

Are Your Boilers Tuned To Save Energy?

Your heating plant is the single largest consumer of fuel and has a significant impact on your energy bill. Ideally, you have the budget to install new boilers and upgrade your heating system to minimize your heating expense. Unfortunately, most school districts do not have such funds and could benefit from some practical recommendations. One very simple tip is to ensure that your heating system operates at **optimal efficiency** since poor operations and maintenance promote energy waste.

To help offset increased energy costs, we'd like to share a few no or low-cost energy savings opportunities – some best practices for the operations and maintenance of boilers. Well-tuned operation and maintenance programs save energy and improve equipment reliability.



At the heart of most heating systems is a boiler, operated either to produce hot water or generate steam.

- The boiler consumes gas or oil.
- The system, as a whole, may need periodic make-up water, which may come at a price.
- Boiler-water chemicals, required to control scale and corrosion, are another ongoing expense.

To minimize waste, include the following in your maintenance schedule:

- Perform a stack gas analysis for all boilers annually. A properly adjusted and maintained burner can save up to 5% of the boiler's fuel consumption.
 - The boiler requires a mixture of fuel and air for combustion.
 - Too much air means energy waste through the stack.
 - Not enough air will cause an incomplete combustion, wasting fuel.

- Monitor the boiler-water quality. Boiler waterside scale acts as an insulator thereby preventing heat transfer from the fire to waterside.
 - A 1/32-inch layer of scale reduces the boiler's fuel efficiency by 2 to 7%.
- Check the system steam traps annually to make sure they are doing their job.
 - A leaking steam trap wastes steam heat.
 - A blocked steam trap can allow water to collect in the piping, leading to water hammer damage.
- Maintain a tight heating system.
 - Steam or hot water leaking from the system means energy is being wasted.
 - Energy is required to heat fresh make-up water. Additional chemicals are needed to treat the fresh make-up water. Also, water may come at a price.
 - Leaking steam or water can cause considerable corrosion of the metal around the leak, possibly necessitating expensive repairs at a later time.
 - A water meter, installed in the fresh make-up water line, will reveal excessive "make-up" water usage due to leaks.
 - If no water meter is installed, inspect boiler and piping systems frequently to detect leaks early.
- Annually, inspect all steam and hot-water piping insulation, evaluate its condition and adequacy.
 - All surfaces over 120°F should be insulated.
 - Insulation can reduce heat loss by 90%.
- Ensure feedwater, hot-water circulating, and condensate return pumps are in good condition.
 - Worn feedwater pumps may not deliver the required amount of water to a steam boiler.
 - Worn hot-water circulating pumps may not produce the proper flow to heated spaces, which will reduce the heating capacity of the system.



Visit these Web sites below to learn more about:

Stack Gas Analysis: http://www.energy.wsu.edu/ftp-ep/pubs/engineering/boiler_comb.pdf

Boiler Scale: http://eereweb.ee.doe.gov/industry/bestpractices/may1999_boiler_system.html

Steam Traps:

http://www.eere.energy.gov/femp/pdfs/FTA_SteamTrap.pdf#search='steam%20and%%20water%20leaks%20heating%heating%20systems%20doe

Piping Insulation:

<http://www.energystar.gov/ia/business/industry/insulate.pdf#search=DOE%2FGO1020021504>

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