

# Energy Solutions

for Commercial Buildings

## Rising Stars

Inside the new  
technologies that can  
improve your bottom line



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# Certified Efficiency

Focus on environment creates more opportunities for green building certification.

**T**oday's increasing emphasis on green building has not only generated awareness about constructing

environmentally sound structures, but has also created more certification choices.

Three options are designed to help building owners certify that they have taken sound steps to ensure their building has the least possible negative effect on the surrounding environment and is energy efficient. The most widely used options are Green Globes, offered through the Green Building Initiative based in Portland, Oregon, and LEED, offered by The U.S. Green Building Council based in Washington, D.C. More recently, the American Society of Heating, Refrigerating and Air Conditioning Engineers, based in Atlanta, Georgia, has launched a Building Energy Quotient certification program as well.

Each program helps building owners receive certification for their environment-conscious building efforts. Here's a closer look at what each one offers:

## Green Globes

- First and only commercial buildings rating system to become an American National Standard by the American National Standards Institute (2010).
- Recognized in legislation in 22 states.
- Many insurance companies offer premium discounts on Green Globes buildings, believing them to be at less risk.
- Offers two programs – Green Globes New Construction and Green Globes Continuous Improvement of Existing Buildings.

- Assessment areas include energy, water, resources, emissions, indoor environment, project management and site.
- Delivered via an interactive web questionnaire, with an assessor assigned to meet and work with the building team.

## Leadership in Energy and Environmental Design

- Offers an audit of building attributes including sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.
- Includes 9 billion square feet of participating building space, with 1.6 million square feet certified worldwide each day.
- Assesses both new construction and existing buildings.
- Does not provide life cycle assessment, flexibility for non-applicable criteria, or an automated online report with sustainability recommendations.

## Building Energy Quotient

- Emphasizes that building owners can control their utility costs, which might be their largest cost in running a building.
- Designed by a team of building design and systems engineers.
- Measures energy consumption, indoor environmental quality, effects on indoor operation costs, and points out investment choices to increase building value.
- ASHRAE-certified assessors available.
- Compares similar building types. ▶

## FOR MORE INFORMATION

[www.thegbi.org](http://www.thegbi.org)  
[www.usgbc.org](http://www.usgbc.org)

# Bring Heating Costs Under Control

New products offer greater efficiency and cost savings.

**H**eating costs are often one of the biggest energy costs a business faces. But today's new generation

high-efficiency gas heat options offer solutions to reduce energy consumption and lower overall costs.

High-efficiency heat systems typically achieve efficiency rates of 92 percent or more, compared to approximately 80 percent efficiency rate of more standard efficiency gas furnaces, according to Natural Resources Canada. Let's look at two forms of this new technology and what they have to offer commercial buildings with large open areas:

## Condensing Unit Heaters

Condensing unit heaters raise comfort levels and lower energy costs. The units have a more efficient flame that burns at higher temperatures and a secondary heat exchanger that captures latent heat from exhaust stream water vapor.

Modine Manufacturing, one supplier of the units, estimates that their condensing unit heaters achieve 93 percent efficiency, resulting in substantial energy savings.

The units reduce carbon dioxide output by about 13 percent when compared with other similarly sized heaters and maintain consistent air circulation and uniform temperatures.

## Infrared Heat

Gas-fired infrared heaters provide heat in much the same way the sun heats the earth. The sun's infrared waves travel directly through space, losing minimal energy, and then turn

## HIGH SCHOOL'S NEW NATURAL GAS HEAT SYSTEM PAYS FOR ITSELF IN TWO YEARS

The nearly 50-year-old heating system at Holy Spirit High School had exceeded its useful life. The oil-fired boiler had to heat 5,000 gallons of water each day to provide heat and hot water to the 80,000-square-foot Absecon, New Jersey facility.

Despite massive energy consumption, the boiler did not provide a consistent temperature for the building's 660 occupants. One side of the school was always excessively warm; the other side always cold.

"The oil equipment was expensive to maintain and the fuel cost was steadily increasing," said Todd Gordon of South Jersey Gas Company. "Converting the boiler system to high efficiency natural gas provided an opportunity to reduce operating and maintenance expenses, increase comfort and reduce emissions of greenhouse gases."

