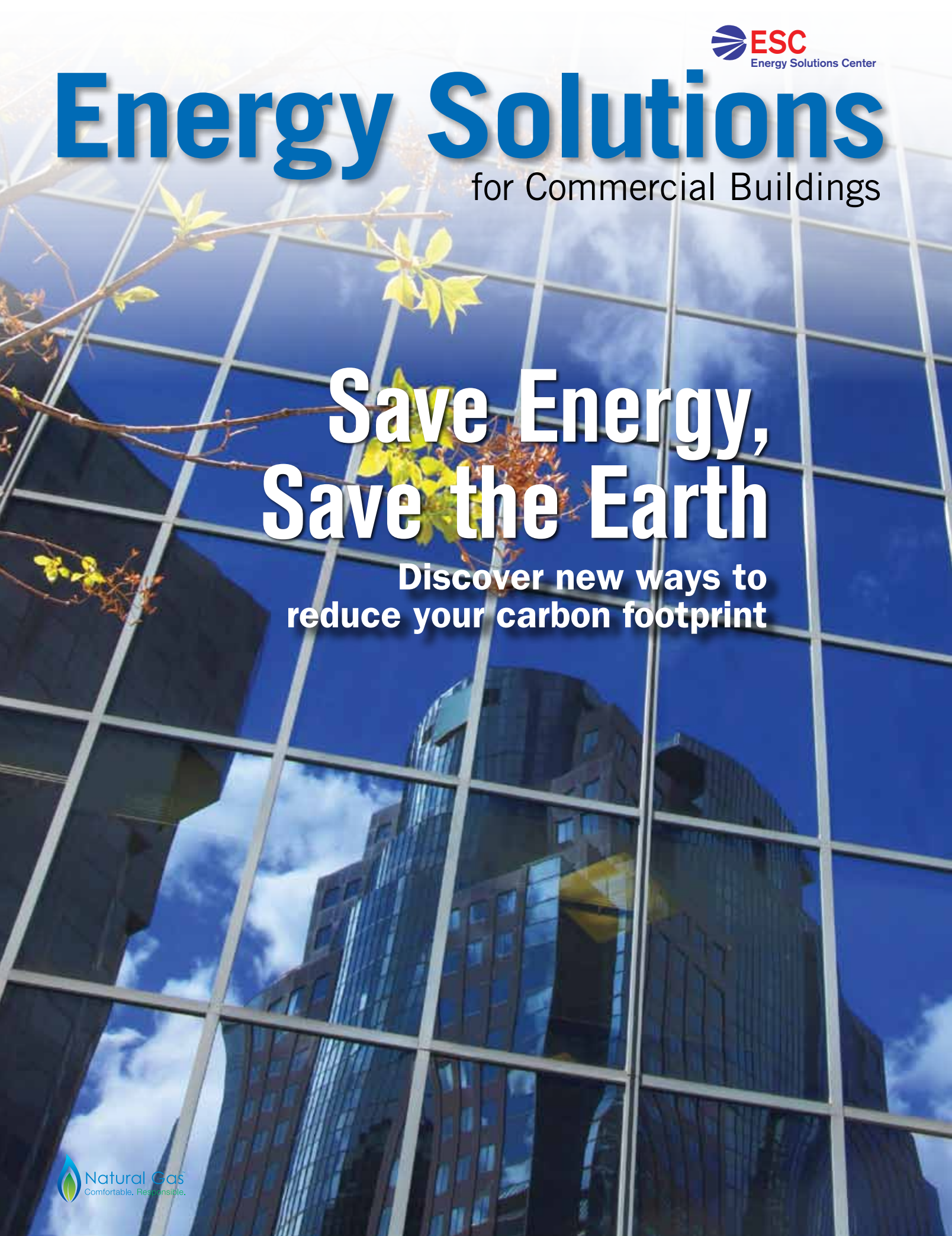
ESC
Energy Solutions Center

Energy Solutions

for Commercial Buildings



Save Energy, Save the Earth

Discover new ways to reduce your carbon footprint

Natural Gas
Comfortable. Responsible.

ESC Energy Solutions Center

TABLE OF CONTENTS

Energy Solutions for Commercial Buildings is a trademark of Energy Solutions Center, and is published in cooperation with PRISM Media Group. We offer our special thanks to the utilities and other businesses that sponsor this issue.

