

Power Struggle

Energy consumption, while not a top-tier concern for hospitals, has gained attention as execs look at economics of conservation

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Story posted: January 28, 2008 - 5:59 am EDT

Like SUV owners who find it increasingly painful to fill up their tanks, healthcare executives are starting to take a harder look at their organizations' energy consumption.

Historically, energy conservation hasn't been given much consideration at U.S. hospitals, but as energy prices continue to climb and the use of energy-guzzling technology also grows, the subject has been getting more attention. In addition to finding ways to squeeze more juice out of their energy dollars, many institutions are also looking at alternative energy sources such as solar and wind power.

Healthcare quality-improvement advocates are fond of pointing out how you can't improve what you don't measure. While individual healthcare organizations may chart their own energy use, aggregate numbers looking at how much the nation's healthcare system consumes as a whole have not been calculated since 2003.

That was the last time the U.S. Energy Department's quadrennial Commercial Buildings Energy Consumption Survey was released, and it noted that healthcare was the third-biggest nonoffice, nonmall commercial energy spender in total dollars behind education and lodging, and ahead of food service. The report states that the healthcare industry spent \$7.44 billion in 2003 for the utilities used in 129,000 buildings containing 3.16 billion square feet of floor space. (Paul Hesse, an Energy Department information specialist, says data collections for the scheduled report on 2007 energy consumption will start in February, and the report will be released in 2009.)

Meanwhile, experts say more organizations are conducting internal energy audits to discover what they can do to conserve energy and trim costs. During the earliest planning stages, minimizing or maximizing sunlight angles is being factored into the orientation of new healthcare buildings, and new technology is on the horizon that can more efficiently harness wind and solar power as well as capture excess heat or cold and redirect it in more useful ways. But these are newer developments as cheap energy prices previously kept many of these projects on the shelf and at the bottom of hospitals' to-do lists.

"Our utility bills are 1.6% of our total expenses," says Thomas Cooper, chief executive officer of Warren Professional Building Corp., a facility management company affiliated with St. Francis Health System in Tulsa, Okla. "It's been a relatively small, relatively uncontrollable expense, and capital dollars for energy-system projects are competing for dollars with patient care, so they hardly ever win,"—unless hardware or systems are broken.

Cooper also says that U.S. healthcare organizations take a better-safe-than-sorry approach when it comes to power-supply redundancies and backup systems. "You don't want the lights to go dim while the doctor is doing surgery," he says.



'Tens of millions of dollars'

Cheap energy has been one of the pillars of the U.S. economy, so energy-conservation innovations have typically emerged in other countries where these costs are higher and there might be more incentive to give new ideas and technologies a try, Cooper says, explaining that, in the U.S., it's easy to spot who the innovating "pioneers" are: "They're the ones with arrows in their backs."

Tom DeBoer, chief engineer for the Mayo Clinic campus in downtown Rochester, Minn., agrees that utility bills only account for about 1% of the campus' operating costs. However, with some 8 million square feet to heat, cool and power in 26 buildings covering four city blocks, that 1% adds up to "tens of millions of dollars," he says.

While Mayo is only now beginning to seriously consider renewable energy sources, DeBoer says the institution has a long history of working to conserve energy. The most visible manifestation of this is Mayo's practice of energy cogeneration, which involves taking steam heat created to turn electricity-producing turbines and reusing it to warm buildings on the Mayo campus.

"We capture a tremendous amount of heat," DeBoer says. "And we're about twice as efficient as a typical utility."

According to DeBoer, a typical utility will cogenerate about 30% of its energy, but Mayo—which has been perfecting these methods since 1927—cogenerates about 60% to 65% of its electrical power helping reduce its reliance on utility companies and saving money in the process. This efficiency helps Mayo produce 30% to 35% of its own energy at a cost of about 2 cents to 2.5 cents a kilowatt hour, DeBoer says, noting that energy purchased from the local utility costs 6.5 cents to 8.5 cents a kilowatt hour.

On a smaller scale, the Slocum Center for Orthopedics & Sports Medicine in Eugene, Ore., was designed from the start with energy efficiency in mind. The four-story building, which opened last October, cost about \$20 million to build. Thomas Wuest, president of Slocum Orthopedics, says environmental and energy-conservation features added about \$1 million to \$2 million to the final bill.

Architect Whitney Churchill with Fort Collins, Colo.-based Neenan Co. says initial costs prohibited the installation of a desired solar power system, but the building is designed for convenient retrofitting for solar power in the future if circumstances change.

