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Calculating Payback on Energy Efficiency Improvements

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Both for-profit and not-for-profit organizations evaluate potential investments based on the financial bottom line. To evaluate this bottom line, organizations use financial analyses to identify whether an investment passes a predetermined profitability hurdle rate, while maintaining acceptable first cost and liquidity requirements. Profitability is typically measured by whether a project's internal rate of return passes the organization's investment hurdle rate. Cash flow and liquidity are evaluated by first cost and simple payback. The EPA's ENERGY STAR Buildings Manual, [Business Analysis for Energy-Efficiency Investments](#), outlines several approaches to calculating payback on energy efficiency projects.

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- **First cost** is the up-front cost that is incurred before the investment generates any savings. Large first costs put stress on an organization's balance sheet and may cause an investment to be rejected, even if it is profitable in the long run.
- To compare two competing options or to prioritize options, **Net Present Value (NPV)** analysis should be used. NPV is the total net cash flow that a project generates over its lifetime, including first costs, with discounting applied to cash flows that occur in the future. NPV indicates what a project's lifetime cash flow is worth today. NPV discounts the future total net cash flow over a project's life, and thus tells you what a project's future cash flow is worth today. The discount rate is the rate of return that a firm would receive if it invested its money someplace else with similar risk. As with IRR (Internal Rate of Return), NPV is calculated by using a financial calculator or spreadsheet, using the 20-percent profitability hurdle rate as the discount rate for future cash flows. Note that IRR and NPV are related; a negative NPV indicates that the option generates less than the discount rate of return.
- **Simple payback** is the amount of time, in years, necessary for future cash flows to return the original investment. Payback is an indicator of liquidity because it measures the speed with which an investment can be converted into cash. Payback is also used as an indicator of risk. As a general rule, short-term events can be predicted more precisely than events in the distant future; thus, assuming everything else is constant, projects with a shorter payback period are generally considered less risky. Most organizations require a maximum two-year payback period. That equates to over 50 percent return on investment! As with first cost, using simple payback does not take other factors into account, such as project life, varying cash flows, maintenance savings, and the cost of capital.
- **Internal rate of return (IRR)** is the interest rate that equates the present value of expected future cash flows to the initial cost of the project. Expressed as a percentage, IRR can be easily compared with loan or hurdle rates to determine an investment's profitability. If the internal rate of return is greater than the opportunity cost of capital, then the investment decision is acceptable. However, decisions are solely dependent on the amount and timing of the project's cash flows. Remember, IRR should be used to indicate a "go" or "no go" decision for each option. It should not be used to compare or prioritize options, which can lead to profit "cream skimming"—in other words, an approach that minimizes first cost rather than maximizing energy efficiency and long-term savings.
- **Hurdle rate** is the accept/reject criterion for determining if an investment passes the profitability test. If the IRR is higher than the hurdle rate, the investment is profitable. Hurdle rates are the marginal cost of capital, adjusted for a project's risk. The higher the cost of capital and risk, the higher the hurdle rate. ENERGY STAR Buildings recommends using a 20-percent hurdle rate for energy-efficiency investments.
- **Life-cycle costing**, using the net-present-value method is considered by many to be the best measuring stick for making investment decisions. This method takes into account the time-value of money, varying cash flows, cost of capital, project life, and different magnitudes of the competing investment decisions. More importantly, the outcome is in today's dollars.



Let's use ENERGY STAR®'s [Financial Value Calculator](#) (Excel-based) to conduct a financial payback analysis for the corporate building portfolio of a large retail company. We'll use the default Representative Sector Data which selects 35 million ft.² of floorspace, with an Energy Cost per Square Foot of \$1.71, resulting in a \$60 million annual energy bill. We will make energy upgrades that will payback (and depreciate) for 15 years, with an externally financed cost of capital rate of 10%, and a corporate tax rate of 41% (34% federal + 7% state). We will also set the Discount Rate at the default value of 11%. On the Calculator page, we will choose an annual energy savings of 20% via an initial investment of \$28 million. The financial summary of these conditions is shown in column A of the table below.

If, however, we choose a higher energy savings level (30%) that costs considerably more to achieve (\$56M), the financial results (column B) are not as attractive. We can also determine the maximum investment that will still achieve a positive NPV (exceeds the discount rate of 11% we chose earlier) for a 20% energy reduction via an iterative process. The answer (column C) is \$36 million. We may also want to query the software tool to determine what minimum level of energy savings is required to achieve a positive NPV for a fixed initial investment of say, \$28 million. The answer is 15.5% as shown in column D.

ENERGY STAR Financial Value Calculator Analysis for the Retail Sector				
	A	B	C	D
Energy Savings	20%	30%	20%	15.5%
Initial Investment	\$28,000,000	\$56,000,000	\$36,000,000	\$28,000,000
Annual Utility Savings	\$12,000,000	\$18,000,000	\$12,000,000	\$9,000,000

Internal Rate of Return	18%	10%	11%	10%
Payback Period (years)	4.9	7.3	6.9	7.3
Net Present Value	\$10,736,115	(\$1,460,113)	0	0

Remember that these financial calculations are based on key assumptions. If any of your assumptions change, analyze all of the options again before going forward with a proposed package of options. Another important factor that may affect the decision to pursue an energy-efficiency investment is the manner in which the project is financed. Financing options affect the balance sheet in different ways and can be a determining factor on whether to accept an investment proposal.

Windows™-based Financial Analysis Tools

ENERGY STAR® 's Financial Value Calculator

The FVC will conduct financial analysis for improvements that result in energy reduction for the following sectors: corporate real estate, healthcare, hotel/motel, grocery, and retail. It calculates financial returns after depreciation, interest, and tax.

eVALUator

eVALUator calculates the lifecycle benefits of investments that improve building design. It analyzes the (pre-tax) financial benefits from buildings that reduce energy cost, raise employee productivity, and enhance tenant satisfaction. eVALUator produces a set of "bottom-line" economic parameters as well as a year-by-year cash flow analysis:

- net present value of lifecycle costs and savings
- savings-to-investment ratio
- adjusted internal rate of return
- net cash flow (first-year, and average over the life of the project)
- annual gross profit
- annual net income
- project value

Life Cycle Cost in Design (LCCID)

LCCID is intended to be used as a tool in evaluating and ranking design alternatives for new and existing buildings. Designed as a general life-cycle costing tool, LCCID compares and evaluates the economic feasibility of different building types, sources of energy, and cost issues like maintenance and repairs.

Building Life Cycle Cost (BLCC)

BLCC 5.3-06 is a program developed by the National Institute of Standards and Technology (NIST) to provide computational support for the analysis of capital investments in **government sector buildings**. The life-cycle cost (LCC) of two or more alternative designs are computed and compared to determine which has the lowest LCC and is therefore more economical in the long run. BLCC also calculates comparative economic measures for alternative designs, including Net Savings, Savings-to-Investment Ratio, Adjusted Internal Rate of Return, and Years to Payback. The software can evaluate federal, state, and local government projects for both new and existing buildings. The remaining modules now in BLCC4, for **private-sector projects**, including tax and financing analyses, will be included in future versions of BLCC5.

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Are You Wasting Energy in Your Kitchen Area?

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Restaurants are energy-intensive operations, and surprisingly it's not just the cooking equipment. Heating, cooling, lighting, and sanitation each account for major portions of the average restaurant's energy consumption. In addition, many common practices in foodservice operations can lead to inefficiencies and wasted energy. The good news is there are a variety of low-cost opportunities to save energy and improve your bottom line. Getting started is as easy as looking around your kitchen area and asking the following questions.



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[Putting Energy Into Profits](#)

[Reducing the Energy Use of Walk-In Coolers](#)

Do you preheat all of your cooking equipment when you open your kitchen?

This is a common practice in many foodservice operations, but very wasteful and costly. The typical time to preheat most cooking equipment is short - usually 10-15 minutes, at most. Some equipment, such as griddles and broilers, require little or no preheating time. It is a good practice to know exact preheating times for all of your equipment. Post the preheat times near the equipment and train employees to preheat accordingly.

Do you leave cooking equipment on at full temperature during slow periods?

Most foodservice operations have slow periods (late morning, mid-afternoon) when cooking equipment receives little or no use. The false perception that it is too costly or time consuming to recover to a certain temperature leads to the notion that it's better to leave equipment at the temperature one will eventually require. In fact, as we have seen above, many pieces of cooking equipment can be preheated very quickly. Avoid maintaining unused cooking equipment at full temperature for long stretches of time when not in use.

Do you run your dishwasher at less than a full-load?

During slow periods, many operations run their dishwashers with partial loads to prepare for busier times of the day. Running a dishwasher with a partial load generally requires as much energy as a full load. It is more cost effective to cold-rinse and stack dishes until a full load is ready.