Please recycle this magazine after you read it.

prism MEDIA GROUP

President Ray Larson
Group Publisher Lori Harvey
Content Manager Paula Felps
Production Manager Pete Adauto
Graphic Designer Emily Burch
Contributing Writers Kristy Alpert, Cindy Baldhoff, Molly Petrilla

ENERGY SOLUTIONS FOR COMMERCIAL BUILDINGS is published by PRISM Media Group, 1321 Valwood Parkway, Ste. 600, Carrollton, Texas 75006. Visit www.prismb2bmedia.com.

The Power of One

Individual meters can save money and headaches for building owners.

Many owners of multi-family residences still rely upon large master meters to calculate their energy usage for their building as a whole. But those who have switched to individual meters have discovered that they can save energy while at the same time eliminating a number of common headaches.

"With a master meter, you're usually dividing the bill up, with some sort of system based on square footage, or by the number of apartment units," explains Jason Tuttle, commercial sales consultant at Citizens Gas in Indianapolis. "This isn't always fair because a tenant might do all the cost-saving efforts to keep their energy use down, while their neighbor isn't as energy conscious. But in the end, they are still paying for irresponsible energy usage."

Individual meters level the playing field for tenants, allowing them to more accurately gauge – and budget for – their energy usage. It also has huge payoffs for the building owners.

"It helps the owner get out from paying a big energy bill, and then having to collect from the tenants," Tuttle says, explaining that with a master meter, the owner has little to no recourse for deadbeat tenants.

Bruce Baird, director of strategic planning and development for the Indianapolis Housing Authority, has worked with Citizens Gas to convert four complexes from master meters to individual meters. Two more complexes are also scheduled for conversion. When all six complexes are finished, they will have converted more than 850 units from a master meter system to individual meters.

"We are very pleased with the switch," Baird says, explaining that, as a HUD-funded organization, they earn utility subsidies, but the subsidies don't fully cover their actual energy costs. The new meters, which allow them to base residents' energy costs on actual usage (instead of averages) has been a powerful tool in cutting costs.

Individual meters can provide tremendous cost savings for multi-family building owners.

Wheels of Fortune

Heat recovery ventilators play an important role in saving energy.

One of the three units Northeastern installed on the rooftop of the International Village building to save energy.

Inside the doors of Northeastern University's newest residency hall, International Village, there's a small plaque that represents a huge impact. The plaque indicates the three-towered, 22-story high structure is a LEED Gold building. While the motion-sensor lighting, recycled building materials, low-flow showers and faucets and roof garden all played an important role in earning this certificate, one of the biggest players was the innovative installation of three enthalpy wheels.

Enthalpy wheels, a type of heat recovery ventilator that exchanges heat and humidity from one air-stream into another, can improve efficiency in HVAC systems. Rather than abandon used air, enthalpy wheels use rotating air-permeable energy exchangers to reclaim useful energy and reassign it to incoming air. It saves energy by significantly lessening the necessity of heating in the winter and cooling in the summer.

"The enthalpy wheels that we have on our new building take advantage of the difference in temperature in our exhaust and supply air streams," says Joe Ranahan, energy manager at Northeastern University. "The wheel rotates with half of its area in the supply air stream and the other half in the exhaust air stream. In the summer, the supply air is warmer than the exhaust air, causing the wheel to absorb heat from the supply air and reject it to the exhaust stream, which pre-cools the supply air. In the winter, the reverse happens."

Installing these wheels has meant significant energy savings which result in monetary savings as well. In addition to offering environmental sustainability, they've helped shape Northeastern University as a leader in implementing energy saving technologies.

"This was a terrific project and a major new addition to National Grid's Boston Gas distribution system," says Yvonne Flanagan, lead account executive, energy solutions delivery for National Grid.

"Northeastern University has demonstrated a commanding leadership role in energy efficiency and sustainability," Flanagan adds. "Their facilities management team consistently seeks out opportunities to use cleaner fuels and technologies to maximize their energy efficiency and green values."

FOR MORE INFORMATION

For more information on enthalpy wheels and the Northeastern University's use of the energy saving technologies, go to:
http://www.northeastern.edu/sustainability/news
www.usgbc.org/leed

Shrinking Your Carbon Footprint

Use natural gas to help reduce carbon dioxide emissions.

It's no secret that we have a serious carbon dioxide problem on our hands. Unwanted greenhouse gases have been increasing for years now, and they aren't going away anytime soon.

