

Managing Energy Costs in Full-Service Hotels

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In the U.S., large hotels (those larger than 8,000 square feet) spend an annual average per square foot (ft²) of \$1.05 on electricity and \$0.25 on natural gas. In a typical lodging facility, lighting, space heating, and water heating represent close to 60 percent of total use, making those systems the best targets for energy savings. For a full-service hotel, energy costs are usually between 4 and 6 percent of revenue, but historic and luxury properties may see energy costs hitting 10 percent or more.

To better manage your building's energy costs, keep in mind how you are charged for energy. Most utilities charge commercial buildings for their natural gas based on the amount of energy delivered, but electricity can be charged based on consumption and demand (**Figure 1**). The consumption component of the bill is the amount of electricity, in kilowatt-hours (kWh), that the building consumes during a month (**Figure 2**, next page); the demand component is the peak demand (in kilowatts) occurring within the month or, for some utilities, during the previous 12 months. Monthly per-kilowatt demand charges can range from a few dollars to more than \$20. If demand charges are a big portion of your energy bills, look for measures that reduce demand.

Quick Fixes

Many full-service hotels can benefit from quick low-cost or no-cost solutions for saving energy. The simplest thing to do is turn things off when they're not needed—every 1,000 kWh that you save by turning things off equals \$100 off your utility bill (assuming average electricity costs of 10 cents per kWh).

Hallway lighting. If hallways have skylights or other natural light and your lighting has dimming capabilities, dim those lights by 30 percent during daytime hours.

Peripheral and back rooms. Make sure that HVAC settings in lobbies, offices, and other such peripheral rooms are at minimum settings during hours of low use.

Kitchen equipment. Hotel kitchens and laundries can be the most energy-intensive areas by square footage. If you stagger start-up times for meal preparation, you can reduce peak demand charges.

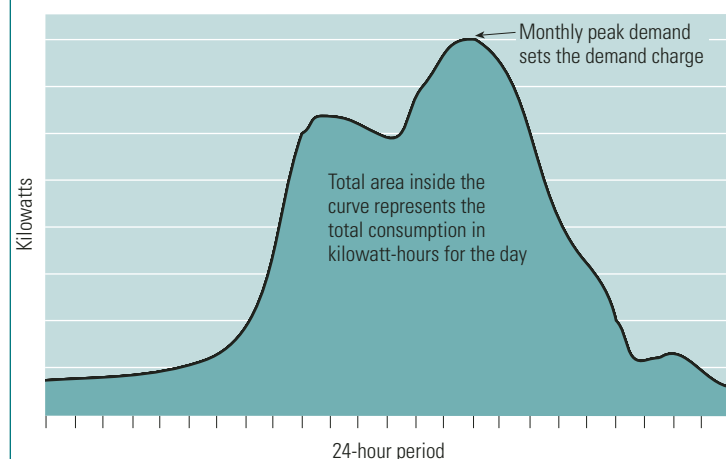
Laundry. Set laundry hot water to 120° Fahrenheit. This is a good temperature for all hot water uses outside of the kitchen, for which codes are specific about water temperature.

Pools and hot tubs. Make sure that all pools and hot tubs are covered after hours to diminish heat loss.

Housekeeping procedures. Encourage housekeepers to turn off all lights and set temperatures to minimum levels after cleaning each room. Closing drapes when a room is unoccupied will reduce heat gain in the summer and heat loss in the winter.

