes through such swings," says Ryan, director of the university's Master of Energy Engineering Program. "The market seems to have equilibrated in the $4 to $5 range with reasonable drilling rates."

The Energy Information Agency predicts natural gas prices will remain stable for the next 10 years. Ryan notes that estimate is based on an assumption that power will remain about 40 percent coal; however, others predict a decline in coal dependency and an increase in the use of natural gas to generate electricity.



If that happens, Ryan says, natural gas prices will probably rise slightly to about $7/MCF over the next 10 years.

In addition, the fracking industry is facing more environmental regulation, which will make the process more expensive. With increased demand and more regulation, Ryan says a price of $7/MCF is a "good bet" over the next decade, making gas prices relatively stable.

Looking long term

While the cost of natural gas is a plus, the up-front investment in equipment can be pricey. However, Ryan says, building owners would be wise to look beyond the initial investment to an overall lifecycle cost.

"Capital constraints tend to push building owners to buying lower first-cost equipment when a more efficient but higher first-cost system may be a better long-term solution," he says.

When one Pennsylvania middle school looked at the long-term cost of a natural gas system, it determined that the long-term savings of natural gas were well worth the initial cost of equipment.

Nitschmann Middle School, one of four middle schools in Pennsylvania's Bethlehem Area School District, needed to replace boilers that were failing and beyond repair. The school worked with D'Huy Engineering on an energy needs assessment. Based on that assessment, D'Huy

concluded that converting the boilers to natural gas would provide reliable energy, with the system paying for itself in less than seven years.

UGI Utilities installed a 1,000-foot main extension to provide natural gas to the middle school, and Nitschmann installed high-efficiency condensing gas hot water boilers and domestic water heaters. The boilers replaced combination gas and oil boilers, which had used oil as the primary fuel source.

The natural gas boilers, which have been online since fall 2011, have resulted in annual savings of $61,643, putting the school district on track for a six-and-a-half-year payback. In addition, D'Huy estimates that the project will result in carbon savings of 1,036 tons a year.

Following the success of the conversion of Nitschmann's boilers to natural gas, the school district switched all of its 22 facilities from oil to natural gas, resulting in savings of nearly $1 million last year. In addition, 16 of the Bethlehem Area School District's facilities have been named Energy Star-compliant, and the district has achieved Energy Star Leader status. Energy Star is a voluntary program established by the U.S. Environmental Protection Agency to identify and promote energy-efficient products and buildings. The program is designed to reduce energy consumption, improve energy security and reduce pollution.

Ryan notes that Nitschmann's results are not unusual.

"Current economic evaluations tend to show high-efficiency cooling systems accompanied by gas for the heating load that remains in today's heavily-insulated buildings tend to make more sense," he says. "Such evaluations should be done on a local basis incorporating the appropriate climatic conditions, but generally, this seems to be the case."

Almost all of the natural gas used in the United States is produced in North America, creating jobs associated with drilling and production. And most of those jobs pay well.

Sustainable job creation

But the economic benefits of natural gas go beyond the savings of individual business owners and organizations.

Almost all of the natural gas used in the United States is produced in North America, creating jobs associated with drilling and production. And most of those jobs pay well.

Industry analyst HIS Global Insight, in a report prepared for America's Natural Gas Alliance, estimates that jobs in the shale gas industry will grow to 870,000 jobs in 2015 and to more than 1.6 million jobs by 2035.

As the natural gas industry grows, HIS estimates that the shale industry will generate more than $933 billion in federal, state and local tax, and royalty revenue over the next 25 years.

Development of natural gas resources tends to boost property, sales and other taxes and fees. A recent report from the Duke University Energy Initiative concludes that the net impact of recent oil and gas development has been generally positive, allowing local governments to maintain, and, in some cases, expand or improve, the services they provide.

Taxes on oil and gas production have provided new revenue for local governments. Some governments have also seen revenue from oil and gas leases on county-owned land while others have partnered with oil and gas companies to maintain local roads.

