



Figure Out Which Energy Management Strategies Work Best

By Tony Shaker



Energy management has moved from the “nice to do” to the “gotta do” realm for North American facilities managers. Luckily, there are a number of new technologies and approaches available to help us. Many of these have been around for years but either the cost/benefit equation hasn’t been right, or we simply have not turned to them because it was more convenient to stick to what we’ve been doing.

It now seems like the equation has changed for good. So, the challenge comes down to figuring out what's the best way to approach energy management within the corporate, budget and technical constraints that we all have to deal with day-in and day-out. There are still many factors to consider to gain the greatest energy savings for the least cost. I've found that the best approach includes a combination of education, operational improvements and real technical change. They can be categorized under a few headings:

- Awareness
- Operational savings
- No-cost, low-cost upgrades
- Business case analysis

Each of these provides energy savings and together they comprise a comprehensive program that will deliver sustained improvements.

There are many more options today than there were just a few years ago.

AWARENESS

Energy awareness is, in some ways, the easiest step, the least expensive and, to most technical building and maintenance managers, the last one that occurs to them. It is essentially a communications program that's roughly equivalent to telling your children at home to turn out the lights. The only difference is that, at work, someone may actually listen to you.

An awareness campaign has the objective of letting building occupants know and understand the consequences of their actions. The tools available to you are the same tools that your company probably uses to communicate with employees about other issues, such as safety or benefits. It can include posters, e-mails, articles, newsletters, even digital signs and events.

Awareness programs are most effective when you take a campaign approach that follows a strategy and uses sustained communications in several media. The campaign should talk about why it's important to conserve energy, and your building's "carbon footprint." Simply, it's a campaign to make people aware of the energy that they consume at work, where energy is being wasted, and how it is harmful to our environment.

It can be tactical, as well. Labels on light switches, or tent cards on conference tables reminding people to turn out the lights when they leave the room can be very effective. Another benefit of an awareness campaign is that it can be helpful to explain changes that are being made to save energy. For instance, why

lights are being changed or why escalators are turned off at night.

Beyond building operations, an awareness campaign can also reap public relations benefits by making an impression on employees and projecting the message that your company is concerned for our planet.

OPERATIONAL SAVINGS

The operational step looks at your HVAC systems as they exist today and how they're being operated. Obviously, the whole issue of preventive and predictive maintenance falls under the operational category. If your facilities equipment is not being maintained at the highest level, you undoubtedly are wasting energy and leaving money on the table.

However, operational savings go beyond just maintenance to include your operating procedures. Are you taking full advantage of the systems' capabilities and flexibilities in order to maximize energy savings? And, are your systems set up to take advantage of the latest thinking in energy savings?

For example, are you using outside air for cooling? Certain buildings don't have the capacity to gain much from outside air because their control systems were set up so that they couldn't mix in any more than 10% of outside air. That was the concept of variable air volume (VAV) systems -- keep everything in. Yet, in most locations there are certain times of the year that buildings are still chilling air while cool outside air is available. Rather than run just 10% outside air, it is more efficient to condition the building with outside air to reduce mechanical cooling. This trend to use outside air to increase efficiency has caught on very rapidly.

Balancing the flow of air and water in the building systems is also important for occupant comfort. Balancing is a relatively simple concept but it is not well understood. Most often, engineers stick to the water side. They will run chilled water at 42 degrees to deliver proper cooling at the end of the duct work. Well, if they balance the air properly to give that person more cooling, they could probably run the water at 44 degrees.

This simple process can deliver big savings, particularly for pumping horsepower. So, pump balancing valves need to be set up properly from the very beginning to get the most efficiency at the least cost.

Demand response programs offered by many utilities represent another operational step that can be taken to reduce energy loads on the system and save money. Some companies have control and monitoring devices that constantly look at electricity use to keep it below some negotiated threshold. The benefit for you is that your company will receive a lower rate. The penalty for non-compliance if you are under a demand response agreement is that, if you exceed the threshold, you will get stuck with the peak rate for the life of the contract or some other stated period.

Some utilities also administer demand management programs themselves. They offer similar incentives but automatically manage your systems remotely.

Other operational considerations include looking at how and when the building is being used.