Do you frequently cook at less than full capacity?

In many facilities, it is often necessary to cook in small batches or cook to order. However, it is very costly to run an oven or broiler all day with significant idle time. Take a look at your operation and business schedule. Are there times when you could take advantage of the energy savings of full capacity cooking, while leaving the equipment turned down or off at other times?

Have you established a daily schedule for cleaning equipment?

Frequent cleaning of cooking equipment, especially griddles and fryers, is very important. Carbon and grease build-up make your equipment work harder and use more energy.

Do you regularly cover pots and pans while cooking?

Covering pots and pans helps retain heat and causes the food to cook faster, using less energy.

Is your refrigerator door closed and sealed tightly?

Many kitchen operations feature large walk-in refrigerators which are significant energy users. Make sure that the door latches tightly and that the door gaskets are sealed correctly. Try to minimize trips to the refrigerator. Use of carts or dollies for loading and unloading can be very helpful. Consider installing door curtains on walk-in entrances to minimize the entry of warm air.

Is your kitchen ventilation system properly balanced?

Make sure that the appropriate amount of "make-up air" is being introduced to compensate for the air being removed by the exhaust hoods. An insufficient or excessive amount of make-up air will cause the ventilation system to work ineffectively. The best way to introduce makeup air in a kitchen is to integrate the kitchen ventilation system with the building HVAC system, using conditioned air from adjacent serving areas or dining rooms.

Are you using high efficiency kitchen appliances and equipment?

A significant amount of energy is wasted in foodservice facilities using older, inefficient equipment. Replacing aging equipment with [Energy Star](#) rated commercial foodservice equipment can save considerably on a foodservice operator's energy bill.

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An Ounce of Prevention: Employee Wellness Programs

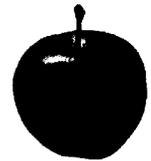
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It's no secret that employer health insurance costs are skyrocketing. According to the Kaiser Family Foundation's [2006 Employer Health Benefits Survey](#), employer-sponsored health insurance premiums increased nearly 8% this year—more than double the increase in the consumer price index and workers' wages. On average, employers spent \$3,615 on premiums per employee for single coverage and \$8,508 on family coverage. Overall, employer-sponsored health insurance premiums have increased 87% since 2000.

Faced with these cost pressures, many employers are naturally looking for ways to reduce their health insurance burden. According to the Kaiser survey, significant numbers of employers are considering measures such as increasing plan deductibles and increasing co-payments for office visits and prescription medications. Many employers are also starting to push consumer-oriented health insurance programs, including health savings accounts. While these measures may help to lower employer costs in the short term, they do little to address some of the long term issues that are causing the problem in the first place, such as the growing number of injuries and chronic health problems that have led to increased insurance claims and rising medical costs.

Wellness Programs for a Healthier Workplace

Another option for employers is to get directly involved in the overall health of their workforce by establishing a wellness program. A wellness program is a set of company policies and procedures that encourage disease prevention and a healthy lifestyle among all staff. Preventive health is an area that has traditionally been overlooked by employers, but has gained more attention recently. The Kaiser survey indicated that a record 27% of employers offering benefits also offered one or more wellness programs. The most popular wellness programs include injury prevention, fitness programs, smoking cessation, and weight loss.



While wellness programs require an initial input of time and resources, they offer numerous benefits that can make it well worth the investment. First of all, they can improve a company's bottom line. Group insurance plans regularly come up for renewal and employers with a large number of claims on their policy or workers with significant risk factors (overweight, smokers, etc.) may see their premiums go up. Studies have shown that wellness programs can reduce claims on health care plans. Providence Health Care in Washington found a 28% reduction after instituting a "wellness challenge" to its employees [1]. In a measure of overall return on investment, DuPont found that they saved \$1.42 for every dollar spent on their wellness program [2].

Of course money is not the only issue. We can all benefit from a healthier lifestyle and a safer work environment. Wellness programs can improve employee morale, increase worker productivity, and lower absenteeism. For example, DuPont found that absenteeism dropped 14% at the forty-one locations where wellness programs were instituted [3]. These benefits, while less immediately tangible, are equally important to building a healthy work environment and improving long-term profitability.

Benefits For Employers	Benefits For Employees
Enhanced employee productivity	Lower levels of stress
Improved health care costs management	Increased well-being, self-image and self-esteem
Decreased rates of illness and injuries	Improved physical fitness, potential weight reduction
Reduced employee absenteeism	Increased stamina
Developed employee leadership skills	Lower out of pocket healthcare expenses
Improved employee morale	Access to smoking cessation and other beneficial programs

Starting A Wellness Program

As with any new initiative, in the beginning there are a lot of questions and the prospect can seem daunting. What should we focus on? Who is going to oversee the project? How are we going to pay for it? These are all valid questions, and the answers will depend on a number of factors, such as the size of your company, the age and make-up of your workforce, etc. While every program is different, you will probably focus on some of the following elements:

- Smoking cessation,
- Weight loss,
- Stress reduction,
- Fitness and dietary habits, and
- Injury prevention, back problems, ergonomics, etc.

Steps To An Effective Wellness Program

Like any workplace initiative, a successful workplace wellness program requires careful planning, commitment, and follow-through. While no situation is exactly alike, there are some basic ingredients that any successful wellness program requires:

1. **Get top management on board.** A wellness program will require a reasonable amount of time and effort, as well as funding. Therefore, it is essential that top executives not only be wholly committed, but set a good example by fully participating.
2. **Establish a wellness team.** Appoint a group of individuals to design, plan, and implement the program. This team should include management, human resources personnel, and representatives from the workforce itself. Not only will this provide valuable input, it will also build support for the program among staff. At a small company, the wellness "team" might be a very small group or even a single individual.
3. **Collect data.** In order to measure the success of any initiative, you must have some form of benchmark to start with. This requires quantifiable data. For a wellness program, this might include an initial health assessment of all employees, as well as examining absentee rates and employee insurance claims.
4. **Goals and objectives.** Create a simple, easy-to-follow plan that has clear goals and objectives. Plan specifics will depend on your staff and specific work environment. Examples of goals and objectives could be collective weight loss, cholesterol lowering targets, or staff participation in exercise classes.
5. **Maintain an accommodating work environment.** Establish flexible time schedules so employees can pursue health-related activities. Consider installing facilities for employees who wish to walk, or bike, to work, or exercise at lunch. Install healthy snacks and juice in breakroom vending machines in place of candy, chips, and soda.
6. **Monitor and adjust.** It will be necessary for the wellness team and management to periodically evaluate program results and make adjustments in areas where they are falling short.

Getting Employees Involved

Holding a meeting and putting up a poster is not enough to get employees involved and keep them interested. Here are a few tips that will help to keep your employees coming back for more:

- Promote a variety of activities.
- Focus on and promote one activity at a time.
- Encourage group activities.
- Establish clear cut guidelines and goals.
- Utilize incentives.
- Make it fun!

[1] Strauss, Steve, "Wellness Programs Keep Health Care Costs Down, Raise Morale," National Federation of Independent Businesses, *Business Tool Box*, July 12, 2005.

[2] Ibid.

[3] Naas, Robert, "DuPont links wellness program to reduced absenteeism," *Business and Health*, December 1992.

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The Cutting Edge: Recent Advances in Natural Gas Appliances

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Through the years, manufacturers of natural gas appliances look for new features, performance, and efficiency improvements to catch the consumer's eye. Times are no different now, though many would argue that a shift toward even higher energy efficiency products is ongoing to satisfy consumers' most current wish lists.



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[Commercial Kitchen Appliance Technology Assessment](#)

[Get Cooking: High Efficiency Gas Equipment Saves Energy](#)

With the passing of the 2005 Energy Policy Act (EPAAct 2005), consumers can claim tax credits for products that meet certain efficiency levels.

For example, water heaters purchased in 2006 or 2007 must have an energy factor of 0.80 or higher in order to qualify for the \$300 tax credit. Only [tankless \(also called instantaneous or demand\) water heaters](#) can meet this standard for natural gas or propane, because their performance isn't dragged down by storage tank losses. The industry has responded by increasing the capacity of tankless water heaters with many new designs exceeding the five gallons per minute range (e.g., [Bosch](#), [Rinnai](#), [Paloma](#), and others), able to meet the demands of two simultaneous showers.

New Venting Options

The last few years have seen new options for venting water heaters. If you have a traditional water heater with a "gravity" vent to exhaust combustion byproducts through the chimney or roof, this is called a basic *atmospheric vent*. *Power-vent* is the same as the atmospheric vent but with a reengineered exhaust system that does not require a chimney, chase, or flue. The power-assisted exhaust water heater can be placed up to 40 feet from where it is vented through a sidewall, allowing considerable installation flexibility. Another option, *direct-vent* units, use no room air at all. Direct-vent water heaters are particularly good for tight construction because they use outside air instead of room air for both combustion and exhaust, so they operate independently of other exhaust systems in the house. If you have airtight construction and are looking for flexible installation, consider a *powered direct-vent* hybrid model that combines the features of power- and direct-vent models.

