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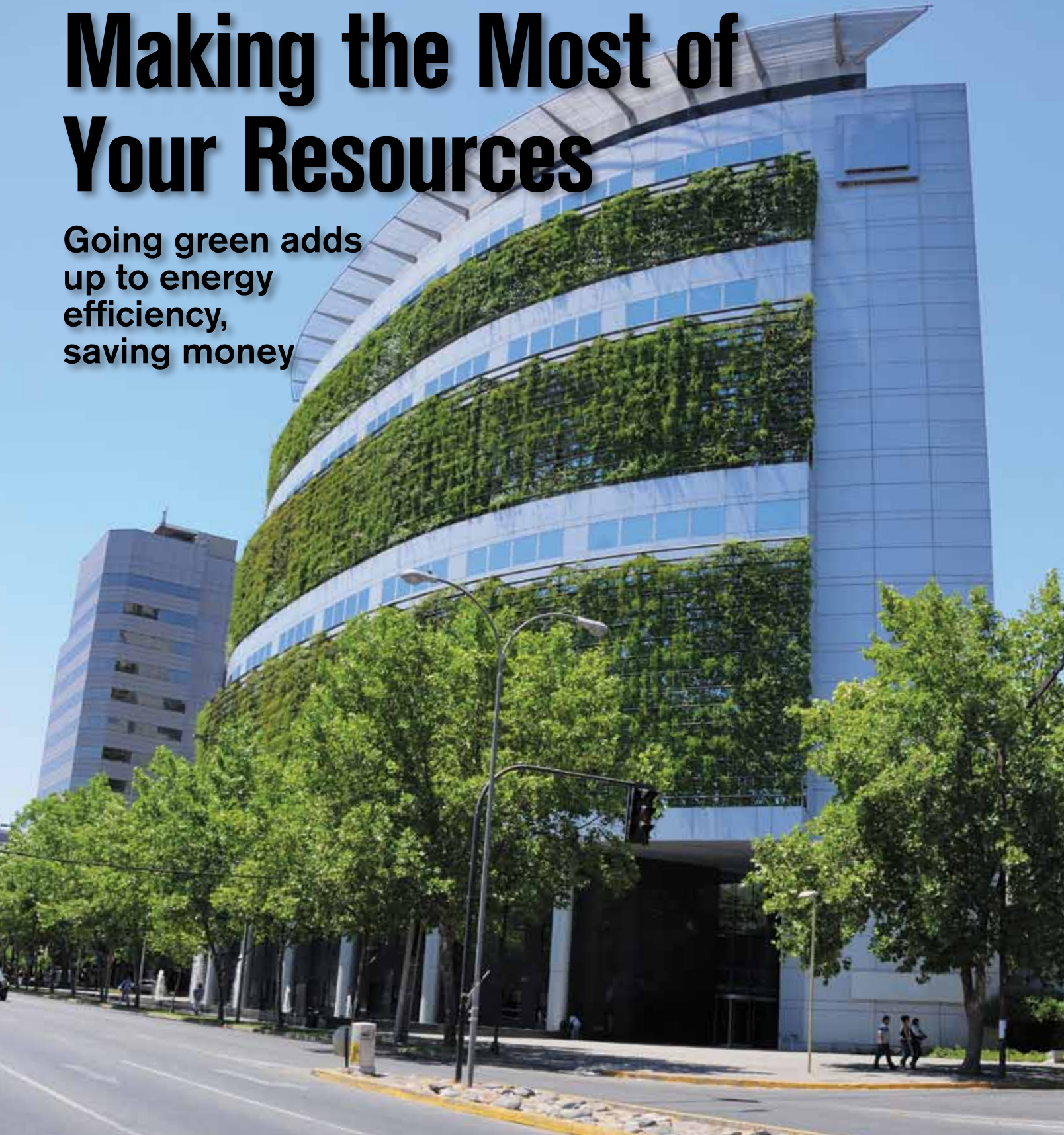




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President Ray Larson
Group Publisher Lori Harvey
Managing Editor Paula Felps
Production Manager Pete Adauto
Graphic Designer Nancy Kekich
Contributing Writers Cindy Baldhoff, Tonya McMurray, Paula Felps

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Better Together

Gas company promotes partnership to boost bottom line results.

