INTEGRATED SYSTEM TO RECOVER PROCESS HEAT AND WATER IN A CERAMIC SPRAY DRYER WITH HEAT EXCHANGERS AND ABSORPTION

Fact Sheet

Project Information

Grant agreement ID: IN.-00028-97

Funded under
FP4-NNE-THERMIE C

Start date
End date

Overall budget
€ 1 165 408

EU contribution
€ 328 786

Coordinated by
CASTELVETRO CERAMICHE
Italy

Objective

Application of the recovery technologies with advanced heat exchangers coupled with the realization and perfection of an absorption system will enable action to cut down the losses of energy produced in the phase of spray drying ceramic raw materials, rationalize energy losses in kiln flue gas and improve the efficiency of a gas turbine. This solution will, by cooling and then condensing exhaust flue gases, permit recovery of the latent heat of condensation of the water they contain, making it possible to considerably limit environmental impact. This initiative will moreover include realizing and experimenting devices to use the waste recovered with different technical solutions. All companies will be interested in the results of the experimentation of the initiative which will make it possible to intervene in the grinding process bringing benefits in terms of energy and for the environment, without affecting the technological scheme of the production cycle. In addition, the
companies who have not yet fitted themselves out with a cogeneration system can be further stimulated to realize a plant including the planned refrigeration system as well. The saving of environmental resources (a reduction in the total process water consumption of over 25% is expected), the reduction in CO2 emissions (proportional to the recovery of heat) will bring benefits for the entire collectivity and the public authorities will be able to request action of environmental protection from ceramic companies also through the technology identified.

This initiative is inserted in the sector of thermal waste recovery through making exchange equipment in existing industrial processes; the impact of the new technology will be considerable at industrial level because it will allow cutting costs in a sector of high energy intensity without changing the current production set-up. Imports of energy will decrease by 2757.7 TEP/year par plant made.

A special, extremely innovative, integrated solution has been studied, comprising multiple exchange appliances operating as follows:

- flue gas/water heat exchangers on the kiln waste gas, flue-gas/air and flue-gas/water of the spray drier waste gas, in relation to the planned use of the energy recovered
- direct introduction of water into an exchange tower, on the spray drier flue gas
- installation of an absorption unit, whose refrigerating capacity allows cooling several uses.

Recovery will be carried out in several subsequent stages:

1. In the first phase recovery will take place by lowering the temperature of the gases emitted down to the wet-bulb temperature by means of a first gas-water exchanger to heat part of the water that will supply the refrigerator unit and a second gas-air exchanger that will be enable producing hot air for drying the ceramic tiles leaving the presses.
2. In the second phase there will be direct recovery of the latent heat and water, with a system comprising direct introduction of water into an exchange tower, at ambient temperature, and recirculation of the water condensed for wet grinding. Part of the thermal energy recovered will be used to preheat the slip and the remainder, through an air-water exchanger, will allow heating the ambient air. The hot air leaving the air-water exchanger has been planned for different uses:
   - eliminating the "plume" from the chimneys into the atmosphere of the waste gas of the spray drier
   - ambient and department heating (in the wintertime).

The command and control system, composed of a control panel with a synoptic panel and PLC, will be such as to allow displaying the process and reading the values of the variables at play in the system, with the possibility of corrective action by using gates or members designated for control.

This system, by using efficient energy technologies compared solution, will allow recovering the heat contained in the flue gases emitted by a drying system and from the flue gases of two ceramic kilns. Heat recovery is obtained by cooling the flue gases to condensation temperature, with consequent condensation of water. The heat recovery on the flue gases of the ceramics kilns occurs by means of thermal
exchange with water reducing the flue gas outlet temperature.

Programme(s)

Topic(s)

Funding Scheme

DEM - Demonstration contracts

Coordinator

CASTELVETRO CERAMICHE

Address
Strada Statale 569, 167/A
41050 Solignano
Italy

Last update: 21 October 1999
Record number: 45198

Permalink: https://cordis.europa.eu/project/id/IN.-00028-97/

© European Union, 2020