Vent-Free Advances

Consumers are continuing to push for the convenience of [natural gas vent-free technology](#) in their heating products. Vent-free gas hearth products now include air purification systems, random flame patterns, remote flame height control, extremely-realistic gas logs, and variable speed heating fans. New space heaters are available in both infrared and blue flame technology in several sizes. In addition, a new CSA-approved gas outlet links a standardized plug on an appliance connector to a home's gas supply. This enables the homeowner to unplug a gas BBQ when the grilling is finished, and then plug in a vent-free gas patio heater to add comfort to the outdoor eating area. There are other advances that you can find at [Ventfree.org](#), an association that keeps tabs on the pulse of the industry.

Cooking with Gas

[Portable cooktops](#), [rice cookers](#), and [smokeless griddles](#) are now available in natural gas designs to improve food quality, as well as to reduce cooking time and energy costs, compared to electric.

Safety Enhancements

Beginning July 1, 2003, gas water heater manufacturers were required to provide flammable-vapor-ignition-resistant technology on residential water heaters. The purpose of the legislation was to eliminate the remote possibility of a flammable vapor fire, and is described in an [American Gas Association fact sheet](#) in greater detail. The new design provides customers peace of mind and added safety to help prevent fires that could result from vapors being ignited.

Combination Heating Systems

Natural gas combination water-heating/space-heating units are compact systems that require only one unit to heat water and heat rooms. They are ideal if the space for a water heater and heating system is small. To provide space heating, water is heated by the gas burner and then pumped through a coil of pipe. A fan blows air over this heated coil and the warm air produced is distributed to the house through ducts. The hot water inside the coil is distributed through a separate piping system to the kitchen, bathrooms, and laundry.

These dual-purpose models feature a tank within a tank, one providing hot water for the family and the other providing warm water for a space heating application, such as a radiant floor system. They offer increased energy efficiency and reduced costs for whole house or room heating, plus all the benefits of natural gas water heating.

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Get Energy Savings Working For You

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Energy efficiency programs can benefit an organization in many ways. Aside from being good for the environment, energy efficiency can lower your energy bills, increase profitability, improve your productivity and enhance your public image. Despite these potential benefits, many energy conservation programs fail to achieve their stated goals and objectives. While it is easy for management to set policy, it is much more difficult to get everyone to participate. Since every employee uses energy, a truly successful energy program requires the active participation of everyone in your organization.

To obtain employee commitment to energy efficiency, you must successfully convey to them how it will benefit them, the organization, and the community as a whole. Of course, energy conservation is not just a one time deal. Maintaining employee involvement requires a clear set of goals and objectives, performance measurement, and regular communication. For employees, conserving energy should be more than just a policy statement. It must become a part of their daily work routine through a mixture of incentives, training, and assigned responsibilities.

The following are some suggested approaches that successful companies have taken to increase energy awareness among their employees and improve participation in energy efficiency programs.

Appoint an Energy Team. Depending on the size of the company, this could be one individual or a large committee. Ideally the energy team should draw members from each department and include a representative from top management. Each team member would act as a liaison with employees, conveying energy program goals and objectives, assigning responsibilities, measuring performance, and soliciting feedback. This helps to put a face on the program and provides employees with a channel through which they can participate.

Communicate Regularly. Hold regular meetings to reinforce the importance of energy efficiency. Highlight energy efficiency improvements made thus far and discuss future goals and objectives. Meetings are an excellent time to recognize individual or departmental achievements and awards. Follow-up the meetings with staff e-mails, handouts, or company newsletter features that highlight important information.

Solicit Ideas. Employees will more likely be enthusiastic about an energy efficiency program if they can participate and feel like they are making a contribution. Maintain a suggestion box or other medium through which employees can convey their energy savings ideas. Hold a contest for the best energy saving suggestions and recognize the winners.

Training. Posting energy saving tips in the break room is not enough. Employees must be made aware of the goals and objectives of the energy efficiency program and their role within it. After all, a machinist and an office worker use energy differently and therefore should be trained individually on the best way to minimize their energy use. Another option is to have each employee work with their manager or a member of the energy team to develop an action plan on how they can best conserve energy in their work area.

Host an Energy Fair. Hosting an energy fair can be a fun and effective way to reach employees with information about energy use at work and at home. Some organizations also sponsor energy fairs for customers, suppliers, school groups, and the communities in which they operate. Energy fairs can be formal all-day events, or informal affairs held in cafeterias, lobbies, and other places where employees pass by or gather. Use displays with graphics to show where energy is used in your facility and to highlight energy program goals and achievements. Use the energy fair to recognize energy champions among your staff who have helped to promote energy program goals.

Develop an Energy Intranet Site. Many organizations have a corporate intranet site. These sites are an effective and convenient way to communicate to employees the importance of energy efficiency and to provide information about the company's energy program. When developing an energy intranet site, consider including the following information:

- The goals and objectives of the company energy program.
- Tables or graphics highlighting the energy performance of various departments within the organization. This will help to build a sense of accomplishment and, hopefully, foster an air of competition that will encourage each department to better improve their environmental performance.
- Highlight your company's energy performance improvements as well as individual recognition of energy champions within your organization.
- Include energy saving tips and ideas which your employees can use both at work and in the home. Also, provide tools and information to help your employees procure energy savings equipment.
- Create a suggestion box or other vehicle through which employees can communicate energy efficiency ideas.

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Create Energy Awareness Posters. Energy awareness posters, placed in high traffic areas such as break rooms or near time clocks, can be an effective tool to convey energy efficiency information to employees. Posters can provide energy saving tips and ideas, highlight company energy performance achievements, or recognize individual energy champions. Posters should include strong visual graphics, with short, easy to read text that conveys simple messages.



Hold Contests and Recognize Achievements. Incentives offer a powerful motivation for any employee. Hold contests for the department that can achieve the best energy performance or for individuals that come up with the best energy savings ideas. Offer bonuses and other rewards and recognize winners at meetings or through the company newsletter or other medium.

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Hedging Your Energy Cost Bets

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In a natural gas publication, *Gas Technology*, John Snell, President of [Risk Management Inc.](#), wrote an article, "[Hedging Your Energy Cost Bets](#)." He also made a presentation, "[Building a Retail Energy Risk Management Strategy](#)" at the August 2006 EEI National Accounts Conference. The following article is based on those documents (used with permission).

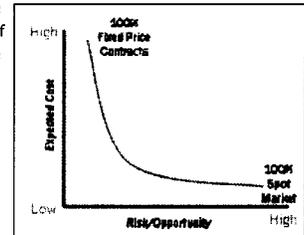
In his *Gas Technology* article, Snell says that "unmanaged [energy] price fluctuations can be highly visible budget busters that flow right through to the bottom line." As a purchasing manager, you are between a rock and a hard place. In rising energy markets, management asks, "Why didn't you buy more when you had the chance?" In falling energy markets, management asks, "Why did you buy at such high prices when you could have waited?" Snell advocates the use of a strategy to minimize price risk, using financial instruments that hedge against price variability and combat second-guessing. How does hedging differ from mere speculation? The following definitions may help answer that question.

- Risk Management: The process of assessing risk, and then developing strategies to manage the risk
- Hedgers: Those who act to reduce market risk for their organization, to reduce the probability that they will be hammered by unexpected large price increases.
- Speculators: Those who are willing to accept risk by betting on up or down price movement, to turn a profit on an energy commodity that they do not use themselves.

Snell outlines a three-step energy procurement process for hedging: define your risk tolerance, develop a price plan, and select price tools.

Define the Organization's Risk Profile

For most organizations, a 50% chance of "losing" is not an acceptable risk. However, the natural gas price rally and subsequent price break in the last year would be equivalent of the Dow Jones going from 10,000 to 25,000 and then back to 10,000. What level of price certainty do we require across our planning horizon? Do we swing for base hits or go for home runs with increased risk of strikeouts? As shown in the graphic to the right, one attempts to get the lowest cost by buying spot, but will also potentially be at risk to the highest prices. A fixed price provides a known and acceptable price, but not necessarily the lowest. To determine your organization's ability to accept energy cost risk, ask yourselves the following questions:



- What percent is energy of the cost of goods sold for our company?
- Can we increase our selling prices on account of energy costs?
- Do we have a competitive market advantage in energy or other areas?
- What are our competitors doing?
- How far forward are our products sold, or our selling prices established?
- At what energy price can we make money in the future?
- Do we need to fix forward costs to justify a capital purchase?
- What is the impact to our business if prices rise or fall 50% in the next twelve or twenty-four months? Is the impact proportionate or skewed?