Pedcor Investments, a developer of affordable housing communities in the Midwestern and

western United States, typically doesn't use gas in its development projects. But when the company was in the planning stages for The Steeples at Washington, a 62-unit low-income senior housing complex in Indianapolis, Citizens Energy Group made a compelling pitch: The two companies could partner together in a way that would not only reduce costs, but also make the project more competitive.

Citizens brought together rebates from several sources to help reduce the overall cost of the project. But more importantly, the partnership with Citizens allowed Pedcor to obtain valuable points on its Low Income Housing Tax Credit (LIHTC) application, says Craig Lintner, senior vice president of development for Pedcor Investments.

The LIHTC is a state-administered federal program that seeks to create a partnership of public and private funds

to develop affordable rental housing. Communities receiving LIHTC awards agree to maintain rents below normal market rates.

Obtaining the credits is competitive, but once those credits are awarded, the developer can sell them to investors and use the funds as equity in the project, Lintner explains.

"The partnership was seen as a win-win for all sides," Lintner says. "Creating this partnership with Citizens allowed us to gain valuable points, which allowed us to obtain the funding and thereby will create 62 much-needed affordable senior rental housing units."

While the partnership between Citizens and Pedcor was beneficial for both parties, Lintner stresses the importance of ongoing communication to make it work.

"Don't assume anything," he says. "Energy is a competitive business like anything else. The available programs are ever changing. You need to stay close to your energy representatives so you can understand each other's needs." ▶





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CHP 101

Combined heat and power offers economical and clean energy generation.

Combined heat and power (CHP) systems are the superheroes of electricity generation, producing

clean energy, recovering waste heat and offering a single reliable and cost-effective source for both heat and power.

CHP is a clean, efficient approach to generating electric power and useful thermal energy from a single fuel source. It integrates a power system (such as an engine or turbine) and a heat recovery system (typically a hot water loop) located on or near the user's facility. For example, a gas turbine, micro turbine or reciprocating engine burns fuel to generate electricity while the heat recovery system captures waste heat.

The recovery of thermal energy that would otherwise be wasted provides greater energy efficiency and more environmental advantages than separate heating and power systems. Conventional power generation converts only about one-third of potential energy into electricity, and loses a significant amount of heat during the process. By capturing this waste heat, CHP systems can achieve total system efficiencies of up to 85 percent. The waste heat is then transformed into useful thermal energy for domestic hot water, space heating, cooling or process loads.

Clean Energy

The U.S. Department of Energy reports that CHP equipment is now installed at more than 3,500 U.S. facilities, resulting in significant cost savings, improved energy efficiency and reduced greenhouse gas emissions. In addition, businesses who opt for CHP often qual-

ify for tax breaks and incentives.

CHP is well-suited to facilities with higher thermal loads, consistent electric and thermal energy requirements, and round-the-clock operations. Industrial facilities, medical institutions, college and university campuses, hotels, airports and large office buildings are all good candidates for CHP systems.

The low cost of natural gas combined with the cost savings of using recovered heat typically results in short payback periods. Many companies see a payback of their investment within three years.

CHP Technologies

CHP systems use a variety of technologies to deliver reliable, efficient power, including reciprocating engines, gas turbines, steam turbines, microturbines and fuel cells.

Reciprocating engines combust fuel to turn a crankshaft that generates power in a process similar to that of a gas-powered car engine. Gas turbines burn fuel and air at high pressure and temperature to generate electric power. With steam turbines, energy is transferred from a boiler or



Multiple 70 kw CPH units help to power downtown Philadelphia high rise buildings while providing heat and hot water for commercial and residential tenants.

other steam source to power the turbine and generator. Microturbines are small, compact and lightweight packaged systems with low emissions. Fuel cells generate power with an electrochemical process similar to the process that allows dry cell batteries to function.

The CHP vendor provides a turnkey operating model, remotely monitoring the system and making adjustments to maximize the run hours throughout various seasons. The vendor also handles both preventative and major maintenance.

CHP systems also reduce the risk of electric grid disruptions and enhance energy reliability. CHP systems allow for continued operation during electrical power outages and can eliminate the need for back-up generators.

Putting CHP to the Test

When Aimco installed seven 70 kw CHP units in three high-rise buildings, it anticipated significant cost savings and a good economic payoff, says James Luiken, regional director of development, national energy programs for the Real Estate Investment Trust (REIT) headquartered in Denver, Colo.

