

Case Study

Industrial Energy Efficiency



| | | | |
|---|-----------------|-----------------|-----------------------------------|
| Sector: X Industry | Large Buildings | Infraestruturas | Small buildings / residential |
| Subsector: Cement | | | Year: 2010 |
| Client: Cimpor (Souselas Plant) | | | Implementation (months): 3 |
| Location: Alhandra (Lisbon region - Portugal) | | | Performance Contract (years): N/A |
| Type of Contract: Energy Audit including an economic viability study for Waste Heat to Power (H2P) project. | | | |

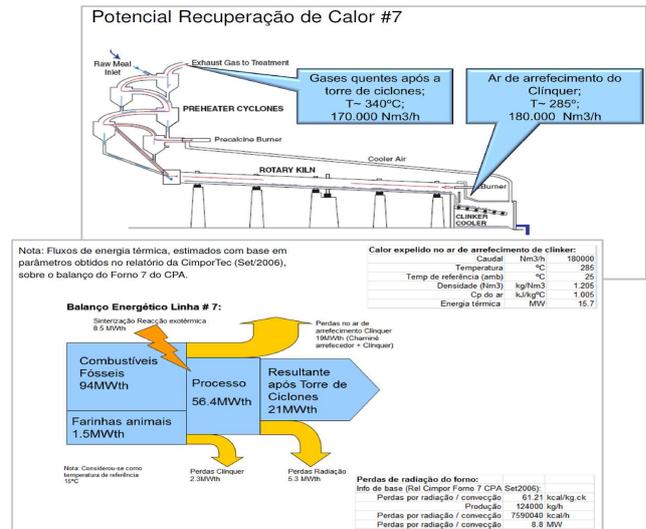
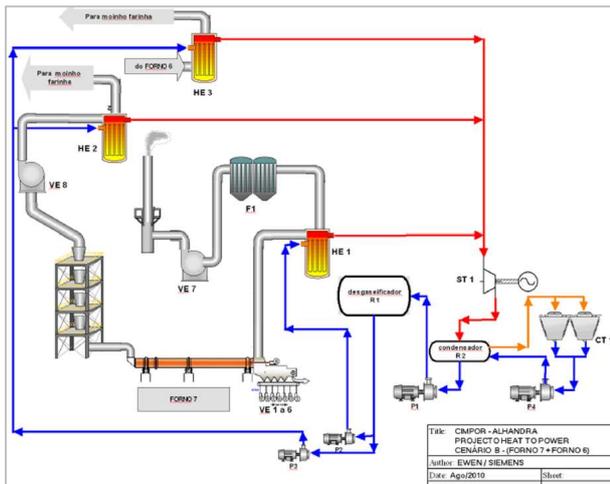
Project description:

In any cement production unit, there is a significant amount of heat, at a temperature of 250 to 400°C, that is wasted (sent to the atmosphere). During an energy audit at the Alhandra cement plant, EWEN studied the industrial process, analysing the BAT (Best Available Technologies) and identifying the heat recovery (and its conversion to electric power) as the technology with the highest impact on the energy efficiency in this industry.

EWEN therefore included in the energy audit being done, a detailed economic viability study, of such as H2P (Heat to Power) project for the Alhandra plant.

A H2P plant was defined, with a heat recovery boiler (adapted to the high dust laden hot air flow) in a Rankine cycle, with a SST-type turbine from Siemens, the selected partner for the study. The study considered two scenarios:

- I) Heat recovery only from oven #7, with power production of approx 1250kW.e;
- II) Heat recovery from oven #6 & 7, with power production of approx 2500kW.e.



Project results: Apart from the energy efficiency measures identified in several systems, and recommended in our Energy Audit report, the economic viability study for the H2P (Heat to Power) unit, had a very significant weight. Following a suggestion by the client Cimpor, Siemens was selected as partner for the H2P study, as eventual supplier of the steam turbines and power control system. Several scenarios were analysed with different economic assumptions (with / without EU funds, power consumption within the plant versus selling the power to the grid, heat recovering from 1 or 2 ovens) with pay-back periods between 2.4 & 9.4 years.

| TURBINAS Siemens Série SST Principais características | | | |
|--|---------------|------------------|------|
| Cenário » | A (Forno 7) | B (Fornos 7 + 6) | Unid |
| P vapor (entrada) | 15 a 17 | 15 a 18 | bara |
| T vapor (entrada) | 280 a 300 | 300 a 325 | °C |
| P vapor (saída) | 0.10 | 0.10 | bara |
| T vapor (saída) | 46 | 46 | °C |
| Caudal | 11000 a 18000 | 22000 a 28000 | Kg/h |
| Velocidade | 1500 | 1500 | rpm |
| DN (entrada) | 150 | 200 | mm |
| DN (saída) | 600 | 800 | mm |
| Potência | 1300 a 1600 | 2600 a 2800 | kWe |
| Consumo próprio | 120 a 160 | 150 a 200 | kWe |
| Potência Net gerada | 1140 a 1480 | 2450 a 2650 | kWe |
| | ~ 1250 kWe | ~ 2500 kWe | |