Develop a Price Plan

In your price plan, you need to clarify your objectives and establish price targets to meet those objectives.

Some possible procurement objectives:

- Buy to meet the budget.
 - Identify and take advantage of opportunities to reduce budgeted costs in successive years.
- Buy to historic value.
 - Establish a forward planning horizon (e.g., 2-5 years); determine prices that represent historical "value," and, when possible, guarantee those prices using long-term contracts.
- Provide price stability.
 - In case the market does not meet established price objectives, set time parameters for purchasing required volumes in advance of the period at risk, in order to reduce price exposure.

Some possible qualitative risk management objectives:

- Manage risks associated with established budgets.
 - Establish quantitative limits on the level of acceptable price risk within the established budget cycle.
- Utilize a portfolio approach.
 - Like an investment portfolio, the risk management plan should be dynamic, reflecting the organization's tolerances, and include a variety of strategic tools for the appropriate time.

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Select Price Tools

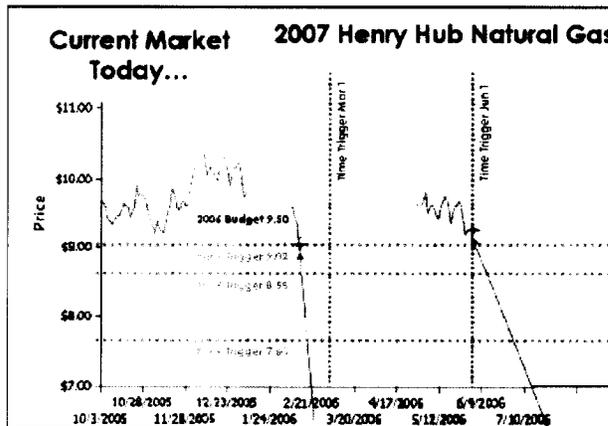
Snell advocates a systematic, disciplined, and structured approach to energy purchasing. He supports a two-pronged approach, based on price targets tied to your budget and a time deadline tied to a budget cycle. First, establish the energy price for annual budgeting purchases. Second, establish **price** triggers below the budget amount, and establish the quantity of energy you will purchase at that price, as shown in the following table. You might choose different trigger prices and quantities to buy than those shown in this example.

Price Triggers 2007 Strip		
2006 Trigger	Trigger Price	Quantity to Buy
Budget	\$9.50	--
-5%	\$9.02	25%
-10%	\$8.55	25%
-20%	\$7.60	25%
-30%	\$6.65	25%

Third, establish **time** triggers and establish the quantity of energy you will purchase at that time, as shown in the following table (example only).

Time Triggers 2007 Strip	
Time Trigger	Quantity to Buy
March 1	25%
June 1	25%
Sept. 1	25%
Dec. 1	25%

The approach is to buy **whenever** a price trigger occurs in a given time period, or at the end of that time period if no price trigger is reached. As shown in the graphic below, one scenario is when the energy price drops down to the first **price trigger** before the first time trigger is reached. You would buy 25% of your energy need at the available price (in this case, \$8.98). Because you reached a price trigger first, you pass on the first time trigger. If the price would continue to fall and reach the second price trigger, you would buy again, even if the first time trigger had not been reached. The scenario continues with energy prices rising above any price triggers until the second **time trigger** occurs. You would then buy 25% more of your energy needs at whatever price was available at that time (in this case, \$9.16). It may be that the energy price has risen far above even your 2006 budget amount. Your disciplined approach requires you to buy anyway. In hindsight, one year from now, that may end up being an attractive price. Because there is uncertainty, this disciplined approach is better than guessing.



Your execution record over that time would be as shown in the table below.

Execution Record			
2007 Trigger	Metric	Quantity Bought	Executed Price
	Price	-5%	25%
	Time	June 1	25%
Totals		50%	\$9.07

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When OSHA Comes Knocking: Surviving an Inspection

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Few employers look forward to the prospect of an inspector from the Occupational Safety and Health Administration (OSHA) showing up at their facility for a surprise inspection. OSHA inspections can sometimes lead to serious costs and legal consequences, including fines, lawsuits, and costly upgrades. Despite this, there is no reason to spend sleepless nights dreading the prospect of an OSHA inspector showing up at your door. The sole purpose of OSHA is to protect the safety and health of your workers. When OSHA inspects a facility, it is usually for a reason. Your best strategy for surviving an unexpected visit is to understand why OSHA inspections typically occur and to take steps to prepare for one.



You Might Also Be Interested In...

[OSHA Recordkeeping Handbook Now Available Online](#)

[Written Hazardous Material Communications Program](#)

[OSHA Requirements for First Aid From the National Safety Council](#)

Why Would OSHA Come To My Facility?

OSHA has limited staff and resources so they, of course, cannot visit every company in their territory. As a result, inspections are typically conducted for a specific purpose or as part of a limited, focused campaign of periodic inspections. The following are some of the most common events that can prompt an OSHA inspection.

- » **Employee Complaints.** An employee complaint will often (depending on the nature of the complaint) trigger a visit from OSHA personnel. Employees typically file a complaint when they see what they perceive as an extreme violation of safety regulations or they feel that there is an imminent threat to their health and safety in the workplace.
- » **Serious Workplace Incident.** Fatalities or serious workplace incidents must be reported to OSHA. Fatalities and certain serious incidents must be reported within eight hours (see [OSHA Regulations 29 CFR 1904](#)). Workplace accidents will also typically prompt an investigation that often includes an inspection.
- » **Follow-Up Visit.** A previous citation might lead to a second visit to ensure compliance.
- » **Program Related.** From time-to-time, OSHA conducts random and routine inspections. Targeted inspection programs are conducted within specific industries identified as high-hazard. In addition, inspection may be conducted for individual companies that have reported particularly high incident rates, missed workdays, etc.

What An OSHA Inspection Involves

A typical OSHA inspection is outlined in OSHA Regulations [29 CFR 1903.7](#). Upon arriving, the OSHA inspector should display his credentials and explain the nature, purpose, and scope of the visit. The first thing the inspector will generally do is ask to examine records, the exact nature of which will depend on the specific industry or reason for the inspection. Typical records might be injury reporting logs, written programs, training records, or employee personnel files.

The inspector will usually want to examine the workplace itself, often taking photographs or environmental samples, if necessary. Interviews with employers and related personnel are also common, depending on the nature of the inspection. At the end of the visit, the inspector will advise the employer of any proposed violations and possible fines or other penalties. The employer will have a chance to respond and present evidence of compliance. If a violation is found, serious penalties can occur. Fines range from nothing for certain minor violations to a possible \$70,000 for willful or repeat violations.

What to Do If OSHA Comes to Your Door

If an OSHA inspector does come to your facility, check his credentials and ascertain the exact nature of the visit. If you are in doubt about the inspector or the visit, contact the local OSHA office to verify. You do have the right to refuse or limit access to your facility or records. Of course, it is always a good idea to cooperate whenever possible. If refused, the inspector may begin a compulsory process, whereby they may obtain a warrant to gain access for the inspection. The details and scope of this process are described in OSHA Regulation [29 CFR 1903.4](#).

Designate a company representative to accompany the inspector throughout the process. Be courteous, but not too talkative. Be careful not to volunteer unnecessarily. Show the inspector only those records and documents that are requested and only those parts of your facility that they ask to see. At the close of the inspection, make sure that you understand the exact outcome and the specific nature of any potential violations. Take notes and ask questions, but don't agree to any proposed violations. You can present evidence of compliance with any proposed violations, but it may be a good idea to consult with upper management and other personnel before responding.

For more information, see the OSHA publication [Employer Rights and Responsibilities Following an Inspection](#).

How to Prepare for (and Hopefully Avoid) an OSHA Inspection

OSHA will rarely give companies the chance to get ready for an inspection, so preparing for one should be an ongoing process. Here are some things you can do.

Designate an OSHA compliance officer. A management level employee should be designated as a specialist in all things OSHA. This could be a full-time job, depending on the size of your facility. This individual should have the training and knowledge necessary to fully understand OSHA policies and requirements. This individual should also be given the authority and resources needed to ensure that all OSHA safety policies are complied with.

Start an in-house complaint program. Institute a program whereby employees are encouraged to report potential OSHA violations or safety hazards to management. Employee complaints often trigger surprise inspections, and this is a good way of heading them off. Make sure that employees are aware that no retaliatory measures will be taken against those who file a complaint. If necessary, institute an anonymous program with a suggestion box for written complaints.