In the fall of 2008, one of Aimco's CHP vendors pointed out a Pennsylvania Department of Energy grant program funded by the American Recovery and Reinvestment Act. After preliminary financial models showed a favorable return from participation in the grant program, Aimco conducted detailed utility bill analysis and site surveys on its Pennsylvania properties.

"We were looking for buildings that had a sizeable electric load on a common area meter along with a place to use the waste heat," Luiken says.

The company selected three high-rise buildings in downtown Philadelphia for the installation of CHP systems in late 2010. The Sterling is a mixed-use

building with ground floor retail, three floors of commercial office space and 537 residential units. Chestnut Hall is an early 1900s 11-story mixed-use building with ground floor retail and commercial space and 315 residential units marketed primarily to students. University Square is a 17-story residen-

tial property with 442 residential units.

Aimco considered both reciprocating engines and microturbines to power the CHP systems, but ultimately chose the reciprocating technology because the heat recovery was better, resulting in a more favorable economic payoff for the system, says Luiken.

All three buildings had enough electric load to support the installation of multiple units, and Aimco was able to use waste heat from the CHP units to provide domestic hot water along with space heating for residential and commercial tenants.

'Free' Electricity

The buildings were already using natural gas to fuel heating and domestic hot water, so the CHP systems would be able to use the same fuel already in place for heat and hot water with the added benefit of on-site electric generation.

"Natural gas consumption at the property increases slightly as the overall efficiency of the CHP unit is less than that of a typical boiler plant. However, the increased gas costs are more than offset by benefits of the 'free' electricity produced by the system," Luiken explains.

Waste heat is injected into the heating and domestic hot water loops upstream of the existing boiler plants, which results in reduced run time on the

boilers. All three systems are capable of meeting all of the buildings' hot water needs during the summer months.

"The trick to maximizing returns on a CHP system is to drive up the run hours on the units," Luiken says. "In our case, the limiting factor on sizing was our domestic hot water heating load in the summer months. Lower run hours in the summer producing hot water only are offset by 100 percent utilization over the winter months when the heating load comes online."

The CHP vendor provides a turnkey operating model, remotely monitoring the system and making adjustments to maximize the run hours throughout various seasons. The vendor also handles both preventative and major maintenance.

"Our service teams really have minimal responsibilities other than looking for leaks or other items requiring service," Luiken says. "The cost of maintenance was built into the financial models and is currently at \$1.40 per run hour per unit."

Luiken reports that financial returns have been favorable and Aimco was able to meet minimum investment thresholds even without the use of American Recovery and Reinvestment Act funds.

"The grant money that was provided by the PA DEP helped make the project a home run and made it very easy to sell to our investment committee," he says.

He estimates that the CHP technology would be financially viable in any multifamily location with at least 200 units serviced by a central plant providing heat via hot water and domestic hot water to residents. In addition, Luiken notes, financial returns increase substantially as the price of electricity increases, making CHP a solid investment in locations with high electricity costs. ▀

FOR MORE INFORMATION:

www.understandingchp.com
<http://www.epa.gov/chp/resources.html>
www.uschpa.org



Investing in Savings

Upgrading existing heating equipment can improve efficiency and reduce energy costs.

For any business, heating is a major expense, and purchasing a new system – or even updating the old one –

is often delayed as long as possible. However, updating an existing system can help business owners gain greater energy efficiency, which in turn reduces energy costs while at the same time reducing greenhouse gas emissions.

Some gas companies today offer customized programs for commercial and industrial clients that allow those businesses to realize faster paybacks on the equipment and enjoy immediate improvements in efficiency.

Here's a look at how two businesses updated their existing systems and were able to reduce costs, improve overall operations and benefit from a rapid return on their investment.

Northwest Community Hospital, Chicago, Ill.

Age of boilers: 16 years

Reason for upgrading: Desire for greater efficiency

Northwest Community Hospital's burners had not yet reached the end of their life cycle when the hospital made a

strategic decision to replace them.

"The return on investment was the driving factor for us," explains Thomas Johnson, director of plant operations, adding that they anticipated a savings of between 6.5 and 8.5 percent. The payback time is estimated at less than four years, Johnson says. "The ROI would have been faster a few years ago, but lower natural gas pricing today stretched out the payback."

The upgrade involved retrofitting the burners on the hospital's current boilers, a project that they decided to move forward with late in 2011.

