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Tips to Conserve Natural Gas

In response to the Hurricanes Katrina and Rita, President George W. Bush issued a directive to the heads of executive departments and federal agencies to take the necessary actions to conserve energy and fuels to reduce overall demand. Recently signed into law, the Energy Policy Act of 2005 also calls for annual energy reduction. This fact sheet helps identify ways to reduce overall natural gas use.

Listed below are numerous measures that may improve fuel-use efficiency and reduce energy consumption at federal buildings in central heating plants and steam distribution systems.

In Buildings:

Optimize combustion efficiency.

Inspect furnaces, space heaters, and water heaters. Tune and adjust natural gas burners to achieve proper excess air settings and uniform, efficient combustion. Performing this maintenance can often save from 2 to 12 percent of annual fuel use.

Lower thermostat settings.

For each degree the thermostat setting can be lowered, a 3 percent reduction in fuel consumption can be achieved. Relax the dress code to allow the use of warmer clothing.

Lower setback temperatures during unoccupied periods.

For a typical building, a 10 percent reduction in annual fuel consumption can be achieved if the thermostat setting is lowered 10 degrees an average of 8 hours each day.

Optimize morning warm-up and night setback controls.

Programmable temperature controls, particularly energy management and control systems at large installations are often times not adjusted to coincide with building occupancy schedules as they change. Heating is needlessly activated when the buildings are not in use. Fuel savings can be achieved by updating the warm-up and setback control schedules to coincide with current occupancy periods in affected buildings for each heating zone and weekday.

Minimize outdoor air use for ventilation consistent with code requirements.

Many large installations use 100 percent outside air to ventilate hazardous areas, meaning that none of the heated air is recirculated. The heating requirement associated with these kinds of systems can be substantial.

Shut off nonessential equipment and spaces.

Isolate unoccupied building areas to further reduce space temperatures and provide only minimum freeze protection.

Reduce and eliminate major sources of infiltration.

Leakage of outside air into heated spaces during the coldest winter days can be the largest single contributor to the heating load in some buildings. Keep large overhead doors tightly closed in warehouses, hangars, and industrial buildings. Check and repair overhead door seals and shut off exhaust fans when not needed.

In Central Heating Plants:

Optimize combustion efficiency.

Maintaining too much excess air is a common occurrence and unnecessarily wastes fuel. It is important to maintain steady excess air levels, which ensure that burners will mix air and fuel efficiently and assure complete combustion. With well-designed natural gas-fired boilers, an excess air level of 10 percent is usually attainable. Excess air levels should be continuously monitored by utility personnel and corrected if necessary.

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Minimize boiler blowdown.

Reliable steam plan operation requires that a portion of the boiler water be discharged to drain in order to maintain solids concentrations. Blowdown rates are often excessive and waste fuel. Plant personnel should continuously monitor boiler blowdown to minimize energy losses.

Optimize boiler loading.

Selected boilers should be shut down during the low load periods so that the remaining boilers can operate at higher, more efficient firing rates.

Perform boiler maintenance.

Clean combustion chamber and heat transfer surfaces. Stack temperature more than 150 degrees Fahrenheit above steam temperature often indicates the presence of excessive water-side scaling, which can reduce heat transfer and increase fuel consumption by as much as 10 percent.

With Thermal Distribution:

Inspect/replace steam traps.

Steam traps are mechanical devices that remove condensate from steam piping and equipment. Hundreds of steam traps may be in service in a typical system, and it is not uncommon to find 15 to 20 percent not functioning properly. Collectively, trap losses can be significant. In systems with a scheduled maintenance program, leaking traps should account for no more than 5 percent of the total trap population.

Inspect/repair condensate return equipment.

Inoperative condensate return equipment, like steam traps, often go unnoticed because collected condensate can be wasted to drain, while the steam system continues to function. Condensate contains useful thermal energy that can be recovered to offset fuel costs. If condensate is returned to a steam plant, fuel costs will typically be reduced by about 10 percent.

Locate/repair steam leaks.

Steam leaks can also be significant and pose a significant safety hazard.

Repair insulation.

Up to one-quarter of total heating system fuel costs can be attributed to the thermal losses from distribution piping, valves, and equipment. Thermographic instruments and infrared pyrometers can be helpful in surveying steam lines and identifying areas needing repair.

Isolate nonessential distribution piping.

Changing missions have reduced the steam requirements at many sites. Steam distribution systems may no longer be optimally configured to serve facility loads. Opportunities may exist to discontinue operation of major sections of a distribution system originally designed to supply much larger loads, allowing existing loads to be served by other more efficient means. The avoided distribution losses can be substantial.

Reduce distribution pressure.

Load reductions that have resulted from changing missions and energy conservation measures may also afford the opportunity to lower steam pressures in existing distribution systems to achieve a corresponding reduction in thermal losses.

For More Information

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