GET REAL ON CAMPUS ENERGY CO$TS

BY KARLA HIGNITE

In the battle for energy project funding, you must develop realistic utility infrastructure plans and budgets and seek creative funding solutions.

Rising utility costs and uncontrollable fluctuations in utility prices are having a big impact on college and university energy budgets across the country. But the issues affecting higher education energy management run much deeper than that.

According to Mohammad Qayoumi, vice president and chief financial officer for California State University, Northridge, colleges and universities are dependent on electric power sources now more than ever, in part because of Internet endeavors such as distance education. The implication? Power quality and power reliability play a huge role not only in an institution's energy budget but also in its ability to fulfill its academic mission. Hand in hand with campus expansion—whether new facilities, new technology or research initiatives, or growth in enrollment—is an increased possibility for corruption of systems because of power failures resulting from increased demand. And power reliability doesn't come cheap, says Qayoumi. Major cost implications are associated with having the kinds of systems in place that ensure 99.999 percent or greater reliability for users 24/7.

Add to this mix a much closer relationship between utilities costs as compared to 20 or 30 years ago. In the past, the prices of different utilities could function more independently, says Qayoumi. Even in the 1970s when the cost of oil and natural gas skyrocketed in the United States, electricity remained fairly constant. Now natural gas, growing as a primary fuel for electricity, plays a critical role in electricity costs. Deregulation and compliance with environmental standards also complicate energy management issues for today's business officer, says Qayoumi.

During a recent two-part NACUBO educational audioconference on campus energy management issues, Qayoumi was among five panelists sharing insight from their experiences. Other panelists included Charles Sturtz, vice president of administrative affairs at the University of Maryland, College Park; Duane Stucky, vice president for finance and administration at Middle Tennessee State University (MTSU), Murfreesboro; Joseph Whitefield, director for the Center for Energy Efficiency at MTSU; and Jerry Preston, executive director of the office of facilities development for the Tennessee Board of Regents, Nashville. Both audioconferences were facilitated by NACUBO Senior Fellow Gerald Schaffer, a Gainesville, Florida-based consultant, and were sponsored by Alliant Energy Integrated Services, an energy provider helping customers make decisions about energy use, purchasing, financing, and compliance. (See sidebar, "Counting Costs and Benefits.")

The consensus among panelists: The complexity of interrelated energy management factors means that business officers have to be more closely involved in assessing and communicating the impacts of energy on campus maintenance and operations and utility budgets. Business officers also must identify appropriate energy initiatives, develop realistic utility infrastructure plans and budgets, and seek creative funding solutions.

Match Energy Needs With Institution Mission

No matter what size the institution, a CFO must always be able to explain the budget in general and its impacts in particular for both internal and external audiences, says Charles Sturtz. This entails communicating the primary drivers of your budget and how efficiencies are gained by capital improvements. Since utilities infrastructure is such a large piece of a college or university budget, the CFO must also defend against claims and criticisms during the budget-building process as energy interests compete with academic interests for funding, says Sturtz. The best defense may be explaining the institution's energy budget in connection with its mission.

"Institution mission has an extraordinary impact on utilities, and vice versa," says Sturtz. The University of Maryland's current 20-year master plan calls for adding 8 million square feet. Only 10 years ago when the university's plan projected a 4 million square foot addition to inventory, virtually nothing was mentioned about associated utility costs, says Sturtz. "When we had consultants look at our electric, water, and HVAC systems, they told us we couldn't get very far without a $45 million investment and that, ideally, we should plan for $75 million to convert our whole system from a central heating plant to a tri-generation facility which produces 25 MW of electricity, chilled water, and

EVALUATING MOTIVES

As important as engaging in an energy initiative is determining its primary motivations so that you can be fully effective carrying it out. Included below is a simple tool from Joseph Whitefield, director of the Center for Energy Efficiency at the Middle Tennessee State University, Murfreesboro, for assessing the motivations behind a given project. Consider the statements and issues carefully, rating each motive statement in terms of importance to your organization by circling one number of the rating scale, where "0" indicates "not at all important" and "5" indicates "extremely important." While some overlap will likely occur among statements, the differences are important to note when structuring your energy initiative since they can help you remain true to your primary motivations.