"The decision came down to an increase in efficiency, the age of the existing burners and the desire to take advantage of a newly launched utility incentive program," says Jeff Crittenden, senior engineering manager for the Midwest unit of Resource Solutions Group. "This project was the first custom project completed within Nicor Gas' Energy Efficiency Program, or EEP."

That efficiency program, which is similar to incentive programs offered by many gas companies in North America, provides rebates and other incentives for companies that purchase and install high efficiency equipment. In this instance, Northwest Community Hospital was offered a custom incentive of \$78,370 and the projected gas savings were measured and verified at 83,500 therms.

The actual replacement of the burners took place early in 2012, with a cost of \$268,650. Crittenden says the high pressure steam boilers provide space heat and play a key role in a large sani-

tation process, but the changes in weather and occupancy presented a variable load requirement for the entire campus.

"The old burners were less able to adapt to those changes and were not as efficient as some of the newer burners on the market," he explains. "The retrofitted burners can better address fluctuations in demand and then maintain a more consistent efficiency during those changes."

He says the resulting efficiency is fairly typical of similar projects of that size.

"You generally see savings of anywhere from 8 to 10 percent for new burners of this type," he explains. "Given the magnitude and operating hours of most hospitals, this amounts to a significant amount of energy conserved."

In many cases, businesses have contingency plans for capital purchases of equipment that has gone beyond its useful life. Those businesses would do well to take note of how Northwest made the decision to replace its equipment even before the equipment had reached the end of its life cycle and, in doing so, is able to reap the rewards of a more efficient system – while also benefitting from rebates and incentives.

"I get asked all the time, 'What does it take to become world class in sustainability?'" Crittenden says. "This is a primary example of how a business gets ahead of the curve by leveraging high investment return opportunities and does not delay replacement by waiting for equipment to fail."

Nestle Purina PetCare, St. Louis, Mo.

Age of boilers: 45 years

Reason for upgrading: Desire to improve overall plant efficiency; age of current equipment



Northwest Community Hospital in Chicago replaced its burners before the end of their life cycle as a money-saving measure.

As the boilers at the Nestle Purina PetCare plant in St. Louis were reaching the end of their life cycle, the company faced an opportunity to upgrade the equipment and improve overall plant efficiency.

“We have been very aggressive over the last 15-plus years at identifying opportunities that will improve our campus overall operating efficiency,” says Vince Jalinsky, group manager, maintenance operations at Nestle Purina PetCare. “The rebates and incentives from Laclede Gas Company played a role in moving this project up on the priority list of projects identified that would improve campus overall operating efficiency.”

Pat Bloomfield, customer accounts representative for Laclede, explains that Nestle Purina PetCare is one of the gas company’s key accounts, and the two companies maintain a close working relationship. Nestle reached out to Laclede about replacing its trio of 45-year-old 300 HP steam boilers with two 500 HP high efficiency high-mass boilers with an economizer.

“Through various meetings and discussions, we made them aware of our Commercial/Industrial Rebate Program,” Bloomfield says, adding that all rebates are individually determined and analyzed. “Based on the benefit cost analysis, the project’s estimated savings resulted in a custom rebate to Nestle in the amount of \$25,000, which is the maximum allowed under our current tariff.”

The boilers were replaced in 2011, carrying an estimated annual energy savings of 6,678 MCF, with an estimated annual cost savings of \$74,626. It will take Nestle Purina PetCare just five years to achieve payback of the \$979,000 boilers, Jalinsky says.

“We are pleased with the results of this project so far,” he says. “We have seen a reduction in gas consumption of 2 to 3 percent, but fully expect to reach our projection of 5 percent when our boiler plant operating strategy is fully implemented later this year.”

He adds that sizing the boilers to better fit their steam profile allowed


Nestle to reduce the number of boilers required to be on line during operations in the spring and summer. In addition, adding the two-circuit economizer to each boiler allowed them to use flue gas to preheat boiler makeup water and maintain a 180-degree temperature in the standby boiler without having to fire the boiler.

Bloomfield says that programs like their Commercial Industrial Rebate Program present the perfect opportunity for businesses to improve efficiency with their natural gas equipment, and hopes that more customers take advantage of the rebates. ▶



Nestle Purina PetCare in St. Louis replaced its trio of 45-year-old 300 HP steam boilers with two high-efficiency 500 HP boilers.