Here's the good news: The direct use of natural gas can help reduce carbon-dioxide emissions. While CO2 emissions are expected to keep growing for the next two decades, emissions from U.S. residences using natural gas have fallen 40 percent since 1970, despite an increase of 27 million customers, according the a report from the Gas Technology Institute (GTI). What's more, according to the report, subsidies provided to increase the direct use of natural gas (together with consumer education and research and development funding) would result in an annual 96 million metric-ton carbon dioxide emission reduction by 2030. In other words, using direct natural gas is "a competitive, cost-effective approach compared to other strategies," says Neil Leslie, research and development director at GTI.

According to data released by the Environmental Protection Agency, an electric water heater uses a little less site energy than a gas water heater does. However, in terms of source energy—that is, the energy used in creating and delivering energy to a site—the same gas water heater uses roughly half as much source energy. What's more, the natural gas heater emits roughly 55 percent less carbon dioxide than the electric water heater, Leslie says.

Serving Up Savings

The foodservice industry turns an eye toward energy efficiency.

The Silver LEED certified dining hall at Clarion University includes a Starbucks coffeeshop. Photos: Halkin Architectural Photography.

When Clarion University unveiled Eagle Commons, its new $12 million dining hall, it opened the doors to some of the most state-of-the-art offerings in green restaurant trends. Replacing a dining hall that had been built in 1966, Eagle Commons is a Silver LEED certified "green" building, which means it meets the national standards for sustainable environmental energy use.

"Clarion University long ago recognized the importance of energy usage within the economy of our state and nation," says Greg Markievich, senior energy consultant at National Fuel Gas in Erie, Penn. "It became proactive in incorporating energy-related information within its numerous curricular offerings and requiring that all new construction and renovation projects are designed for maximum efficiency while utilizing 'green' principles."

Eagle Commons was Clarion University's first example of the school's commitment to green initiatives, and Markievich points out a number of features that make it energy efficient and earth-friendly.

"While basic building heat is supplied from a gas-fired central boiler plant, indoor air quality and circulation is enhanced with strategically-located gas-fired air make-up units," he says. "In addition to using clean burning natural gas for heating and cooking, additional 'green' considerations included the location of the facility along established transportation and bike routes, green materials selections and the use of a 'trayless' food delivery system."

The "trayless" food delivery system means that students don't use a tray to pick up their food, but receive their portions on a plate. The result is less food waste – because diners don't take more than they can eat – and the amount of water used by the university was also slashed because there are no trays to be washed. In addition, there are preferred parking spaces available for fuel-efficient vehicles, and a green tenant coffee bar that features products that are purchased locally.

Paul Bylaska, vice president of finance and administration for Clarion University, says the cost to build a Silver LEED certified dining hall was only about .5 percent higher than the cost to build a conventional dining facility.

"Since so many people have gotten into the LEED technology, the cost of going LEED versus other building is about the same in terms of materials," he says. "With LEED-certified buildings … we have cut our energy costs by about $600,000 this year. That's pretty impressive."

Green vs. Energy Efficiency

Clarion's forward-thinking approach to dining is one that's gradually becoming more prevalent throughout the foodservice industry. Doug Fryett, founder and president of the Fryett Consulting Group, says there are two separate issues driving the movement: energy efficiency and the green movement.

"In terms of energy efficiency, there's a huge drive for manufacturers to get their equipment Energy Star approved, if they can," he explains. "There's also a drive for more end-user operators to buy more energy efficient equipment if their old equipment is wearing out or if there is a big enough incentive to drive them to buy new equipment."

Just as with other forms of green and energy-efficient technology, buyers aren't likely to change their ways – or make a major purchase – until they have both a need and a financial incentive.

"It's the same analogy of an automobile – if your car is three years old, you could probably go out and buy a more energy-efficient car. But you probably won't do that until you're ready to buy a new car again," Fryett says. "It's the same scenario with restaurateurs. When they're looking to buy new equipment, then they'll buy the most energy-efficient choice they can."

A trayless food delivery system means that diners at Eagle Commons dining hall only take the amount of food that will fit on their plate - a measure that has significantly reduced food waste.

He says while energy efficiency is being embraced, green certification is facing a tougher road in the restaurant industry, primarily because no single green certification program has reached "critical mass."

"The number of restaurants that have gotten certified is very small," he says, citing such organizations as Greener Restaurants, Green Seal, Go Green Go and the Green Restaurant Association as among those who are trying to propel the green restaurant movement forward. "Not one has been able to get the critical mass, so a lot of people are playing the wait-and-see game."

However, there are exceptions, he says. Chicago is home to a green restaurant association with about 250 members – all of whom are independent restaurateurs who are committed to become greener and more sustainable.

