



Replacing an oversized boiler with one such as this (smaller) load matched field erectable Flexible watertube, will save substantial energy costs year after year.

The Cost of an Oversized and Cycling Boiler

Looking at the commercial/industrial market today, there are approximately 160,000 boilers used for heating and/or process that average in size from 36 – 400 horsepower. Approximately 106,000 of these boilers are more than 20 years old, operating at or below an “In-Service or Cycle Efficiency” of 75%.

Why the low efficiency? It is primarily due to frequent burner cycling. This can be caused by: installing a boiler that is too large for the heat/process load as a result of original over-sizing; building efficiency upgrades; boiler efficiency upgrades, or a combination of all three.

Oversized boiler/burner cycling is extremely inefficient as it exacerbates fixed losses such as radiation and convection that increase at the lower firing rates as a percent of full input. For instance, a given boiler may have a 1% radiation and convection loss at high fire, but at 50% firing rate that loss increases to 2%, and at 25% firing, a 4% energy loss results. Compound this problem with other cycling losses due to pre and post purging of air through the boiler for safety reasons, and the result is an in-service or cycle efficiency of 75% or less.

As an example, say we have a 500 horsepower, high pressure steam boiler cycling over 10 times per hour at an average of 175 horsepower for a period of 8,400 hours per year. Assume it burns natural gas at \$12.00 per decatherm, and its in-service or cycle efficiency is calculated at 71.6%. The annual fuel cost is \$825,552.

By matching the load with the properly sized boiler, we find a 250 horsepower unit is now the proper selection.

Going through the same calculations, but now with a higher in-service or cycle efficiency of 76.2%, we apply the formula $[1 - 71.6/76.2 \times 100 = .06\%]$.

Taking the percentage savings from the result, the new fuel cost amounts to \$776,019, representing an annual savings of approximately \$49,533. The substantial decrease in fuel cost is the direct result of proper boiler sizing to load and cycle reduction.

So in the final analysis, if your boiler is too big for the load and frequently cycles, it really pays to analyze and act. The savings can be staggering.

Rightsizing your boiler can often pay for itself fairly quickly. Let an authorized C-B rep analyze if your boiler is properly sized and suggest a custom solution. They can provide a BOOST report that justifies the investment with the fuel savings and lowered emissions.