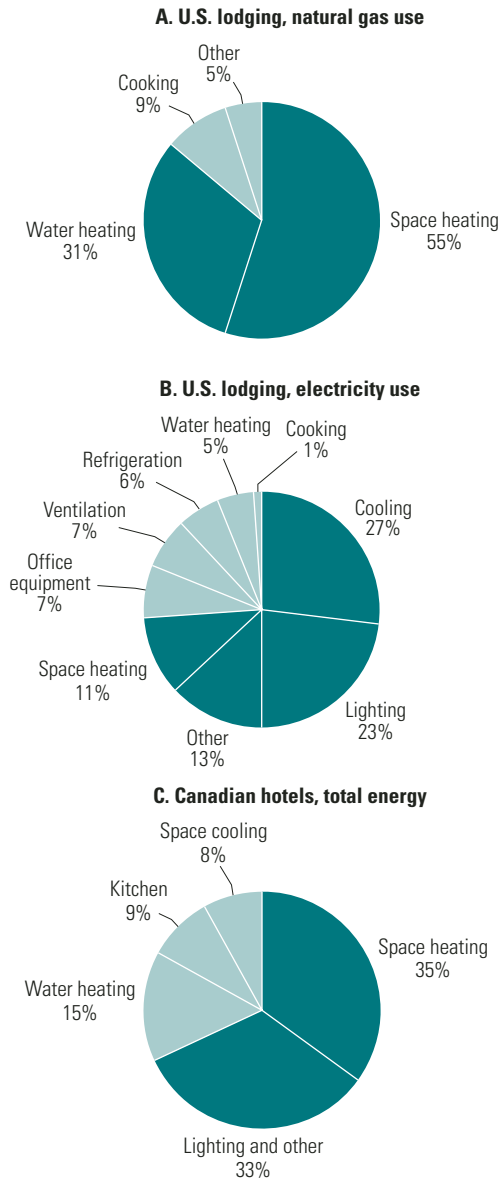
Front desk. Teach registration staff that they can help save energy costs by booking rooms in clusters, so that only

Figure 1: Diagram of a hypothetical load shape



Source: E SOURCE

Figure 2: Lodging facility annual energy consumption by end use, U.S. (1999) and Canada (2000)



Source: E SOURCE, data from U.S. Energy Information Administration and Natural Resources Canada

occupied building areas or wings need to be heated or cooled to guest comfort levels. Rooms on top floors, at building corners, and facing west (in summer) or north (in winter) can be the most energy-intensive—consider renting them last.

Longer-Term Solutions

Although the actions covered in this section require more extensive implementation, they can dramatically

increase the efficiency of your facility without compromising the hospitality environment. Ask your local utility's representative for more information about initiating such projects.

Try Recommissioning

Commissioning is a process in which engineers observe a building and perform a "tune-up" to ensure that its systems are operating appropriately and efficiently. Commissioning typically takes place when a facility first opens, but recommissioning periodically throughout a building's life can provide big benefits. Studies have shown that continuously monitoring a building's energy systems can lead to reductions of 10 to 15 percent or more in annual energy bills. For a typical 100,000-ft² hotel, that's equal to about \$19,500 in savings per year! Savings typically result from resetting existing controls to reduce HVAC waste while maintaining or even increasing comfort levels for occupants. Commissioning usually costs between 5 and 40 cents/ft².

Upgrade to More-Efficient Lighting

Compact fluorescent lamps (CFLs) can replace incandescent lamps in many applications, reducing energy use by two-thirds and saving up to \$20 per lamp per year in energy costs. CFLs also last far longer than incandescent bulbs. You can even select fixtures designed to accept only CFLs so that maintenance staff cannot accidentally relamp them with incandescent bulbs. One California hotel reports that its guests prefer the brighter CFLs in the desk lamps, and many choose to use them as the main light source in the room.

Some 40 percent of hotel guests leave bathroom lights on as nightlights. Consider installing nightlights or enabling a nighttime feature that operates bathroom fixtures at 10 percent light output.

If your facility uses T12 fluorescent lamps, relamping with modern T8 lamps and electronic ballasts can reduce your lighting energy consumption by 35 percent. Adding specular reflectors, new lenses, and occupancy

sensors or timers can double the savings. Paybacks of one to three years are common.

Light-emitting diode (LED) bulbs offer great energy savings over incandescent lamps for signage, and they are easier to maintain because of their long service life.

“Group relamping”—replacing all bulbs in an entire room, hallway, or large area on a scheduled basis—can boost light levels and save on maintenance costs, and can also be outsourced.

Install Occupancy Sensors

Occupancy sensors can reduce energy usage by lighting and HVAC systems, and there are even options that go beyond equipment control. The GEM system (www.lodgingtechnology.com), for example, also provides a handheld sensory device so that housekeeping staff can detect whether a room is occupied without disturbing the guests.

Occupancy sensors are particularly useful in public restrooms and conference rooms. Infrared technology that is now available is more accurate than motion detectors, reducing the risk of compromising guest comfort. Hallway fixtures can also include occupancy sensors and the capability to provide two different lighting levels.