"They're the exception, not the rule," he says. "Restaurants aren't seeing it as that important to get certified. Some are, but a vast majority are not. The driver of this is definitely energy efficiency."

Fryett says energy efficiency is simpler to attain than green certification, and it has more easily identifiable results.

"Energy efficiency benefits their bottom line, but getting certified doesn't guarantee more customers."

Cutting Costs, Gaining Profits

So, while the green movement continues gaining ground in small increments, it is energy efficiency that is becoming the driving force in restaurant innovation. Natural gas becomes a natural ally, because it can be used in a variety of applications in food service operations. The applications of natural gas in restaurants include:

- Cooking
- Heating and air conditioning
- Water heating
- Humidity control
- Enhancing ambiance

Natural gas is the top choice for cooking in food service operations, with 91 percent of food service operators opting for gas over electric or other means. Significantly, nearly a quarter – 23 percent – of the energy consumed by a restaurant is used for cooking. The National Restaurant Association's 2010 Restaurant Industry Forecast calls energy efficiency one of the industry's top trends, and predicts that more restaurants will invest in ways to conserve energy and ease water consumption.

Fryett points out that the cost of energy and the cost of labor are two of the primary concerns for restaurateurs, so increased energy efficiency is an important topic for them.

"A lot of the new equipment that's coming out is energy efficient, so it also [allows for] higher levels of productivity," he says. "It's a dual bang for your buck."

FOR MORE INFORMATION

Gas Foodservice Equipment Network	www.gfen.org
National Restaurant Association	www.restaurant.org

Driven to Change

NGVs Offer Alternative Fuel Options for Commercial Fleets

Natural gas vehicles run on clean fuel provided by special fueling stations. Photo courtesy CityCenter Las Vegas.

As concerns over reliance on oil continue to escalate, natural gas vehicles, or NGVs, are gaining traction. In June, Chrysler Chief Executive Sergio Marchionne called natural gas a "rational" alternative to electric, hybrid and traditional gasoline-powered cars, pointing out that NGVs will cut greenhouse emissions by 25 percent compared with gasoline.

At the same time, GM announced that it was betting on the NGVs to be a hit among fleet customers and would roll out its full-sized compressed natural gas (CNG) fleet van in 2011.

According to Kim Hill, director of the Sustainable Transportation and Communities group for the Center for Automotive Research in Ann Arbor, Mich., the CNG fleet vans represent a prime opportunity for auto manufacturers to try out new technology. She told The New York Times that since the vehicles are not required to travel long distances, and buyers tend to purchase between 100 and 1,000 vehicles at a time, that market provides automakers with an easier way to get the vehicles on the road as opposed to selling to consumers.

"There are a limited number of natural gas vehicle options, and they are clearly geared toward commercial fleet operators," says Randy Gabe, Senior Manager for Southwest Gas Corporation.

"It's expensive for NGV equipment manufacturers to make conversion kits for the entire automobile market. Fleet operators buy in bulk and the makeup of fleet vehicles are similar across the country. It makes sense for NGV equipment manufacturers to focus on this demographic."

Southwest Gas has been purchasing NGVs for its fleet since the 1980s and Gabe says that today there are "compelling economic reasons" for businesses to buy natural gas vehicles.

"Currently there are very attractive tax credits that can offset the incremental cost of purchasing a NGV," he says. "Equally important is the cost of natural gas relative to gasoline. On a gasoline gallon equivalent, or GGE, basis, natural gas is less expensive – resulting in lower operating costs for NGVs."

He says the combination of tax credits and lower operating costs make the case for buying NGVs more appealing than every before. And he says there is an added bonus to the financial benefits.

"Using clean-burning natural gas as a vehicle fuel can help a company project a greener image," Gabe explains.

Going Natural – Vegas Style

Most recently, NGVs played a pivotal role in the development of the massive CityCenter on the Las Vegas Strip. This city-within-a-city, which is a joint venture between MGM Mirage and Infinity World Development Corp., sprawls across 67 acres. Southwest Gas worked with the development company to supply natural gas to the property.

Included in the natural gas-powered features is a fleet of stretch limousines

which are powered by compressed natural gas, supplied by a fueling station behind the Mirage. The fleet is the first of its kind in the world and was developed by Krystal Enterprises, the world's largest manufacturer of stretch limousines, in collaboration with Clean Energy Fuels, BAF Technologies and Ford engineers.

The 26 silver Lincoln Town Cars emit up to 60 percent fewer nitrogen oxides and, according to the U.S. Department of Energy, reduce other greenhouse gasses (like carbon dioxide) by 25 percent.

