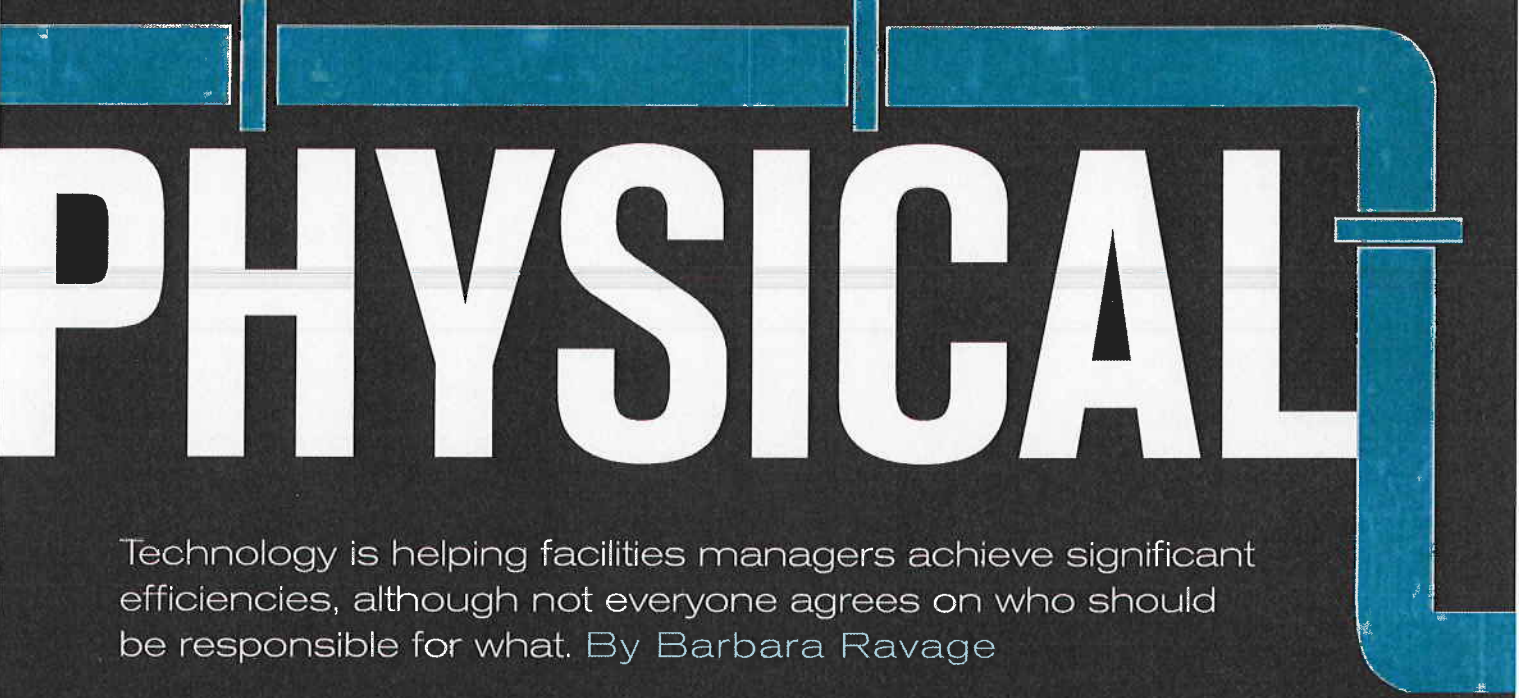


TECH GETS PHYSICAL



Technology is helping facilities managers achieve significant efficiencies, although not everyone agrees on who should be responsible for what. By Barbara Ravage

ON A SWELTERING DAY in the summer of 2010, a call came in to Drexel University (PA) facilities from PJM, which operates the regional power grid where the Philadelphia-based school is located. In accordance with its demand-response agreement with PJM, Drexel had two hours to curtail electrical usage by 1 megawatt—approximately 10 percent of what the campus draws on a peak summer day. Like many large customers, Drexel had committed to shedding load if a power plant tripped offline and threatened to bring down the entire grid.

A facilities team duly fanned out across the campus to flip switches and manually dial back the air-conditioning systems in 37 of the university's buildings. The team didn't have to set foot in three others, which are piloting a smart grid operated by Viridity Energy that helps optimize energy usage and costs. In those buildings, the cutback was automatic.

