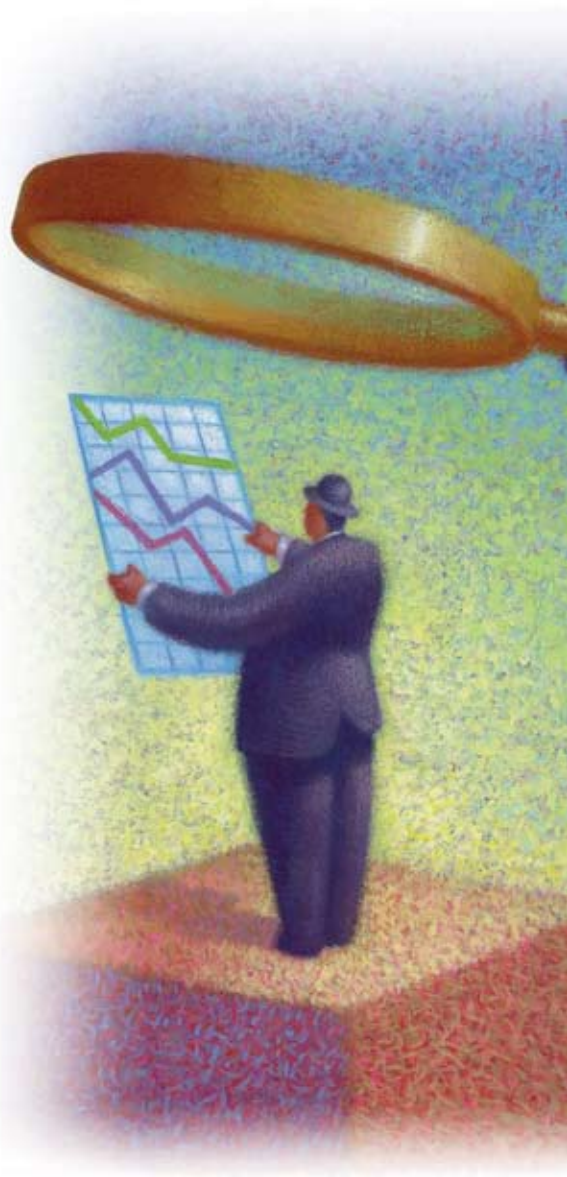
# FROM AUDIT TO ACTION

## Five steps can help ensure that energy investments hit their bottom-line targets



**BY RICHARD G. LUBINSKI**

Energy conservation is the most abundant and least expensive form of energy supply available. Proven energy conservation measures provide cost-effective means to reduce a building's energy consumption by 5 to 50 percent and still provide an attractive return on investment (ROI) and positive net present value (NPV). Energy conservation measures can also make buildings more valuable. When a building produces higher bottom line profits and ROI for its owner, it also enjoys asset appreciation due to better business cash flows.

But that doesn't mean that all ideas to save energy are good ones. There is a business risk involved in jumping at the first proposal to reduce energy costs, particularly when that proposal comes from a vendor or contractor with a vested interest in selling a specific type of product. The only way to determine the most profitable path to energy efficiency is to conduct a careful analysis of opportunities and gains. To do that, facility executives should analyze a building's energy efficiency options and the ROIs for each. If there isn't the right level of expertise in house, it's worth considering an independent energy consultant, one without any connection to a product or service. One good source for independent energy advice is a Certified Energy Manager or CEM.

Here's what to consider.

### 1. LOOK AT THE NUMBERS

The first step is an objective review of utility billing history including consumption and costs. This step looks at the building with the eyes of a CFO plus an understanding of the building's operating requirements. Take a close look at the building's hours of operation, mechanical, electrical and plumbing systems, and existing control measures to better understand why and where the building uses energy. The idea is to identify energy costs for HVAC, motors, lighting, plug load

(equipment that is plugged in, such as computers, printers, copiers, etc.), natural gas and water use. Having 12 to 36 months of data shows trends in the utility monthly energy consumption from winter to summer.

The hard way is to gather this data from paid utility bills. The easy way is to get the information from each utility vendor.

