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Winter Warmth

High-Tech and Low-Tech Tips to Improve Energy Consumption While Cutting Costs

By Brad Berton

As commercial property executives enter their third consecutive winter of chilling supply-demand fundamentals, many owner-operators remain reluctant to upgrade heating systems of less-than-efficient older and middle-age buildings. Indeed, for some landlords, the notion of engaging “retro-commissioning” sustainability analysts, and investing precious dollars into recommended capital improvements, is about as popular as pneumonia these days.

But even as the economy recovers all too slowly from its acute afflictions, heating systems and technologies are becoming ever smarter and more efficient. And so are the building management and engineering professionals who install and operate them.

In other words, even while efficiency improvements rarely justify costs of major HVAC system overhauls, certain low-budget strategies can significantly reduce heating-related energy consumption.

Effective moderate-cost adjustments include more intensive and better coordinated building operations, as well as innovative strategies such as installing radiative barriers, supplementing boiler networks and operating independent lobby HVAC systems.

Meanwhile, given the ongoing introduction of technological improvements, digitizing via modern “smart” controls—without replacing legacy HVAC systems—is becoming an increasingly cost-effective strategy. These control systems help cure one of the industry’s most pervading ailments: heating and cooling systems that waste energy (and money) by fighting with each other rather than working in tandem.

And when frail heating and cooling mechanisms in aging buildings become terminally obsolete, engineers are devising strategies to replace them with some of the ultra-efficient systems now being employed in newly constructed buildings.

Experts stress that insightful, customized operational strategies and equipment upgrades can reduce heating-based energy consumption with minimal capital outlays in just about any middle-age or older building—and in late-vintage properties as well, in many cases. “It’s more about fixing what you have,” stressed Peter Belisle, president of Jones Lang LaSalle Inc.’s Energy & Sustainability Services unit.

Minor Maintenance

Particularly given that many owners have not invested in upkeep in recent years as much as they do when properties are throwing off cash, relatively minor maintenance items that impact heating bills get deferred. So something as simple as replacing weather stripping in com-

mon areas can actually make a noteworthy difference, Belisle related.

“People wonder how bad things can get over just a couple-three years,” he continued. “Well, you’d be surprised.”

Vice president of engineering Jim Gieselman and colleagues at sustainability consultant **Servidyne Inc.** are called on to improve plenty of poorly performing properties. “Let me put it this way: There’s no building out there that couldn’t benefit from retro-commissioning,” the veteran commercial HVAC specialist observed.

And where heating systems are concerned, the analytical regimen Servidyne follows when clients assume control of a property typically leads to numerous low-cost and no-cost tune-up-type adjustments generating immediate savings.

This might include checking outside air dampers to ensure they are not stuck open and allowing in more air than is appropriate for a given structure. Too much ventilation might cost a 250,000-square-foot Northeast U.S. office building an extra \$90,000 annually, Gieselman calculated.

Likewise, landlords should rectify situations where setpoints automatically pump heat into equipment-heavy spaces—which do not require additional heating—at pre-determined exterior air temperatures. “Unfortunately, that happens all the time,” especially with data centers, Gieselman lamented.

And as certain spaces need to be cooled even on the coldest days, building managers should make sure cooling economizer mechanisms are operating properly and in turn minimizing winter cooling costs.

“There’s no holy grail out there that solves all of the building owner’s energy concerns,” Gieselman stressed. “It takes vigilance on the part of the building operators, and sometimes a helping hand from outside experts, to keep buildings fine-tuned and running efficiently.”

That vigilance extends to even more basic, non-technical property management logistics, added Belisle. “It’s more about labor modification, behavior, how the property is managed” than about technological systems, he noted.

Property managers often focus more on tenant and visitor circulation, including deliveries, at the expense of HVAC-related energy consumption, Belisle said. For instance, all too often, lobby doors remain propped open unnecessarily.

“An automatic door-closer only costs a couple hundred dollars,” Belisle continued, adding that leaving loading docks open unnecessarily also increases heating costs during cold weather. He suggested an aggressive audit of how the labor pool physically runs a building—

along with remedial training where needed.

Logically, improving efficiency of HVAC systems can in many cases significantly reduce heating-related energy consumption. Hence, better coordination of system components and controls, aimed at circulating heat only to where and when it is required, can result in substantially lower utility bills.

One of the biggest challenges in managing energy consumption in office buildings is that some spaces may need to be cooled at the same time others need to be heated, explained Carlos Santamaria, director of engineering with major owner-operator Glenborough L.L.C. The trick to efficiency is to link the related systems and devices through a network that automatically coordinates operations and more effectively controls energy consumption, he added.

