

nationalgrid

HERE WITH YOU. HERE FOR YOU.

GAS & ELECTRIC

Energy

Efficiency Opportunities



for better industrial and manufacturing facilities

Would you like to...



- ◆ Reduce lost-time accident rates?
- ◆ Decrease scrap rates?
- ◆ Improve employee productivity?
- ◆ **REDUCE BUILDING-RELATED SICKNESS?**
- ◆ Decrease your carbon footprint?
- ◆ Make sure money isn't left on the table?
- ◆ **AND decrease your utility bill?**

THEN, consider the following energy-saving opportunities:



- ◆ Variable speed drives on pumps and fans
- ◆ **CONDENSING HOT WATER BOILERS**
- ◆ Advanced compressed air system controls
- ◆ Direct digital boiler controls
- ◆ High-volume, low-speed fans
- ◆ LED lighting and controls
- ◆ Energy management systems
- ◆ And many more



National Grid is here to help you build a better facility.

When you implement these solutions with National Grid as your partner in energy efficiency, you'll experience a smooth upgrade process and enjoy the long-term benefits of improved efficiency. Plus, National Grid offers numerous financial incentives to help offset the cost of your energy efficiency investments.

Upgrade achievements: Cedar's Mediterranean Foods

This Massachusetts manufacturer of Mediterranean food products partnered with National Grid to take advantage of several energy-saving opportunities. Many of the production processes in their 100,000 sq. ft. facility are characterized by the need to both heat and cool products at various stages of production, as well as the motors required to move the products through the process lines. As a result, Cedar's used a comprehensive approach toward energy efficiency, investing in everything from heat recovery to lighting opportunities. National Grid incentivized the installation of several upgrades:

- ◆ A 100-ton water-cooled scroll chiller with a closed-circuit evaporative cooler
- ◆ High-efficiency condensing water heaters
- ◆ Advanced heat tunnel to affix clear plastic container seals using 90% less power
- ◆ Variable speed drives on over 50 motors
- ◆ The replacement of 275 linear fluorescent light fixtures with LEDs and controls
- ◆ A 125 hp two-stage, oil-free compressor with VSD control and waste heat recovery
- ◆ Steam trap replacement

A \$4.5 million investment resulted in annual savings of \$585,000 as well as higher throughput, higher employee productivity, decreased scrap rate and reduced carbon footprint. **Experience these benefits at your facility. Read on to learn more about proven upgrades and incentive offerings.**



Electric energy efficiency solutions

To optimize efficiency, manufacturers should focus on eliminating waste and educating employees on energy-saving practices, as well as investing in targeted equipment upgrades.

Our energy solutions encompass the major segments of industrial production. No matter the size of your operation, there are a number of things you can do to conserve energy.

Motors and motor-driven systems

To reduce energy costs, implement an integrated systems approach to improving performance – selecting high-efficiency equipment and installing motor controls.

Variable speed drive (VSD) motor control

Using a VSD to reduce motor speed saves energy because the power draw is proportional to the cube of the motor speed for variable torque applications. If you decrease speed (rpm) by 50%, you decrease power horsepower (hp) by 87% (power is now $0.5 \times 0.5 \times 0.5 = 0.13$ or 13%)!

In addition to up to 80% energy savings, VSDs provide:

- ◆ Built-in soft starting. Motor inrush current is significantly reduced, avoiding brown-outs, nuisance tripping of breakers and motor wear and tear.
- ◆ Higher power factor, which reduces your electric bill.
- ◆ Improved speed control, improving product quality or environmental comfort.
- ◆ Increased reliability, which reduces maintenance costs.

Better yet, National Grid offers rebates for VSDs.

Compressed air systems

Partially loaded air compressors are less efficient. To maximize system efficiency, designate a “trim” unit to control the main system pressure by changing the output of the compressor as needed.

VSD motor control

New compressors equipped with load/no load VSDs or variable displacement capacity controls are eligible for incentives.

Decrease system pressure

Increasing operating air pressure dramatically raises costs – it takes more energy to supply the higher pressure, plus flow to unregulated loads/leaks is increased. An increase of just 10 pounds per square inch (psi) will increase operating costs by 5–8%. The rule-of-thumb for receiver storage volume is roughly 3 to 5 gallons per cubic foot per minute (cfm) of flow capacity to minimize compressor cycling.