Rich Energy Solutions replaced the oil boilers with high-efficiency gas boilers to more effectively deliver heat and hot water throughout the facility.

The project cost approximately \$430,000,

but rebates from New Jersey's Clean Energy Program and South Jersey Gas covered more than half the cost. Completed in 2010, the new system saves the school an estimated \$93,000 in utility costs each year, so the system has almost paid for itself in two years of operation.

And the system works better, too. Individual room thermostats can be set to achieve more comfortable and consistent temperatures throughout the building, making everyone at the school happier.



Holy Spirit High School in Absecon, New Jersey, has a more efficient and less costly heat system thanks to new high-efficiency gas heat system.

into warmth upon making contact with the earth's surface. In the same way, infrared heaters provide heat transfer directly to people and objects with minimal energy loss along the way.

Most infrared heaters use gas combustion to heat a steel tube or ceramic surface, which then emits infrared heat. Heaters are mounted overhead and direct heat downward. The floor and objects at floor level, including people, are warmed by the infrared heat, and release that heat into the surrounding air.

Infrared systems often achieve overall

system efficiencies of 95 percent or more.

Infrared technology and condensing unit heaters are two of the new generation of high efficiency solutions that offer increased efficiency, greater cost savings and cleaner energy. ▀

## FOR MORE INFORMATION

[oee.nrcan.gc.ca/publications/residential/heating-with-gas/39](http://oee.nrcan.gc.ca/publications/residential/heating-with-gas/39)

For free tools to help analyze the life cycle cost of a HVAC system, go to

[http://www1.eere.energy.gov/femp/technologies/eep\\_boilers\\_calc.html](http://www1.eere.energy.gov/femp/technologies/eep_boilers_calc.html)

# Combining Heat Recovery and Power Generation

Cogeneration technology provides powerful high-efficiency energy.

**E**ven the most efficient energy production system creates significant waste heat that can be a valuable

resource for space heating, water heating, laundry use, absorption cooling, dehumidification or other applications.

Cogeneration is the process of generating power at the point of use while recovering heat that would normally be lost to be used in other applications. The U.S. Department of Energy reports that cogeneration equipment is now installed at more than 3,500 U.S. facilities, saving countless dollars, improving energy efficiency and reducing greenhouse gas emissions.

Cogeneration goes by different names – distributed energy resources, distributed generation, integrated energy systems and total energy systems, among others. One of the more popular names for cogeneration is Combined Heat and Power (CHP), which describes what the technology does: Combine heat recovery and power generation.

Just as cogeneration goes by different names, it also uses different technologies and fuels to deliver reliable, efficient power. Technologies used in cogeneration include reciprocating engines, gas turbines, steam turbines, microturbines and fuel cells along with a range of thermal technologies capable of using the waste heat that has been recovered.

## Reciprocating Engines

Reciprocating engines use the combustion of a fuel/air mixture to drive

pistons that turn a crankshaft, generating power in a process similar to that of a car or truck engine. Reciprocating engines used in power generation come in two types – spark ignition and compression ignition.

Spark ignition engines typically use natural gas as the preferred fuel.

Compression ignition engines typically operate on diesel fuel, or they can utilize a bi-fuel conversion system.

Bi-fuel conversion allows diesel engines to substitute natural gas for up to 90 percent of the diesel fuel the engine would typically consume, thus running the engine on as little as 10 percent diesel fuel mixed with up to 90 percent natural gas. The conversion can yield significant cost savings and reduced emissions, as natural gas is cleaner and less costly compared to other fuels.

## Gas Turbines

Industrial gas turbines burn a fuel/air mixture in the same manner as the turbine engines used on planes, except that the thrust from the turbine that enables the plane to fly is used to spin a drive shaft that can either turn an electric generator or a mechanical drive system.

The Environmental Protection Agency (EPA) notes that natural gas fueled turbines are one of the cleanest methods of generating electricity with emissions of nitrogen from some large turbines in the single digit parts per million range. The EPA also states that, “Because of their relatively high efficiency and reliance on natural gas as the primary fuel, gas turbines emit substantially less carbon dioxide (CO<sub>2</sub>) per kilowatt-hour (kWh) generated than any other fossil technology in general commercial use.”