"Commissioning the first CNG stretch-limo fleet is a demonstration of CityCenter's commitment to environmental responsibility, while never sacrificing guest experience," said Bill McBeath, president and COO of ARIA Resort & Casino, one of the resorts included on the property.

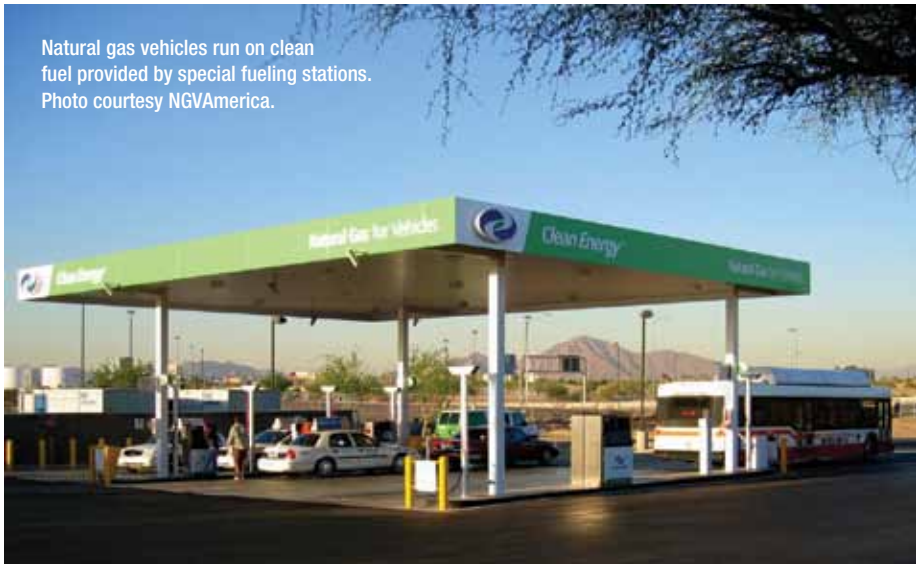
"Just as with every element of CityCenter's design and construction, we're determined to employ the most innovative solutions possible to grow responsibly, while continuing to raise the bar on service, comfort and experience."

"Currently there are very attractive credits that can offset the incremental cost of purchasing a NGV." - Randy Gabe, Southwest Gas Corp.

He added that CityCenter chose compressed natural gas for multiple reasons, including the abundant natural gas reserves. Other factors include the fact that it is one of the cleanest burning alternative fuels available and is generally less expensive than either gasoline or diesel with greater price stability.

Getting With the Program

Natural gas has been fueling part of the 70-vehicle fleet at Temple University in Philadelphia since 2001. Originally, the school acquired six compressed natural gas passenger vans as part of the U.S.



Natural gas vehicles run on clean fuel provided by special fueling stations. Photo courtesy NGVAmerica.

Department of Energy's Clean Cities Program. Today, the number of vehicles running on natural gas has grown to 16.

Two of their vehicles are multi-fuel for CNG or gasoline, and the rest are designated CNG. The CNG fleet now includes 10 cargo vans, two buses, two pickup trucks, one car and one passenger van.

According to Mark Gottlieb, superintendent of service operations at Temple University, the natural gas vehicles are cheaper to fuel than traditional gasoline vehicles, and also require less maintenance.

"They … go for longer periods of time without repairs and end up being as efficient as the regular gasoline models," he says. Additionally, while it takes nearly $40 to fill up the tank of a gasoline-fueled vehicle, Gottlieb says he can fill the same size CNG vehicle's tank for just $20.

"The savings is in the fuel," he notes. "CNG vehicles run at a lower cost per mile. CNG is a cleaner fuel, has fewer additives and delivers a benefit to the neighborhood. Running this fleet gives 90 percent less emissions and provides us with a leadership position in this area."

Kieran McGovern, major accounts executive at Philadelphia Gas Works, says that Temple University has been aggressively trying to reduce its carbon footprint over the past few years, so it made sense for them to turn to vehicles that run on natural gas.

"The fact that the cost of CNG is far less than regular gasoline and has a positive impact on engine maintenance made it attractive for Temple to add NGV vehicles to its fleet," McGovern says. "CNG burns a great deal cleaner than gasoline or diesel fuel."

Two of the best reasons to invest in NGVs are fuel and maintenance costs, he says, and other customers are jumping on the bandwagon. Currently in Philadelphia there are three projects in progress to fuel more growth in this area, which include a garbage collection truck for the city of Philadelphia, a NGV airport shuttle service for Wally Park and a fleet of cabs on Broad Street.