Glenborough's energy team accomplished just

Winter Checklist

A handful of practical tips to minimize heating-driven energy consumption as winter weather approaches.

- Check boilers, furnaces and other systems to make sure they are working efficiently before they are needed;
- Make use of the building's technologies to optimize distribution of heat (for instance, only to where and when it is needed);
- Make sure the building has proper seals around its windows and doors;
- Keep nighttime temperatures near enough to the comfort zone so that the system is not forced to work too hard to "catch up" in the morning; and
- Program systems to turn off exhaust fans when they are not needed so they do not bring in too much cold air from the outside.

Source: Jones Lang LaSalle's Energy & Sustainability Services Unit

that at the company's 1525 Wilson property in the Rosslyn district of Arlington, Va. The team converted all of the building's older pneumatic variable-air-volume control boxes to a direct digital control (DDC) platform, upgraded the energy management system and is now in the process of upgrading all the compressors and controls of floor supply fans.

With coordination automated, the cooling system no longer fights the heating system during the Washington area's cold winters and hot summers, Santamaria related. Temperatures now remain more constant, resulting in fewer tenant complaints "and best of all, considerably lower energy costs," he added.

More specifically, the property's EPA EnergyStar score improved from 46 to 97 over just 18 months, ranking it among the top 3 percent of office buildings in the nation in terms of energy efficiency. And annual energy consumption at the building declined 28 percent.

Another new option is just becoming available in the United States, thanks to technology introduced by the Australian government. The Predictive Energy Optimization System, offered through spinoff BuildingIQ, can be applied to existing HVAC systems, automatically measuring and adjusting for low-cost solutions. It corrects for tenant comfort and improves EnergyStar ratings, but the main focus is cost savings through energy reductions that have thus far averaged 10 to 20 percent and in one case reached 30 percent. BuildingIQ has just begun working with the U.S. Department of Energy's National Labs and is simultaneously pursuing other pilot projects here (*for more on this, search for "BuildingIQ" on www.cpexecutive.com*).

Indeed, today's increasingly intelligent control systems under many circumstances can quickly pay for themselves through energy savings even in older-building applications, Belisle noted. "The age of the intelligent building is upon us; costs are coming down every year."

Some creative thinking can extend efficiency even further. Big owner-operator Hines in certain cases has removed the lobby from a property's general HVAC system in order to heat and otherwise condition it separately. Engineers would typically look to electric or natural gas systems in those situations, senior engineering officer Clayton Ulrich noted. "It's a case-by-case situation; there's no one right solution."

And if energy savings justify costs, Hines in some situations will supplement existing primary boilers with additional smaller, ultra-efficient condensing boilers that might boost efficiency from 80-ish up to perhaps 96 percent, added Hines vice president Thomas Bay. (*continued on page 41*)



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Installing perimeter radiative barriers (insulated steel plates) between heating vents and exterior walls led to a “dramatic”—and quite cost-effective—reduction in heat waste as Jones Lang LaSalle helped retrofit the Empire State Building, Belisle noted. This simple low-cost strategy alone reduced energy consumption by 3 percent at the Midtown Manhattan landmark, part of the 38 percent overall reduction achieved via a comprehensive sustainability program.

Penciling with Major Renovations

On a larger scale, some of the high-efficiency modern heating systems that generally are not cost effective as single-system retrofits might still pencil out when installed as part of a substantial overall renovation. Innovative systems that heat through circulated fluids (rather than air) are finding wider application in renovations as well as new construction, observed Rick Hermans, systems director with commercial HVAC specialist McQuay International.

“The age of the intelligent building is upon us; costs are coming down every year.”

—Peter Belisle, Jones Lang LaSalle

Hydronic systems with modern condensing boilers have again become a system of choice for many owners and managers due to their great efficiencies as well as changes in energy codes, he continued. However, due to the complex engineering involved in designing and installing these systems, “it isn’t the sort of thing that your typical contractor can pull off,” Hermans cautioned.

Another technology gaining ground in the United States today, and which does not rely on circulating fluid, is variable refrigerant flow, or VRF. Popular in Europe and Asia, these systems offer exceptional performance and zone control—and can replace outdated systems with relative ease in many cases, Hermans noted.

As energy-saving heating technologies and techniques continue to advance, more property owners seem destined to adopt them. With market fundamentals and capital markets recovering, Belisle expects more landlords to cure deferred maintenance issues and otherwise invest in performance-enhancing upgrades in coming quarters.

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