Natural gas generator

In a CHP operation, a heat exchanger or waste heat recovery boiler is added to recover heat from the turbine exhaust for the production of process steam, hot water or process heat. Combined cycle electric power plants recover this heat in the form of high pressure steam which is then used to generate additional power through a steam turbine-driven generator, dramatically increasing the overall output and efficiency of the total system.

### Steam Turbines

With steam turbines, energy is transferred from a boiler to the turbine through high-pressure steam that powers the steam turbine and the generator or mechanical drive system attached to the turbine. The boilers used to provide the steam can operate on a variety of fuel sources, with natural gas being the cleanest and most efficient.

In cogeneration operations, the lower pressure steam coming out of the steam turbine is then used directly for heating or converted to other forms of thermal energy.

### Microturbines

Microturbines are compact, lightweight packaged systems that can use a variety of gaseous and liquid fuels to generate electric power. Natural gas is the most popular fuel source and produces the lowest emissions.

Microturbines function much like conventional turbines. Most contain an internal heat exchanger called a recuperator that captures some of the exhaust heat to preheat the inlet air. A radial flow compressor compresses the preheated inlet air which is then combined with the fuel in the microturbine's combustor. The mixture is ignited and fed to the turbine that drives the generator, producing both electric energy and waste heat.

In CHP operations, a second heat exchanger, called the exhaust heat exchanger, removes much of the remaining energy from the exhaust to be used

## ARCHITECTURAL FIRM SELECTS NATURAL GAS TECHNOLOGY FOR ITS PLATINUM LEED FACILITY

When Atlanta, Georgia, architect Perkins+Will began planning a new facility, the firm wanted to showcase the latest green technology. So when it came time to pick heating and cooling equipment, the firm chose high-efficiency natural gas cogeneration equipment.

Perkins+Will selected microturbines and an enthalpy wheel for their energy efficiency and environmental benefits, both of which were important in the firm's desire to earn platinum status LEED certification, says Corey Minshew, director of new business development at AGL Resources.

Environmentally friendly natural gas technology fit in well with the firm's "2030 Challenge," which includes reduction of greenhouse gas emissions; pursuit of high-performance, sustainable buildings; and elimination of toxic substances.

The building combines many strategies for energy savings, including high-efficiency

equipment such as the rooftop enthalpy wheel, which reduces overall energy use by an estimated 58 percent.

The enthalpy wheel exchanges heat and humidity from one air stream to another, recovering energy from used building air and transferring it to incoming fresh air. This reduces the need for cooling in the summer and heating in the winter.

Two microturbines produce electricity onsite using natural gas. While microturbines can run on a variety of fuels, the firm selected natural gas because it is a clean and efficient fuel source. The microturbines help power an adsorption chiller that uses water as the refrigerant and silica gel as the desiccant, thereby eliminating harmful chemicals.

The completed building provides a snapshot of the latest green technologies and shows the central role of natural gas powered cogeneration technologies in green energy production.

in a hot water system or the heat can be used to preheat process streams.

### Fuel Cells

Fuel cells generate power with an electrochemical process that is similar to the process that allows dry cell batteries to function, except that they are supplied continuously by oxygen/air and a constant supply of fuel source such as hydrogen. Fuel is required to keep the process going. As the fuel cells convert chemical energy into electricity, recoverable heat is also produced.

Fuel cells contain two electrodes, the cathode and anode, immersed in an electrolyte. Hydrogen from the fuel source is drawn to the anode where a catalyst helps split the hydrogen molecule into two hydrogen protons and two electrons. The protons travel through the electrolyte to the cathode. The electrons travel through the anode to an external circuit to provide electric power and then return to the fuel cell at the cathode, where they combine with the hydrogen protons and oxygen in the

electrolyte solution to produce water and heat. Because there are few moving parts, fuel cells are very quiet. And, because the fuel reacts electrochemically rather than being burned, there is also virtually no air pollution associated with fuel cell use when operated on hydrogen, typically produced from natural gas.