Next, facility executives should benchmark the building with others of similar size and type in the same geographic region. Company records, the free, online ENERGY STAR Portfolio Manager tool, the Information Exchange from the Building Owners and Managers Association (BOMA) International, and other databases can be helpful. The ENERGY STAR model converts all energy types (electricity, natural gas, oil, district chilled water, district steam and any other fuel) to BTUs and then uses the metric BTUs per square foot. This takes utility rates and costs out of the picture and provides a better apples-to-apples comparison.

Benchmarking buildings by BTUs per square foot also helps set priorities within a portfolio of buildings. An independent energy consultant and an internal energy champion can work together to create a meaningful picture of the building's energy consumption.

## 2. DO AN ENERGY AUDIT

While everyone knows what an energy audit is, most facility executives don't have the time or expertise to do it themselves, and therefore hire a firm. A level 1 energy audit focuses on low- and no-cost energy efficiency measures and operational improvements and provides great ROI for its moderate cost. This is usually the best place to start an energy management effort.

A specialized version of a level 1 energy audit is called retrocommissioning. This type of study focuses on the building's HVAC systems, controls, and operation and maintenance issues. Retrocommissioning also examines the way the building was designed to operate and compares it with the way the building is actually running. It also reviews whether the HVAC system is working properly.

For more information on using net present value analysis and other tips for selling energy projects to the CFO, see **WWW.FACILITIESNET.COM/BOM/ARTICLE.ASP?ID=8224**

Retrocommissioning can appear to be expensive but it usually generates energy cost savings that pay for related repairs in one or two years (50 to 100 percent ROI).

A level 2 energy audit focuses on specific energy efficiency measures that require some capital investments but yield an attractive ROI. This type of audit is for sophisticated organizations that understand the basics of energy efficiency measures and have capital available for energy-related investments. These types of organizations will always want to know the investment performance that can be expected from specific efficiency steps in the building being studied. A level 2 audit can logically follow a level 1 audit.

A level 3 energy audit is an investment-grade engineering study conducted after capital investment dollars are budgeted and the organization can justify a comprehensive study of all major energy savings opportunities in a building. This audit is for buildings that can economically justify such a detailed engineering study. A level 3 energy audit is performed for major capital investments, like those involved with an energy savings performance contract. The level 3 energy audit examines the who, what, where, when and why of each energy efficiency measure.

The cost of each type of energy audit varies and can increase from one level to the next by a factor of ten or more depending on what is included in the scope of work.

For all energy efficiency measures, check prior performance, actual savings and references. Avoid experimental devices and services. After the technology is proven and debugged it is generally a safer investment because the price drops as efficiency steps become more mainstream.

How much should be invested in efficiency? That depends on the organization's ROI criteria and a common sense evaluation of the potential financial outcome. A simple budgeting tool is to calculate some "what ifs." What if 20 percent of the present utility cost (yielding a specific amount annual savings) could be saved by measures producing a simple payback of a given number of years or less? If that is the case, then a specific range of investment is possible. By changing the "what if" numbers, facility executives can get a sense of what options will be possible.

Facility executives may also be surprised by other bonus benefits, like better comfort, better lighting, improved productivity and less impact on the environment. A slight improvement in worker productivity can pay for major investments in buildings. But these intangible benefits should not be included in the financial calculations because they're difficult to measure.

## 3. SHOW ME THE MONEY

Every energy efficiency measure, along with the energy audit itself, should be justified based on the company's ROI criteria and discount rate for net present value calculations. Conservative energy engineering assumptions and rates should be used to guarantee that the project performs as expected. Top management rarely trusts vendor energy-savings numbers because

# WHEN JUSTIFYING AN UPGRADE, USE HARD COSTS, CONSERVATIVE ASSUMPTIONS

they tend to favor the vendor's side of the table to make the project look more attractive.

It is common to package various energy efficiency measures together to balance steps having a payback of one year or less and ones with longer payback periods. The more attractive efficiency measures help pay for other worthwhile projects with a longer payback period. The key is to focus on major energy savings opportunities and not settle for small capital expenditure projects with attractive ROIs.

