Fact Sheet

AUSTRALIAN MEAT INDUSTRY COUNCIL

AMIC Australian Meat Industry Council

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No. 5

ECONOMISERS AND AIR PREHEATERS ON STEAM/HOT WATER BOILERS

Boilers and steam systems are very common sources of heat for a wide range of industrial plants and can account for 20-60% of their total energy costs. Improving the efficiency of boilers through minor adjustments such as installing economisers and air-preheaters are two key methods of increasing the efficiency of boilers. In turn, this will saves on energy bills and reduce the emission of greenhouse gases into the atmosphere.

WHAT'S AN ECONOMISER?

An economiser is a heat exchanger that recovers heat from the boiler flue gases to heat the boiler makeup water. When installing an economiser onto a boiler, the feed water or the return water is pumped through the heat exchanger tubes and absorbs the heat from the hot flue gas, as shown in Figure 1. This results in an increase in the feed water temperature which is then pumped into the boiler, increasing then its efficiency.

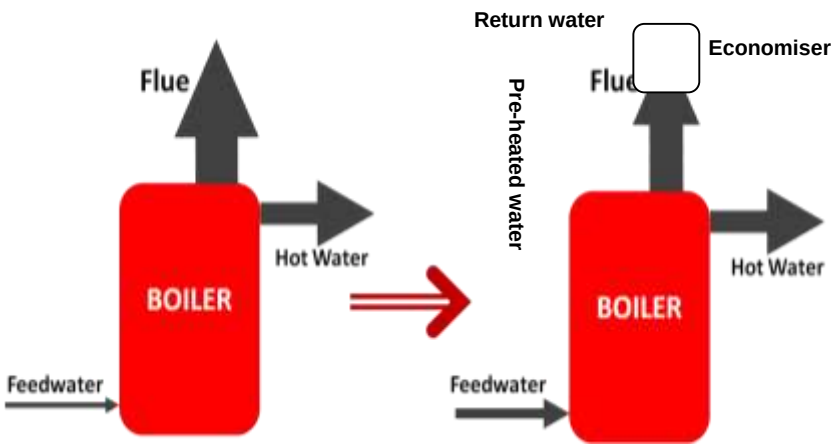

Figure 1 - Schematic depiction of the transfer of heat provided by the installation of a gas to water economiser.

The efficiency of the boiler can typically be increased by up to 5% when using a non-condensing gas to water economiser of by up to 15% with a condensing economiser.

Due to the significant cost of the economiser, it is normally viable only for boilers above 3 MW. It is also important that the boiler operate for more than 6,000 hours per year but this is dependent on the cost of fuel.
A by-pass may be required if the boiler operates at part loads for long periods.

WHAT'S AN AIR PRE-HEATER?

An air pre-heater is an air-to-air heat exchanger that heats the boiler combustion air using the recovered heat from exit flue gases of a boiler.

Australian Government
Department of Industry

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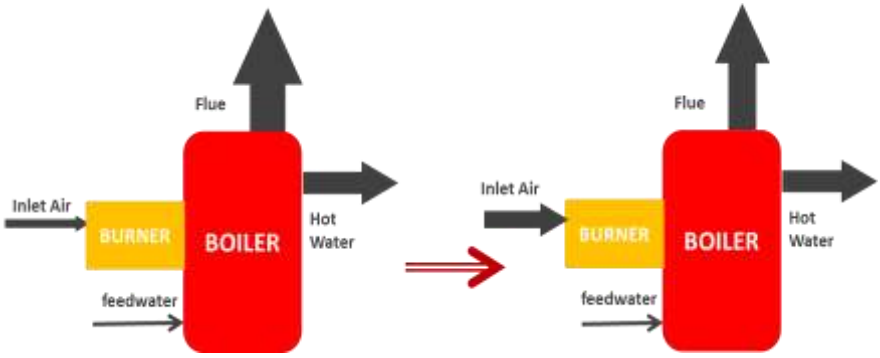
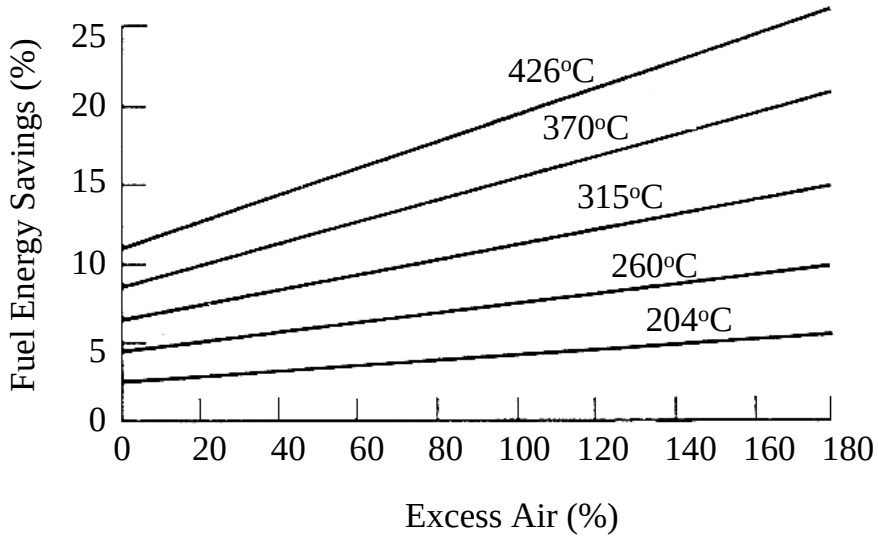


Figure 2 - Schematic depiction of the transfer of heat provided by the installation of an air preheater.

A boiler without pre-heater fitted draws ambient air during the combustion process, as shown in Figure 2 (left). Heating the inlet air improves the combustion efficiency by reducing the energy required to heat the air, as shown in Figure 2 (right). This also results in a higher flame temperature. The efficiency of the boiler can typically be increased by 1% for every 20°C increased, as shown in Figure 3.



EXAMPLE
(Australian Wine Research Institute)

A site has demands for 24,000 kg of 95°C hot water per hour, met by a boiler with 78% efficiency. With feed water having a temperature of 23.4°C, and flue temperature being 250°C, the potential energy savings gained through the installation of a boiler were calculated. Based on a calculated boiler heat output of 2000kW, the recoverable heat was calculated to be 165kW. Assuming the energy cost was $0.025/MJ, this corresponds to an annual cost saving of $28,557. Considering a capital cost of ~$114,000, this installation would payback in 4 years.