Theoretical efficiencies can be as high as 83 percent, but 40 to 60 percent energy efficiencies are more common for power generation applications. Adding heat recovery systems to the fuel cell in a CHP application can increase the overall energy efficiency to as much as 85 to 90 percent. Fuel cells are typically installed near the location where the energy is used, thereby eliminating the transmission losses associated with typical electric power generation so that all of the power is available for use. Compare this to the overall electric power generation and transmission efficiencies of 30 to 35 percent and fuel cells have a definite advantage.

(continued on page 6)



(continued from page 5)

### Thermal Technologies

Typically the hot water or steam from recovered heat is used for heating, domestic hot water or to operate thermally activated equipment, such as a single and double effect absorption chiller, a steam turbine chiller, or a desiccant dehumidifier.

Using recovered heat for chillers allows customers to reduce use of their electric powered cooling systems, thereby reducing seasonal peak electric demand and keeping both electric and gas grids at more consistent year round loads, according to the U.S. Department of Energy.

### A Little Credit

Cogeneration offers businesses better energy efficiency and lowers utility costs. And, according to the U.S. Department of Energy, cogeneration improves environmental quality, promotes economic growth and fosters a more robust energy infrastructure. In addition to all those benefits, businesses who opt for cogeneration often qualify for tax breaks and incentives.

The Energy Improvement and Extension Act of 2008 provides a 10 percent investment tax credit for the first 15 mw of CHP property and CHP qualifies for five-year depreciation under the Modified Accelerated Cost Recovery System. The tax credit can be taken by owners of CHP systems smaller than 50 mw if their systems are placed into service between October 4, 2008 and December 31, 2016. The CHP system efficiency must exceed 60 percent.

In addition, several states offer incentives and or have created legislation favorable to CHP technologies.

All of this adds up to a technology that can recapture profits as effectively as it recaptures waste heat. ▾

### FOR MORE INFORMATION

[www.poweronsite.org](http://www.poweronsite.org)  
[www.gasairconditioning.com](http://www.gasairconditioning.com)  
[www.epa.gov/chp/](http://www.epa.gov/chp/)

## OSTEOPATHIC COLLEGE PUTS MICROTUBINES TO THE TEST

More than a century old, the Philadelphia College of Osteopathic Medicine (PCOM) prides itself on the progressive use of cutting-edge technology. So when PCOM began looking for an energy solution to power a 172,000-square-foot building, the facilities department explored technologies to reduce the college's carbon footprint.

The college initially focused on solar and wind power; however, those technologies were not feasible because of the college's location. "The payback would not have been that good," explains Frank Windle, PCOM's director of operations. "So we began looking at other options."

After more research, PCOM decided on gas-powered microturbines. Windle says the microturbines were a good choice because they provided an energy efficient solution with low emissions and they fit well with the college's existing absorption system.

The college installed two 65 kw Capstone microturbines in June. The microturbines will provide electric power to the building, and

recaptured waste heat will be used for hot water, heating and cooling.

In addition to increased energy efficiency, Windle notes that the microturbines have few moving parts, and he estimates they will run 8,000 or more hours before needing maintenance.

Kiernan McGovern with Philadelphia Gas Works notes the college carefully analyzed energy costs. Because gas prices are stable and low, the college will likely recoup its costs in less than five years, McGovern said.

Windle says the college is already seeing a 10 percent reduction in energy demand. "100 KW popped off the grid right away," Windle said. "We're waiting on the first electricity bill to see the savings, but we're really pleased so far."

The school is testing the microturbines in a single building, and if results continue to be favorable, the college plans to expand the use of microturbines to other campus facilities, says Windle.



PCOM installed two 65 kw Capstone gas-powered microturbines to provide electric power to their building. The college will likely recoup its costs in less than five years.

# Pumped Up

Gas heat pump provides more than 50 percent cost savings.

**W**ith two virtually identical fire stations, the Plano (Texas) Fire Department found itself with a

unique opportunity: to put natural gas and electric systems to a head-to-head test.