Conduct internal inspections. Your OSHA compliance officer or other personnel should periodically conduct surprise inspections similar in nature to those conducted by OSHA. This will help keep you on your toes and also may help to identify any potential non-compliance issues before they become a problem.

Self regulate. Of course the best way to avoid an OSHA inspection is to comply with all safety policies and regulations. Conduct all training programs required by regulations, and adhere to all OSHA hazardous workplace standards. Make sure that all testing and reporting requirements are met.

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Nicor's Energy News – February 2007

Nicor Gas Online Help Is Only a Click Away

The Nicor Gas Web site is loaded with information designed to help our customers manage their energy needs. Account information, home and business energy audit tools and energy efficiency tips are just a few of the things you can access when you visit www.nicorgas.com.

My Account

With My Account, residential and business customers can easily manage their accounts. After signing up for My Account, customers are able to:

- Pay their bill
- Update their account information
- Sign up for the Budget Plan*
- Make payment arrangements*
- Enroll in Nicor's Auto Payment*
- Check your recent account activity
- Enter a meter read and view meter reading information
- Schedule or check an appointment
- Find a payment center
- View 12 months of your gas use history
- Sign up for e-mail reminders

**Certain restrictions may apply. Visit www.nicorgas.com/myaccount for details.*

Energy Depot

Energy Depot is a free, comprehensive home energy audit tool offering two levels of analysis:

- The **Personal Energy Profile** provides a thorough analysis of your billing history in conjunction with your answers to an online survey regarding your home energy systems and practices. A report specific to your residence is generated.
- The **Home Energy Calculator** calculates the annual energy costs for the complete range of your home energy systems and appliances. A cost analysis is generated without having to complete a full audit.

In addition to the audit tools:

- The **Energy Library** contains more detailed and specific information to address your energy questions and help explain your personal energy saving recommendations.

You'll find Energy Depot at www.nicorgas.com and then click "Managing Your Gas Costs."

Facility Assessment Wizard

Business customers are encouraged to try our free commercial facility energy audit tool, the Online Facility Assessment Wizard. The assessment will uncover a wealth of information that can lower your energy costs, increase efficiency, and improve your bottom line. At the completion of this short 6-step interview process, an online report will be provided to you with a set of recommendations tailored specifically for businesses in your industry segment. The report is personalized to address your facility's needs, challenges and opportunities. The entire process should take no more than 5-10 minutes.

The Assessment Wizard is accessed directly through Nicor's Energy News. In the left navigation menu, hover over "Tools You Can Use" and then click "Facility Assessment Wizard."

Energy Efficiency Tips

The Nicor Gas Web site offers a variety of ways to keep your family comfortable, your energy bills manageable and every room in your home as energy efficient as possible through its energy efficiency tips. You can even download our energy conservation guide, "Keeping the Warmth In and The Cold Out."

For more information, visit www.nicorgas.com and then click "Energy Efficiency Tips."

Nicor Gas Landscaping and Paving Winter Procedures

Everyone likes manicured lawns, smooth sidewalks and nicely paved roadways. At times it is necessary for Nicor Gas to dig up these surfaces to make critical repairs. As much as we'd like to restore these areas to the original condition immediately, the winter cold often delays final restoration until spring.

Depending on weather conditions, in general, Nicor Gas follows its winter landscaping and paving procedures from mid-December until April 1.

During the winter, lawns that are disrupted are simply backfilled and tamped down until the repair can be completed in the spring. Sidewalks and roadways are filled with stone and tamped down. In most instances an asphalt cold patch or cement cap is applied as a temporary fix until hot asphalt or permanent cement can be poured.

Landscaping and paving inquiries can be made by calling Nicor Gas at 1 800 730-6114, ext. 7773.

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- Make payment arrangements*
- Enroll in Nicor's Auto Payment*
- Check your recent account activity
- Enter a meter read and view meter reading information
- Schedule or check an appointment
- Find a payment center
- View 12 months of your gas use history
- Sign up for e-mail reminders

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Lower energy costs
Increased efficiency
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This St. Patrick's Day, How About Buying Green?

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Green purchasing, or environmentally preferable procurement (EPP), is becoming more common than ever among companies interested in social responsibility and burnishing their corporate image. Green purchasing involves incorporating environmental considerations into new and existing procurement practices. The goal is to identify and reduce environmental impacts throughout the supply chain and maximize resource efficiency.

While larger companies have embraced environmental purchasing practices, many smaller and medium-sized organizations have shied away, fearing the extra costs involved. It is true that many environmentally friendly products and services may cost more to purchase, but that is not the whole picture. In analyzing procurement costs, it is helpful to look at the entire life-cycle of the products that you buy. In other words, when making purchasing decisions, it is a good idea to look at how much a product might cost you (and the environment) from beginning to end. This includes raw material extraction, production, packaging, distribution, and disposal.

Looking at it from this angle, you might find that green purchasing can actually save you money through reduced waste, decreased disposal costs, and lower resource consumption. For example, purchasing toner cartridges from a supplier with a take-back program might cost a little more, but it can save in costly disposal fees. Also, procuring bio-based oils and chemicals for cleaning and processing may help to improve the health of your workforce and save on treatment and disposal charges. Of course, as with any purchasing decision, factors such as performance and availability are important.

Life-Cycle Assessment

A life-cycle assessment consists of evaluating a broad spectrum of environmental attributes—the attributes of the product, the manufacturing process, and the manufacturer itself. Selecting the most relevant attributes is dependent upon the commodity or service being purchased, local environmental priorities, and the availability of reliable information. In general, there are five different categories to consider when evaluating the environmental attributes and life-cycle costs of most products and services.

Product Feedstock - What raw materials were used to make the product? Environmentally friendly products should be made (at least partly) from bio-based or recycled materials. Were the materials procured in an environmentally sensitive area or in a manner that may be damaging to the environment?

Production Processes - How was the product made? Does the production process involve a significant amount of waste? Look for products from companies that utilize closed loop manufacturing processes that minimize waste and resource usage. Also, find out if the production process uses renewable forms of energy, such as solar, hydro, or wind. You should also consider factors such as the level of air and water emissions that may result from the production process.

Packaging and Distribution - Is the product packaged in materials (cardboard, plastic, etc.) that are 100% recyclable? In turn, packaging that is made from secondary or recycled materials is preferable. Does distribution of the product require long transport involving extensive use of fossil fuels and potential air or water emissions? Choose products that are manufactured and sold locally or transported with minimum environmental impact.

Usage and Maintenance - Look for products that are durable and repairable, with replacement parts. In the case of equipment and appliances, consider products that can be upgraded, thus avoiding wasteful replacement and disposal. Also, look for physical properties contained in the product that might cause health or environmental concerns through its usage. These might include chemicals with hazardous properties or volatile organic compounds.

End-of-Life and Disposal - Products that end up in a landfill are both costly to dispose of and harmful to the environment. Ask yourself if the product is designed to be recycled or reused at the end of its useful life, or if it is meant to be discarded as waste. Does the product contain hazardous materials or other properties that may make disposal or reuse complicated? Find out if potential suppliers have a take-back program, where products can be returned for recycling or for remanufacturing.

Of course, this type of cost analysis could become much more complex, given the amount and type of products and services under consideration. This article is merely designed as an overview of things to consider as you try to get a better picture of

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[The Great Energy Bill Debate of 2007](#)

[Natural Gas Takes the LEED in Green Building Certification](#)

[Ultraviolet Water Treatment Technology](#)

Did You Know?

Compared to other fossil fuels, natural gas has far lower emission levels of greenhouse gases and other pollutants that cause global warming, smog, and acid rain. Natural gas is seen by many as a cleaner energy choice that can help to address air pollution and other environmental concerns.

For more information, see [Natural Gas and The Environment](#), from the Natural Gas Supply Association.

how green purchasing might impact your organization as a whole.

According to the Environmental Protection Agency (EPA), environmentally preferable products typically have the following characteristics:	
Bio-based	Made from rapidly renewable materials
Biodegradable	Made of recycled content
Carcinogen-free	Minimal packaging and/or manufacturing take back of packaging program
Chlorofluorocarbon (CFC)-free	Persistent, bioaccumulative toxic (PBT)-free
Does not reduce the ability of future generations to meet their own needs	Recyclable
Durable	Reduced green house gas emissions
Energy efficient	Reusable or with reusable parts
Heavy metal free	Resource efficient
Less hazardous	Upgradeable
Locally manufactured	Water efficient
Low volatile organic compound (VOC) content	

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Laundry Operations: Reducing Your Energy Load

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Laundry operations form a critical part of many commercial and institutional facilities, such as hospitals, colleges and universities, and the lodging industry. Laundry rooms are big energy users, and often big wasters of both energy and water. Many facilities have instituted some basic energy saving measures, such as cold water rinse, washing with full-loads, regularly cleaning lint traps, etc. While these steps can have some impact, the truth is that many facilities have left untapped a variety of opportunities to save energy and conserve water in their laundry operations. While some of these measures may require significant upfront cost, they generally offer quick return on investment in lower energy consumption, water and sewer bills, and a cleaner, more efficient laundry operation.