## PACKAGE LOW COST UPGRADES WITH INVESTMENTS THAT HAVE LONGER ROI

The life-cycle cost analysis and net present value calculations provide a better picture of the value of the investment over time. Considering the cost savings over five years, 10 years, 15 years or even 20 years provides a more legitimate assessment of the project's value over time than a simple payback period method.

Vendors generally include operation and maintenance (O&M) savings as part of the project cost savings. Sometimes this is legitimate, but other times it presents a misleading view of the real cash flow. It is best to acknowledge the O&M savings but not include them in the financial analysis. It may be worthwhile to put together an alternative view of the project with O&M savings taken into consideration but the focus should be on the more conservative financial analysis involving energy savings only.

It is important to recognize the difference between the average value of energy units consumed and saved and the incremental value of those units. While the average cost per kWh might be 12 cents, the real value of the kWh saved could be the incremental value which would be lower, say 10 cents per kWh. The incremental value or cost is the cost of the last kWh purchased or saved from the monthly bill. The cost of the first kWh purchased each month is more expensive than the last kWh purchased. The calculation is specific to an organization's electricity tariff

and where it falls within the tariff. In deregulated markets, the calculation is a little more complicated.

If you can't calculate the incremental value, another approach is to use the average cost of energy and reduce the projected energy savings by 10 percent to help ensure that the ROI presented to management is conservative and that the project will make its numbers.

## 4. GET IT DONE RIGHT

Plans, specifications, bids and performance guarantees get the energy efficiency measures ready for final consideration. Energy savings guarantees, if offered by a vendor, should be understood and fully documented, including the method used to measure the energy savings results vs. the base period.

If there are utility or state energy office rebates for energy improvements, they should be added to the analysis to determine the net capital investment. Care should be exercised to make sure the rebate process is followed and pre-approval is sought before the organization commits to the energy project.

Always use conservative assumptions for energy cost, operating hours and energy savings when proposing energy projects. While this conservative approach may well lengthen the simple payback period, it helps guarantee that the estimated savings will be achieved. It is far better to report that an energy project exceeded savings projections than to try to explain why it did not make the numbers.

Good project management will keep the process on track and ensure that the scope of work has been completed — that improvements are properly commissioned, documentation supplied, user training provided and warranties delivered before final payments and sign offs. Just because a vendor says it is finished does not mean it actually is — check to be sure the scope of work is complete and all documentation is provided.

## 5. MEASURE, VERIFY AND SPREAD THE NEWS

After project completion, it is important to track monthly utility bills against the estimated savings in electrical consumption (kWh), electrical demand (kW), natural gas consumption (therms, Dths, CCF or MCF), water consumption, etc. The simple method is to ignore everything but the billing data and note if year-over-year monthly consumption data changes. Facility executives can also develop an even more sophisticated measurement and verification report by considering other factors like heating or cooling degree days and other changes in the building, such as operating hours, or equipment added or removed. To do that, a small energy model will be needed because a change in cooling degree days for a given month does not affect the entire electricity bill. A certified energy manager can document the normal historical impact of changes in heating and cooling degree days on a building. While heating and cooling degree days affect the HVAC load and cost, they have no impact on the electricity associated with lighting, pumps and plug load.

Not interested in tracking the results? Then it does not matter how much is invested or how it is invested, because no one will be keeping score. If facility executives do plan to keep score, then all the numbers matter and reputations are on the line. Consistent performance produces confidence, builds reputations and opens the door for future investments.

The measurement and verification results should be shared with the building management team and top management. At this point, facility executives will see the value of conservative energy engineering assumptions and conservative values for energy units saved. No one likes to report that the energy project is producing less than expected. It is better to sell an energy project with a slightly longer projected payback period and later be in a position to report that the project is saving 125 percent of the expected total. Energy consultants and vendors looking after the owner's interest and having long-term relationships understand the need to use conservative assumptions.

There can be a public relations benefit to improving building energy efficiency. The ENERGY STAR program will provide a plaque if the building is in the top 25 percent of like buildings in terms of BTUs per square foot. Energy efficiency is a good example of environmental responsibility, which can resonate with employees and potential tenants. An energy efficiency project also helps the local utility companies better manage peak load and capital investments. If energy management is successfully implemented and widespread, it can actually reduce the cost of energy. BOM

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