"The future of NGVs is brightest with heavier vehicles," McGovern adds. "The trend is being driven by the higher cost of diesel fuel. Natural gas is cheaper than gasoline or diesel."

FOR MORE INFORMATION

Natural Gas Vehicles for America	www.america.org
Clean Energy	www.cleanenergyfuels.com
Natural Gas Vehicle Institute	www.ngvi.com

Save Energy While Cutting Costs

Combined heat and power provide a strategic solution for overtaxed power grids.

Imagine a world where efficiency isn't just an afterthought, it's a strategic tool that saves time, money and energy. That world is quickly approaching as new technologies combat the current burden on the power grid – and create a more efficient world.

Combined heat and power (CHP) technologies are leading the industry into a new direction of sustainable energy. Also known as cogeneration, CHP generates power and thermal energy from a single fuel source. One application of a CHP unit is a microturbine, aptly named as it is basically a micro (small) turbine engine.

Today, there are basically two types of engines: turbine and reciprocating engines. Both are only about 30 to 40 percent efficient in generating electricity, leaving lots of additional heat (waste heat) to be used for other applications.

"We have to do a better job about managing our waste heat," explains Marvin Dixon, director of engineering at the Four Seasons Hotel in Pennsylvania. Dixon adds that most of the energy used for transportation is waste heat, as is two-thirds of the energy used to make electricity.

"One third of all the other energy used is waste heat," he says. When mixed together, waste heat accounts for half of the energy America uses today.

"It's alarming." Dixon says. "Just think about how much more self-dependent we could become if we do a better job of managing our waste heat."

Complex Problem, Simple Solution

The simple installation of a CHP system designed to meet the heat and electrical needs of a facility can greatly increase a building's efficiency. It also decreases the emission of waste heat, which in turn reduces energy costs.

CHP is also a great tool to reduce the emission of greenhouse gases, which contribute to global climate change. The technology uses a reciprocating engine, micro turbine, turbine generator or fuel cell to generate electricity. These are also known as Prime Movers. The generators produce power and excess heat. Instead of rejecting the "unused" heat into the air, it takes that heat and directs it into a building to be put to an internal thermal use like making hot water—hence the name Combined Heat and Power.

Across the country, CHP technology is being installed into systems in a variety of industries, providing both energy savings and financial benefits.

The Four Seasons Hotel

"Part of our motivation to switch to these units came from the cost of district steam," Dixon recalls. "Our electrical prices were rising. So the energy we were getting from the utilities kept changing and were becoming hard for us to manage. We used district steam to

Henry Gorstayn (Hotel general manager) and Marvin Dixon with their microturbines.

View of the microturbines from the roof of the Four Seasons Hotel.

heat all of our domestic hot water and we were also buying heat from an office building which had a boiler plant that supplied us with all the hydronic heat we needed to heat our building through the colder months."

Taking his knowledge and understanding of heat concepts in hotels along with knowing the amount of heat needed to supply a hotel the size of the Four Seasons, Dixon went to work bringing in the CHP microturbines. "I knew they would make the hotel operation very efficient by being able to utilize the waste heat," Dixon says. "The good thing about hotels in relation to CHP units is that we use a lot of hot water. So we have a place to put all the heat."

In October 2009, Marvin and his team started up the 3 Capstone 65 KW microturbines for the first time, and have never looked back; with a combined energy savings of over 30 percent and a significantly reduced carbon footprint, it doesn't look like they'll ever need to.

"The energy savings for our hotel is a beautiful thing," says Dixon. "It has a big impact; it's what we need to do. Our whole world revolves around heat; all we need to do is do a better job at managing it."

Since installing the microturbines and recording his success in energy efficiency, Dixon and his team at the Four Seasons have become industry leaders in their line of work. "We are the first Four Seasons to include this technology and the first business or facility in the city of Philadelphia to have microturbines," Dixon says with pride. He has since led tours of the facility to show other interested parties the benefits first-hand of incorporating these new technologies into their buildings.

Salem County Community College

Executive Director of Special Projects Raymond Constantine has been with the Salem County Community College since 1998 and has seen his share of challenges. But it wasn't until recently that he noticed a new challenge emerging.

"It started with a facility called Davidow Hall," Constantine recalls. "The cooling and heating systems were failing. The building was built in 1991 and in 2005 we had to close classes because of poor HVAC performance."

Faced with the task of getting students back into the classroom, Constantine started looking for sustainable solutions for this building. They didn't have to look much further then their local natural gas utility South Jersey Gas.