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[Cold Weather Is Coming: Are You Prepared?](#)

[Wireless Diagnostics for Steam Traps](#)

Reduce temperatures. Laundry can be safely and effectively cleaned at lower temperatures. In many facilities, it is common practice to run washers at 160°F. Modern detergents and bleaches allow laundry to be safely washed at 120°F. This can save tremendously on your water-heating bill.

Reuse rinse water. Consider installing a system that recovers rinse water and stores it in a holding tank to be used in later cycles. A micro-filtration system can reduce small particles from the wastewater and make it suitable for reuse. This will not only help to conserve water, but may help to lower wastewater discharge costs.

Success story. Red Lion Hotels in Portland Oregon replaced its twenty-year-old laundry system with a pumped closed-loop system featuring three-phase micro-filtration and water recycling. Although the system increased electric bills and maintenance slightly, it saved over \$40,000 per year in heating, water, and sewer bills, and achieved a simple payback in 4.1 years. See [full case study](#).

Recover heat. A properly installed heat exchanger can recover heat from outgoing wastewater and transfer it to incoming laundry water. This can have a significant impact on water heating costs.

Install ozone laundering. Ozone systems utilize an ozone generator that integrates with your laundry equipment and injects ozone into your wash water, where it acts as a powerful cleaning agent. Ozone systems are effective at colder water temperatures and use shorter wash cycles. They can help save energy and reduce dependence on chemical cleaning agents.



Install equipment controls. Laundry rooms must be air conditioned to ensure worker comfort and safety. Laundry room equipment such as steam tables, however, generates heat that can dramatically increase cooling loads. Consider installing an electrical actuated steam valve and mechanical timer on your steam table. This will ensure that the equipment operates only when in use and will help to lower air conditioning costs.

Success story. Shriners Hospitals for Children in Houston, TX found that their laundry steam table was used for approximately thirty minutes every day, although steam was being fed to the equipment continuously twenty-four hours a day. A steam valve with a mechanical timer was installed to provide heat only when the table was in use. This project saved 2.5 tons of added heat per hour. The facility saved thousands of dollars per year both in steam cost and in chilled-water costs. (Source: U.S. Department of Energy)

Use dryer controls. Look for clothes dryers with a moisture sensor that automatically shuts off the machine when your clothes are dry. Not only will this save energy, it will reduce the wear and tear on clothes from over-drying. The best dryers have moisture sensors in the drum for sensing dryness, while most only infer dryness by sensing the temperature of the exhaust air. Compared with timed drying, you can save about 10% with a temperature sensing control, and 15% with a moisture sensing control.

Use energy efficient equipment. When replacing older washing machines, consider purchasing horizontal axis or "front-loading" machines. These are far more energy (and water) efficient than conventional top-loading, vertical-axis machines. Also, make sure that any new washing machines meet [Energy Star](#) standards for energy efficiency.

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Increasing Boiler Efficiency for Small Condensing Boilers

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Condensing boilers achieve high efficiency by capturing the additional heat released from condensing flue gas (up to 12%–13% of the original energy content of the gas). The condensation of exhaust gases releases the latent heat of vaporization of the water, a more significant source of energy than the transfer of heat by cooling the vapor. Flue gas condensation happens around 130°F (55°C), compared with exiting flue gas temperatures of 250°F–350°F (120°C–180°C) in a standard non-condensing boiler. This requires a larger, more efficient (and more costly) heat exchanger than traditional boilers (Figure 1). The water that condenses out also tends to be acidic because of impurities in the fuel (chiefly sulphur and nitrogen), so it has to be piped away. The relevant parts of the boiler, therefore, have to be constructed of materials that will withstand this acidity. Also, the natural buoyancy of the flue gases is lost when the temperature is brought this low, so it is necessary to have a fan to remove them.

- You Might Also Be Interested In...
- [Lower Your Natural Gas Use Now: Quick and Easy Energy Saving Tips](#)
 - [Boiler Maintenance Strategies That Save Energy](#)
 - [Waste Fluid Energy Recovery System](#)

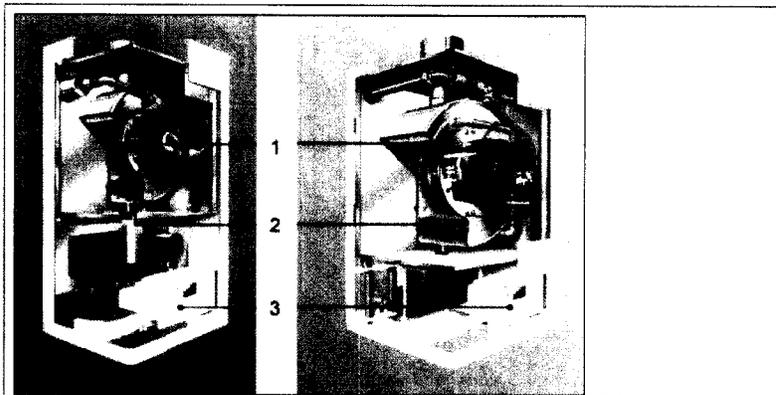


Figure 1. Vitodens 200 Condensing Boiler (courtesy of Viessmann)
1- gas burner; 2- heat exchanger surface; 3- control unit

For flue gas to condense, return water must be below around 140°F. Condensing boilers, therefore, are best suited for low-temperature boiler applications, such as radiant floor heating, swimming pool and spa heating, and facility hot water heating in cold climates. A high-temperature application such as baseboard heating would limit thermal efficiency to 86%–88%, compared to a typical efficiency of 90%–94% for a condensing boiler used in lower temperature applications. While condensing boilers cost more, for the right application they can achieve a payback of five years or less. Condensing boilers typically produce less nitrogen oxide (NOx) while exceeding all current environmental standards.

Peter D'Antonio, founder and president of PCD Engineering Services Inc. (Longmont, CO), published an article, Maximizing Small Boiler Efficiency, in the August 2006 edition of *HVAC Engineering* magazine. He cites two recommendations for small condensing boilers (<500,000 Btuh).

First, use a multiple boiler system sequenced in tandem for loads greater than 200,000 Btuh. The efficiency of a condensing boiler increases as load decreases. A boiler receiving 90°F return water at full load has a thermal efficiency of about 90%. At 25% load, efficiency increases to 97%!

The table below compares the strategy of using two condensing boilers sequenced in tandem and two boilers individually sequenced. It assumes a maximum 400,000 Btuh heating load shared between two 200,000 Btuh condensing boilers. At low loads, you can achieve a 4% thermal efficiency advantage (92% vs. 88%) by tandem sequencing compared to individual sequencing. Seasonal efficiency gains would be even greater.

Load	Individual Sequencing			Tandem Sequencing			Efficiency Gain Using Tandem
	kBtuh	Boiler 1	Boiler 2	Efficiency	Boiler 1	Boiler 2	
100	100 (92%)	Off	92%	50 (95%)	50 (95%)	95%	3%
200	200 (88%)	Off	88%	100 (92%)	100 (92%)	92%	4%
300	200 (88%)	100 (92%)	89.3%	150 (90%)	150 (90%)	90%	1%
400	200 (88%)	200 (88%)	88%	200 (88%)	200 (88%)	88%	0

Second, use a weather compensation strategy (outdoor-air reset), which lowers supply water temperature as outdoor-air temperature goes up. Rather than having a boiler that starts and stops, more exact temperatures are maintained, saving fuel

and money.

Manufacturers

North American manufacturers include [Crown Boiler](#), [Dunkirk Boilers](#), [Heat Transfer Products Inc.](#), [Monitor Products, Inc.](#), [NY Thermal Inc.](#), [Utica Boilers](#), and [Viessmann](#).

Additional Resources

[List of specific boiler models](#) that are higher than 85% AFUE and eligible for the ENERGY STAR. Keep in mind boilers higher than 95% AFUE (GAMA) qualify you for a \$150 federal income tax credit through 2007.

DOE EERE HVAC Best Practices - [Condensing Boilers](#).

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Nicor's Energy News – March 2007

“Know what's below” - new nationwide 811 number

As of April 1, having utilities come out to mark their facilities prior to excavating on municipal or your residents' property will be a little easier – when all you'll have to do is dial “811.”