In May 2011, the newly built Plano Fire Station No. 13 installed a 15-ton gas heat pump, the first gas heat pump in use in a Texas fire station. The city's lead engineer recommended installing the gas heat pump to conduct a comparison test with an electric heat pump installed in the almost identical Plano Fire Station No. 12.

Heat pumps can both heat and cool, pumping hot air in or out, depending on weather conditions. Gas heat pumps can be one of two types, either an absorption system or an engine driven system. The Plano fire station is using a natural gas engine driven heat pump.

In addition to lower cost and better efficiency, gas fired heat pumps are easier on the environment. Based on Environmental Protection Agency comparisons, natural gas is the cleanest of the fossil fuels, emitting fewer harmful pollutants than other fossil fuels.

## Gas Outperforms Electric Alternative

Plano Fire Station No. 13 officially opened in October 2011 and the city began its comparison study of the two stations' energy use in February 2012.

From February to May, the roof-top condensing unit at Station No. 13 showed more than 85 percent electric energy reduction each month as well as a 13.5 kW demand reduction in May, said Greg Anderson, commercial marketing manager for Atmos Energy, which is working with the station on the comparison study.



The 15-ton heat pump installed at Plano (TX) Fire Station No. 13 offers the opportunity to test the operating costs of gas vs. electric cooling. Energy use and cost at the station will be compared with that of another "twin" station using electric cooling technology.

That usage reduction has translated into significant cost savings, Anderson said. During the first four months of the study, Station No. 13 had \$636 in energy costs, a 56 percent savings over the \$1,432 in energy costs incurred by Station No. 12 with its electric heat pump, and most of that savings occurred before the real cooling season begun.

## Company Proves Value of Gas Technology

Similarly, Alabama-based Alagasco has also seen significant cost savings since the company installed a natural gas-fired heat pump in its own building in early 2010. Plus, the company has had no maintenance issues and has found the facility to be more comfortable, said Alagasco's Robert Thuston. The installation also helped the facility earn its gold status LEED certification.

When Alagasco installed the heat pump, there were no other gas heat pumps in Alabama. The company hoped to use its installation to show the benefits of the technology to others in the state.

"The technology itself is one of the most cutting edge, and it's very reliable" Thuston said. "We've been able to call up engineers and designers working on specific projects and have them come down to our facility. It gives them a chance to get comfortable with the technology."

As a result, the company has seen some additional installations and is currently in discussion with several other customers such as a school and a baseball stadium about potential installations.

With an equivalent efficiency of 149 percent, gas-fired heat pumps offer maximum thermal efficiency. The pumps are ideal for colder climates where heating is the dominant energy demand, for places where electricity rates are high or for customers who are looking for renewable energy sources. ▶

## FOR MORE INFORMATION

[www.gasairconditioning.com](http://www.gasairconditioning.com)  
[www.gasheatpump.org](http://www.gasheatpump.org)

# Fire up the Savings

New kitchen technology cutting costs in many different ways.

**T**he old saying goes, “If you can’t stand the heat, get out of the kitchen.” But today’s new technologies are

taking some of the heat out of the kitchen – and cutting energy costs at the same time.

“Food service is a very slow-to-change industry, and it’s a very cost-driven industry,” says Richard Young, senior engineer and director of education for the Food Service Technology Center in San Ramon, California. “Many times, the people procuring the equipment aren’t the same people paying the energy bills.” As a result, he says, the procurement department will focus on building something as inexpensively as possible, and miss out on energy savings along the way.

“They don’t realize how quickly systems can pay for themselves,” he says.

One of the big changes in foodservice efficiency is in the area of demand control ventilation, which replaces the old practice of running an exhaust hood around the clock. In addition to removing grease, heat and smoke, exhaust hoods also quickly move conditioned air out of the building, which drives up costs. “The heated or cooled air comes in one side of the kitchen and goes right out ... the exhaust hood. It doesn’t circulate like it does in your home or office buildings.”

Demand control ventilation allows users to vary the speed of the hood de-



**New technology is creating high-tech foodservice options that can save on operating costs and pay for themselves very quickly.**

pendent upon the load. Controls in the duct work react to temperature changes and automatically vary the amount of ventilation used. A second sensor activates ventilation when smoke or steam rises.

