



HA BAC NITROGEN FERTILIZERS AND CHEMICALS

Reduction of Flue Gas Temperature of Air Heater of Pulverized Coal-fired Boiler

SUMMARY OF THE OPTION

The state owned company Ha Bac Nitrogenous Fertilizers and Chemical is located about 70 kilometers north of Hanoi. Its main products are: liquid ammonia (NH₃), urea and carbon dioxide (in both solid and liquid forms). During the energy assessment, the Team found out that the flue gas temperature before the wet dust scrubbers was too high (190°C) due to improper operation of the air heater. By cleaning the air heater and adopting proper settings for the forced draft (FD) fan damper, it is estimated that the thermal efficiency of the boiler is increased by approximately 1.5%, which results in annual coal savings of 414 tons.

KEY WORDS

Chemicals, Vietnam, Boilers and Thermic Fluid Heaters, Air heater, Coal, Flue gas

OBSERVATIONS

Based on energy audit, it has been observed that the temperature of the flue gas just before the wet dust scrubbers was too high (190°C as compared to the designed figure of 140°C). This can come from low heat transfer efficiency of the air heater and will result in relatively high energy losses due to the wasted flue gas sensible heat. As it was not possible to record the temperature of the preheated air at the control desk, a 1.5% increase in the boiler efficiency has been calculated, assuming that the flue gas temperature can be brought down to 160°C by improving the heat transfer process between the cooling air and hot gases.

OPTIONS

In order to reduce the temperature of the flue gas to 160°C, the Team recommended to check the FD fan damper and adjust its settings, as well as to replace damaged heat transfer tubes in the air heater and regularly clean it , in order to prevent scale formation on the heat transfer surfaces.

RESULTS

During the project, an evaluation of the air heater indicated that the thermal efficiency of the boiler could be improved by cleaning the air heater. As shown in table 1, by reducing flue gas temperature by 30°C it is estimated that approximately 414 tons of coal can be saved per annum. It results in CO₂ emission reduction of 1,039 tons per year. Annual savings from the implementation of this option are expected to be in the order of US \$ 8,694 (around 137 million VND). The investment of US \$ 3,500 (around 55 million VND) for the work will be paid back in five months.



Financial benefits

- Investment: US\$ 3500
- Operating cost: US\$ 368
- Annual cost savings: US\$ 8694
- Payback period: 5 months

Environmental benefits

- Annual coal savings: 414 tons
- Annual electricity savings: 130,200 kWh
- Emission factor: 2.51 tons CO₂/tons of coal
- Annual GHG emissions reduction: 1,039 tons CO₂

FOR MORE INFORMATION

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