Savings from efficient energy use fall straight to retailers' bottom line

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By Chris Torline and James E. Megerson

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Decisions in retail store design have historically been driven by one primary factor: increasing revenue by increasing sales. Because of the emphasis placed upon sales volume and because of the difficulty associated with analyzing energy efficiency, there are typically many missed opportunities for cost savings in the design of a new or remodeled store.

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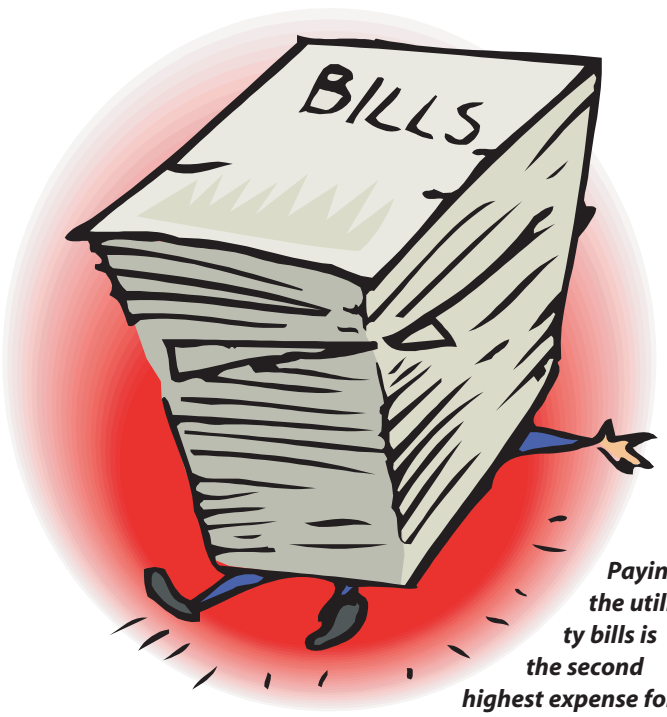

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Evaluating life cycle cost

In order to properly evaluate an energy-efficient system, the life cycle cost of the design must be understood. The actual cost of a system is the initial installed cost, plus the cost of ongoing energy consumption and maintenance. A life cycle cost analysis takes into account the total cost of the equipment over an estimated time frame. What if you are only signing a five-year lease on your new store or you are going into an unproven market where you don't know if the store will make it more than a year? There are still energy efficient options that are financially viable.

Consider the following example:

You are remodeling a 3,000-square-foot store and plan to install new three-lamp 2'x4' fluorescent lighting fixtures. The local energy code will allow you to install 1.2 watts per square foot for general store lighting. Your store operates at 80 lighting burn hours per week, and has a blended electric energy cost of $0.08 per kWh.

There are 28-watt, 4' T8 linear fluorescent lamps available that produce the same light levels as 32-watt 4' T8 lamps, but at a reduction of 4 watts per lamp. The initial cost of the 28-watt lamp is around $2.40, while the 32-watt lamp can be purchased for about $1.30.

The purchase of 111 lamps for your 3,000 square foot store would cost an extra $122 for the energy efficient 28-watt lamps. The fixture cost,

ballast cost, and installation costs are all equal, so they are omitted from this comparison.

The annual electrical energy cost for this example is $1,182 for the 32-watt lamp scenario and $1,034 for the 28-watt lamp. This is an annual energy savings of $148. The simple payback of installing the highly efficient lamps is 10 months.

The cost savings for this measure in one small store seems relatively insignificant, but it begins to add up when used on a larger scale and in conjunction with a comprehensive energy program. If you have 100 stores where you install 28-watt lamps, you will have to pay $12,200 of increased first cost for the 28-watt lamps. But if you consider the actual life cycle cost savings that will occur over the 4.5-year life of the lamps, you have actually saved $66,600. And, your stores only had to be open 10 months for this measure to break even.

Or, if your goal is to increase the lighting level within your store, the reduced energy consumption of the 28-watt lamp would allow you to add extra fixtures and still meet energy code requirements. Note that increased burn hours, higher utility rates, and cooling savings if you are in a warm climate will also increase the annual energy savings of this measure.

Work with your engineer and take the time to share your cost goals so that together you can make good decisions based upon accurate information. Your engineer can help you understand the components of energy efficiency and what options are available.

This is one small example of the types of opportunities that are available when designing the mechanical, electrical, and plumbing systems of your retail stores. Work with your engineer and take the time to share your cost goals so that together you can make good decisions based upon accurate information. Your engineer can help you understand the components of energy efficiency and what options are available.

Understanding energy consumption

There are two factors that determine how energy is consumed in your store: the efficiency of the equipment and how the system is controlled. A compact fluorescent lamp is a more efficient technology than an incandescent lamp, therefore consuming less energy for the same amount of light output. But the equipment efficiency is only part of the equation. System control is the second factor in energy consumption. If a store manager with compact fluorescent lamps leaves his lights on all night long and a manager with the incandescent lamps turns his off when the store is unoccupied, who will have the lower electric bill?

The way a building system is operated and the equipment that is selected are both important factors when trying to reduce operational costs. It doesn't make any sense to install the highest efficiency heating, ventilation, and air conditioning unit available and then not take the time to program the night setback thermostat.

