



VIET TRI PAPER COMPANY

Installation of economizers on boilers

SUMMARY OF THE OPTION

Viet Tri Paper Company is located in Phu Tho province. It is specialized in manufacturing of printing paper, writing paper, toilet paper and wrapping paper. In its old production line, the company uses three coal-fired boilers with very low efficiency (40 - 45%). During the assessment, it was observed that the boilers were fed with water at ambient temperature (25°C), whereas the flue gas of the boilers had temperatures ranging from 190°C to 200°C. It was thus decided that the company should install economizers to recover the waste heat from flue gas and use it to pre-heat the feed water of the boilers. The implementation of this option results in reduced use of coal and corresponding yearly cost savings of approximately US\$ 8,750.

KEY WORDS

Pulp and Paper, Vietnam, Boilers and Thermic Fluid Heaters, Waste Heat Recovery, Economizers, Flue Gas

OBSERVATIONS

The thermal efficiency of the boilers was measured and calculated by the indirect method using flue gases analyzer and data logger. The results are summarized below:

- Thermal efficiency : 45 %
- Flue gas temperature : 200 °C
- CO₂ %: 7
- O₂ %: 13
- Feed water consumption (3 boilers): 5,625 m³/hr

Waste heat recovery offers a great opportunity to productively use the energy contained in the flue gases, reducing overall plant energy consumption and greenhouse gas emissions. The units were designed to recover a constant 189,000 kcal/h from the flue gases of the three coal fire boilers. This resulted in a rise in feed water temperature by about 35 °C.

OPTIONS

Figure 1. Stack economizer installed on coal fire boiler





Economizers are implemented on the three boilers to capture heat from the exhausted combustion gases and transfer it to the cold feed water. The feed water is thus pre-heated up to a temperature of 60°C (from an ambient temperature of 25°C it is heated by about 35°C). It is then stored in an insulated tank before being fed in the boilers.

RESULTS

It was observed that three boilers consumed hourly a total of 870 kg coal and produced saturated steam at actual pressure of 8.5 at. The temperature of flue gas was reduced to 180°C. The installation of economizers requires a storage tank that allows providing hot feed water into boilers. The rise of 35°C in feed water temperature achieved thanks to this measure corresponds to 5.5 % saving of fuel in the boiler. This allowed the company to save approximately 380 tons coal per annum, currently worth US\$ 8,750 at local commercial rates. The total cost for implementing this option, including a storage tank, economizers, water pump and civil works, amounted to US\$ 4,763. However, this option requires additional electricity consumption for the pump with output capacity of 5.5 kW. Operating time of this pump is of three hours per day and thus annual power consumption of the pump is 5,940 kWh which is equivalent to US\$ 368. The new system thus has a simple payback period of seven months. It has been operating successfully for a year with no problems.

Financial benefits

- Investment: US\$ 4,762
- Annual operating cost: US\$ 368
- Annual cost savings (3 boilers): US\$ 8,750
- Payback period (month): 7 months

Environmental benefits

- Annual coal savings (3 boilers): 380 tons
- Emission factor: 2.51 tons CO₂/tons of coal
- 0.00068 tons CO₂/kwh
- Annual GHG emissions reduction: (380 x 2.51) - (5940 x 0.00068): 950 tons CO₂

FOR MORE INFORMATION

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