A recent economic impact study estimates the natural gas industry contributed more than $380 billion to the U.S. economy and is responsible for 2.8 million American jobs over the course of a year. Estimates for one recent year for the Marcellus Shale in the Appalachian basin are that it created an additional 44,000 jobs in Pennsylvania along with $389 million in tax revenue and more than $1 billion in federal tax revenue.

Natural gas is clean, reliable and efficient. Its stable and competitive price makes it a solid long-term investment for businesses. And, it creates a domestic fuel source that creates jobs and reduces dependence on foreign oil. From any perspective, natural gas is a solid economic investment.

'Superheroes' of Electricity Generation

CHP systems offer a single reliable and cost-effective source for both heat and power.

From the dazzling lights of Las Vegas to classrooms in Delaware, more commercial buildings are taking advantage of combined heat and power (CHP) for economical, clean energy.

CHP is an efficient way to generate electric power and useful thermal energy from a single fuel source. It uses a power system, such as an engine or turbine, and a heat recovery system – typically a hot water loop – located at or near the user's facility.

Considered the "superheroes" of electricity generation, CHP systems are environmentally friendly. They produce clean energy, recover waste heat and offer a single reliable and cost-effective source for both heat and power. CHP systems can generate two types of energy from one source. Heat that is created generating electricity is not wasted but captured for different uses such as hot water and chillers.

Because electricity and residual heat are both produced by a single fuel source, the cost is less than it would be through a utility company.

CHP systems are typically placed at or near a customer's facility. The systems use various technologies and different equipment such as reciprocating engines, steam turbines, gas turbines, microturbines and fuel cells.

Each option works in its own distinctive way. Reciprocating engines combust fuel to turn a crankshaft that generates power the way a gas-powered car engine works. Steam turbines allow energy to be transferred from a boiler or other steam source to power the turbine and generator. Gas turbines burn fuel and air at high pressure and temperatures to create electric power. Microturbines are small, packaged systems with low emissions. And fuel cells generate power using an electrochemical process similar to one that allows dry cell batteries to function.

CHP is becoming more popular as a way to reduce energy costs, lower greenhouse gas emissions and lessen overcrowding of the national power grid. But the technology is actually a century old. And more facility owners and managers across the nation are using it to their advantage as they realize that investing in CHP equipment will save money in the long run.

Generating some heat

In 2009, CityCenter in Las Vegas opened its doors to the public. Located on 67 acres, CityCenter includes ARIA Resort and Casino, a 61-story, 4,000-room gaming resort; two luxury non-gaming hotels; residential buildings; and Crystals, a 500,000-square-foot retail and dining facility. The modern complex features an efficient, state-of-the-art central plant with a CHP system that captures waste heat before it enters the atmosphere and uses it for heating water in the hotel and pools.

It may get hot in Vegas, but CityCenter accounts for 18 million square feet of air-conditioned space. Billed as an "urban resort destination," CityCenter is the world's largest environmentally sustainable, mixed-use new construction development to achieve Leadership in Energy and Environmental Design (LEED) Gold certifications. LEED recognizes sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Using CHP, CityCenter generates its own electricity onsite at a central power plant that uses natural gas to create electricity, then capture emitted heat before it enters the atmosphere. This process meets the domestic hot water needs of their guests which includes showers, sinks, pools and general space heating for comfort control for all buildings in the complex. This, in turn, reduces the energy that would otherwise be used by boilers to heat water.

"It's really exciting that we can generate our own power onsite and not have to buy it from a utility and also capture

CityCenter in Las Vegas features an efficient, state-of-the-art combined heat and power (CHP) system.

that heat for the campus for heating or domestic hot water purposes," says Michael Heiman, facilities manager, central plant at ARIA.

The two turbines produce a combined 8.4 megawatts of power, roughly one third of the total annual electricity needs at ARIA.