Consider flexibility in starting and stopping times. An office building that is officially occupied from 8:30 a.m. to 5 p.m. may have control systems that start up at 7 a.m. or 8 a.m. You may not have to do that. On the other end of the day, you may be able to start shutting down the systems at 4 p.m. and let the building coast for the next hour. You can shave 10% to 12% off your peak operating hours, saving energy and wear and tear on the equipment.

Lighting, of course, is another major area, which we'll discuss in more detail below. Many buildings leave virtually all of their office lighting on at night. They'll tell you that it's so the cleaners can



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work at night. You can arrange with your cleaning contractor to have a floor or section cleaned at a time so lighting can be shut off on the floor as they move on. Daytime cleaning may also be an option for some departments.

Outside lighting is another area that can deliver considerable energy savings. Take a look at managing outside lighting, keeping safety in mind, by shutting off outside lighting including ornamental lighting, as well as lights in parking lots and garages.

Step back, take a look at your normal building operations with an eye toward energy and ask, "Are there things that we can do differently that will save energy and are not disruptive or costly?"

LOW-COST, NO-COST UPGRADES

There are many low-cost, no-cost ways to save energy. Probably the easiest, least expensive and least disruptive is to replace your current lamping with high-efficiency lamps. It can be as simple as replacing burned out bulbs with higher-efficiency lamps or it can be part of a floor- or department-level lamp replacement program. I consider this to be no cost because you would be replacing the lamps anyway and the cost of the high-efficiency lamps is less than the energy savings that they deliver over a normal operating lifespan.

A step up from lamp replacement in terms of both initial cost (still low) and the potential for savings is a lighting retrofit program under which you replace light fixtures and rebalast fluorescent to take advantage of the latest technologies on a building- or campus-wide basis. The savings can be extended through the use of lighting controls, motion sensors, dimmers and other devices that also deliver big returns.

One recent innovative approach is power controls for vending machines. They control the power going to vending machines with timers that turn off the compressors. The temperature may rise a bit but you save by not running the compressor all night. The machines recover rapidly in the morning.

BUSINESS CASE ANALYSIS- INVESTMENT GRADE AUDIT

The biggest investment and the highest returns come through a full facilities energy and comfort audit along with a business case analysis. It looks at both the building design and its application. When I say "design and application," I'm referring to the original intent (design) of the building at the time it was constructed in

relation to the current use (application). Certain systems were specified and installed based on the original intent. For instance, an office building that was designed for open cubicles would be affected if the cubicles were replaced by floor-to-ceiling offices and meeting rooms; the same is true of office space that has been converted to retail, or vice versa.

These changes may or may not create significant energy or comfort issues, but the idea is to review the design and the application with an eye towards each capital asset. Once you're sure that you're working with a building that is suited to its use, conduct an investment grade audit. An audit generally involves outside experts, as well as your maintenance organization with the assistance of system vendors. The audit should look at all building systems, analyze their costs and project savings for various upgrades, retrofits and replacements. The audit must answer the questions: What energy does each system consume? Why does it consume it? Why is this piece of equipment here to begin with? Is it still necessary? Is it adequate?

Once you have the audit in hand, you can make decisions about the most cost-effective upgrades. You can also incorporate the findings into your normal maintenance program so you can implement energy management improvements incrementally as you move through your maintenance cycle. The advantage of the plan is that it will let you see how one change may affect another system so that you can group upgrades to avoid negatively affecting the rest of the system.

Based on the audit, you can develop a business case for major systems that presents a cost/benefit analysis for financial managers of capital investments and the energy savings that can be expected. You could show, for instance, that if you put in a building automation system, you could save 10% by controlling the equipment start and stop times to meet new usage patterns and project an ROI based on that; or, that by replacing older motors with high-efficiency motors or installing more efficient chiller equipment you would have a predictable ROI over a set period.

ENERGY MANAGEMENT IN THE MAINSTREAM

Energy management has moved to the mainstream. It is our obligation to understand how we can conserve, not only to benefit the environment, but also to impact our bottom lines. There are many more options today than there were just a few years ago. Research these options. Make sure to check with your energy suppliers and government agencies to see what programs, incentives and grants are available. In today's world, we're not doing our jobs if we're not actively searching for ways to conserve.

Tony Shaker is vice president, operations and maintenance, for UNICCO Service Co., an AFE Global Technical Partner. He does extensive consulting with UNICCO customers on predictive and preventive maintenance, energy management and building system upgrades and retrofits. For more information visit www.unicco.com.

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