Upgrade the Chiller

If you are replacing a chiller, consider downsizing it. Apart from wasted energy, oversized HVAC equipment is a significant contributing factor to mold and mildew in guest rooms. Additionally, new chillers can be 25 to 50 percent more efficient than equipment 10 or more years old.

Also, consider auxiliary condensers to preheat makeup water for centrifugal chillers—they can pay for themselves in under a year. And chillers equipped with variable-speed drives can be cost-effective energy savers in all but the most humid climates. Alternatively, desiccant cooling and dehumidification systems offer a variety of benefits: They can operate on natural gas, reducing peak electric demand, and they help to avoid costly mold and mildew damage.

Use Smart Vent Hoods in the Kitchen

Intelligent, variable-speed hood controller systems can significantly reduce energy costs in commercial kitchens. In appropriate applications, this technology yields a one- to two-year simple payback. A photoelectric smoke or heat detector determines when and how much ventilation is needed and activates the exhaust fan at the proper speed.

Use Efficient Water Heating Systems

Direct-vent, sealed-combustion condensing water heaters and boilers are a highly efficient option. Condensing boilers operate very efficiently during periods of low water demand—unlike traditional hot water heaters—and they can also provide space heating. In general, installing multiple, smaller water heaters provides better reliability, effectiveness, and efficiency compared to using one large hot water heater.

Save with Ozone and Tunnel Washers

Some 40 percent of water use in hotels is attributable to laundry and kitchen operations. New efficient tunnel washers reduce labor and utility costs, and use less water than older units.

Ozone laundering systems, which use cold water, offer even bigger savings by using much less water, energy, and detergent. Ozone systems have a 20-year projected life span and can reach payback in 1 to 2 years. In fact, one Maryland hotel installed a \$50,000 ozone system that reached payback in just 1 year by cutting laundry hot water consumption by 100 percent, reducing wash time from 26 to 15 minutes, and reducing overall sewage costs.

Install Heat-Recovery Systems

Graywater heat-recovery equipment in showers can save 60 percent of water-heating energy and can double or triple the first-hour capacity of water heaters. Upper-floor systems need little or no maintenance; for lower levels, demand-operated pumps are available. Heat-recovery systems with heat storage are useful for

laundries, where the supply flow is not balanced with drainage; heat storage systems require more space, as well as regular inspection and cleaning. Hotels can obtain “free” hot water from their cooling and refrigeration equipment by using double-bundled heat exchangers in the chillers or a plate heat exchanger in the condenser-cooling loop.

Use Heat Pumps in Swimming Pools

Indoor swimming pools require simultaneous heating and dehumidification. Heat-pump water heaters are a perfect solution to efficiently serve both of these needs: They heat water and also produce cool air, which can lower the pool room temperature and humidity. If traditional equipment is a must, look for a highly efficient condensing boiler and use variable-speed drives on pump motors, which can reduce pump costs by more than 50 percent. Low-temperature unglazed solar water heaters are an inexpensive approach well suited for swimming pools and spas in some climates. Glazed flat-plate collectors can provide higher-temperature water.

Make the Most of Your BMS

Think about how your building management system (BMS) is set up—could you use an upgrade? Multiple options for controls are possible. For example, one supplier offers a system that transfers control of heating and cooling to the room when it is occupied and returns to the “unoccupied” setting—where the energy manager

has control—when the room is empty. Alternatively, a centralized system can be switched on or off by the front desk when guests check in or out. Either approach can prevent the typical scenario of cleaning staff turning up the air conditioner in a vacated room that then sits empty—but well chilled—for days. Installing submeters, even at just one or two properties, can help to identify problem areas and where investments in efficiency upgrades will bring the biggest returns. If you can use your BMS to adjust energy usage during peak times when energy prices are high, check with your utility about money-saving rate options available to you.

Control Vending Machines

Because vending machines operate continuously, energy costs for one refrigerated vending machine can reach \$440 per year. Technologies are available that will turn off lighting when no one is near and adjust refrigeration in response to ambient temperatures.

The Bottom Line

All of the conservation measures discussed here represent good investments for the typical full-service hotel. One Canadian hotel chain worked with its local utility to implement a package of energy improvements that resulted in savings equal to revenue for 3,500 sold rooms. Energy conservation measures can not only save money but also help to ensure the comfort of your facility’s guests and staff.