As colleges push for increased efficiencies, facilities departments nationwide are turning more and more to such high-tech approaches. And nowhere has this trend been more visible than in the realm of energy consumption, where managers hope to extract significant cost savings. The principal purpose of Drexel's Viridity pilot project, for example, is to adjust energy consumption to real-time pricing as Pennsylvania's electric rate deregulation goes into effect.

"With deregulation, all customers become more fully exposed to the real cost of generating electricity," says Bill Taylor, director of mechanical services at Drexel. Typically, rates are at their peak during the day and in the summer, so it makes sense to shift as much consumption as possible to off-peak periods. ▶

Viridity's smart grid technology takes that concept to a higher level, continually transmitting the real-time cost of electricity to each of the three building automation systems (BAS), which have been programmed to respond at a trigger point. For example, if the price of electricity goes above \$150 per megawatt, the systems will allow building temperatures to rise a few degrees. "It all happens automatically," says Taylor. "No one's sitting there watching it."

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Based on performance so far in the three buildings—the Mack School of Law, the Hagerty Library, and the General Services building, which houses the facilities operations and shops—Drexel plans to hook other campus buildings into the smart grid. "We'll probably double the number of buildings going into the next year, maybe more," Taylor says.

As far as Taylor is concerned, the automated reaction of the three Drexel buildings to the PJM demand-response emergency was just icing on the cake. The university's timely cut in energy consumption, he says, helps "the grid managers get through an emergency without having to interrupt power to customers." PJM pays the school a monthly fee and an additional sum if it complies when an emergency arises. "If you don't comply, you forfeit some or all of the money," Taylor explains.

Georgia Tech is another institution that is reaping energy savings through real-time pricing. An interface between its electrical supplier, Georgia Power, and its Johnson Controls BAS ensures that when the price of electricity goes above a predetermined threshold, the cooling system automatically resets from a comfort range of plus or minus 2 degrees to plus or minus 5 degrees.

An Ounce of Prevention

As important as these energy savings are, however, the facilities department at Georgia Tech believes that it is getting just

as much bang for its technology buck in another, less glamorous area of facilities management: preventive maintenance.

Warren Page, director of operations and maintenance at Georgia Tech, knows all too well that it's a lot less expensive to take care of equipment than it is to fix or replace it. "It's just like your car," explains Page. "You have to change the oil, rotate the tires—if you do those kinds of things, then maybe something won't happen to your car. Well, we have thousands of pieces of equip-

ment we do that on." The challenge for Page and all facilities managers is tracking what equipment needs to be serviced when.

Georgia Tech uses AiM, a web-based asset-management system, for preventive maintenance, break-fix maintenance, construction project cost accounting, work-order billing, and utility billing. "We do about 50,000 in-house work orders annually," says Chuck LaFleur, director of information technology at Georgia Tech facilities.

Georgia Tech instituted its preventive maintenance program in October 2001. Full implementation took about a year: It involved cataloging every piece of equipment, entering the data into the AiM database, and associating the preventive maintenance tasks and schedule for each item.

The system generates a work order for scheduled periodic maintenance of a piece of equipment, and outlines all the steps involved. "The work orders are quite detailed: Remove screws, remove fan, inspect belt, that sort of thing," explains Anjum Khan, database administrator for the asset management system. Each work

order has a checklist, which the employee assigned to the job ticks off as each step is done. When the task is finished, the work order status is changed from "open" to "complete."

The system allows Page to manage costs, schedules, and the deployment of personnel. "One of our objectives is to be able to control the work we do," he says. "We have that work order, which tells us how many minutes or hours it takes to do each task, so we can establish a schedule

for that month and say, 'This is when we're going to do it, this is who is going to do it.' And we can do that in a much more efficient way, as opposed to somebody calling on the phone and saying, 'Rush right over because there's water leaking.'"

One aim of preventive maintenance is to reduce the number of reactive work orders. "Our goal is to have less than 30 percent reactive," says Page. The Georgia Tech team crossed that threshold in 2007, when reactive work orders fell to 29 percent, hitting a low of 22 percent in 2009. Page won't venture a guess about how much has been saved through systematic preventive maintenance. "It's hard to know what didn't happen. What we do know is that we've been able to continue to achieve our goals in spite of budget cuts."

Convergence of IT and Facilities

As the roles of the IT and facilities departments become increasingly intertwined, institutions now are struggling to figure out the best organizational structure to handle the demands of a modern physical plant.