ENERGY MANAGEMENT MOTIVATION EVALUATION FORM

MOTIVE STATEMENT	PRIMARY ISSUES BEHIND THE MOTIVE	RATING SCALE					
Reduce energy consumption	Environmental, political	0	1	2	3	4	5
Reduce energy/energy-related costs	Financial	0	1	2	3	4	5
Reduce peak energy demand	Utility infrastructure capacity/reliability	0	1	2	3	4	5
Reduce deferred maintenance/augment capital maintenance	Facilities maintenance (operations and maintenance and capital maintenance issues)	0	1	2	3	4	5
Demonstrate technologies/processes	Innovation and research and development	0	1	2	3	4	5
Other (list other motivations)	Other (list other issues)	0	1	2	3	4	5

Source: Middle Tennessee State University, 2002

ENERGY MANAGEMENT MEETS DEFERRED MAINTENANCE

BY JOSEPH WHITEFIELD

The condition of deteriorating facilities brought on by inadequate funding over time for larger capital maintenance needs is frequently referred to as *deferred maintenance.* For any institution, the effects of deferred maintenance may be compounded by modernization and code issues, poor routine maintenance practices, poor operating conditions, and poor design or construction practices that seem to plague a facility forever. The fundamental problem resulting from deferred maintenance is an inability to provide functional, reliable, safe, clean, and environmentally controlled facilities for campus tenants and the public.

The importance of deferred maintenance is not its estimated value but the liability it represents. Major equipment breakdowns, system failures, and plant shutdowns—typically at the most inopportune times—become more common. Not only are building systems at risk for damage, but building contents and people may also be at increased risk. The day-to-day impacts of deferred maintenance are felt physically by building occupants and financially in both the maintenance and operations and utilities budgets.

At Middle Tennessee State University, we estimate our campus deferred maintenance needs in excess of $75 million. For our energy program to be effective in meeting the higher motives of energy and environmental stewardship, financial responsibility, and academic mission support, we must account for the deferred maintenance condition of our campus in every project and initiative. What follows is a partial list of considerations we use when developing a project. The list may be beneficial for other colleges and universities as well.

Capital investment emphasis. Energy-related project economics considering paybacks and cash flows typically involve the capital investment, operational and energy savings, and other soft factors such as avoided costs. While each component is important to the overall performance of the project, the capital investment in deteriorating facility systems is particularly important to a campus suffering from severe deferred maintenance. Projects that provide incentives to invest in the more costly, but more needed, replacement of these facility systems can provide energy benefits as well as some deferred maintenance relief. Energy Service Company profits applied to capital investment rather than a percentage of savings is a simple example of one such incentive strategy.

Life cycle costing considerations. Don't lose sight of the soft economic benefits that aren't reflected in the capital investment (debt service), energy savings (revenue source) cash-flow models of typical off-budget energy projects. The avoided capital costs of equipment replacements and system upgrades as well as other maintenance and operations savings are real to a campus where budgets are insufficient to accomplish needed capital maintenance.

Project bundling strategies. Energy cost savings measures (ECSMs) involving older systems and technologies typically will not yield the more attractive economic paybacks. Selectively combining or bundling these ECSMs with other more attractive ECSMs produces an overall project scope and net economic payback that allows the deferred maintenance-oriented ECSM to be accomplished. While these projects often benefit from the economies of scale associated with larger projects, they may suffer as a consolidation of smaller projects in various locations. Sound bundling strategies that account for the challenges as well as the benefits are important.

Energy efficient design of new buildings. With all the emphasis on retrofit-type projects, it's important to review the planning, design, and construction processes for any new buildings for energy, maintenance, and operations performance. Any campus should require designers to provide an energy report detailing expected system descriptions and performance expectations, utilities costs, special operating conditions, energy management routines, metering considerations, and commissioning plans. This can prevent new buildings from becoming instant candidates for energy-related retrofit projects.

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steam for heating and cooling."

The lesson for Maryland: "You can't limp along without a long-term detailed utility infrastructure plan that supports your operations," says Sturtz. Otherwise, the unexpected costs from your operations will ultimately have an adverse impact on mission fulfillment when you find you can't pay the bills to keep your state-of-the-art research facilities up and running.

