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Issue # 1: June 2008

IGEN – Thermal Power Plant Corner

Estimation of savings due to control of de-super heater water spray

Background:

A 140 MW thermal power generating unit, operating at 110 MW, was found to having main steam flow of 390 Ton/hr (TPH) at 120 kg/cm²(g) pressure and 536°C temperature (enthalpy = 822.9 kCal/kg). To control the super heat temperature, 30 TPH of water spray at 128 kg/cm²(g) and 170°C (enthalpy = 173.4 kCal/kg) was used in the de-super heater. The other operating parameters/ assumptions of the generating unit are as under:

Parameters/ Assumptions:

- (a) Main steam required at the above main steam pressure & temperature to generate 1 MW = 3.5 TPH.
- (b) Specific coal consumption = 0.65 kg/kWh
- (c) Coal GCV = 4,600 kCal/kg
- (d) Landed coal cost = Rs. 1,800 per ton
- (e) Expected steam consumption in the soot blowers after repair = 110 ton per day
- (f) Average revenue realised = Rs. 2 per kWh generated
- (g) Investment towards repairing of soot blowers = Rs. 4 crores
- (h) Boiler efficiency = 80%
- (i) Annual plant operating hours = 7000

Proposal:

The power plant plans to repair the existing steam soot blowers in order to improve the heat transfer within the boiler and to reduce the de-super heater water spray from 30 TPH to 7 TPH.

Issue:

What will be the energy and money saving potential if the above proposal is implemented by the power plant management?

Please send your solutions latest by 10th July 2008 to Mr. K. K. Chakarvarti, Manager – Power Plant Component at ppc@energymanagertraining.com

All the best solutions received will be posted on the website latest by 17th July 2008 alongwith the names of the contributors.

SOLUTION

Energy Saved:

Reduction in the de-super heater water spray = $30 - 7 = 23$ Tons per Hr

Energy Saved = $23000 \times (170 - 40)$ Kcal/Hr

= 2990000 Kcal/Hr

= 2990000 \times 7000 Kcal/Year

Energy Saved = 20930000000 Kcal/Year

Money Saved

Coal Saved = $20930000000 / (4600 \times 0.8)$ Kg/Year

= 5687.500 Tons/Year

Money Saved = (5687.500×1800) Rs/Year

= 10237500 Rs/Year

= 1.2375 Crores Rs per year

Money Spent towards repairing of Soot Bolwers Rs 4 Crores

Net Money Saved = $1.2375 - 20\%$ of 4 crores = $1.2375 - 0.8$

= 0.4375 Rs Crores per year.

= 43.75 Lac Rs per year

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