


Steps To Reduce Steam Energy Losses

Four pieces of industrial equipment are shown in a row against a light blue background. From left to right: a large rectangular metal tank, a tall vertical cylindrical tank with a ladder, a horizontal cylindrical tank with various pipes and valves, and another tall vertical cylindrical tank with a ladder.

There are a number of equipment options that can recover energy from wasted heat or steam.

- Studies show that plants waste as much as \$0.27 to \$0.39 of every dollar due to poor energy practices.
- The boiler room is a plant's primary energy culprit.
- To stop issues and losses, the first step is to work with an experienced service technician who can properly inspect the boiler.

The fuel spend in a manufacturing or process operation is a significant part of the company's operating budget. Studies show that plants waste as much as \$0.27 to \$0.39 of every dollar due to poor energy practices. Identifying and correcting steam energy losses can add thousands of dollars to a company's bottom line.

The boiler room is a plant's primary energy culprit. Some of the common causes for excessive energy loss in the boiler are:

- Boiler stack. This is the biggest loss area at about 20%.
- Fouled waterside and fireside surfaces. For every 40-degree rise in stack temperature over the base point, 1% is lost in efficiency.
- Excessive cycling. Cycling causes pre- and post-energy losses but often goes undetected.
- Improper burner setup. This leads to high or too low excess air that causes inefficient and possibly unsafe combustion.

To stop these issues and losses, the first step is to work with an experienced service technician who can properly inspect the boiler. The best time is during the boiler's annual inspection when it is down and drained.

The technician will check the waterside and fireside surfaces for cleanliness. If the waterside is fouled, an acid cleaning is recommended, or if there is a soot fouling on the fireside, a good cleaning should be done. After this, the boiler will be closed and refilled, and a complete tune-up should be initiated, including the resetting of combustion and performing a combustion analysis throughout the burner's complete turndown range.

After the boiler has been cleaned and tuned, it is important to watch the operation of the boiler during normal production hours to see if it is cycling more than 10 times per hour. If it is, the boiler is either oversized for the load, or the burner doesn't have the turndown required to match the varying conditions. To resolve excessive cycling, consider a smaller capacity boiler or retrofitting the boiler with a new burner that has higher turndown capability.

With the burner, maintaining 3% O₂ is optimal. For every 2% increase in O₂, another 1% is lost in efficiency. If a burner is originally set up to maintain 3% O₂, and the system drifts unknowingly to 7%, there is a loss of 2% overall.

There are several equipment options that can help recover steam energy loss in a boiler system; however, before installing new equipment, it is important to establish an energy baseline. Many times, plants that burn natural gas have only one meter to measure the boiler as well as other commonly connected energy users. It's important to install a second gas meter that shows only the boiler's fuel consumption, providing a benchmark to substantiate improvements.

Among the equipment options to consider that will recover energy from wasted heat or steam are: a flash condensate recovery system, a blowdown heat recovery system, a non-condensing stack economizer, a condensing economizer, a deaerator and a (condensate) surge tank.

One website that can help justify energy saving initiatives for your facility is energypathfinder.com. This site includes a tool that demonstrates the process of recovering capital for energy-saving initiatives,



calculates the results and shows how much money is being wasted by not proceeding with the recommended action.

To learn more about minimizing or eliminating steam energy losses, watch the [Identifying and Capturing Parasitic Steam Energy Losses webinar](#).