"Promoting Energy Efficiency and Renewable Energy in MSMEs in India"

With an aim to develop and promote a market environment for introducing energy efficiency and enhanced use of renewable energy technologies in process applications in the energy-intensive MSME clusters, 'KV ENERGY REVENUE LLP' in collaborations with various industries is implementing industry-funded projects "Promoting Energy Efficiency and Renewable Energy in MSME clusters in India". The project supports MSME units in implementing various energy conservation measures and thus the result is reduced energy consumption and Green House Gas (GHG).

A Project by 'KV ENERGY REVENUE LLP', INDIA

Waste Heat Recovery through Recuperator from Fuel Fired Furnaces

Company Profile

'KV Energy Revenue LLP' is a registered company in INDIA as per company's act and Electrical Contracting and Energy Auditing firm. The company has also the scope in the area of Solar PV Plant Inspection, Electrical Design, Earthing Adequacy, Thermal Scanning and Energy Monitoring Services with state of art instruments.

Objective

To reduce losses from chimney flue gases, reduce fuel consumption, increase capacity utilization of furnaces, increase refractory life and reduce Green House Gas emissions.

Intervention

Installation of metallic Recuperator at chimney to recover waste heat from flue gases to preheat combustion air and to reduce fuel consumption along with reduction in air pollution.

Outcomes

Reduced specific energy consumption

- ✓ Increased furnace efficiency
- ✓ Increased refractory life
- ✓ Reduced GHG emissions
- ✓ Reduced dry flue gases loss
- ✓ Reduced radiation losses
- ✓ Increased furnace capacity utilization

Principle

Fuel fired furnace performance is also directly related to the chimney flue gas losses. The flue gas losses comprise about 40 to 50% of input energy. The flue gases carried away waste heat to the atmosphere through the chimney. The incomplete combustion of fuel is related to the proper mixture of fuel and combustion air.

As a rule of thumb, every 22°C increase in combustion air temperature or every 22°C reduction in flue gas temperature reduces 1% of fuel consumption in fuel fired furnaces. By waste heat recovery about 10 to 20% fuel savings can be achieved.

Tuning of air-fuel ratio along with waste heat recovery also results in 5 to 10% additional fuel savings.

Implementation

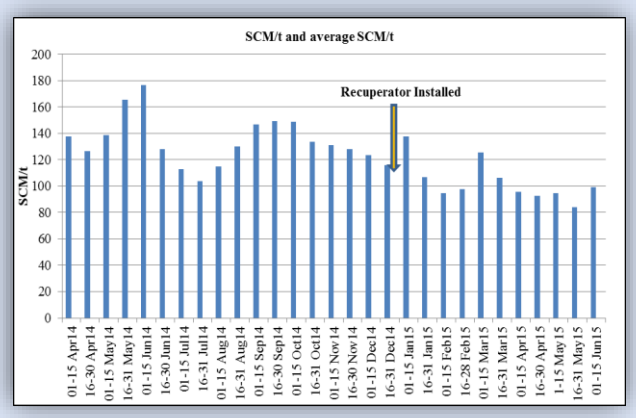
The waste flue gases carried away much amount to heat into the atmosphere. It is the direct losses of the furnaces. The measurement of flue gases constitutes like O_2, CO_2 and CO clearly give indication of complete/incomplete combustion of fuel. It also indicates the situation of stoichiometric combustion like fuel-rich condition or excess air condition.

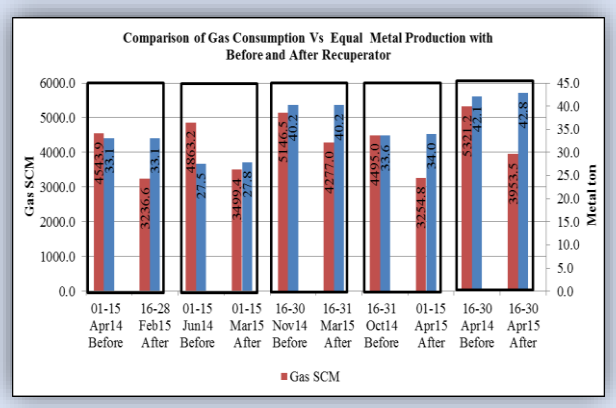
Installation of Recuperator (air to air heat exchanger) recovers waste heat from chimney flue gases and by use of it, preheats the combustion air before entering into the fuel burner. The preheated combustion air adds the extra heat into the process and increases the air temperature that results in fuel savings. Optimization of air-fuel ratio also helps to save the fuel.

Cost Economics

Average annual production	850-1050 ton
Average annual savings in fuel	26K – 32K SCM
Unit cost of fuel per SCM	68 Rs.
Average annual Monetary savings	17 - 21 Lac
Approximate investment	9 - 10 Lac
Simple payback period	6 - 7 months
Average annual energy savings	2200 - 2700 Lac MCal
Reduction of CO_2 emissions per annum	237 - 293 ton
Reduction of oil equivalent per annum	22 - 27 MTOE

Proposed Equipment





Results

By installing the Recuperator, the Specific Energy Consumption was **reduced from 135 SCM/ton to 95 SCM/ton**

Average annual fuel consumption was **reduced about 26000 SCM to 32000 SCM per annum**

Average annual monetary savings was **observed about 17 Lac INR to 21 Lac INR per annum**

Average annual GHG savings was **observed about 237 ton to 293 ton of CO_2 per annum**

Replication Potential

This method can be implemented in all fuel fired furnaces. However, periodic monitoring and measurement of Fluegas and recuperator performance indices is essential.

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