

Natural gas efficiency ideas for your business

According to the U.S. Environmental Protection Agency’s (EPA’s) Energy Star program, energy costs are among the largest controllable costs for many small and midsize businesses. For many businesses, every dollar saved represents \$10 to \$100 in revenues that would otherwise need to be earned. Many businesses use natural gas for heating, hot water, cooking, and drying. Although natural gas is a cost-effective energy source, there are many easy and inexpensive steps you can take to reduce gas use—and save money. And if you’re willing to invest more in your facility, you can achieve even greater gas energy savings. The gas energy intensity (energy used per square foot) of a facility is determined by its function, with food preparation and healthcare being the most energy-intensive businesses (Figure 1).

No- and Low-Cost Ways to Save

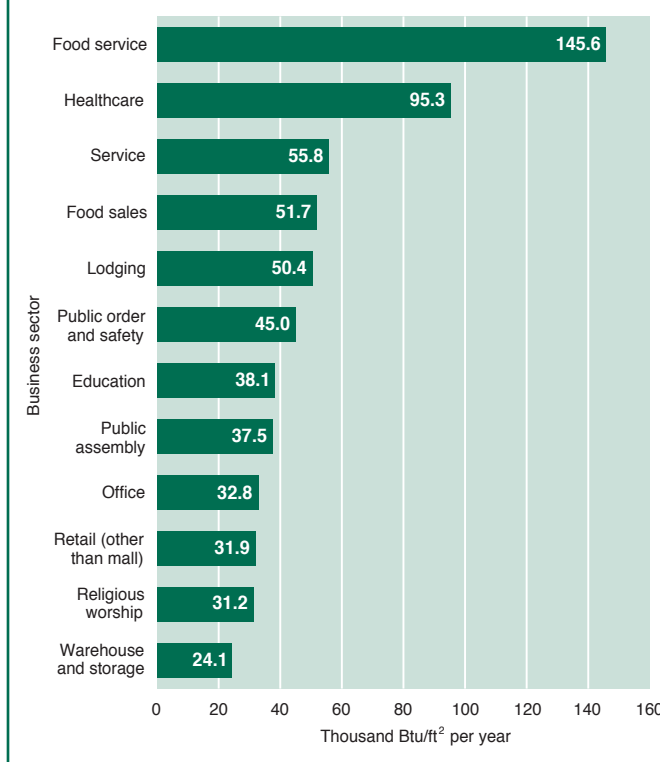
Before investing additional capital in your facility, it’s wise to benchmark your business first and take basic steps to reduce natural gas use with these simple no- and low-cost measures that earn quick paybacks.

Benchmark Your Business

Small and midsize businesses rarely have energy experts on staff or at their disposal. Yet there are inexpensive tools that business owners can use to track and assess their energy consumption. EPA Energy Star has a tool that can help you determine how your energy use compares with that of your peers. After entering basic information about your building and a year’s worth of utility bills, Portfolio Manager will score your building. A score of 50 is average; a score of 75 is very good, meaning that your building is among the least energy-intensive 25 percent of similar buildings. However, scores below 50 indicate that there is room for improvement. Someone with Web-based data entry experience and familiarity with utility bills can set up an account in about an hour and start the review process. To get started with benchmarking your business, visit www.energystar.gov and select “Buildings & Plants.”

FIGURE 1: Restaurants and healthcare facilities have the highest energy intensities

Restaurants are about three times as energy-intensive as other business types, whereas warehouses are the least energy-intensive.



Note: ft² = square feet.
© E Source; data from the U.S. Energy Information Administration

Reduce Winter Heating Costs

Close entrance and loading dock doors. Open doors may improve foot traffic, but at a cost. A single open door where you can barely detect a breeze may lose \$4 per day when the temperature is 40° Fahrenheit (F) outside. In colder weather with stronger breezes, losses could be \$40 per day. Install plastic strip doors in the loading dock area to reduce heat loss. Prices vary by size but start as low as \$150 for small doors. Depending on climate conditions, payback could be as little as one month.

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Install programmable thermostats or program existing ones to maintain 68°F during occupied hours and 55°F during unoccupied hours. In winter, such a setting typically reduces energy use by 2 percent for every degree you reduce, assuming an average temperature of 40°F. Thus, reducing from 74°F to 68°F can cut heating costs by more than 10 percent. Customers wearing sweaters and heavy coats will also appreciate it.