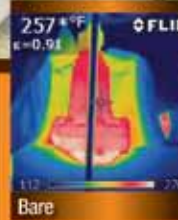
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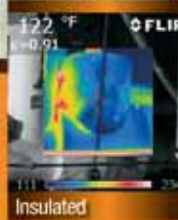
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Spending to Save

Fleet owners find significant savings by investing in NGV instead of traditional diesel vehicles.

Converting a fleet of vehicles from reliance on diesel gasoline to compressed natural gas

is a major consideration for any business. Several factors go into making that decision, including operating costs, the cost of converting the vehicles and the payback time of that investment. But today, many business operators are discovering that it makes more sense than ever before.

"It takes a significant investment," says Scott Hults, manager at Xcel Energy in Minneapolis-St. Paul, Minn. "But there is definitely more interest in it. It's something that makes a lot of sense for fleets, and we are getting more inquiries about it. We even have several companies with CNG (compressed natural gas) capabilities who have built their own [fueling station] for their fleet."

That includes a bus manufacturer



Kwik Trip opened its first fueling island last May and has since opened nine more locations, with 11 more slated for construction.

whose vehicles run on CNG. "Then they can fuel up and just send the new bus on its way."

For the convenience store chain Kwik Trip Inc., the decision to convert to NGVs came fairly easily. Beginning in early 2012, the chain with locations in Iowa, Min-

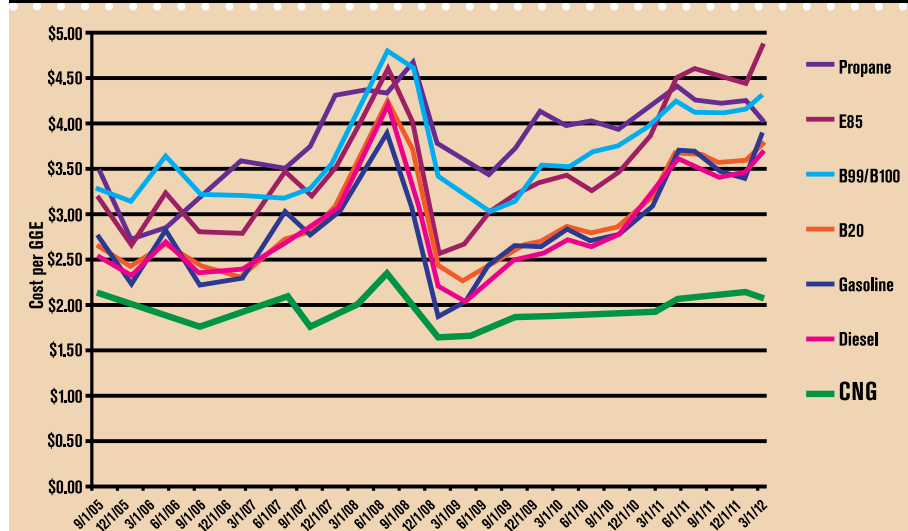
nesota and Wisconsin added nine heavy duty trucks and five light-duty NGVs to its fleet, says Joel Hirschboeck of the company's alternative fuels department.

"The operational cost of our fleet had continued to rise, and we needed to look at what other solutions existed," he explains. "We took a global look at what is viable today, and that's when NGVs started to jump off the page for us. We're confident that over the next 20 to 30 years, that market is going to continue to grow."

Investing in Fuel

Kwik Trip's confidence in the compressed natural gas market is so strong that they opened their first fueling island last May and have since opened nine more locations—and have 11 more slated for construction. Stations are planned around major transportation corridors throughout their tri-state area and are enjoying a brisk business from other fleets that have converted to natural gas. For their initial station, Xcel Energy installed about a mile of pipe to reinforce flow and provide the needed compression to create a satisfying fueling

U.S. AVERAGE RETAIL FUEL PRICES – 2005/2012



This chart of U.S. average fuel prices reflects the consistent pricing of CNG compared to other fuel options. SOURCE: Alternative Fuels Data Center

experience for customers.

"That was a pivotal piece for us," Hirschboeck says. "We needed to have a similar performance to filling up a diesel engine in terms of fill times and rates."

Xcel's Hults says Kwik Trip's vision of natural gas fueling stations made it worth the investment for Xcel to install additional pipe.

"Based on the estimated usage it justified such an investment on our part to be able to provide them with gas at the proper compression," Hults says. "Now, they identify an opportunity [for a fueling station] and we let them know our capability in that area."