The facility has a variety of features including reflective roofing, high-efficiency glass and light fixtures with sensors that activate one to three bulbs depending on the amount of sunlight coming into a room (See illustration, p. 30). Also, heat pulled from the air-conditioning system is used to warm therapy pools, Churchill says.

Located in a highly visible location on one of Eugene's main streets, Coburg Road, Churchill says a zoning variance was needed to orient the new building east to west in such a way to mitigate the impact of sunlight. City ordinances require buildings on Coburg to front the street, but Churchill says an exception was required to "twist" the building to lessen sun exposure while also letting sunlight pour into waiting rooms and other common areas.

An early energy analysis indicates that these measures will pay off. While Slocum Orthopedics had been paying \$1.69 per square foot on energy at its old spaces, which totaled 32,000 square feet, it's now spending \$1.06 per square foot at its new 78,000-square-foot space, or a projected savings of 37% per square foot.

While healthcare organizations report that utilities account for only 1% of their costs, literature from Kaiser Permanente in California cites a February 2007 article in the healthcare journal *Lancet* stating that healthcare accounts for 11% of all commercial energy use in the U.S.

Kaiser goes on to say it is taking steps to lower that amount and, so far, conservation efforts have resulted in annual savings of \$10 million in the past five years.

"The whole industry needs to change," says Tom Cooper, environmental design and research principal for Kaiser. "I don't think it's just a feel-good thing at Kaiser Permanente. Part of it is the business model we have and the culture of the company."

Kaiser's Cooper says the reasons for exploring conservation go beyond both economics and altruism. He says global warming and environmental degradation are public health hazards, so the healthcare industry needs to do what it can to help solve or not contribute to the problem. To that end, Kaiser Permanente is participating in the Global Health and Safety Initiative with more than a dozen other healthcare organizations to share best environmental practices and "broaden the market for cleaner energy."

Cooper, who chairs Kaiser Permanente's High Performance Buildings Committee or "green buildings" group, says he is excited about a new



Churchill: A "twist" in siting the Ore. facility will help save energy.

development he's researching called "displacement ventilation," which may not only save on energy but also could help with infection control. The concept is simple, Cooper says. Instead of bringing in air through the ceiling, it would come in low on the wall. With this setup, Cooper says the air doesn't need to be cooled as much and ventilation fans can operate at a lower velocity because it doesn't need to be driven down into the room.

He says Kaiser also is using energy cogeneration and energy audits to determine where equipment can be retrofitted to enhance energy conservation, and that reducing water consumption is also explored because of the high costs of pumping and heating.

With energy costs at their current levels, Kaiser's Cooper says such conservation projects pay for themselves in two to three years. One way the organization has found to lower energy use, Cooper says is through "cool roof" strategies. To that end, Kaiser Permanente has installed more than 50 acres of reflective roofing surfaces across its system to reduce air-conditioning costs.

Offsetting costs

In some cases energy savings on one side are offset by increased costs on another. For example, electronic imaging has reportedly led to a decrease in water use as film has been eliminated and a decline in the associated electrical costs of pumping the water where it needs to go. However, the increases in electricity consumption associated with electric imaging, e-prescribing, intensive-care-unit monitoring and other technological innovations are reportedly huge.

R. Stephen Spinazzola, a vice president in the Baltimore office of architectural firm RTKL Associates, has been tracking electricity requirements for the data centers at 10 different hospitals over the past three years, and he has found that these requirements have increased between 400% and 800%.

"People don't believe it until they see the numbers, and there's a ton of money being spent across the country to update data centers; this is the elephant in the room that nobody sees," Spinazzola says, "But you can't slow down, it's like saying, 'Stop inventing things.' "

So while the demand for energy is expected to remain high, alternative sources become more and more viable. This spirit of invention has been active in the renewable energy field, with increased system installations as prices for traditional energy sources have risen and as the new technology works—and looks—better than ever.

The economics are more attractive as well.

"Solar collection is much more feasible now," says Scott Rawlings, RTKL's vice president for healthcare. "We used to shy away from solar power because the collectors were so inefficient and big and ugly."

Rawlings says technology is being developed where glass panes are being "impregnated" with solar cells. Wind power is also increasing as "whisper smooth" devices replace the noisy and inefficient turbines most people associate with it.

The new devices, he says, resemble foil DNA structures housed in long linear tubes that can be "pleasing architecturally." Rawlings says renewable energy sources are being incorporated into hospitals he's working on in Saudi Arabia and Edmonton, Alberta, Canada.

"It's not 'this is a good thing' anymore; it's absolutely mandatory," Rawlings says.