Articulate Energy Project Motives

"The whole idea of utilities master planning is very important because we're talking about major investments, and many in the academic areas don't understand the depth of infrastructure *support* required to keep facilities functioning," says Qayoumi. "We're talking about major expenditures and long-term decisions. Not only does it cost a lot of money now to build that new facility, but the choices about how you set it up and how you supply energy sources have major implications for operating costs for the next 30 or 40 years."

A utilities master plan must begin with a careful review of your campus facility land use plan so you can get a handle on your projected physical growth during a 30-year period, says Sturtz. You also need to factor in expectations about growth in campus enrollment and research, he adds. For instance, if you have an enrollment growth projection, you can do a square-foot-per-student/faculty estimate to arrive at a projected utilities cost.

Whatever energy initiative you consider, question whether the project design fits with the needs and desires of your campus, says Joseph Whitefield. Is your primary motivation environmental—to reduce consumption? Financial—to reduce energy costs? Or technological—to demonstrate new processes? Make sure your projects reflect your motives, Whitefield urges.

Assess Existing Structures

While energy initiatives associated with new construction may be at the top of your list, don't forget to assess the condition of your existing plant, says Qayoumi. How old are your boilers, substations, and distribution system? Are these optimized? Do you need to upgrade existing systems?

Whitefield concurs. Taking a look at your central plant often provides opportunities for easy savings through distribution system efficiencies, operational improvements, changes in how you stage energy, and fuel purchasing opportunities. Even the small stuff such as upgraded insulation in older campus buildings can contribute significant savings, Whitefield notes.

Keep in mind that from an engineering perspective, you need to define up front what you mean by savings—whether energy savings or energy cost savings, says Whitefield. When faced with a large project such as replacing a central plant, think in terms of the end of its useful life and add that to the cost factor. "A rule of thumb we like to use is to estimate the useful life of the project to be 1.5 times the payback of the project," Whitefield says. "So, if the payback is 8 years, we aim for a useful life of 12 years."

Prioritize Energy Endeavors

MTSU recently engaged in a major overhaul of its central plant that included a capital investment of close to $11 million in co-generation. The co-generation plant produces 50 percent of MTSU's power needs, for which the estimated annual savings ranges from $1 million to $1.3 million, says Stucky. By MTSU calculations, that $1 million savings allows the university to pursue about $10 million in improvements, so it's important to think not only about capital outlay but about aborted costs as well, says Stucky. "We are a rapidly expanding campus, so even though our utilities budget continues to increase, we estimate that our co-generation plant is saving us about 17 percent on our energy costs compared to what we would pay without it."

With its central plant overhaul complete, MTSU is now focused on deferred maintenance as its predominant energy-related initiative. (See sidebar, "Energy Management Meets Deferred Maintenance.") Currently MTSU is halfway through identifying $5 million in projects that combine energy initiatives with academic needs.

Particularly important is what you do to retrofit a building so that occupants will see the change and feel better about the building, says Stucky. "Building occupants have certain expectations about how facilities should operate," Whitefield adds. "When you talk about reducing consumption, you have to do it in such a way that the occupants don't think you're inconveniencing them."

Seek a Range of Funding Options

Once you've convinced internal audiences of the need for a particular energy project, finding appropriate funding sources will require innovative thinking. For routine energy management, joining one or more consortia may be a good way to purchase energy at reduced costs. A little research into providers of green technologies may also uncover alternative funding sources, says Qayoumi. And, of course, energy-specific programs are likely offered through your state. For instance, Qayoumi points out, campuses in California can buy natural gas as part of a state contract that allows for economies of scale in purchasing.

State bond programs also provide funding sources. The Tennessee State School Bonds Authority sells revenue bonds that provide a capital mechanism and front-end funding of energy projects. The state also sponsors specific energy-saving projects. With some federal backing, the Tennessee Board of Regents set up a revolving loan fund for energy-specific initiatives. Also, a state-wide chiller replacement program has been established where the state funds up to 60 percent of each new chiller for campuses, with the remainder being paid by energy savings.