"Any time you can utilize CHP and the heat that comes off of it, that's the key to making it successful as a program at your site," says Bill Arnold, assistant director, central plant at ARIA. "The heat is the key factor. What you have to be able to use is that waste heat. Here, we choose to use the waste heat in the form of heating water. We've got boilers that take the exhaust off of the turbines to heat water and supply it for the entire CityCenter campus."

In an area with such extreme temperatures, everything has been designed to be as efficient as possible, Heiman says.

"It helps us maintain our temperatures," he says. "It's all about keeping people happy."

Southwest Gas, which provides energy to the Las Vegas area, is a supporter of CHP and the benefits its technology provides, says Michael Cooper, supervisor, Key Account Management. Within the region, the most common application is a natural gas turbine, or engine, with a heat recovery unit, he says.

"CHP is important to our customers because the technology is efficient, reliable, environmentally responsible and economical," says Cooper. "CHP allows our customers to obtain more control over their energy costs and hedge against unanticipated swings within the energy market."

West to east

Across the country in Dover, Delaware, Seaford High School is the first non-utility facility in the state to have a gas-fired co-generation system. The district was a 2013 recipient of a partnership award for Innovative Energy Solutions by the Energy Solutions Center of Washington, D.C. The school is located in a town that operates its own municipal electric utility.

Chesapeake Utilities partnered with the school district to employ the gas-fired co-generation system to help reduce overall operating costs during a high school expansion project. A diversified energy company, Chesapeake Utilities is a division of Chesapeake Utilities Corp.; it provides natural gas distribution services to 56,000 residential and commercial customers in Delaware and Maryland.

The Inverde-100 Ultra, like the one above, was installed in Seaford High School in Dover, Delaware, which is the first non-utility facility in the state to have a gas-fired co-generation system.

"CHP is certainly one of our major strategic initiatives," says Darrell K. Wilson, director of Marketing and Communications with Chesapeake Utilities. "That's not unlike other local distribution companies in our industry. Most are focusing on schools, hospitals and manufacturing and government facilities. If you can generate your own electricity, that's a good thing. And it's quiet and clean."

The high school expansion included a 65,000-square-foot addition to the existing 150,000-square-foot school and a new central plant with condensing gas boilers and new absorption chiller. The Inverde 100 co-generation system, manufactured by Tecogen, can produce 100 kilowatts of continuous electric power and 700,000 Btu per hour of usable thermal output.

The heat is used for the first stage of heating for the building and provides 40 tons of chilled water, offsetting 10 to 15 percent of the school's cooling needs, according to Chesapeake Utilities. Radiators were added to allow for 24/7 operation of the co-generation system, even during months when little or no heating or cooling load is present. It was shown that, given the high local electric rate, a positive spark spread can be maintained even without complete use of the water heat.

Thanks, in part, to the Inverde-100, engineering models show an overall reduction in utility costs, even with the additional square footage.

CHP, Wilson says, will benefit not only the school, but also "the surrounding community, taxpayers and society in general."

With onsite electric generation, the school will be able to reduce its energy costs by $50,000 to $60,000 a year while providing a measure of backup emergency power. CO^2 emissions associated with the school are expected to drop by 12 million pounds per year.

As more institutions opt for CHP for cost-effective, efficient energy, the federal government is also encouraging it. In 2012, an executive order called for production of 40,000 megawatts over the next decade. Prime prospects for the technology include hospitals and universities.

CHP offers a lot of promise, with some challenges such as cost.

"If you're operating with a thin margin and you have to decide between this and manufacturing equipment, and you only have so many capital dollars to spend, you'll probably gravitate toward the equipment," Wilson says. "Some states do have grant money available. And the American Gas Association is a proponent of combined heat and power.

"So, awareness is certainly growing," Wilson adds. "All it takes is an event – a hurricane – to raise people's awareness."

On-Time Delivery

Hot technology combines with natural gas efficiencies to create cool savings.

These days, energy costs often represent a major challenge for many building owners or managers.