The Department of Energy's Office of Energy Efficiency and Renewable Energy suggests that programmable thermostats can save 10 percent of heating energy costs. Evening setback can add another 10 percent to the heating savings. The furnace will not work harder in the mornings to restore comfortable conditions. Many programmable thermostats cost less than \$100 excluding installation and pay for themselves within a year.

Control or schedule exhaust fans. In bathrooms, connect fans to a timer, the lights, or an occupancy sensor.

Reduce Hot Water Energy Use

Fix leaky water faucets and install faucet aerators in washrooms to reduce hot water use. This will save both energy and water.

Schedule circulating pump operation. Many buildings circulate hot water so that it is available instantly. Use timers and temperature sensors so pumps run only when instant hot water is needed.

Improve Heating Equipment Performance

Check dampers, actuators, and controls. Most heating and air-conditioning systems—from simple rooftop units to large air handlers—use dampers to control the amount of outside air being brought into the building. Inspect the dampers, actuators, and controls to ensure that they aren't allowing too much outside air and that they close when the building is unoccupied. Outside air dampers should be set to provide 20 cubic feet per person, which is typically about 10 percent of the total air supply. Malfunctioning economizers can significantly increase gas heating costs and should be repaired.

Inspect external ductwork for leaks. Look for leaks, especially where the rooftop unit connects to the duct. Also look for missing insulation on external ductwork.

Tune up boilers to optimize combustion efficiency. Check the condition of furnace tubes and location of combustion air source (to prevent using heated building air for combustion). Check operation of the hot water reset controller and outdoor temperature sensor so that the water temperature can be reduced in mild conditions.

Identify and replace leaking or failed steam traps. A single failed trap can waste more than \$50 per month. Operate your steam system at the lowest practical pressure to increase boiler efficiency.

Spend More to Get More Savings

Selecting high-efficiency equipment when it's time to replace heating and hot water systems may cost a little more, but the incremental costs are often recovered quickly. Look for the EPA Energy Star logo when purchasing new or replacement equipment. In many cases, Energy Star–approved equipment may be eligible for rebates from your utility or tax deductions from the federal, state, or local government. Consult the Database of State Incentives for Renewables and Efficiency for a list of incentives available in your area.

Conduct a retrocommissioning study. Experienced professionals can pinpoint where your facility is using—and possibly wasting—energy and identify ways to reduce use while improving comfort. Retrocommissioning is a comprehensive process of ensuring that an existing building's energy systems and equipment are operating at their optimal levels. For example, it is all too common for heating and cooling systems to operate simultaneously, wasting both heating and cooling energy. Lawrence Berkeley National Laboratory showed that retrocommissioning is one of the most cost-effective means of improving energy savings in commercial buildings, with average whole-building energy savings of 15 percent and a simple payback of 0.7 years for building owners.

For hot-water baseboard heating systems, install a temperature-reset controller. It will lower hot water temperature during mild conditions, reducing overheating and improving boiler efficiency. Hot water temperature reset improves part-load efficiency and reduces boiler short-cycling. Madison Gas and Electric and the University of Rochester both estimate that heating savings can be as much as 10 to 15 percent with simple paybacks often in less than three years.

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When furnaces need to be replaced, consider high-efficiency models. Conventional gas furnaces are limited to about 80 percent annual fuel utilization efficiency, whereas condensing furnaces can exceed 90 percent.

When water heaters need replacing, install a tankless or condensing water heater. Few conventional tank water heaters have an energy factor above 60 percent, whereas condensing and tankless heaters exceed 80 percent. The Energy Star program estimates that hot water energy use can be reduced by more than 30 percent. Incremental costs can typically be recovered within five years.

Use multiple modular boilers rather than a single boiler for space-heating hot water or steam. With proper staging and controls, part-load efficiencies can be significantly improved, reducing heating gas use by up to 30 percent. Additionally, having redundancy improves reliability in the event that one boiler fails.

Consider solar thermal systems. These hot water systems can be cost-effective if your business is located in a sunny, nonfreezing climate and uses a lot of water. The American Recovery and Reinvestment Act of 2009 established a 30 percent federal tax credit for systems installed through 2016.