So what is the impact of not programming your thermostat? Consider a 3,000-square-foot retail store located in Kansas City (or a similar climate) that has employees in the store from 9 a.m. to 9:30 p.m., Monday through Saturday and 11 a.m. to 6:30 p.m. on Sunday. Setting back the thermostat 10 degrees in the winter and setting up the thermostat 10 degrees in the summer during unoccupied hours while also allowing for building warm-up, will result in natural gas and electricity savings of more than $800 per year based upon an electricity rate of $0.08 per kWh and $10 per Mcf of natural gas. That savings goes straight to your bottom line.

Efficiency measures for consideration

So what should you be doing as a retailer to optimize the energy efficiency of your store and to increase store profitability? Following are descriptions of several of the most common energy saving measures associated with retail store design:

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■ **Meet energy code requirements**. Energy codes are designed to allow reasonable maximum limitations on energy consumption in buildings, and the laws of the local jurisdiction must be met. Use qualified lighting designers and/or design engineers who understand how to apply the applicable codes to your situation on the first design. It is no more difficult to design an energy-code-compliant system than one that is noncompliant if the regulations are understood. Code compliance will ensure that your systems operate at a minimum efficiency standard, and that you will avoid any headaches, additional costs, and delays when dealing with code enforcement officials.

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Since energy-efficiency items fall within mechanical, electrical, and plumbing engineering design services, the best source of quality information is your design engineer. Develop a working relationship with your engineer so systems are designed to meet both your first cost requirements and your life cycle cost requirements.

■ **Turn it off**. The greatest payback scenario you can get is to reduce energy consumption with little or no additional cost. Turn the lights off when the store is unoccupied. Close the door. Turn off computers and other equipment when possible. Utilize a building control system or seven-day programmable thermostat to setback the HVAC system at night. Install occupancy sensors to shut off lights in low occupancy areas. Put exterior and window display lighting on an astronomical time clock, turning them off during the day as well as during late night hours.

■ **Install an efficient lighting system.** Avoid incandescent lamps and obsolete T12 lamps and magnetic ballasts. Use metal halide, compact fluorescent, or 28-watt linear fluorescent lighting sources. Exit signs and exterior sign lighting should be light emitting diode technology. Consider lowering the ambient light levels within the store. Although the common trend is to install the highest light levels permitted by code, it is possible to create a successful retail space with fewer installed lumens if it is done correctly. Another benefit of reducing the general lighting level throughout the store is that it is easier to create definitive accent lighting.

■ **Evaluate the efficiency of the HVAC system.** All HVAC equipment is designed to meet minimum efficiency standards, but if you are installing new, you have the option to install more efficient equipment. Consider the existing roof-top unit you are thinking about reusing — it may be less efficient than today's standards, it may have had hail damage or clogged fins, or it may soon need compressor replacements or other repairs. It probably does not have a properly working economizer cycle (if it has one at all), or demand controlled ventilation capabilities. Each of these items can greatly impact the efficiency of your HVAC system and should be carefully evaluated before deciding upon the equipment to use. If you are installing a new system, there are efficiency and cost savings that can be obtained with proper ductwork and system design. Properly locate thermostats, sensors, supply diffusers and return air grilles.

■ **Understand and track your energy bill.** Pay your bill on time to avoid penalties. Understand your choices for purchasing energy, such as utilities in deregulated areas or available rate schedules. Ideally, if you can track energy consumption monthly for all your stores you can quickly identify poor performers and identify system problems or billing errors.

■ **Tighten the building envelope.** Maintain close-fitting seals on doors and operable windows, especially large dock doors. Use at least double pane window glass with an ultraviolet reflective coating. Install adequate roof and wall insulation, and use a light colored roof in most climates.

■ **Reduce water consumption.** Fix or replace leaky faucets or running toilets. Install low-flow toilets and aerators on faucets.

■ **Maintain building systems.** Perform regularly scheduled maintenance on your building systems. Change the air filters, and reset the building control system or programmable thermostat with holiday season hours or daylight

saving changes. Pay attention to changes in the HVAC system or uncommon noises so that problems can be identified, and have the equipment serviced as soon as there is a problem.

■ **Promote energy awareness.** Because of the large impact that human control of building systems plays in energy consumption, it is important that company philosophies concerning energy conservation are made known to store managers and employees. Develop and publicize a green and energy-conscious corporate image. Create an atmosphere where store operators understand the financial impact of their actions, so that they give attention to shutting the lights off, closing the door, and setting the programmable thermostats.

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Moving forward

So how do you analyze existing technologies and stay on top of new trends and innovations in energy conservation strategies? Expand your knowledge of energy conservation by reading articles in trade journals and other publications. Make use of manufacturer representatives and online sources to research unfamiliar technologies, and then perform a life cycle cost analysis of proposed equipment.

As part of the Energy Policy Act of 2005 passed by Congress, tax incentives will be available in 2006 for owners or tenants who use energy-efficient designs within their buildings. Additional state incentives or utility rebates may also be available based upon the location of your store, such as the Savings by Design program in California. Take advantage of these programs for energy efficient improvements that can help offset equipment and installation costs.

Since energy-efficiency items fall within mechanical, electrical, and plumbing engineering design services, the best source of quality information is your design engineer. Develop a working relationship with your engineer so systems are designed to meet both your first cost requirements and your life cycle cost requirements. In the end, a successful design is the result of close coordination between the re-tail store owner and the design team. Take a new look at energy conservation in your store's operation, and then collaborate with the experts on your team to achieve a cost effective design that will increase your store's profitability. R

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