Multifamily residential buildings often face unique challenges that can prove costly for both the owner and the tenants. In fact, the challenges facing multifamily residence operations have attracted the attention of the Obama administration, which recently expanded the Better Buildings Challenge to the multifamily sector. (See article on page 2).

The Department of Energy and Department of Housing and Urban Development have also partnered to find ways to reduce energy use and carbon pollution from the multifamily sector.

Natural gas will continue playing an important role in improving efficiencies for commercial markets overall and the multifamily market in particular. Specifically, the multifamily market offers both challenges and opportunities in its quest to become more efficient, but natural gas continues emerging as an environmentally friendly and economically favorable solution for both new and existing structures.

In some cases, new technology is creating even more efficient ways to provide natural solutions, leading to greater savings as well as better heating outcomes. For example, when the Steeves & Rozema Group, owners of the 45-unit apartment building The Prince at Trillium Park in Sarnia, Ontario, committed to reducing heating costs, the company did it by installing an innovative heating control system that was developed by K3D Inc. The system, which continuously monitors weather conditions, allows the heating plant to produce and deliver the right amount of heat when – and where – it's needed.

Owners of the Prince at Trillium Park complex (above) in Sarnia, Ontario, reduced heating costs by installing an innovative natural gas-powered heating control system which continuously monitors weather conditions, allowing a heating plant to produce and deliver the right amount of heat when – and where – it's needed.

Bob Gawley, project manager of Commercial and Industrial Markets at Union Gas in Ontario, Canada, says The Prince at Trillium Park relied upon a natural gas-fired hot water central heating plant that used two boilers to provide heat through hydronic radiators in the building. The temperature was controlled by an "indoor and outdoor" controller, and that resulted in uneven – and very often uncomfortable – heating patterns. On the side of the building that faced the sun, the building often was too hot; at the same time, the tenants on the other, non-sunny side of the building were literally left out in the cold.

With no other options, the building manager could only increase the temperature to try to warm the cold apartments, but since it raised the temperature of the entire complex, the tenants in the hotter apartments now were too hot.

"This meant that tenants in the hotter apartments resorted to opening windows to vent excess heat," says Gawley.

It also created what he calls a "stack effect" in which the hot air rises and then escapes through open windows on the upper floors. This caused the cold air to be continuously drawn into the building to replace the air that was leaving through the open windows. Cold air, which can leak in through parking areas, cracks, poorly sealed windows and many other openings, was causing heating costs to rise as the building's power plant worked hard to

warm the incoming cold air. It was an uphill battle that couldn't be won.

"It can become a never-ending attempt to meet a heating demand created by the excessive influx of cold air," says Gawley.

> "The client is ecstatic about saving 40 percent on natural gas, and tenants really like living in apartment units that aren't too hot or too cold."

Old problem, new solutions

Steeves & Rozema had tried many costly solutions over the years, but none were effective for the 1960s-era building. It had invested in new windows that were better insulated, but didn't get the hoped-for results. Windows and balcony doors were still being left open in the warmer units, which continued putting heavy demand on the boilers. Heating lines beneath balcony doors were freezing when doors were left open, leading to leaking pipes, property damage and expensive repairs. The company needed a permanent solution, and turned to Union Gas.

"Union Gas is always seeking innovative, demand-side management technologies," Gawley says. The natural gas provider partnered with K3D and Steeves & Rozema to install a new natural gas-powered heating control system that K3D was confident would resolve the issue.

"One of the biggest challenges in any apartment building is to provide comfortable heat for all units," Gawley says, noting challenges like sun exposure, wind, humidity, outdoor temperatures, and weather demand, which affects different areas of the building in various ways.

The new system by K3D continuously monitors and adjusts for such variables, allowing real-time input variables that controlled the system. "They also installed new motorized control valves on each of the eight hot water heating pipe risers that distributed heat throughout the building," Gawley adds.

Major changes

The installation of the new heating control system was completed in fall 2012, and Union Gas engineers monitored the results over a full heating season. They used a statistical analysis tool to estimate the natural gas savings, and Gawley says the project produced "spectacular" results.

