The Vattenfall Energy Award – Presentation 2012

Effective Use of Excess Heat in a Cement Plant

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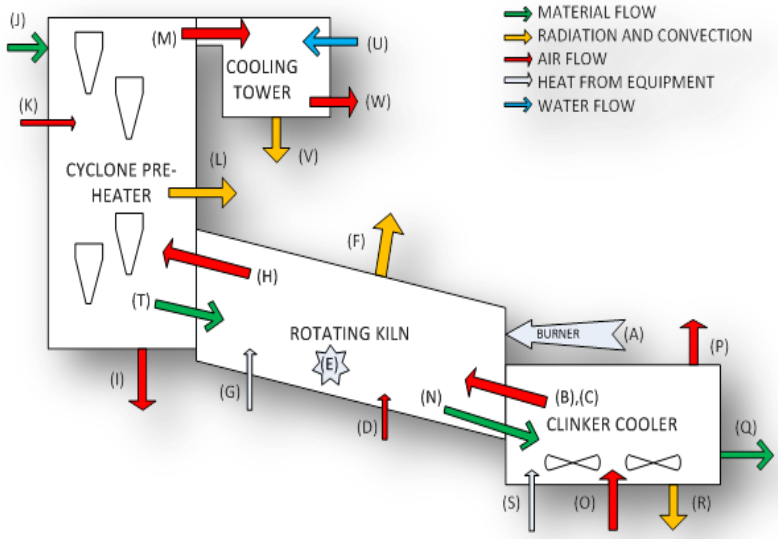
About the Thesis

Literature and background

- The thesis project is conducted at Cementa AB in Slite, Gotland;
- It provides a short history and a detailed description of the cement manufacturing process and methods used at the plant.



Content of Study

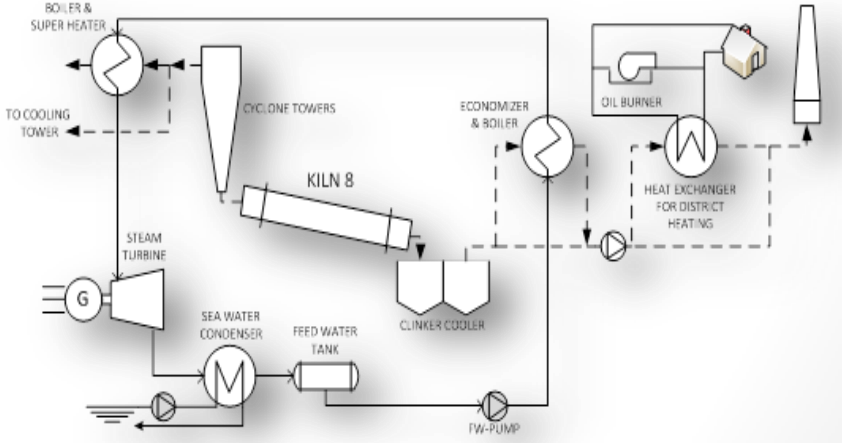
- Lost heat is identified and quantified at the cement plant;
- Heat recovery methods are investigated;
- Possible uses for the excess heat are identified;
- Most suitable heat recovery methods and setups are obtained through a study of the costs, heat recovery and savings;
- Final solution provides for quick return on investment with high level of heat recovery, fuel savings, electricity production and improved efficiencies.

Study Outcome

The cement plant has two production facilities (kilns), one of which is connected to a recovery system. The recovery system supplies heat to a Vattenfall steam generator and a GEAB district heating system, additionally the system has an oil burner as backup. This study focused on improving on the existing systems by using the unconnected production facility.

After considering various possible setups and connections, the student identified the most feasible solution. Connecting a 5,4 MW heat exchanger to the clinker cooler gas outlet, which would:

- Recover 17,24 GWh/year (34%) of available heat;
- Supply the town's district heating with 87 % of the demand;
- Increase the amount of electricity generated by 3,79 GWh/year (15%);
- Reduce oil consumption from the backup boilers, resulting in an emissions reduction of 348 tons of CO_2;
- Investment payback period of 5 years.



Global Problems

Problems

- The cement industry produces 5 % of the global CO2 emissions;
- Poor efficiencies with over 40 % of heat lost from the system;
- Most cement plants still use coal as the main source of energy.

Solution provided by the Study

The study is unique to the Slite plant, although by applying similar methods at other plants, the following could be achieved:

- 50 % recovery of lost heat;
- Support for local communities through district heating or electricity generation from recovered heat;
- 4,8 % reduction in fuel consumption, which could amount to 72 million tons of CO_2 emissions globally;
- Financially attractive solution with a short payback time for companies.

By taking on an industry which is the second largest producer of carbon emissions, we can greatly reduce our impact on the environment with even the smallest % savings.