Supporting the environment while saving money

While Kwik Trip is just now exploring the market, Bruce McShan of McShan Florist in Dallas has been relying upon CNG for over two decades. At the time he bought his first CNG fleet vehicle, he could only find one place in Texas that did such conversions. It took more than three months for the conversion to be completed.

"I wanted to convert to CNG because of the smog in Dallas, and I thought every little bit helps," he says. While he started using NGVs for environmental reasons, he continued using them for economic ones.

"It proves economically feasible if you run enough miles on your vehicles," he explains. "We have vans with 400,000 miles on them that are running fine. They run clean, there's no carbon ... they run a whole lot longer than a fleet on diesel."

Today, with more than two dozen vans in his fleet, McShan is completely sold on using natural gas vehicles. Conversion technology has evolved tremendously over the past two decades, he says, and getting a fleet converted is easier and faster than when he entered the arena. Currently Ford and Honda make a few natural gas vehicles, including cars, light trucks and vans that are primarily used in fleets and often are bought by companies that have their own refueling facilities, according to the Energy Infor-

mation Administration.

McShan says Dodge and General Motors will be experimenting with NGVs in 2014 and he expects to see the CNG-powered vehicles continue gaining popularity. For business owners who are looking at expanding their fleet or replacing vehicles, he says that this is a good time to consider vehicles that run on CNG. The cost of fuel is about half that

of diesel fuel, and he says a conversion can pay for itself in just 70,000 miles. While the cost per vehicle is \$10,000 to \$60,000 higher than its diesel counterpart, fuel savings are where the payback makes itself known.

Beyond the initial cost of conversion or purchase price, one of the biggest considerations for fleet operators is

available fueling stations.

"It can be done, it's just that they aren't on every corner," he says. "But they are around. You have to make sure they're open and operational, and if you are driving anywhere, you have to be cognizant of how much fuel you have and where you are going to fill up. It just requires a little more planning." ▶



Engineers and technicians perform a final check of the new CNG dispenser just prior to becoming operational for McShan Florist. Bruce McShan can now refuel his fleet of 25 Ford E-350 vans onsite. The station opened to the public on October 26, 2012.

PAYBACK EXAMPLE OF CNG VS. DIESEL			
	Diesel	CNG	Difference
Number of trucks	20	20	
Est. Cost	\$110,000	\$150,000	\$40,000
Miles/yr/truck	150,000	150,000	
MPG	6.5	5.85	
APR	4%	4%	
Term in Mos.	48	48	
Truck Payment	\$2,475	\$3,376	\$901
Operational Cost	\$0.065	\$0.075	\$0.010
Total Ann. Equip. Cost	\$594,000	\$810,240	\$216,240
Total Ann. Ops. Cost	\$195,000	\$225,000	\$30,000
Total Vehicle Cost	\$789,000	\$1,035,240	\$246,240
FUEL			
Miles	3,000,000	3,000,000	
Gallons	461,538	512,821	
Fuel Price per Gallon	\$4.05	\$2.00	
Fuel Cost	\$1,869,231	\$1,025,641	
Total annual costs	\$2,658,231	\$2,060,881	\$597,350
Total savings to Customer			\$351,110
Savings per mile			\$0.188
Percentage Savings			22.47%

The chart above illustrates how the payback from a natural gas vehicle offsets its cost compared to a traditional diesel fleet vehicle. Although the initial purchase price and operational costs are higher, the cost of CNG fuel provides a savings of more than \$350,000 — offsetting all of the operational and purchase costs, and providing a 22.47 percent savings over a diesel truck.

Peak Performance

Natural gas cooling systems offer increased efficiency, lower cost.

Most people think of natural gas as a heating fuel. But the same qualities that make it an efficient

heating fuel also make it a winning choice for cooling systems. Natural gas cooling systems offer lower operating costs, reduced demand charges, improved air quality and a quick payback on equipment purchases.

Jeffrey Glick, vice president of sales at Tecogen, notes that customers choose gas cooling systems for many reasons. "A certain percentage of users are looking to be green," he says. "Others are looking to reduce operating costs. And some are diversifying their fuel usage and going with a hybrid solution."

Reducing Energy Costs

Approximately 15 percent of all energy consumed in commercial buildings is for cooling. In summer months, higher electric demand for air conditioning means higher cost as electric utilities levy on-peak demand charges in addition to consumption charges.