At Georgia Tech, an alliance between facilities and IT has deep historic roots. In the early 1980s, there was no IT department. In fact, there was no network infrastructure at all. Individual departments had their own computer systems, some of them wired to dumb terminals via dedicated phone lines. When it became clear that the ad hoc installations were inad-

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quate, Don Alexander, then an engineer in facilities, stepped in. In 1986, with the help of a BellSouth grant, he assembled an operations team of engineers and technicians to design, install, and configure a fiber-optic network throughout the Atlanta campus. "On the Friday after Thanksgiving in 1988, we turned on Georgia Tech's network in 65 buildings at one time," recalls Alexander, who is retiring this year as manager of facilities engineering.

one OIT representative attends biweekly design review meetings, where each project is specced out. "I think it's a true partnership. We want them to be involved as deeply as they can be," says LaFleur.

Georgia Tech's partnership model is unusual right now. More typically, facilities management and IT act as separate business units, using a customer-provider relationship with interdepartmental billing. IT often regards facilities as providing—or not providing—what it needs to

Center for Electric Power Engineering, is an expert on the fusion of information-based technologies with the electric energy infrastructure. He worked with Viridity Energy on the basic project outline, and then brought it to facilities to define and refine the pilot.

Cooperation between the IT and facilities departments also saved the day at the College of Charleston (SC), when the building-control system in the brand-new, 125,000-square-foot science center could

When the building-control system in the College of Charleston's brand-new science center could not communicate with the central BAS, IT saved the day by connecting a single laptop to collect the data.

Two years later, the administrative and academic IT arenas were spun off into a separate Office of Information Technology (OIT), but core IT functions remained in facilities. Today, LaFleur and a staff of four deliver such traditional IT services as e-mail, calendar, contacts, printing, backup and restore, help desk support, and hardware and software procurement and installation to the 500-person facilities department. In addition, they provide a unique set of IT services to some other departments, such as chemical-inventory management for the Office of Environmental Health & Safety and database support for the Office of Radiological Safety.

"It's extremely important that the facilities department have an embedded IT shop," believes LaFleur. "It doesn't necessarily have to provide all of the IT services for facilities like we do, but if [the department is] going to have any kind of work-order or asset-management system, or any resources to help the architects and engineers design, construct, and spec out buildings, the folks who are running that software and providing [technical] help need to be embedded in the facilities organization."

Although facilities has its own IT group at Georgia Tech, the central OIT still works closely with the design and construction side of facilities. At least

operate; in turn, facilities regards IT as an energy and space hog. And when it comes to tech-heavy solutions, facilities managers tend to use outside consultants and service providers.

Georgia Tech's Alexander thinks this is a missed opportunity, and something he'd like to see change. "I've spoken to a lot of universities about how the physical plant integrates with networking services, and most universities have a very difficult time understanding that."

Silos and Synergies

Indeed, real problems can arise when facilities doesn't have input at the building design and procurement stages. "Hopefully, facilities managers are sitting at the table when construction is planned and designed, but it doesn't always happen," says Judy Marks, director of the National Clearinghouse for Educational Facilities. "Facilities inherits the buildings and then has to manage them."

In an environment as rich in talent as the nation's universities and colleges, it's counterproductive for any department to view itself as a self-contained silo. At Drexel, for example, the idea for the Viridity Energy project originated in the College of Engineering's department of electrical engineering. Chika Nwankpa, professor of electrical and computer engineering and director of Drexel's

not communicate with the central BAS in the physical plant department. "We rely heavily on IT support for our building automation system because the control systems at the field level all have to transmit the data over the Ethernet to the mainframe collection point back at the physical plant," says Tom Fressilli, an associate engineer for energy management.

In this case, however, the control system in the science center and the mainframe did not speak the same language, and, according to Fressilli, neither the vendor nor the service contractor "was very interested in getting together after the fact and making it work." Fortunately, the IT department was able to design a workaround, establishing connectivity through a single laptop to collect the data.

How institutions structure the relationship between IT and facilities varies from college to college, but one thing is clear: Gone is the nuts-and-bolts image of the old facilities department. Today's facilities managers must be as knowledgeable about the flow of systems data as they are about the flow of water on campus. "The biggest change," says Georgia Tech's Page, "is we now have to figure out what data is important because we've got so much of it at our fingertips." **CT**

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