"It [the new system] dramatically lowered heating bills through reduced energy wasted, and reduced natural gas use by up to 40 percent," Gawley reports. The reduced fuel consumption lowered the building's overall impact on the environment, and the system is equipped with upper heating limits that ensure the heating system won't be triggered by open windows and doors.

"The client is ecstatic about saving 40 percent on natural gas, and tenants really like living in apartment units that aren't too hot or too cold," he adds.

"We live on the top floor," says A. Altay, one of the building's tenants. "Before the system was installed, when other tenants complained about the cold, the building managers would turn up the heat."

That solution led to having to open their windows. But last winter, with the new system installed, "we didn't have to do anything," Altay adds. "Now, the heat is steady, and it is more comfortable than before."

Greg Fraser, vice president of Corporate Real Estate at Steeves & Rozema, calls the addition "exciting."

"The huge savings we achieved surprised all of us," he says. "With the incentive received from Union Gas, we estimate a two- to three-year payback, and that makes it a good future investment for other buildings as well."

A Chill in the Air

Gas cooling technology can save money as well as the environment.

As technological innovations continue to advance, natural gas is becoming a bigger player in the commercial cooling space. Engine-driven chillers that use a natural gas engine (instead of an electric motor) to drive a compressor have the extra advantage of using waste heat from the engine for heating applications, which further increases energy efficiency and results in dramatic cost savings for the end user.

A second category of cooling devices, absorption chillers, use an evaporating refrigerant like water or ammonia to cool the air. They are being used with greater frequency in both residential applications and in large commercial buildings like supermarkets, shopping centers and office buildings.

Doug Davis, director of Marketing and account manager for Broad U.S.A. Inc. in Hackensack, N.J., says gas cooling advancements have provided the ideal solutions for several of its clients, including a new, sustainable Whole Foods Market grocery store project in Brooklyn, N.Y., and Becton High School in East Rutherford, N.J.

Broad U.S.A. is the world's largest manufacturer of absorption chillers and has absorbers in more than 70 countries, a testament to how well the chiller/heater absorption units are being received worldwide. In most cases, the company reports, using such a combined heat and power source can dramatically lower a building's carbon footprint while at the same time making a significant reduction in operating costs when compared to grid-powered systems.

Cutting the cord – and costs

Davis notes that the affordable price of natural gas when compared to rising electricity costs, along with the dual usage of chillers (for air conditioning as well as heating), made the gas-powered coolers a natural and easy choice for Becton High School when it decided to replace its aging boiler system.

Becton High School in East Rutherford, N.J. replaced its electric boilers with a combined cooling, heat and power (CCHP) system using gas chillers from Broad U.S.A. Inc.

"They were in the landing path of the airport, so the open windows (in warm weather) were distracting students," says Davis, explaining the dire need for a reliable cooling source.

He says the project involved replacement of the school's existing boilers, which were powered by electricity. A combined cooling, heat and power system (CCHP) was installed, providing the school with a new, gas-powered air conditioning system.

"This building will see savings over [its usage of] the conventional Clever Brooks boilers that were replaced in the heating season, and will see additional savings in the summer over using electrical chillers powered from the electric grid," Davis says. "The savings should be around 20 percent."

He says, so far, the client has been happy with the system in its first year of usage, and the results – and savings – have been as well as expected.

EATING UP ENERGY SAVINGS

Independence from the electric grid, fuel flexibility and low operating costs were all goals achieved by Whole Foods Market in Brooklyn, N.Y., when it chose a new HVAC/CCHP (combined cooling, heat and power) system from Broad U.S.A. Inc. Whole Foods wanted to lower its energy operating costs as well as CO^2 emissions for its new, sustainable location, which also includes a rooftop greenhouse that provides produce for the store [see more at https://www.youtube.com/watch?v=yaBhyjuZXyo(4:46)].