Use transpired solar collectors. Transpired solar collectors from Conserval, Inspire, or Wescor can provide a low-cost source of warm air for ventilation and building makeup air applications (Figure 2). Unlike conventional solar collectors, these are mounted to

south-facing walls instead of the roof. Because they are simple and contain no glass, they are reliable and relatively inexpensive. In makeup air applications in cool and sunny climates, the Department of Energy's Office of Energy Efficiency and Renewable Energy estimates that simple paybacks are between 3 and 12 years.

Special Advice for Kitchens

Commercial kitchens can achieve considerable gas savings by making some of these easy changes, many of which provide additional benefits like reducing water use.

Set the hot water temperature no higher than 140°F. Temperatures above 140°F waste energy and can scald employees and patrons. Set the dishwasher wash-tank temperature to 166°F and the booster heater to 180°F. NSF International, an organization that develops standards for public health and safety, recommends that dishwasher rinse pressure be set to 15 to 25 pounds per square inch to avoid excess hot water use. Run the dishwasher only when full.

Install low-flow prerinse spray valves to remove food from dishes and utensils before placing them in a dishwasher. The Food Service Technology Center (FSTC) recommends models that discharge hot water at a rate of 1.6 gallons per minute or less, saving both water and energy. At a cost of around \$60, payback is often less than two months.

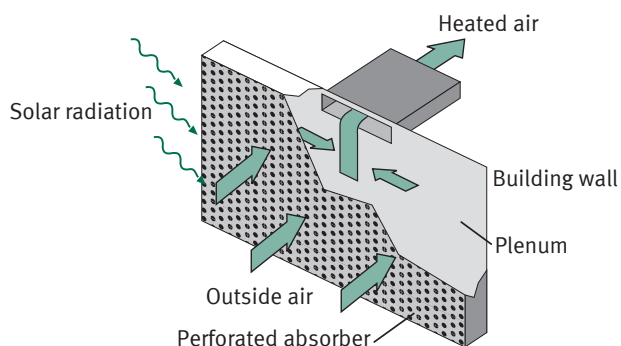
When it is time to add or replace a dishwasher, purchase a high-water-efficiency model. High-efficiency dishwashers are distinguished by their low water consumption and Energy Star label. Select a dishwasher with an NSF water consumption rating of less than 1 gallon per rack. Low-temperature dishwashers use less energy than high-temperature units, but operating costs are about the same because of the cost of the sanitization chemicals required for low-temperature units.

Use only the kitchen hoods needed. Turn off hoods when stoves are not operating. Hoods exhaust conditioned air that needs to be replaced with outdoor air, increasing both heating and cooling costs. Convert your hoods to variable-volume systems that only exhaust as much air as is needed to control grease and fumes. Because hoods pull conditioned air from the dining area, this significantly reduces the need to heat (or cool) the entire restaurant. Simple paybacks are two to four years, depending on climate and variability in cooking loads.

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FIGURE 2: Transpired solar collectors use the sun to warm buildings

Transpired solar collectors use a simple technology to reduce heating costs. Outside air is heated as it passes through the collector (perforated absorber) and up through the air space (plenum) between the collector and the wall.



Improve the performance of your cookware. The weak link in cooking is the heat transfer between the stove and the pot. Eneron takes a novel (and patent pending) approach by placing fins on the bottom of the cook pot (Figure 3). FSTC tested the pot and found that it improved heat transfer by up to 50 percent, resulting in reduced cooking times. A 24-quart pot costs \$190 and will pay for itself in gas savings in less than a year.

**FIGURE 3: Commercial cooking pots:
standard versus the Turbo Pot**

Parallel heat-transfer fins affixed to the Turbo Pot (right) help to capture the flames.



Courtesy: Eneron Inc.

Useful Links and Resources

EPA Energy Star Program: www.energystar.gov

Database of State Incentives for Renewables and Efficiency: www.dsireusa.org

NSF International: www.nsf.org

Food Service Technology Center: www.fishnick.com

Need more help?

Need help getting started? Contact an MGE account manager at (608) 252-7007. Find more operating tips and free equipment guides at mge.com/business/saving.

Financial incentives for selected energy efficiency improvements are available from **Focus on Energy**, Wisconsin's statewide program for energy efficiency and renewable energy. See focusonenergy.com/incentives for more details.

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