

RECP Best Practice Catalogue

Heat recovery from furnace flue gases
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Best Practice - Heat recovery from furnace flue gases

SECTOR:	Others
SUBSECTOR:	Manufacture of glass and glass products
PRODUCTS	Transparent, coloured, decorated and printed tableware glass as well as home accessories
CATEGORY	Process control or modification
APPLICABILITY	Process
COMPANY NAME	--
COMPANY SIZE	Large

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Description of the problem (Base scenario):

The production line has a natural gas fired furnace as the main energy consumer. Due to the nature of glass furnaces, the furnace has to run continuously disregarding the production levels. This is to avoid deterioration of the furnace wall resulting from temperature variations.

As the temperature of the furnace reaches over 1600 degrees, and to preheat the combustion air, the furnace design utilizes the flue gases to indirectly preheat the combustion air in a recuperator (metal heat exchanger), and are then released to the stack.

Temperature monitored on the recuperator external surface (via thermal camera and laser thermometer) show thermal leaks. Moreover the temperature of the stack was also recorded to be high

Description of the solution

Maintaining and fixing the insulation of the recuperator shall reduce the heat dissipation, thus assisting in recovery of more energy from the flue gases to preheat the combustion air.

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Economic Benefits	<p>Saving will be around 1% of the natural gas consumption in the furnace. The furnace accounts for 85% of the total natural gas consumption, so the total cost saving was calculated as:</p> <p>$1\% \times 85\% \times \text{annual gas consumption} = 63,305 \text{ m}^3/\text{year} (712,183 \text{ kWh/year})$</p> <p>With an annual production of 6,640 tons, the energy reduction is $9.53 \text{ m}^3/\text{ton} (107.26 \text{ kWh/ton})$</p> <p>Cost savings= 10,920 Euro/year.</p>
Environmental Benefits	<p>Reduction in energy consumption by $107.26 \text{ kWh/ton} \sim 712,183 \text{ kWh/year}$</p> <p>CO₂ reduction associated with the energy savings is equivalent to 144 ton/year</p> <p>Reduction in flue gases temperature by around 20 degrees</p>
Health and safety impact	Not applicable

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Capital investments & financial indicators	Repair and insulate heat dissipation locations in the recuperator would cost 2,500 Euro. Payback is 0.23 year
Suppliers	Local suppliers of refractory and insulation material.
Other aspects	None
Implementation	The company implemented this measure

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Replicability sectors	The same concept can be replicated in <ul style="list-style-type: none">• Glass industry
Aspects to investigate for replicability	Temperature records for the recuperator surface Stack flue gases temperature
Useful resources	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass, 2013, section 2.3.2 Conventional recuperative furnace http://eippcb.jrc.ec.europa.eu/reference/BREF/GLS_Adopted_03_2012.pdf