Whole Foods Market Third & 3rd chose a 157 kW CHP system that will provide simultaneous heating and cooling year-round. In conjunction with other energy-saving measures, Whole Foods officials project that the store will be about 60 percent more efficient than other traditional grocery stores.

Whole Foods Market Third & 3rd is the grocery chain's new, sustainable store in Brooklyn, N.Y. It uses a new HVAC/CCHP (combined cooling, heat and power) system to help achieve new sustainability and operating cost goals.

A Natural Choice

Natural gas vehicles offer a low-cost, low-emission alternative fuel option for fleet and business use.

As a seller of natural gas, South Jersey Gas (SJG) had long wanted to incorporate natural gas vehicles (NGVs) into its fleet.

"In the past, the economics of the decision were challenging, as natural gas and oil prices were comparable," says Todd Gordon, manager of Commercial and Industrial Sales at SJG.

But over the last decade, discoveries of natural gas shale formations in the United States and advances in drilling technology have driven natural gas costs down, making NGVs viable – and even desirable – options for fleet vehicles. Natural gas is a cheaper, cleaner fuel than gasoline or diesel.

So, in 2011, SJG committed to converting its fleet to NGVs within 10 years. In 2012, the company added its first NGV and completed construction of its first compressed natural gas (CNG) fueling station. SJG expects to have 60 NGVs in operation by the end of 2014 and another 110 over the next five to six years.

SJG's second CNG fueling station was completed in 2013 and a third is under construction. The company plans to construct an additional three to five stations in the next five years. The fueling stations are designed not only to support the SJG fleet, but also are open to other fleets in the utility's service territory.

The Millville (N.J.) compressed natural gas (CNG) fueling station is used for South Jersey Gas' fleet and is open to other fleets in the utility's service area. South Jersey Gas officials hope this will help fuel growth in natural gas vehicles.

The Ford F-550 is one of 60 natural gas vehicles that South Jersey Gas plans to have on the road by the end of 2014. The company has committed to an additional 110 natural gas vehicles over the next five to six years.

"Providing additional fuel infrastructure helps eliminate one of the hurdles to wider adoption of natural gas vehicles," Gordon says. "Third-party usage now exceeds 75 percent of the throughput of SJG's Glassboro [N.J.] stations. That's powerful proof that the CNG market is growing considerably."

Fleets fueled by natural gas

SJG is only one of many companies converting their fleets to natural gas. Gordon estimates that about 300 commercial NGVs operate within SJG's 2,500-square-mile territory. According to CNGnow.com, an educational website dedicated to spreading the message about NGVs and the benefits of CNG, there are more than 250,000 NGVs in the United States and more than 12 million worldwide.

Today's primary markets for NGVs are medium- to heavy-duty fleet vehicles that typically have lower fuel efficiency and higher annual mileage. The American Public Transit Association estimates that about a fifth of all transit buses are run on natural gas. The fastest growing NGV segment is for waste collection and transfer vehicles.

A cost-effective choice

Natural gas vehicles typically cost more than gasoline or diesel vehicles, in part because of the cost of high-pressure, insulated fuel tanks needed to store compressed or liquefied natural gas.

However, fuel savings can easily offset the initial higher vehicle cost – especially in fleets that drive many miles over the course of a year. Natural Gas Vehicles for America (NGV America), a national organization promoting the development of the NGV marketplace, estimates that the fuel savings for high mileage fleet vehicles can result in a payback of the higher vehicle cost in as little as 24 months.

Even in the early stages of its conversion to natural gas, SJG has already seen significant cost savings, Gordon says. Typical fuel savings for the company's natural gas vehicles are between 30 and 40 percent.

Gordon estimates SJG has reduced its carbon footprint by more than 700 tons in the two years that it has had NGVs in its fleet. NGV America estimates that natural gas vehicles in the United States offset the use of about 400 million gallons of gasoline in 2013.

Natural gas offers a low-cost, low-emissions fuel source for vehicles. And, as SJG and other companies are proving, natural gas vehicles offer a viable alternative fuel vehicle.

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