

Top Energy-Saving Tips for Better Business



Investing in energy efficiency is one way to cut operational costs without sacrificing customer service or product integrity. On average, commercial buildings in the U.S. use 14.1 kilowatt-hours (kWh) of electricity and 43 cubic feet of natural gas per square foot annually—at a cost of about \$22,000 per year, per facility. The U.S. Environmental Protection Agency estimates that the energy-saving potential for an existing commercial facility is around 30 percent. Lighting systems represent the biggest electric-saving opportunity, and space heating is the biggest natural gas-saving opportunity (Figure 1).

Know Your Target

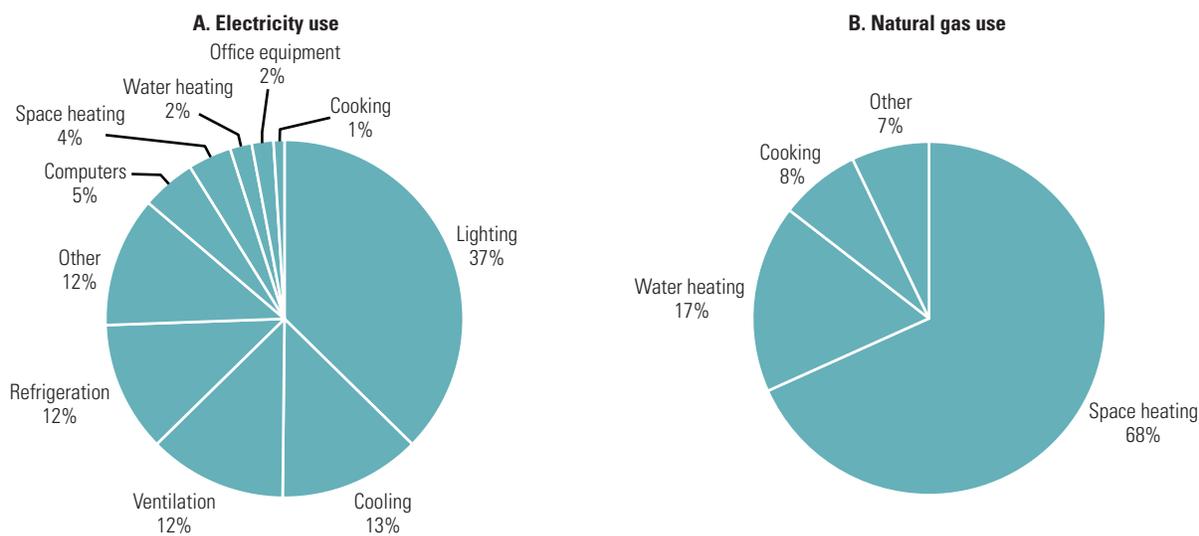
Before you implement measures to reduce energy consumption in a commercial facility, it's useful to understand how much

energy you are currently using, and how that use compares to buildings with similar characteristics. **Energy Star Portfolio Manager** is a free online tool that can track and assess energy and water consumption within individual buildings as well as across your entire building stock. Portfolio Manager allows building operators to track multiple energy and water meters for each facility, monitor costs associated with energy and water use, benchmark facilities relative to their past performance, view energy reduction percentages from energy-saving projects, calculate cost savings for a specific project, and rate a building's performance using criteria that can later be used to apply for Energy Star certification.

Equipment Upgrades: Lighting and HVAC

Lighting, heating, and cooling represent about 72 percent of total energy use in a commercial facility.

FIGURE 1: Commercial building electricity and natural gas consumption by end use in non-mall buildings. In commercial buildings, lighting represents about 38 percent of total electricity use, making those systems the biggest target for electric savings (A). Space heating is the best target for natural gas savings, as it represents about 68 percent of total natural gas use (B).



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Lighting

Lighting system upgrades are typically the first place to look for low-cost energy-efficiency measures.

Occupancy sensors. Controls like occupancy sensors and computer-based lighting-management systems solve the problem by automatically turning off lights.