Where states aren't able to back energy-related capital investment or retrofit initiatives, institutions can also look to partner with for-profit providers. It took the University of Maryland five years to do a thorough RFP to identify a partner to implement and operate system improvements, but the payout was worth the wait. The university now has two companies willing to stay with the institution for the next 20 years to help finance the upgrade of campus systems, says Sturtz. "The projected energy cost savings in the Maryland plan will more than amortize the $75 million of debt incurred to make the improvements."

But where states are viable funding sources, colleges and universities would do well to document the projected savings of a given energy initiative and link that to other capital outlays. According to Jerry Preston, the biggest hurdle with receiving Tennessee state funding for the replacement of central plants may have to do with the size and amount of funding required. The Tennessee Board of Regents—one of two systems in the state providing oversight of postsecondary institutions—leans toward funding academic programs first. "With funding as short as it is nationwide, a pretty stiff competition exists for outlay and capi-

COUNTING COSTS AND BENEFITS

While the largest colleges and universities stand to save in the millions of dollars annually from energy and utilities management initiatives, much work is being done even at the smallest liberal arts colleges across the country, with impacts on budgets that are equally significant, according to Darcy Immerman. The vice president of business development for Alliant Energy Integrated Services says that the success of any energy project hinges on getting relevant stakeholders talking. This list includes finance, key administrative, physical plant, engineering, and safety and security staff—the importance of the latter made much more evident since September 11.

Once all the players are in the same room, pose a series of questions, says Immerman. Following is her checklist of key considerations for calculating the cost and benefits of any energy project.

- **Condition.** What is the realistic condition of your existing buildings? Many faculty and administrators have an idealistic view of facility performance. If you want to implement energy savings as a way to improve the condition of your buildings but you haven't kept up with routine maintenance for 20 years, then don't expect an energy retrofit to offset all your problems.

- **Construction.** What new construction is on the books of your institution's master plan for the next 5-20 years? If proposing an energy project, understand what your limits are for both the short and long term. It's easy to build bricks and mortar (your first cost), but ongoing maintenance and operation costs for the long term are more difficult to calculate, though just as important.

- **Competition.** Is your institution successfully competing for student market share by providing state-of-the-art equipment and research facilities, or does the high cost of running your buildings preclude you from keeping pace with advances in technology?

- **Commodity.** How are you currently buying energy? Where are you buying it? And how are you using it once you get it? If you're wasting energy and money because of inefficient lighting, does it make most sense for you to first negotiate a better rate on your commodity or reduce demand?

- **Communication.** How are you communicating the impact of your energy decisions to students, faculty, alumni, and board members? Are they more interested in the technical aspect (efficiency through use of better technologies), a green message (reducing environmental footprint by reducing demand), or both? Whatever the emphasis, communicate the positive aspects of a project and why a particular energy initiative is a good thing.

- **Capital.** Where's the money coming from? Preservation of capital is increasingly difficult for most colleges, and some can't use outside funding. Finding creative ways to finance is extremely important in the face of decreasing student populations, increasing tuitions, rising building costs, and aging facilities. Working out how you'll deal with a particular initiative from an investment standpoint should happen before you talk about the technical aspects of a project.

- **Complexity.** Is your institution composed of a dozen autonomous campus administrations—each of which must be convinced separately about the value of the project—or do all decisions flow through one central administration? It's essential to prepare to discuss the benefits of a particular initiative—and to understand the complexity of the decision-making process you face. Likewise, whether organizing information for an RFP or an internal committee, be sure to use terminology that people understand and to link your message with your institution's mission.

tal dollars," says Preston. "If we have a request for funding for a central plant, that can take a large portion away from other campus systems, so it has a hard time competing."

The Tennessee Board of Regents is now also engaging in performance contracting with institutions as one more tool to help finance capital costs of energy projects and pay off debt service with energy savings. The linchpin for institutions to secure funding for their energy initiatives will increasingly be a matter of demonstrating energy cost savings within their budgets, says Preston. That's all the more reason for business officers to acquire a comprehensive understanding of the complexities of energy management issues and be able to communicate those to key stakeholders focused on institution mission.

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