Custom incentives may apply to the following projects:

- ◆ Compressors larger than 75 hp
- ◆ Multiple compressor systems
- ◆ Controls, piping improvements and leak repair projects



Refrigeration systems

Electronically commutated motors (ECM)

ECM motors are single-phase brushless DC permanent magnet motors that use from one-third to one-half of the electricity used by permanent split capacitor (PSC) AC induction motors. Some best uses include refrigeration display case and walk-in cooler evaporator fans, rooftop condenser fans and HVAC air handler fans.

Defrost controls

Energy-efficient defrost systems improve the operation of the defrost cycle. Demand controls are the most effective. Energy savings range up to 6%.

HVAC

Improved temperature control and increased airflow from HVAC upgrades not only reduce your electric bill, but also achieve the following non-energy benefits:

- ◆ Higher employee productivity
- ◆ Decreased building-related health costs and lost time for sickness
- ◆ Improved employee retention and recruitment

High-volume, low-speed fans

High-volume, low-speed ceiling fans circulate air and push it downward to create a more uniform temperature, reducing heat loss through the roof and increasing floor-level comfort. In a typical facility having a 15-degree heat gradient from floor to ceiling, space heating savings of 20-40% are typical, with a payback period of less than two years.

High efficiency chillers and packaged rooftop units

Replacing your old chillers or rooftop units with new, energy-efficient models will provide energy savings of 30% or more.

Multiple chiller control

If you operate multiple chillers, strategic scheduling is necessary to minimize energy consumption without compromising temperature control. Standard chillers operate most efficiently at rated (highest) load. Rather than operating all chillers at low load, turn off some units to keep the remaining chillers operating in their most efficient zone—typically more than 30-50% of rated load. Optimize efficiency by first running the smallest chiller up to full rated load and adding additional chillers at equal loads.

Economizers

Economizers provide free cooling by pulling in cold outside air. The building energy efficiency standard ASHRAE 90.1-2010 requires economizers on all new rooftop units.

Lighting

Lighting upgrades reduce your electric bill and result in these non-energy benefits:

- ◆ Increased employee productivity
- ◆ Lower scrap rates
- ◆ Fewer accidents from trips and falls

Shop and outdoor lighting

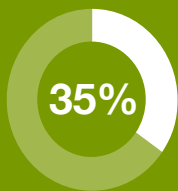
High-bay LED lighting provides higher color quality, while maintaining light output over the rated life of the lamps (70,000 to 100,000 hrs). In parking lots and garages, high color quality (70+ CRI) enables easier identification of people and vehicles, which improves safety. LED lighting can be controlled and dimmed to respond to occupancy or daylight sensors, which optimizes savings by up to 90%.

Office lighting

Compared to outdated T12 lamps, high-performance T8 and T5 lamps offer improved light quality and a longer rated life, which reduces maintenance costs. Additional options include LED tube lamps, integral LED fixtures and LED retrofit kits. Lighting upgrades can reduce your lighting energy consumption by up to 35%.

Lighting controls

While it is not feasible to shut off some lighting entirely, lowering it to minimum levels can save energy. National Grid offers incentives on automatic controls (occupancy sensors, timers, photosensors, dimmers and more) that can save energy and reduce maintenance costs. In hallways, scheduled lighting and dimming, combined with occupancy sensors, can result in energy savings of up to 50%.



Lighting upgrades can reduce your lighting energy consumption by up to 35%.

Energy management systems (EMS)

Facility control

An EMS can control chillers, boilers, variable air volume (VAV) boxes, lighting, water and security systems for energy savings of 5-10%. Older pneumatic-control systems can be recalibrated or replaced with electronic systems. Software is the heart of today's EMS systems, which also support commissioning and LEED verification.

Process control

Industrial energy management software (IEMS) incorporates energy procurement (risk management and demand response), use (monitoring and control) and reporting (energy intensity and emissions). With proper data collection, visualization software and analytical tools, you can improve your bottom line and reduce your carbon footprint.



Natural gas energy efficiency solutions

Improved temperature control and increased airflow from HVAC upgrades reduce your utility bill and achieve the following non-energy benefits:

- ◆ Higher employee productivity
- ◆ Decreased building-related health costs and lost time for sickness
- ◆ Improved employee retention and recruitment

High-efficiency heating equipment

Condensing hot water boilers

When combustion exhaust gas cools and turns back into liquid (condenses), it releases this heat back into the environment. Condensing boilers recover heat by cooling the exhaust air temperature and by condensing exhaust gas water vapor before it leaves the exhaust stack. Condensing boilers can achieve efficiencies of more than 90%.