"We provide more than just safe and reliable gas service to our customers; we provide our energy services expertise free as a value-added service," says Todd Gordon, manager for Commercial and Industrial Energy Efficiency Consulting at South Jersey Gas. "We have a vested interest in helping our customers find ways to reduce their energy consumption and energy-related expenses, while at the same time making customer and employees more comfortable. When customers like the college succeed, SJG succeeds."

South Jersey Gas helped the college identify the financial and technical resources needed to develop a long-range facilities energy master plan. The utility was there every step of the way. The final plan not only addressed the need to upgrade aging mechanical, lighting and control systems but it also provided an opportunity to integrate combined heat and power into the project. The CHP equipment improved the project economics while providing the onsite electric generators needed to meet the emergency relief shelter requirements. CHP made this project work.

Davidow Hall is a 65,000-square-foot facility with a field house, a theater, classrooms, lecture hall and is also a community use building for Salem

"The energy savings for our hotel is a beautiful thing. It has a big impact; it's what we need to do." -Marvin Dixon, Four Seasons Hotel

County, NJ. Since the building had no back up power at the time, its use as an emergency shelter for the community was severely limited.

"Based on that particular need, and the fact that we needed to do some HVAC renovations, we looked at combined heat and power projects and found that New Jersey's Board of Public Utilities had incentive programs. I applied for and got a $10,000 design grant from their smart start program, and decided on CHP microturbines to reclaim the heat."

In September of 2009, the school installed three Capstone 65KW units and 1 Thermax 100-ton absorption chiller, and everything has worked flawlessly since then.

"We now have a stand-alone facility that is off the grid and we are making electricity from natural gas, hot water by reclaiming heat off the Capstone microturbines [that handles the heating load as well as hot water for showers and locker facilities], and provides for the emergency shelter with heating and hot water," says Constantine. "We are also taking the hot water in the cooling season and making chilled water by using the Thermax absorption chiller."

Constantine has since recorded a 30 to 40 percent energy savings and has big dreams for the future of energy efficiency in the public sector. "If we could get any public municipal government to start adopting this technology, we'd have all these mini-power plants running," advises Constantine. "First of all, we'd be saving all this money, but we'd also have all these plants that could be run if the grid shuts down so they could become shelters right away to support the local population."

Understanding DSM and BAS

Save money by managing your facility's utility needs differently.

Most buildings aren't as energy efficient as they could be. In other instances, lighting drains more energy than it should, and as a result, costs far more than expected. Whatever the situation, Demand Side Management (DSM) and Building Automation Systems (BAS) can help.

Understanding Demand Side Management

While the U.S. Energy Information Administration defines DSM as "the planning, implementing and monitoring of utility activities designed to encourage consumers to modify patterns of electricity usage," it can be used with natural gas and water utilities, too. As National Grid's Senior Engineer Michael Pace sums it up: "DSM is managing the demand of your facility with regards to utilities."

DSM has been around for several decades in the U.S., but became especially popular at the turn of the 21st century due to the uncertain cost of energy, environmental concerns and transmission constraints. In that sense, "DSM became a possible buffer for energy utilities against a wide range of potential risks," according to a research brief from Energy Business Intelligence.

Its popularity has continued growing since then – especially in the face of the Federal Energy Policy Act of 2005, which authorized a number of DSM-related efforts, and the American Recovery and Reinvestment Act of 2009, which offers incentives to encourage DSM activities. DSM is also an important component of Natural Resources Canada's environmental efforts.

Quincy Medical Center in Massachusetts used DSM initiatives developed by National Grid to cut its energy use in half.

DSM is typically achieved through conservation, efficiency and load management. Pace says he's seen it take the form of lighting upgrades, high-efficiency boiler replacements, motor replacements and controls, "all of which will reduce your energy bills and manage your demand."

Turning to Building Automation Systems (BAS)

Building Automation Systems are systems that "control the building environment—specifically the air conditioning, the heating and the lighting—to maximize the energy efficiency of the building," Pace says.

They typically save five to 15 percent on total building energy consumption, and retrofit installations can save as much as 30 percent. Energy Business Intelligence reports that in the U.S., more than half of buildings greater than 100,000 square feet have BASs, resulting in an average savings of 10 percent overall building energy consumption. They're most useful in buildings that consume large amounts of energy, such as data centers and hospitals.