Variations of this system include one that is activated only by heat, and a third system that uses infrared sensors pointed directly at the appliance.

“When properly installed, we’ve seen

energy savings of almost 50 percent – and that’s a big number,” Young says. “One reason you get these huge savings with demand ventilation is that the waste is so huge to begin with; that you would run these fans all the time for no reason is ridiculous.”

The savings have a domino effect; when the exhaust fan slows down, the fans that are pushing air back into the building can slow down as well, and the air conditioning doesn’t have to work as hard, either.

“So I save on heating and/or cooling – and the whole time I save money on the exhaust fan, too. It’s a real win-win,” Young says.

**“The savings have a domino effect; when the exhaust fan slows down, the fans that are pushing air back into the building can slow down as well, and the air conditioning doesn’t have to work as hard.”**

Changing how kitchens are designed has played a role in increasing energy efficiency and productivity, too. More thought is being given to the amount of exhaust created by each appliance and systems are optimized to suit their exact usage.

### Savings By Design

Changing how kitchens are designed has played a role in increasing energy efficiency and productivity, too. More thought is being given to the amount of exhaust created by each appliance and systems are optimized to suit their exact usage. For example, in older kitchens, everything was placed under an exhaust hood, regardless of the amount of exhaust it needed, so a great deal of air was being moved – and energy being expended – where it wasn't needed, such as over a convection oven.

"Now, you're not moving more air than needed, and you become more efficient in the way you move air in the building, which is a way of saving energy."

Combination ovens, which offer the dry cooking experience of a convection oven as well as the wet cooking experience of a steamer, can now combine the two processes for certain types of foods. They offer more versatility to commercial kitchens, and also create a more comfortable work environment by eliminating open flames – which also decreases the amount of energy needed to run an exhaust fan.

"Another place we're seeing movement is with high-efficiency gas convection ovens," Young says. "We are seeing some high-efficiency combination gas

ovens, and we think the gas convection ovens can match that."

Presently, Energy Star has eight categories

in food service equipment, and within those categories, Young says more high-efficient equipment is coming as manufacturers become more innovative.

"One of the things that people aren't promoting like they should is high-efficiency gas fryers," says Young. "Fryers are in so many restaurants – it's probably one piece that is sold the most – but the application rate of high efficiency gas fryers in commercial food service is under 10 percent."

The reason for that, he says, is because food service decision-makers tend to buy equipment based on its cost rather than looking at the long-term savings.

"When you do the math on high-efficiency fryers, they are a good investment. They perform well, and production capacity in a restaurant is important. People need to look at that. How much of the energy you buy is going into the food you're selling?"

### Hot Tools

New and emerging gas technologies are providing greater efficiency in the foodservice industry. Some key areas where Young sees natural gas equipment outperforming its electric counterparts include:

**High-efficiency gas hot water heating.** "In the food service world, most people are still buying standard hot water heaters; they are work horses, but they cost you," Young says. New high-efficiency gas water heaters and tankless heaters are more cost-effective – "particularly in a facility where a lot of hot water is used."

**Eneron Turbo Pot.** The technology in this cookware improves the trans-

fer of heat from the gas flame, which saves energy and "is a great example of innovation in a category of gas appliances that has not had much in the way of innovation for many years," Young says. "It cuts about 30 percent off the heat-up time on big pots, which is a tremendous improvement."



Eneron Turbo pot

**Steamers.** "Steamers are typically costly to run, as you create steam and then let it go down the drain," Young says. New, efficient technology includes the Eco-Tech Steamer by Market Forge Industries, a gas steamer which boasts 40 percent efficiency, and the Cleveland Gemini, which has a 45 percent efficiency rate. ▸



Cleveland Gemini steamer



# Emerging Possibilities

A look at what's new in technology – and how it just might change the way you do business.

**T**echnology has changed the business world, and that even includes changing the way business operations

are being powered. Today there are many opportunities to provide greater comfort for building occupants while at the same time cutting costs and lowering waste and emissions.