Receiving more than 20 million calls annually, the United States is currently served by approximately 62 separate one call centers. In Illinois, Joint Utility Locating Information for Excavators (JULIE) serves the entire state (excluding Chicago). Homeowners, government officials, professional excavators and utility companies use these one call centers as a way to notify affected utilities in the area of their intent to dig. The utility companies then mark or locate the approximate location of buried utilities at the proposed excavation site. Municipalities are reminded to contact JULIE prior to any directional boring work as well.

The implementation of 811 is meant to minimize confusion regarding which 800 number to call by providing an easy to remember three digit number.

The nationwide implementation of 811 began in January and will be operational in our area by April 1. JULIE's current number, 800 892-0123 will continue to be operational even after the 811 launch.

The Nicor Gas liaison for JULIE is Mike Bass, Area Manager Locating Services. You can direct any JULIE questions or concerns to Mike at 630 918-0534.

For more information, you can also visit www.illinoisonecall.com or www.call811.com.

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Energy Efficiency Opportunities for Food Retailers

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There are a number of recent innovations that save energy for food retailers. These include refrigeration case door moisture sensors, case covers, fiberoptic and LED lighting, near-floor located ventilation ducting, and secondary loop refrigeration systems.

You Might Also Be Interested In...

[Heat Reclaim from Refrigeration and Air Conditioning](#)

Door Condensation Sensor

[Door Miser](#) uses a patented digital moisture sensor technology that detects moisture at the microscopic level, and then sends a signal to its controller that activates the anti-sweat heaters. Once the threat of condensation is eliminated, Door Miser automatically shuts off the anti-sweat heaters. Running the heaters only when they are really needed saves energy.

Case Covers

Covering refrigeration cases reduces heat transfer into the refrigeration case, thereby reducing power use and maintenance costs. Specific advantages include:

- Reduced refrigeration load and compressor power,
- Improved product temperature maintenance, and
- Increase product shelf life.

Permanent daytime glass or acrylic doors can be used on upright display cases. Wal-Mart claims a 70% energy reduction using doors on refrigeration cases for packaged lunchmeats, cheese, etc. This applies to new case purchases. Retrofitting existing cases with permanent doors does not appear feasible.

An alternative to permanent case doors is the nighttime use of temporary, roll-up covers that can be retrofit on existing cases (vertical/island/bunker/coffin). The covers should have small perforated holes to decrease moisture buildup. Some suppliers claim that aluminum covers are much more effective than plastic covers, and that potential energy savings of 50% can be achieved.



Photo Source: [Lighting Research Center at Rensselaer Polytechnic Institute](#)

[Door Miser, LLC \(Night Shield\)](#)
[SuperMarket Energy Technologies](#)
2445 East Chambers St.
Phoenix, Arizona 85040
602.266.1635

[Eliason Corporation \(Econo Covers\)](#)
Kalamazoo, MI
(800) 828-3655

[Market Group Ventures Inc. \(ECONOFROST\)](#)
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250-743-1222

LED Lighting

[Wal-Mart](#) has experimented with replacing fluorescent lighting with LED lighting, reducing the lighting load in refrigeration cases by 50%. Maintenance costs are virtually eliminated, due to extended life of LEDs (up to 50,000 hours) and the negative impact of disposal of fluorescents (mercury) is eliminated.

[GELcore LLC](#)
6180 Halle Drive
Valley View, Ohio 44125-4635
(216) 606-6555

Fiber optic Lighting

Fiber optic lighting uses glass strands to transmit light from a bulb located outside of the refrigerated case. A single HID bulb light source can replace several fluorescent tubes, greatly reducing maintenance and replacement costs above and beyond the energy savings.

Energy Focus, Inc. retrofitted 109 refrigeration case doors at Brookshire Stores' Flint, Texas store. Thirty-eight [EFO-ICE systems](#) were used to replace 131 fluorescent lamp-and-ballast systems in the cases. The 131 fluorescents were estimated to consume about 17.2 kW (11.5 kW directly and 5.7 kW through added case-cooling load), while the 38 EFO-ICE illuminators consume only about 3.1 kW. The fluorescent system was estimated to consume more than five times as much energy as EFO-ICE. Seafood is another good application, due to the low heat output of fiber optic lights (reducing ice melting and food

spoilage).

Energy Focus, Inc.
32000 Aurora Road
Solon, OH 44139
800-327-7877

SCHOTT North America Inc.
122 Charlton Street
Southbridge, MA 01550
(508)7653235

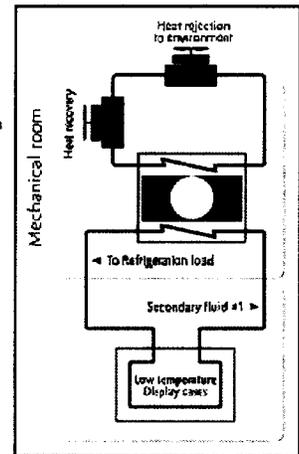
Near-floor Ventilation Ducting

A Wal-Mart Supercenter store has reduced its typical cooling load from 450 tons to 380 tons (16% less) by locating the cooling ductwork about 11' above the floor. The one linear mile of DuctSox fabric duct cools the bottom half of the store where it's needed most. The DuctSox have a linear array of holes that deliver supply air at a draft-less low velocity (eliminating expensive displacement diffusers) and at a moderate temperature of 65-68°F. After gently falling to the floor and mixing with air warmed by occupants and other heat sources, the air rises slowly to the upper levels of the store. Ceiling mounted return registers recycle the air back to the rooftop units, where it is mixed with outdoor air and conditioned again. Supplying air at 65°F allows WalMart to increase the amount of free cooling during the swing months.

DuctSox Corporation
4343 Chavenelle Road
Dubuque, IA 52002
(866) 563-7729

Secondary Loop Refrigeration Systems

Refrigeration accounts for nearly half of all energy use in supermarkets. Present multiplex supermarket refrigeration systems consume approximately 1 to 1.5 million kWh/yr. and may lose annually as much as half of the 3,000 to 5,000 lb. system refrigerant charge. The secondary loop refrigeration system employs fluid loops and a central vapor compression chiller to provide refrigeration to the supermarket display cases, requiring just 300 to 500 lb. of HCFC refrigerant for operation. The system is contained within the store's mechanical room, where it is used to cool a secondary fluid (propylene glycol medium temperature or carbon dioxide low temperature), which, in turn, moves through the store's pipes to the display cases at a much lower pressure than the HCFC refrigerant. A secondary loop system also eliminates evaporator pressure regulators, as well as most thermal expansion valves and other components to further cut maintenance costs. Because the secondary coolant always stays in a liquid state to keep coils fully flooded, it creates a more stable condition that eliminates the product temperature fluctuations common to direct expansion refrigeration systems. A March 2004 report, Investigation of Secondary Loop Supermarket Refrigerations Systems, produced for the California Energy Commission's Public Interest Energy Research (PIER) Program, concluded that the benefit of the secondary loop system as tested over an air-cooled multiplex system was in excess of 15% energy savings. We are aware of installations at Loblaw's Repentigny, Quebec store (with heat reclamation), Wal-Mart's Savannah, GA Sam's Club store, and Clemens Family Market in Kuilpsville, Pa.



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Understanding Peak Demand and Its Impact on Your Energy Bill

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With the summer cooling season approaching, more commercial and industrial facilities will pay attention to peak demand charges on their electric bill. High summer peak loads strain the electric grid, and customers are asked to share in the cost burden of chasing more expensive power. If you only understand the high kW demand charges after the fact, consider proactive strategies to lower your overall energy bill before electric grid capacity puts the strain on your energy budget.

You Might Also Be Interested In...

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[How Do They Do That? Gas Cooling](#)

[Chillers for Cooling & Refrigeration](#)

The two components of an electric bill are driven by energy use (kWh) and system capacity (kW demand). All too often, we focus on the energy use component (cost per kWh), and are surprised when kW demand capacity charges comprise as much as 50% of an electric bill. When this happens, your average cost per kWh doubles, and this can wreak havoc on an energy budget.

What is Peak Demand?

The system demand on power plants that generate electricity varies throughout the year. Generating plants are large fixed assets, so many utilities utilize a strategy of using the largest most economical power plants to meet base load. It is costly to have a large generating plant idled, so electric utilities have been building "peaking" units that are smaller, more flexible, but unfortunately have higher operating costs. The strategy works best if the "peaking" units are only run for short periods, typically in the summer when cooling loads tend to create demand peaks. These peaking units alleviate some of the strain on the electric system supplying the base load.