Standard occupancy sensors can save an estimated \$0.05 to \$0.20 per square foot (ft²) per year, with payback periods from six months to five years. For spaces with multiple work areas, a computer-based lighting-management system is a more appropriate choice. These systems turn lights on and off at designated times and allow for overrides when necessary. A computer-based lighting system installed in a 250,000-ft² facility in Boston, Massachusetts, saved an estimated 112,500 kWh in the first year—a cost saving of more than \$10,000 annually.

Lighting upgrades. High-efficiency lighting systems can save as much as 30 to 50 percent of lighting costs. For existing buildings, consider replacing systems that are more than 10 years old.

- *Relamp T12 fluorescent lamps with high-performance T8 lamps and electronic ballasts.* This can reduce lighting energy consumption by 35 percent, and paybacks of three years are common. Adding specular reflectors, new lenses, and occupancy sensors or timers can double the savings.
- *Use high-intensity fluorescent lamps (HIFs) in rooms where ceilings are more than 15 feet high.* HIFs are more efficient than the more commonly used high-intensity discharge (HID) lamps and frequently deliver significant cost savings. Fluorescent fixtures have much better dimming options than HID lamps, which can translate into additional energy savings.

Exterior lighting. For a new parking lot, consider using low-wattage metal halide lamps or high-pressure sodium lamps in fixtures that direct the light downward.

Seventy-four percent of outdoor lighting energy use can be saved. Costs can be further reduced with photocell sensors that automatically turn on outdoor lights at dusk and off at dawn.

HVAC Systems

On average, HVAC systems account for 52 percent of annual energy consumption in commercial buildings. The most cost-effective ways to enhance HVAC performance is through controls and system upgrades.

Programmable thermostats and building automation systems. Programmable thermostats automatically adjust temperature to preset levels. Installation is simple and the investment can pay for itself quickly for a space that does not require 24/7 heating or cooling. An Energy Star-rated programmable thermostat costs about \$19 more than a standard model, saves an estimated \$150 per year, and has a payback period of about one month.

For larger or more complex buildings, consider using a building automation system, a centralized control system that automates operation of HVAC and lighting. These systems can save an average of 5 to 15 percent of total building consumption—older or poorly maintained buildings can yield savings of 30 percent or more. Most have a payback of two to four years.

Demand-controlled ventilation (DCV). DCV systems are a higher-cost investment than programmable thermostats, but are effective at reducing heating and cooling costs. DCVs determine a building or space's occupancy level by measuring the concentration of carbon dioxide (CO₂) in the return air stream. When CO₂ levels are low, the system decreases outdoor air intake, reducing the energy that would have been used to heat and cool the space. The biggest savings are possible for spaces with variable occupancy, such as an auditorium.

Radiant heaters. Consider installing gas or electric radiant heaters in facilities with large open spaces. In many warehouse applications it is costly to maintain

temperatures of 60° to 70° Fahrenheit (F). Mounting radiant heaters above work areas can keep employees comfortable with the ambient interior air temperature as low as 40° to 50°F. The reduction in overall indoor air temperature can dramatically reduce energy consumption, sometimes by as much as 50 percent.

Plug-Load Management

Plug loads from office equipment such as computers, copiers, printers, and vending machines typically account for about one-fifth of an office energy bill. Setting computers to go into sleep mode after 5 to 20 minutes of inactivity can save \$20 to \$75 per year, per computer. Researchers at the Florida Solar Energy Center found that for every 100-Watt (W) reduction in computer energy consumption in an office building, there's a corresponding 28-W drop in cooling loads.

Operations and Maintenance

Building owners can save 5 to 20 percent annually by implementing operations and maintenance best practices. This reduces the risk of early equipment failure and unscheduled downtime. Schedule regular system checks and replace air-conditioner filters, clean condenser coils, and check gaskets in refrigeration units. Establish service level agreements with outside maintenance contractors requiring these checks, or train on-site facility management staff. The **Building Operator Certification** program is a nationally recognized training and certification program for building operators that has produced demonstrated energy savings.

