SAMPLE CHECKLIST FOR AUDITING A BOILER AND HEATER SYSTEM

The following questions will help uncover inefficiencies.

Management:

- Is the use of steam and heating fluid throughout the facility budgeted? Is it monitored? Are there consumption targets?
- If so, are the users of thermal energy accountable for its use? How?
- Are there approved procedures and work instructions governing thermal energy generation, distribution, monitoring and other processes?
- Have employees learned about the significance of energy and utility conservation, and do they use correct practices?
- Are boiler and heater operators involved with the efforts to conserve energy and utilities?
- Are employees aware of how much energy and utilities cost, and how much is being spent for these in the facility? Are they significantly interested in improving the results?
- Is there a system for communicating to employees the results of efforts to conserve energy and utilities?

Heat consumption

- Are there procedures for shutting off thermal energy-using production equipment and auxiliary production equipment when not in use?
- Are the above procedures implemented?
- Is steam or heating fluid produced at temperatures or pressures greater than those required by end-user processes, product, plant or equipment?
- In multiple boiler installations, how is steam demand matched to boiler deployment? How is it done on weekends, during non-production periods and in various seasons?

Fuels

- Can a cheaper alternative source for thermal energy be used?
- Can process by-products be used as an auxiliary fuel or fuel supplement?
- If natural gas is used, have the costs of uninterruptible versus interruptible supply been evaluated?
- Is the boiler fitted with dual capability to use natural gas or fuel oil to take advantage of interruptible gas supply contracts?

Fuel storage

- Are heated oil tanks and associated piping adequately insulated?
- Is the external insulation for the above items watertight?
- Is oil heated at the correct temperature?
- Is solid fuel (e.g. biomass) protected against rain? Is it dried?

Boilers and steam distribution

- Is the flue gas free of combustibles?
- Is the boiler efficiency checked on a regular basis?
- Is a proper method for determining boiler efficiency being used?
- Is the efficiency acceptable for the type of boiler and fuel?
- Is the burner operating in the “zone of maximum combustion efficiency”?
- Are the heat losses of the boiler and system known and quantified?
- Is the flue gas checked for combustibles, carbon monoxide and oxygen content on a regular basis? Is the content within an acceptable range?
- How is the excess combustion air managed? How frequently?
- Can unwanted air get into the boiler and the flue stack?
- What type of air or fuel control is used? How is it maintained?
- What type of equipment is used for controlling and monitoring the system? What instruments are used?
- Where is the combustion air intake located?
- Is the combustion air preheated? If so, how?
- Are the NOx levels in the flue gas known and monitored? Are they within an acceptable range?
- What are the flue gas temperatures at various boiler loads? Are they monitored?
- Is heat being recovered from flue gas? What type? How efficiently?
- Is there any evidence of soot buildup on the fireside surface of the boiler?
- Is there a program for inspecting and removing soot and scale from heat transfer surfaces of the heater and boiler? From process equipment?

- Is the flame in the combustion chamber bright and clear? Does it fill the combustion chamber without encroaching?
- What is the blowdown rate, and is it at the level recommended by water treatment specialists? Is it based on the content of dissolved solids (DS) in the boiler water? Have the levels of DS content been calibrated to conductivity?
- How is the blowdown rate controlled?
- Is there a system for recovering heat from the blowdown?
- Is there redundant, oversized or undersized steam piping that causes heat losses? Is there an inspection program for it?
- Are steam lines, flanges, valves and condensate lines adequately insulated? Is the insulation dry and protected against water ingress?
- Is steam or condensate leaking?
- Is the makeup water preheated? If so, how?
- Is the condensate return rate adequate? Has it been verified?
- Is the correct type of steam traps for the application being used?
- Is there an adequate maintenance program for inspecting, repairing and replacing steam traps?
- How many of the traps are faulty?

Reference:

http://oee.nrcan.gc.ca/publications/infosource/pub/cipec/2000-869_Boilers_and_Heat_E.pdf