Energy savings at a coal fired power plant

The site is a coal fired power station located in Denmark, designed to be one of the most efficient coal fired power stations in the country, if not the world. It produces about 250 MW of electricity, as well as up to 350 MW of heat for a local district heating system.

The client was running a cost saving programme, and in order to reduce energy costs wanted to improve energy efficiency at the power plant. The owner / operator is regarded as the premier supplier of energy efficiency advice within Denmark, via a governmental energy efficiency programme.

However, they considered the site too complex to investigate themselves. Having used ABB’s equipment and services in the past, and hearing of the previous work ABB consultants had carried out assisting power stations, they asked ABB for help.

We were asked to carry out the work at very short notice in order to accommodate a relatively unexpected plant shutdown. ABB were able to complete both the site visit and reporting within the very limited time frame, allowing the client to meet budgetary requirements and obtain funding for implementation.

Solution
ABB spent a week on site, and identified annual savings of between £630,000 and £1.4M, equivalent to 7 - 13% of the site parasitic load.

The savings identified applied across the site, ranging from low or no cost investments to capital cost projects. By implementing only the quick win opportunities, the savings would more than pay for the cost of the study.

Opportunities to reduce energy consumption at the site included:

- An optimisation of the air / fuel ratio within the boilers would allow the combustion efficiency to be maximised. This would result in a reduction in coal consumption, leading to savings of between £181,000 and £545,000 each year.
- By balancing the sea water cooling flows, the site could save between £19,000 and £39,000 each year. This involves optimising the supply of cooling water and cutting excess water flow - as a result cutting pumping costs. Payback for this measure would be less than two months.
A reduction in site standby load could save £31,000 to £46,000 each year. During standby operation, the electrical load on the site was around 3MW. By assessing the components of this load, unnecessary loads could be turned off, cutting costs.

- By carrying out real-time monitoring of ash carbon content, the site could measure the combustion efficiency and take remedial action as required. By reducing the ash carbon content by 50%, an annual saving of £178,000 to £335,000 each year could be realised.

- A number of desulphurisation pumps were running during normal operations, but the demand for the slurry supplied by these pumps was low. By turning off some pumps, and fitting the remainder with variable speed drives, electricity consumption could be reduced by £115,000 to £194,000 each year.

**Benefits**

- Opportunities to reduce energy costs by £0.6m to £1.4m each year were identified.
- Equivalent to a reduction in parasitic load of 7 - 13%.
- Improved efficiency.
- Improvement in heat rate of coal to electricity production.
- CO₂ and SOₓ emissions reduced.
- Reduced maintenance requirements and cost as wear and tear on equipment was reduced.