Electric utilities want to discourage commercial and industrial customers from exacerbating the demand peak, so the rate structure is set up with higher charges that come into effect during these critical periods. These are called peak demand charges. The following table provides an example:

Energy Customer	Energy Use		Peak Demand		Total Monthly Cost	Average Cost per kWh
	kWh	Cost	kW	Cost		
Facility A	25,000 kWh	\$1,250 @ \$0.05/kWh	60 kW	\$600 @ \$10/kW	\$1,850	\$0.074/kWh
Facility B	25,000 kWh	\$1,250 @ \$0.05/kWh	100 kW	\$1,000 @ \$10/kW	\$2,250	\$0.090/kWh

The demand component at Facility B represents almost 45% of its electric bill, nearly doubling its average electric rate from \$0.05/kWh to \$0.09/kWh. Facility A is able to coordinate the use of motors and other large electric loads to lower its peak demand. Since peak demand periods are typically registered in 15 minute increments, the large electric loads are not allowed to run in the same 15 minute periods. These loads are, in effect, distributed over longer periods or shifted to other times to lower the potential strain on the electric grid.

Facility B cannot or chooses not to manage its large electric loads in this manner. If it is a manufacturer trying to meet a tight shipping date, it may not have a choice. Commercial facilities, such as an office building, may also choose not to compromise the comfort of workers during a hot summer day that is pushing its chillers to operate for long periods at full capacity. A hospital, communications facility, brokerage house, and data center are other examples of facilities that may be more limited in shifting large electric loads during critical periods.

One other difficulty in working with peak demand is trying to guess when it will occur. Since individual loads are typically not metered, some guesswork may be required. What is the total kW load of a particular piece of equipment, is it running at full capacity, which billing period is involved, etc? In some cases, electric utilities also charge a higher rate for a coincident peak. There are two demand peaks involved here: the utility system peak and the commercial or industrial customer peak. If the facility happens to peak at the same time as the utility system, the coincident peak demand charges can be quite high.

Strategies to Reduce Demand Charges

The first step is awareness. Becoming educated about peak demand and its effects on your energy bill is absolutely necessary. Look over your past energy bills and then be sure to know about any changes to your rate structure, particularly during the summer peak demand cooling season. In some cases, electrical loads can be shifted to less busy time periods. In other case where the loads cannot be shifted, you might consider some options that do not rely as heavily on electric power. For example, natural gas engine driven chillers can help commercial building owners reduce electric peak demand charges and lower operating expenses. Since cooling is generally the most significant cause of electric demand spikes, gas cooling has the potential to largely minimize or flatten electric peak load in a building. Engine driven chillers are often operated to maximize electric peak shaving. Thus, most facilities with engine driven chillers operate a "hybrid plant," which means that they have installed both an electric and gas powered chiller and operate the gas unit during times of peak electric demand.

Many hospitals, college campuses, large retail centers, and office buildings have gas engine or natural gas absorption chillers in place to control energy costs and to provide redundancy. Applications continue to expand where electric demand rates are

highest due to system capacity constraints, and there a number of potential advantages over ele

Lower Operating Costs — gas powered chillers can be utilized to reduce peak loads in applications with high peak demand charges.

Variable Speed Control — engine speed can be varied to match the cooling load without significant loss in efficiency.

Heat Recovery — during operation, the engine generates waste heat that can be recovered for refrigeration or for process and space heating. This can result in greater operating efficiency than similar electric units.

Fuel Choice — gas engine driven chillers can use natural gas or other sources, such as biogas, to provide cooling and hot water for space conditioning or process applications.

For those applications where biogas is available, engine driven chillers can be run on biogas alone or mixed with natural gas to provide an economical means of providing chilled water. Biogas can be found in wastewater treatment plants, landfills, dairies, animal feed lots, and food processing facilities.

For those applications with high peak demand charges, the economics of standard engine driven or natural gas absorption chillers can provide a favorable return on investment.

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Pipeline Safety Public Awareness

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As a natural gas pipeline operator, Nicor Gas is committed to keeping the public informed regarding pipeline safety and damage prevention. Last November, Nicor Gas began implementation of its **Pipeline Safety Public Awareness Program**. The goal of the program is to raise public awareness about pipeline safety by explaining how our network of underground pipelines operate, why it is important to prevent damage to these pipelines and the actions that can be taken to ensure safety around natural gas pipelines. The program will periodically be measured and refined to ensure that messaging resonates with all stakeholder audiences, including the affected public, emergency officials, public officials and excavators.

Last year's communications efforts included outreach by Nicor Gas Damage Prevention personnel to excavators through various JULIE events, Fire Department Open Houses where materials were distributed to the general public, presentations and fire training made available to fire department personnel by Nicor Gas Regional Community Relations Directors and the development of a [Pipeline Safety page](#) on our Web site. We also created a comprehensive brochure called "What You Need to Know About Pipeline Safety" that was mailed via our monthly bill to all Nicor Gas customers.



Our outreach efforts will continue in 2007. Additionally, the Pipeline Safety brochure will be mailed twice to customers (May and August), as well as to non-customers, excavators and emergency personnel located in the Nicor Gas service territory. You can [download the brochure here](#).

If you would like to request copies of the brochure, or have questions regarding the Nicor Gas Pipeline Safety Public Awareness Program, you can contact the program's administrator, [Steve Grzenia](#) at 630 388-2862.

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Preventive Maintenance Checklist for Air Conditioning Systems

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Refrigerant Circuit and Controls

- Inspect the moisture-liquid indicator to ensure that no moisture is in the system.
- Check for and repair refrigerant and oil leaks around the shaft seal, sight glasses, valve bonnets, flanges, flare connections, and the condenser assembly relief valve.
- Check for and repair leaks at pipe joints on equipment, valves, and instrumentation.
- Check for and repair the source of oil spots on connections or under equipment.
- Inspect the liquid line leaving the strainer.
- Listen to the system operate for a few minutes and determine the cause of any unusual sounds.
- Check all gauges frequently to ensure that design conditions are being met.
- Inspect the tension and alignment of all belts and adjust as needed.
- Lubricate motor bearings and all moving parts.
- Inspect the insulation on suction and liquid lines and replace as necessary.

You Might Also Be Interested In...

[HVAC Systems](#)

[Guidelines for Good Installation Practices of Commercial Air Conditioners](#)

[Packaged Rooftop HVAC Systems](#)

Compressor

- Check for unusual compressor operation, such as continuous running or frequent stopping and starting.
- Listen to the compressor operate for a few minutes and determine the cause of any unusual sounds.
- Check to see that the compressor and motor are securely fastened to the base.
- Check all compressor joints for leakage.
- Inspect instrumentation frequently to ensure that the operating oil pressure and temperature agree with manufacturer's specifications.

Air-Cooled Condenser

- Check the fan belt drive and motor to see if they are properly aligned and lubricated.
- Be sure that refrigerant piping connections to the condenser coil are tight. Check for leaks.
- Clean the face of the condenser coil.
- Determine if hot air is being bypassed from the fan outlet to the coil inlet.

Evaporative Condenser

- Inspect piping joints and check for leaks.
- Check for dirt on the coil surface.
- Inspect the air inlet screen, spray nozzles, water distribution hoses, and the pump screen.
- Check to see if the local water supply leaves surface deposits on the coil.
- Follow the manufacturer's guidelines for fan and pump maintenance.

Water-Cooled Condenser

- Clean condenser shells and tubes.

Cooling Towers

- Conduct a chemical analysis to determine if solid concentrations are being maintained at acceptable levels.
- Check the overflow pipe's clearance from the normal operating water level.
- Listen to the fan and determine the cause of any unusual noise or vibration.
- Inspect the V-belt and the alignment of the fan and motor.
- Follow the manufacturer's guidelines for fan maintenance.
- Check to see if the tower is clean.
- Check to see if the intake strainer is clean.
- Determine if air is bypassed from the tower outlet back to the inlet.
- Inspect spray-filled and gravity-distributed towers for proper nozzle performance. Be sure the nozzles are clean.
- Inspect gravity-distributed towers for even water depth in the distribution basins.
- Monitor the effectiveness of any water-treatment programs.

Chillers

- All large tonnage chillers should be inspected once a year by a trained professional.
- Change compressor oil.
- Check and change refrigerant filters as necessary.
- Check and monitor refrigerant charge.

- Check purge operation in the case of low pressure refrigerants.
- Keep water-side tubing clean and the refrigerant-side free of noncondensables.

Absorption Equipment

- Condenser and absorber tubes should be cleaned annually.
- Clean the strainer and seal tank regularly.
- Lubricate flow valves regularly.
- Replace the rubber diaphragms in the service valves every 3 to 5 years.
- Follow the manufacturer's instructions for proper maintenance.

Self-Contained Units (window and through-the-wall units, heat pumps, etc.)

- Clean evaporator and condenser coils.
- Clean air intake louvers, filters, and controls.
- Keep airflow from units unrestricted.
- Replace worn caulking in openings between the units and windows or wall frames.
- Check the voltage to ensure that unit is operating at full power.
- Follow applicable maintenance guidelines for compressors, condensers, and fans.

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