## Demand Controlled Ventilation

Proper ventilation allows building owners to improve indoor air quality and provide a healthy atmosphere by diluting indoor contaminants and providing fresh air. It also provides cooling or heating and saves energy. Demand controlled ventilation uses sensors to respond to the actual number of occupants and occupant activity, instead of basing activity on assumed occupants.

In addition to improving indoor air quality and well-being for building occupants, this monitoring system can help a building run more profitably and efficiently, and reduce energy consumption by as much as 60 percent compared to continuous or scheduled ventilations.

## High Efficiency Water Heater

Any location with a need for large amounts of hot water can benefit from a high efficiency natural gas heat pump water heater. A natural gas heat pump water heater can boost efficiency, save money and reduce impact on the environment.

Fueled by natural gas, it extracts heat from the surrounding environment, implements traditional boiler technology and combines it with an engine-driven heat pump to cut fuel consumption and carbon emissions in half. Free waste heat from the engine is captured and used, which adds to the capacity and efficiency of the unit.



The Clearfield County Area Agency on Aging in Clearfield, Pennsylvania, added 11 natural gas-fueled cargo vans to its fleet.

With efficiency up to twice that of a gas-fired boiler, the high efficiency natural gas heat pump water heater represents an exciting opportunity for both environmental and economic advantages in commercial building solutions.

## Gas to Steam Humidification

One of the ongoing challenges in large buildings is dry air, which can cause numerous problems for building occupants. Isothermal humidification is a commercial solution that can include steam to steam and natural gas to steam options. While older systems have traditionally used electric to make steam, new alternatives use natural gas to boil water and make steam.

Natural gas-fired humidifiers are more economical to run, with efficiency ratings of about 80 percent, and since gas-fired humidifiers also produce a chemical-free form of steam, it creates better overall environmental conditions and indoor air quality within the building.

## Natural Gas Vehicles

Natural gas vehicles, or NGVs, are becoming increasingly popular as an option for fleet vehicles. High gasoline prices

– and an unpredictable future for fossil fuels – contribute to the appeal of NGVs.

Vehicles powered by compressed natural gas, or CNG, are responsible for less exhaust and greenhouse gas emissions than either gasoline or diesel-fueled vehicles. The U.S. Environmental Protection Agency reports that NGVs offer fewer toxins and carcinogenic pollutants, reduce carbon monoxide emissions by more than 90 percent, cut carbon dioxide emissions by 25 percent and lower nitrogen oxide emissions by 35 to 60 percent.

Presently there are about 120,000 NGVs and 1,000 fueling stations operating in the U.S., and both state and federal grants are available for businesses who choose to utilize NGVs. ▶

## FOR MORE INFORMATION

### DEMAND CONTROLLED VENTILATION:

[www.iaqpoint2.com](http://www.iaqpoint2.com)

### HIGH EFFICIENCY WATER HEATER:

[www.iliosdynamics.com](http://www.iliosdynamics.com)

### GAS TO STEAM HUMIDIFICATION:

[www.armstronginternational.com](http://www.armstronginternational.com)

[www.carelusa.com](http://www.carelusa.com)

[www.humidity.com](http://www.humidity.com)

[www.drysteem.com](http://www.drysteem.com)

# Thinking Long-Term

Use life cycle costing to make better equipment purchase decisions.

**F**aced with costly maintenance of existing heavy equipment, building owners often look at the cost of a

replacement as too pricey. But the decision to stay with an older, inefficient model just might end up costing more than it would to buy a new, energy-efficient machine.

Rather than looking at an arbitrary two-year return on an investment, or wondering when that significant outlay of cash will be paid back, decision-makers can use life cycle costing analysis to estimate the real costs over time of various equipment options, and make a more informed and well-rounded purchase decision.

For example, a building needs a new boiler about every 25 years. Annual costs include a loan payment, energy costs and maintenance costs.

Life cycle cost analysis lays out the purchase, operating and maintenance costs over the economic life of the equipment and salvage value at the end of life (usually \$0 for energy-related technologies). The analysis also compares the initial investment with future savings, uses a consistent method to compare options and includes consideration of financing choices like taking out a bank loan.