Energy Teams

Establishing an energy team at your business to be responsible for developing projects and pushing an efficiency agenda can ensure that your company's stated energy-savings goals become a reality. An energy team should include representatives from accounting, operations, and upper management.

American Foods Group in Green Bay, Wisconsin, created an energy-management team to seek out energy-saving opportunities. The team completed 16 projects in 2006 that translated into \$143,000 in energy cost savings with a half-year payback. Additional approved projects are estimated to save another \$900,000. At each meeting, the team identifies new projects and assigns each member a task. Tasks may include estimating potential energy savings, getting bids from contractors, or investigating new technologies.

Commissioning

To ensure that your existing equipment is performing as efficiently as possible, consider commissioning. As buildings age, their performance can degrade and their use or occupancy patterns often change. Unless a building's systems have been periodically updated, they may no longer perform as designed or meet the needs of their occupants. Commissioning addresses these problems by systematically investigating the O&M of building systems and "tuning" them to work as an integrated whole to suit current needs. Commissioning yields an average whole-building energy savings of 15 percent with a simple payback of less than nine months.

The Bottom Line

Increasing energy costs coupled with economic downturn have forced business owners to do more with less. These days, smart business means efficient business—and energy is one of the few areas where you can cut costs without sacrificing customer service or product integrity. The tips presented here will be appropriate for almost any type of building and are a great place to start (**Table 1**, page 4).

TABLE 1: Summary of savings and paybacks.

The following lists savings and payback periods you can expect from pursuing these energy-saving actions.

Category	Equipment	Action	Potential savings	Payback period
Lighting	LED exit signs	Switch from incandescent models to Energy Star LED models	\$100 per year, per sign	3 months
	Occupancy sensors	Install occupancy sensors to control lighting systems in office spaces	\$0.05–\$0.20/ft ² , per year	6 months–5 years
	HIFs	Replace HIDs with HIFs	\$133 per year, per lamp	2 years
	Photocell sensors	Install photocell sensors to control exterior lights	\$30 per year, per lamp	2 years
	T8 lighting systems with electronic ballasts	Replace incandescent and T12 fluorescent lamps with T8 systems with electronic ballasts	Overall annual lighting energy consumption reduction of 35%	3 years
HVAC	Programmable thermostats	Install programmable thermostats to control building temperatures	\$150/year, per thermostat	1 month
	Demand controlled ventilation	Install demand-controlled ventilation devices on existing ventilation systems	\$0.05–\$1.00/ft ² , per year	3 months–3 years
	Premium economizers for RTU air conditioners	Install a premium economizer on RTU air conditioners	2–9% of total building energy use	5–7 months
Plug loads of equipment	All-in-one printer, copier, fax and scanner	Switch to Energy Star models	\$4/year, per machine	Immediate
	Vending machines	Switch to Energy Star models	\$171/year, per machine	Less than one year
	Computers	Switch from non-sleep mode–enabled standard computers to sleep-mode enabled Energy Star models	\$47/year, per computer	Less than one year
	Monitors	Switch from a CRT monitor that is not sleep-mode–enabled to an Energy Star model that is sleep-mode–enabled	\$44/year, per machine	2 years
Miscellaneous	Energy teams	Form an energy team responsible for creating, delivering, and tracking the progress of energy-efficiency initiatives	American Food Groups in Green Bay, WI saved \$143,000 on 2006 energy bill as a result of its energy team implementing 16 efficiency projects	6 months
	Commissioning	Perform commissioning on existing equipment	Whole-building energy savings of 15%	9 months
	BASs	Install a BAS to control major energy users such as lighting and HVAC systems	5–30% of total building energy consumption	2–4 years
	Operations and Maintenance	Schedule regular maintenance and train staff on proper maintenance procedures	5–20% on a building's annual energy bill	NA

Notes: BAS = building automation system; CRT = cathode ray tube; ft² = square foot; HID = high-intensity discharge lamp; HIF = high-intensity fluorescent lamp; LED = light-emitting diode; RTU = rooftop unit.

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