

Fine-tuning buildings' energy systems urged

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What if there were a way to save the nation \$30 billion a year in energy costs, reduce greenhouse gas emissions by more than 300 million tons a year and create thousands of new jobs - using existing technologies and at a price so cheap that it would pay for itself in the first year?

Evan Mills, a researcher at the Lawrence Berkeley National Laboratory, says there already is one: building commissioning, the art and science of maximizing the energy efficiency of commercial buildings.

"Roughly 40 percent of all humanity's greenhouse gas emissions from energy come from the building sector," Mills said. "I would rank it one of the very first, if not *the* first thing to do."

Commissioning is gaining new attention as Congress considers cap-and-trade laws and earmarks billions of dollars for green jobs. California is the focus of that attention because the state embraced commissioning early on and supports researchers like Mills.

In July, Mills calculated that commissioning the nation's nearly 5 million commercial buildings would yield more bang for the buck in energy savings than just about anything else out there: wind farms, new nuclear plants, improved car fuel efficiency, you name it.

Yet a survey in 2000 suggested that as few as 0.03 percent of existing commercial buildings, and as little as 5 percent of new ones, undergo commissioning for energy efficiency. Building owners seeking energy savings are more likely to invest in new light bulbs than they are to fine-tune their existing systems - like people who buy a new hybrid but don't keep the tires on their old clunker properly inflated.

Mills' work was supported by the Public Interest Energy Research Program at the California Energy Commission, which along with utilities and private firms supports research into new tools for calculating and verifying energy savings from building commissioning, increasing the number of commissioning workers and training programs and removing obstacles to the growth of the practice.

Bridging the interests

Those obstacles are daunting, said Norm Bourassa, an energy commission specialist, such as bridging the interests of building owners who generally pay for commissioning and of tenants who reap the rewards in the form of lower utility bills.

California has supported commissioning research for years, Bourassa said, especially since 2004, when Gov. Arnold Schwarzenegger called for 20 percent energy savings in all state-owned buildings by 2015. As a result of that long focus, he said, about half of all commissioning activity in the United States has happened in California.

Now other states are paying attention and getting on board.

Business is booming at firms such as Quantum Energy Services & Technologies, or QuEST, an energy-efficiency firm in Berkeley that conducts free energy assessments of municipal buildings under a program supported by Pacific Gas and Electric Co.

Buildings are big and complicated structures, their walls, floors and roofs masking a tangled maze of wiring, pumps, ducts and pipes controlled by old or poorly understood computer systems. But most occupants have little reason to go climbing around in those guts unless something is obviously wrong, said Matthew Denny, a senior engineer at QuEST.

"They're not paid to think about the energy side," he said. "They're paid to think about the comfort side."

But just because a building is comfortable doesn't mean it's efficient. Denny recalled a building where an air intake system routed fresh air past two sets of pipes - one to heat air on cool days, the other to cool air on hot days.

Heater locked on

At some point, the heater locked on, leading tenants to crank the cooling system. The result was comfortable tenants with no idea that their air was originating outside at 70 degrees, being heated to 130 degrees and immediately chilled to 60 degrees.

"I saved them probably close to a million therms, and at a dollar a therm that's like a million dollars a year," Denny said. Such discoveries are common, he said - cooling systems running two pumps when one will do or timers to turn off air conditioners at night that instead are stuck turned on.

Private owners aren't the only ones who overlook such problems. In July, the U.S. Department of Energy's inspector general reported that the department was failing to use thermostats that turn off the heat or air conditioning at night in its 9,000-plus buildings.

Potential annual savings: nearly \$12 million.

But fixing broken or overlooked systems is just the simplest form of commissioning. The real goal is to look at whether the building's design meets tenants' needs in an energy-efficient way.

Mills offers an ambitious proposal: commissioning all U.S. commercial buildings within 10 years and reinspecting and fine-tuning them every five years.

It will require training to boost the number of commissioning specialists from 1,500 to about 25,000 and

create a \$4 billion commissioning industry. Based on Mills' estimates, such an effort would pay for itself in the first year - and as a bonus leave buildings more comfortable and healthier places to work.

Saving energy in buildings

For more information on building commissioning, go to links.sfgate.com/ZICK.

Read Lawrence Berkeley National Laboratory researcher Evan Mills' report at links.sfgate.com/ZICL.

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<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/09/06/MN3P19FC1Q.DTL>

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Doug Wiedwald, a Quantum Energy Services & Technologies engineer, measures an air filter area.
Photo: Carlos Avila Gonzalez / The Chronicle

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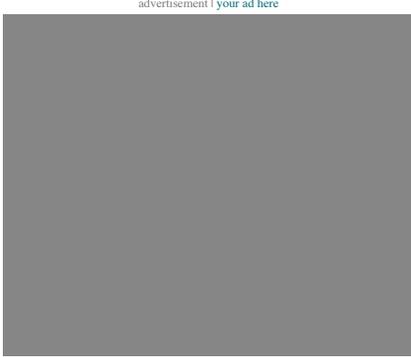
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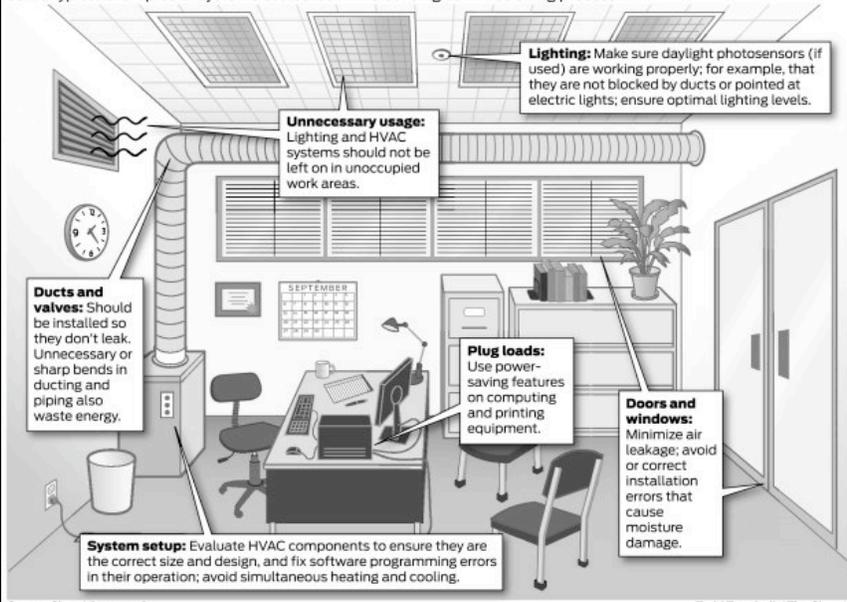
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What is building commissioning?

The process of building commissioning seeks to improve the energy efficiency and indoor environmental quality of commercial buildings by optimizing systems such as power usage and HVAC (heating, ventilation and air conditioning). The practice has the potential to save considerable amounts of energy, according to a recent report. Here are some typical examples of systems evaluated in the building commissioning process:



Source: Chronicle research

Todd Trumbull / The Chronicle

What is building commissioning?

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