## Here are the steps to follow:

- Select equipment purchase options.
- Tally the first cost (including initial equipment and construction costs) for each choice.
- Establish the expected life of each equipment choice.
- Calculate the expected energy costs depending on the form of



energy used, keeping in mind a slight increase over time.

- Calculate the maintenance (routine, preventive and repair) costs over the life of each choice, with an eye on inflation as the piece ages.
- Compare to the estimated cost to maintain and operate the existing equipment over the same time period.

In the boiler example, options can include buying a new standard efficiency boiler, a new high efficiency boiler, or keeping the decrepit boiler and hoping for the best.

After comparing capital, energy and maintenance costs for the life of the three options, the new, higher capital outlay high efficiency boiler may very well have a lower life cycle cost than

other options being investigated.

For an accurate analysis, remember to make apples-to-apples comparisons. If comparing a heat pump with a 10-year life expectancy to a boiler or furnace with a 20-year life expectancy, add the replacement cost of a new heat pump after the first 10 years to equalize the comparison.

The federal government has mandated the use of life-cycle costing as a way to reduce energy costs and usage. Executive Order 13123, "Greening the Government Through Efficient Energy Management," outlines numerous ways that life-cycle costing helps achieve efficiency, including greenhouse gas reduction, reduced energy consumption, improved water conservation and more. ▶





# BAXI LUNA SAT

## Now, you can enjoy an authoritative submetering system for multi-suite properties

The Baxi Luna SAT Integrated Submetering System promises long-term accuracy, reliability and cost effectiveness – consistently meeting a property owner's need for metering precision of each suite's heating, cooling, hot and cold water consumption.

Together with a Baxi high efficiency central boilers plant, the SAT system features Zenner pulsed water and BTU meters, as well as remote data collection and communication.

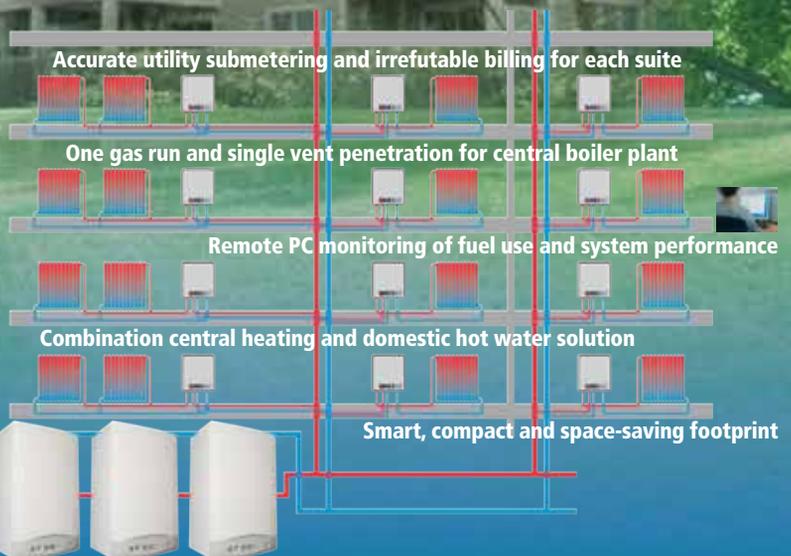
Baxi Luna SAT puts the user of each residential or commercial unit of a property in charge of their own energy conservation, while lowering condo fees for everyone. Property managers can monitor utility use for each unit remotely, and produce accurate, irrefutable billing for each suite.

Enjoy the peace of mind that a proven and authoritative Baxi Luna SAT Integrated Submetering System will provide over many years.

Learn more about Baxi Luna SAT by contacting Marathon International, the exclusive distributor of Baxi heating, renewable energy and multi-suite integrated submetering solutions:

Mike Thomas  
President  
M: 416-878-8137

Pat Kahnert  
Director, Sales & Marketing  
M: 905-466-4525



Central Baxi high efficiency boiler plant



Multiple Baxi Luna HT high efficiency boilers may be cascaded to produce up to 4 million BTUs heat output, while sharing a common venting system with a single exterior penetration.

# BAXI



## www.wallhungboilers.com

Marathon International is an equipment manufacturer member of Energy Solutions Center, Inc.