Infrared heaters

Infrared (IR) technology is ideal for powder coating curing applications where there is a need for uniform, clean and fast surface heating. Infrared can decrease curing times by up to 30% and increase control over cure cycles.

Heat recovery

Boilers produce heat for steam or hot water. Any heat not transferred from the combustion process into steam or hot water is wasted energy. All of the following upgrades can enhance boiler efficiency.

Boiler economizers

An economizer is a heat exchanger that uses the hot stack gas from a boiler and transfers its waste heat into the cold boiler feedwater. The boiler does not have to add as much heat to create steam, saving energy and money. For every 40-50°F drop in stack temperature, boiler efficiency increases by 1%.

Stack recuperators

These recover heat from the hot stack exhaust gas and use it to preheat burner air. Continuous gas-to-gas heat exchangers transfer heat from exhaust to incoming combustion air without mixing the streams. A stack recuperator can increase burner combustion efficiency to more than 90%.

Insulation

Bare steam pipes lose heat by radiation and conduction. To reduce heat loss and save money, insulate bare steam pipes with at least half-inch insulation. For a 100-foot, two-inch diameter process steam pipe at 350°F, you can realize annual savings of \$5,000. Heat exchangers are often uninsulated; they can be wrapped for significant savings.



Combined heat and power (CHP) systems* decentralize power generation to facilities having continuous thermal requirements. Also, CHP systems **POTENTIALLY DOUBLE THE EFFICIENCY IN UTILIZING FUELS,** reduce energy costs, meet increased energy needs, improve power quality and reliability, and increase the energy security of a facility.

*Incentives for CHP aren't available in all of National Grid's service territories.

Boiler controls

Direct digital control

Older boiler controls use mechanical linkages to mix fuel and air using a manual foot pedal. Direct digital control automates the combustion process, providing turndown ratios of 6 to 1, easy fuel switching and a reduction in wasteful short cycling. Energy savings of 4-10% are typical.

Boiler reset controls

Boiler reset controls adjust the space heating hot water temperature based on the outside air temperature. As outdoor air temperature increases, the hot water boiler temperature setting decreases, saving energy.

Steam traps

Mechanical steam traps remove water from the steam distribution system. They periodically open to allow water to drain away or go to a condensate return line. If they are open for too long, steam can escape and the boiler must replace the lost steam by heating make-up water. Steam traps can become stuck in the open position, wasting energy.

Steam system survey

In steam systems that have not been maintained for three to five years, up to 30% of the installed steam traps may have failed. National Grid will fund up to 100% of the cost of a steam system survey, which will examine your facility's steam traps to uncover failed or non-operating traps and missing or damaged pipe insulation. The surveyor will recommend measures to make your system more efficient. We will then pay for up to 50% of the cost of identified steam trap repairs.

Custom projects

For electric- and gas-saving measures not eligible for prescriptive incentives, we offer custom incentives for pre-approved projects. Custom projects can often provide dual fuel savings, which provide for rebates on both the gas and electric side. Here's an example: A custom EMS project may involve installing gas points and electric points, offering savings of both therms and kWh's.





Next steps: Your energy efficiency action plan

No matter the size of your organization, successful energy management requires a commitment to allocate staff and funding for continuous improvement. Create a dedicated energy team from multiple disciplines (purchasing, human resources, facilities and National Grid), and develop a formal energy policy that has the support of the president and executive staff.

Once your team and policy are in place, assess your facility's energy performance. National Grid recommends beginning with an ASHRAE Level 1 commissioning audit. Our partners will help.

- ◆ **Take inventory**— Identify the components at your facility that impact energy costs.
- ◆ **Review the last three years of energy bills**— Identify the areas of highest energy use and trends that show increasing energy costs.
- ◆ **Establish evaluation metrics and selection criteria**— Decide how you will measure energy consumption (energy use or dollars per square foot). Consider which financial evaluation criteria work best and how you will prioritize investments.

After completing an assessment through our commissioning process, we'll help you set your performance goals and create an action plan. Your partners at National Grid will recommend specific upgrades and identify available National Grid incentives that can be incorporated into the financial analysis.

Now it's time to implement your plan. Consider hiring an energy manager or assigning someone internally to that responsibility. Periodically evaluate your progress and reward achievements!

From start to finish, National Grid is here to help
you achieve your energy efficiency goals.
Learn more and connect with us today.

Call 1-800-787-1706

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