Energy Management Opportunities – TIPS

HOUSEKEEPING EMOS are energy management actions that are repeated regularly and at least once a year.

- Run the process equipment using downstream steam (or heating fluid) efficiently by proper production scheduling and maintenance.
- Try to operate the process equipment using downstream steam (or heating fluid) at capacity.
- Shut down the equipment in the process using downstream steam (or heating fluid) when it is not needed.
- Try to stabilize heating demand. To do this, review the schedule for process demand. This will minimize boiler load swings and maximize boiler efficiencies. Try to operate boilers at full load.
- Maintain good steam quality with a program of regular water chemical treatment and the blowdown regime. Ensure that the feedwater de-aerating equipment and the air vents on the steam piping work properly.
- Monitor the flue gas combustibles and the combustion excess air regularly. Adjust as conditions change.
- Check for and eliminate the entrance of unwanted air into the boiler and flue gas exhaust system.
- Keep burners properly adjusted.
- Maintain the best operating condition of air and fuel controls.
- Calibrate measuring equipment and instruments and tune up the combustion control system regularly.
- Check all the control settings regularly.
- Check and verify the boiler efficiency regularly.
- Monitor and compare the boiler performance related data to standard and targets regularly.
- Apply routine and preventive maintenance programs to the boiler and heat distribution and condensate collection systems.
- Inspect the fireside and waterside heat transfer surfaces when the boiler plant is shut down; keep the surfaces clean.
- Ensure that the fireside anti-fouling equipment works properly.
- Check the integrity of the steam and condensate network (heating fluid supply and return network) and related equipment routinely. Walk through the facility with appropriate detection equipment (e.g. ultrasonic detector, listening rods, pyrometer and stethoscope), looking and listening for steam leaks. Repair the leaks.
- Set up a steam trap inspection and maintenance program and procedures.
- Inspect the insulation for water logging; locate the source of the moisture (e.g. a leaking pipe) and correct the problem.
- Replace or repair any missing and damaged insulation and insulation covering.

LOW-COST EMOS are energy management actions that are done once at a reasonable cost.

- Develop and implement operating procedures and work instructions. Train boiler house operators and other employees when necessary. Create an awareness of energy efficiency among all employees.

- Operate the boiler (heater) at the lowest steam pressure (or heating fluid temperature) that meets the needs of the production process. To do this, the process, plant and equipment may need to be modified.

- Review whether the type of facility or industry has combustible by-products (e.g. waste hydrogen, oxygen, carbon monoxide, biogas or hydrocarbon streams, or biomass) that could be used as no- or low-cost boiler fuel supplements. Consider using these by-products.

- Add measuring, metering and monitoring equipment to the boiler and heat distribution systems for fuel, steam, heating fluid, condensate and blowdown flows.

- Optimize the location of sensors. Make sure that the sensor and control devices can be easilyaccessed for control and maintenance.

- Fit controls with locks to prevent tampering and unauthorized adjustment.

- Consider starting a metering and targeting program to better manage the use of thermal energy (and other utilities) throughout the facility.

- Repair, replace or add air vents (e.g. thermostatic air vents).

- Consider recovering heat from blowdown water. To do this, use flash tanks to generate low-pressure steam from the blowdown (and use it in other heating applications, such as the de-aerator). Use the remaining water in the heat exchanger to preheat makeup water.

- Overhaul steam pressure-reducing stations.

- Consider the economics and means of capturing radiation and convection heat from the boiler shell for pre-heating combustion air.

- Relocate the combustion air intake to a spot where the incoming air has the highest possible temperature year-round.

- Upgrade the fuel and air controls.

- Insulate pipes, flanges, fittings and other equipment with efficient insulation at an economic thickness. Add insulation where it is inadequate.

- Review whether the steam and steam condensate recovery network (and heating coils and other steam-using equipment) has proper drainage. This will eliminate water hammer, losses and damage.

- Shut down the steam and condensate branch system when it is not needed.

- Look for opportunities to rationalize and streamline the steam and condensate network. Examine current plant-piping drawings, if available, or walk through the facility. First, ensure that the obsolete, unused or redundant piping can be isolated from the rest of the system. Then remove the unnecessary parts.

- Set up a program for steam trap replacement.

RETROFIT EMOS are energy management actions that are done once at significant cost.

- Review whether possibilities exist in the facility and industry to eliminate or scale down the use of steam and heating fluid. Or supplement heat usage with other sources, such as a ground-source heat pump, solar walls or thermal storage.
- Replace obsolete boilers with high-efficiency, low-emissions units fitted with new burner technology and heat recovery options suited to the required demand.
- Upgrade the fuel burner.
- Install a turbulator in the firetube boiler.
- Convert the burner from oil to natural gas.
- Convert from indirect to direct steam heating, where appropriate.
- Convert from steam to heating fluid heating, where appropriate.
- Install an integrated computerized management system for generating and distributing thermal energy.
- Determine whether a waste product is flared off in the operations (e.g. petrochemical, steel and lime industries). If so, consider using it to preheat boiler combustion air or even to operate a micro-turbine generator.
- Install equipment to recuperate heat on the flue gas system. This includes economizers, combustion air preheaters and flue gas condensers (indirect or direct contact). If already in place, review its efficiency and consider replacing or upgrading it.
- Consider alternate uses for the remaining heat in the flue gas. Use it for space heating, process or drying the product or biomass fuel. Consider deploying absorption heat converters (AHC) on the flue gas system.
- Recover heat from waste streams, such as flash steam. Consider incorporating a heat pump into the system to further boost the energy recovery or integrating the new technology of highly efficient compact heat exchangers (CHE) with other processes.
- Consider installing a system for closed-loop pressurized condensate return.
- Hire a qualified contractor to redesign the steam and condensate network to maximize its use. Repipe systems or relocate equipment to shorten pipe lengths.
- If required, consider moving steam generation units (possibly smaller or new) and delivery closer to the steam-using equipment.
- Use the correct pipe size. In heating fluid systems, consider the economics of going to increased pipe diameter versus pumping cost and pressure losses.
- Evaluate the economics of upgrading or adding more insulation. Upgrade insulation cladding.

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