To keep up with a growing suburban community east of Indianapolis, Mt. Vernon High School in Fortville, Ind., is in the midst of a $44 million overhaul. Renovations to the 210,000-square-foot campus and construction of about 180,000 square feet of new space are expected to meet the school’s space needs for years to come.

And to meet the school’s energy needs well into the future, workers have drilled several hundred holes 200 to 300 feet into the ground to install a geothermal heat-pump system.

If administrators in the Mt. Vernon district were concerned only with the costs of installing a system to heat and cool the campus, it’s unlikely that they would have chosen a geothermal system. “The upfront costs are more than for a traditional system,” says assistant superintendent Mike Horton.

But by looking beyond initial construction and analyzing how much the school district would have to pay to operate and maintain the system in the years ahead—and how much the system would reduce the facility’s carbon footprint—Mt. Vernon leaders concluded that a geothermal system was the most cost-effective.

“The ongoing cost to run the system is going to be less,” says Horton. “With our general funds shrinking, it’s important to find ways to save money.”

Mt. Vernon is one of many school districts and higher-education institutions that have embraced life-cycle costing strategies as they make their facility plans.

“The understanding of the process is growing,” says Richard Thomas, a vice president at SHP Leading Design, an architecture firm based in Cincinnati. “Because of rising energy costs and a greater awareness of the environmental movement, more people are willing to look at the long term.”

SAVVIY SPENDING

Incorporating life-cycle costing into facility decisions enables schools and universities to have buildings that operate efficiently for the long term.

BY MIKE KENNEDY

Continued...
The long view

The concept underpinning life-cycle costing strategies should be familiar to every consumer that makes a spending decision. Two products may promise similar benefits, but the price of one is noticeably less. Can you choose wisely? If the price at the cash register were the only factor, buyers would opt for the lower price every time. But many people consider other characteristics: which product performs better, which one lasts longer, which one has more appealing aesthetics. Consumers don’t always have access to that data, so they may have to make decisions based on other factors—marketing, word of mouth, and trial and error.

In education, life-cycle costing is a method of gathering reliable information to provide administrators with a basis for choosing the most cost-effective option in designing, building and outfitting a facility. Rather than rely on hunches, vague estimates or promises, life-cycle costing can help schools and universities arrive at objective answers to questions about the total cost of owning a facility over its entire life. That includes how long a building will last and how much it will cost to operate and maintain it to make sure it does last. It also may include the costs of disposing of the facility and the materials and equipment within it once they have worn out.

Old idea

The concept of life-cycle costing is not new. The expression “penny wise, pound foolish” has been around for centuries to admonish those who opt for short-term solutions that don’t provide savings in the long run. Yet, much of modern society, especially in the post-World War II United States, has adopted a throw-away culture that emphasizes discarding and replacing items.

“Americans have tended to focus on more short-term investments,” says Thomas.

That short-term thinking is reflected in many of the school facilities built in the baby-boom era. Thousands of hurriedly planned, built-on-the-cheap schools provided badly needed classroom space for the post-war generation. Those buildings served their purpose of accommodating the baby-boom population bubble, but by the 1990s, facilities were deteriorating more quickly than those built decades earlier.

As more educators, administrators and political leaders came to the realization in the 1990s that they had to do something about the hundreds of billions of dollars in deferred-maintenance needs in U.S. school facilities, a new wave of school construction and renovation began with a different perspective. Instead of short-term providers of space that taxpayers reluctantly paid for out of an obligation, schools were seen as integral components of a community and worthy of significant long-term investment.

Schools and universities that look at their facilities as assets that will be valuable and vital for years to come...
are more likely to see the worth of life-cycle costing strategies.

**Green considerations**

In the last several years, the growing demand that education institutions incorporate sustainable design and construction concepts in school facility plans has created a greater emphasis on using life-cycle costing. The use of long-lasting materials and equipment enables schools and universities to avoid the unnecessary consumption of energy and resources to replace those items.

Systems designed that generate sufficient heating and cooling but use less energy and emit fewer pollutants can provide schools with operational savings and environmental benefits. Buildings that use less water save schools money and conserve limited resources.

Life-cycle costing can be applied to countless items in a school facility. As the process evolves, designers and administrators are gathering more data about how various elements in a project can affect costs over the life of the project. Sifting through all that information and determining how all the factors interrelate to affect building performance can be overwhelming, so many planners have turned to building information management (BIM) technology to create models and test how decisions influence how building systems operate, says Aaron Phillips, director of technology and BIM services at SHP Leading Design. (see sidebar, p. 22.)

The data collection won’t enable planners to translate all the potential features of a school facility design to a simple price tag. Still, school and university officials may decide they want them included.

“It’s not all dollars and cents with (life-cycle costing),” says a guide published by the state of Hawaii’s Department of Business, Economic De-
Development and Tourism. “Qualitative factors should also be considered.”

Among those factors cited in the Hawaii publication: Occupants’ access to views; illumination provided by daylight; occupant thermal comfort; access to operable openings; compatibility with maintenance staff capabilities; and use of standardized parts and materials.

Institutions that use life-cycle costing in their facility decisions may have to change how they handle operations and maintenance. A facility designed to maximize efficiency and reduce operational costs over the long term may require different maintenance methods and equipment.

“We try to provide a clear picture of how they should maintain the facilities,” says Thomas. “Sometimes a school system will have to bump up against the culture of its own maintenance staff. They may feel threatened by outsiders or fear their jobs will be outsourced.”

From the ground up

One of the best examples of adopting a long-term approach in facility planning is the use of a geothermal system that uses the energy found in the earth’s surface to provide heating and cooling.

Installing such systems generally cost more than a more conventional system, but geothermal systems typically provide energy savings that enable schools and universities to recover the upfront costs. The Collaborative for High Performance Schools Best Practices Manual states that geothermal heat-pump systems provide energy cost savings ranging from 20 percent to 50 percent; maintenance costs are reduced by 30 percent. The payback period for recovering initial costs is five to 10 years, the CHPS says.

In the Mt. Vernon district, administrators were confident that a geothermal system would be beneficial at the district’s high school because Mt. Vernon Middle School has had a similar system since 2001. That gen-
erated sufficient savings to recover the initial cost in eight years, Horton says. In addition to the geothermal system being installed at the high school, the district also has installed one in a new elementary school.

“The geothermal system provides a lot more consistent heat,” says Horton. “It also has a very limited maintenance cost.”

The Mt. Vernon systems work by transferring heat back and forth from the ground. Other systems tap energy from water flowing underground.

In Orange City, Fla., the Volusia County district has a geothermal system that uses water from the Floridan Aquifer hundreds of feet below to provide cooling for River Springs Middle School, says Larry Hood, senior construction project manager for the district. The system has been built so that it also will provide cooling to a 3,000-student high school set to open in 2010; long-range plans call for the system to connect to a nearby elementary school in another 10 years or so, Hood says.

Having three campuses within a mile of each other provides enough economy of scale to justify the initial costs—including $100,000 for each 750-foot-deep well that is dug.

But the operational savings that the district anticipates are significant. The engineering firm working on the project estimates that the system will save the district $3.6 million over 20 years, and school leaders gave the go-ahead for the geothermal system.

“The numbers convinced them real fast,” says Hood.

The life-cycle cost analysis covered a 20-year timeframe, but Hood says the geothermal system is expected to last 50 years or longer. In addition, because the system doesn’t require cooling towers, the schools will use significantly less water.