A natural gas cooling system dramatically reduces the demand for electricity. With a gas system, commercial customers often avoid on-peak demand charges or "time of day" rates. And natural gas is often "off peak" during summer months at precisely the time electricity rates are reaching their peak.

Rates for natural gas have dropped over the past few years while electric rates have remained consistent. And while gas prices will likely level out, natural gas will remain a cost-effective fuel source, says Doug Davis, marketing director for Broad USA.

"No one is lowering electric bills by 30 percent," he said. "There is no technology on the horizon to do that."

Glick cites the case of a New York City medical center that found rates for a gas engine-driven chiller were approximately half the rates for those of an electric chiller. The cost dropped even more – to about one-fourth the electric cost – when the medical center factored in the savings of using recovered heat within the facility.

environment and its bottom line, Davis adds. The school uses methane gas from a nearby landfill to power gas-fired turbines, providing steam to absorption chillers. The university's state-of-the-art system is expected to save the university between \$30 and \$40 million over the next 20 years while dramatically reducing emissions of sulfur dioxide, nitrous oxides and carbon dioxide.

Gas-Powered Cooling Technologies

Customers can choose among several options for natural gas cooling systems:

Absorption cooling uses a thermal compressor to replace the traditional electric compressor. Absorption units are often integrated into cogeneration or combined heat and power (CHP) systems, allowing converted heat to be used in other applications within the facility.

Engine-driven chillers substitute a natural gas engine for the electric motor. Users can recover engine and exhaust heat to produce hot water and meet other energy needs within the facility.

Hybrid systems combine gas and electric chillers, allowing for the use of gas when electric rates are at their highest and using gas chillers as a backup when electric rates are lower. The ability to switch between gas and electricity lets plant operators better manage their energy use and costs.

Regardless of the technology, gas cooling offers a cost effective and environmentally sound option for summer-time cooling.

"I would challenge owners to do due diligence when designing or renovating," advises Davis. "Just because you've had an electric chiller for 30 years doesn't mean you should replace it with an electric chiller. Take a hard look at the economics." ▶



Sempra's corporate learning center uses Broad USA's absorption chillers to provide energy for its chilled, hot and domestic hot water plant.

The Green Choice

Natural gas is the cleanest of the fossil fuels, resulting in lower CO2 emissions and typically exceeding even the most stringent state emission requirements, says Bill Martini, vice president of sales for Tecogen's western region.

The University of New Hampshire is an example of an institution that is improving both the en-

Backup Plan

Automatic standby generators can mean the difference between your business sinking and swimming when disaster strikes.

When Superstorm Sandy crashed into South Glastonbury, Conn., last October, the city lost

power—with some homes and businesses going without power for as long as two weeks. Adding to the cost from property damage, many businesses were paralyzed and had to shut their doors, losing revenue as well as suffering the loss of product, either from storm damage or spoilage. But Richards Mobil gas station stayed open the entire time.

“We lost power, but our generator came on and everything worked—freezers, cash registers, lights, everything,” says Donna Richards, owner. “Because of that generator, we never had to shut down.”

A backup generator can literally be a lifesaver, particularly when disasters like Sandy create an emergency scenario. Without the generator, Richards says,



Despite an extended power outage following Superstorm Sandy last October, Richards Mobil gas station remained open for business and was able to provide customers with necessities—and avoid product loss.

“we would have lost all of our products in the coolers and the pumps would not have worked. We could have done cash sales, but we would have lost most of our products.”

Richards says the company purchased its generator eight to 10 years ago and researched the product beforehand to make sure that it would be big enough to handle their entire business in the event of an emergency. And, with Superstorm Sandy, they learned that they had indeed chosen the right product.

“We did it right,” she says.

Sure-fire Investment

Not all businesses plan ahead as well as Richards, but increasingly uncertain weather patterns provide plenty of examples as to why they’re important.

“There are so many reasons to install an automatic standby generator to protect a business or commercial building,” explains Huston Sprang, marketing communications specialist for Kohler Generators. “First and foremost, it ensures that your business can remain open and operating during an extended power outage.”

He says that can help prevent losses ranging from sales and inventory to property damage, and also can help provide security against possible theft. It may even help create new customers, he says.

“While your business remains open during an outage, your competitors’ businesses may not—so you could gain new customers.” ▶



For Richards Mobil gas station in South Glastonbury, Conn., this backup generator made the difference between staying afloat and losing both sales and inventory when Superstorm Sandy hit in October 2012.



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