Case Study: Quincy Medical Center

A few years ago, the central boiler plant used by Massachusetts-based Quincy Medical Center was showing its age. Built back in 1952, it was beginning to deteriorate, and its aging components were no match for today's technology. According to National Grid Account Manager Eric Szulak, it had two aging water tube boilers and the boiler itself operated at 100 pounds of pressure. It burned #6 fuel oil, and required 24-hour supervision and operation. In all, it burned approximately 650,000 gallons of #6 oil per year—the equivalent of 97,500 MMBTUs.

With help from an engineering firm, Quincy switched over from one large central boiler plant to two new closer, smaller plants that operate at low pressure (15 pounds) and burn natural gas. The new design has essentially cut Quincy's energy use in half, thanks in part to several DSM initiatives developed by National Grid.

FOR MORE INFORMATION

For More Information on DSM:

U.S. Department of Energy	www.energy.gov
Natural Resources Canada	www.nrcan.gc.ca

A Natural Choice

Why natural gas systems are often a better choice than geothermal heat pumps.

After deciding to install geothermal heat pumps (GHP) into the new 172,000-square-foot, two-story Warwick Middle School in Lititz, Penn., Dave Zerbe, business manager for the Warwick School District, ran into some muddy water … literally.

"The district currently has two elementary buildings with geothermal systems installed," says Zerbe. "This would have been the third building."

But they ran into problems as soon as they initiated the test boring for the well field, when subsurface groundwater disturbance created problems downstream.

"The new building was in the watershed area for the borough's water supply," Zerbe explains. "Each test bore created a problem. We abandoned the geothermal system and re-designed, using a water source heat pump system that includes gas fired boilers and evaporative coolers."

The risks of GHP

As geothermal heat pumps become more common, concerns about them are surfacing. A recent study from the University of Idaho outlines the environmental regulations and risks of these systems, which include:

- corrosive risks
- leakage risks (mentioning the risks of utilizing antifreeze)
- health, fire and environmental concerns
- regulatory risks.

Federal regulations are designed to help prevent the contamination of groundwater, aquifer and surface water. With the risks of contamination and the high installation costs, GHP systems make it tougher to compete with conventional systems of natural gas.

Quality heating … naturally

Stephen Bareuther, major account representative with UGI Utilities, a natural gas distribution company in Pennsylvania, recommended the Warwick School District use natural gas. He was more than happy to help them install the system once they made the final decision to use natural gas.

"Once the decision was made to go with gas heating, I worked with the school district on gas rates and contracts for their gas boilers," Bareuther says.

According to a study by America's Natural Gas Alliance, "natural gas is the cleanest fossil fuel and is a highly efficient form of energy." The study goes on to cite the U.S. Energy Information Administration (EIA), stating that natural gas is twice as clean as coal with dramatically reduced carbon dioxide, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulates and mercury.

Conventionally cool

Geothermal technology has also been applied to cooling buildings in the warmer months, and although it poses a viable solution to cooling a building, it is yet another electrical system being added to an already overloaded electrical grid.

William Ryan, Ph.D., P.E., Director of the UIC Masters of Energy Engineering Program, University of Illinois at Chicago, recently published a study called Carbon Emission Comparison Between Residential Heating and Cooling Options

The new Warwick Middle School sits on 172,000 square feet in Lititz, Pennsylvania.

that found, "in many areas of the country, ground source heat pumps actually had greater carbon emissions than a high efficiency gas furnace. In any area of North America, a high efficiency gas furnace would give substantially better carbon emissions per extra dollar first cost to the home owner because of the low cost of the gas furnace as compared to the ground source heat pump."

Ryan says "the results indicate that, overall, ground source heat pumps, due to their high first cost, did not provide a lower cost carbon dioxide reduction strategy in any location." Although GHP cooling systems are in some cases credited as having "the lowest lifecycle cost of any cooling system available," the upfront costs of the installing the system make it a far more costly route to take when cooling a building—conventional cooling systems are typically half the cost of GHP systems overall.

FOR MORE INFORMATION

www.anga.us
www.geoexchange.org

ENERGY SOLUTIONS FOR COMMERCIAL BUILDINGS

Note to self:

Savings

Smart Conservation

relms

Cost-Effective

Greener

Accountability

Proactive

IS THE

Easy

Innovative

Environmentally Friendly

Convenient

ENERGY SOLUTION

Simplistic

Practical

Management

Relms Submetering Systems are for those situations when your gas provider is unable to meet the design needs of your project.

Safe

Control

Integrated

relms®

www.GoRelms.com 1-888-GoRelms

Relms is marketed exclusively by Custom Select Billing – SLC, UT