

For Expert comments on Issue #1 – [click here](#)

Please find the attached excel file on estimation of savings in terms of energy and money.

Philosophy / Logic

Enthalpy of steam as a result of desuperheating with 30 TPH and 7 TPH is computed. The difference in enthalpy is considered as an increased input energy to turbine which will result in increased power generation and increased revenue. The steam consumption for repaired soot blower is taken care and deducted from the available increased input.

Net increase in power generation is 3.6 MW with increased revenue is Rs. 500 Lac / annum.

Refer the calculation sheet where in each cell of column D the computations are available.

I hope you will find the estimation in line with your requirements.

Thanks & Regards

Pramath

For Expert comments on Issue #1 – [click here](#)

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 536oC temperature (enthalpy = 822.9 kCal/kg). To control the super heat temperature, 30 TPH of water spray at 128 kg/cm²(g) and 170oC (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. - Word file](#)

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

Installed Capacity	MW	140	
Operating Capacity	MW	110	
Steam Generation Parameters			
Pressure	kg/cm ² g	120	
Temperature	° C	536	
Flow Rate	TPH	390	
Enthalpy	Kcal/Kg	822.9	
Desuperheating done with Hot water at			
Pressure	kg/cm ² g	128	
Temperature	° C	170	
Flow Rate	TPH	30	
Enthalpy	Kcal/Kg	173.4	
Flow Rate after soot blower repairs	TPH	7	
Other Parameters			
Sp. Steam Cons.	TPH/MW	3.5	
Sp. Coal Cons.	Kg/kWh	0.65	
Coal GCV	Kcal/Kg	4600	
Coal Cost	Rs./MT	1800	
Steam Cons. In Soot Blower after repairs	TPD	110	
Ave Revenue Realized	Rs/kWh	2	
Investment for Soot Blower Repairing	Rs. Lac	400	
Boiler Efficiency	%	80	
Annual perating Hours	Hrs	7000	
Enthalpy of Steam at Turbine Inlet with 30 TPH at Desuperheater			
Energy of Steam	Kcal/hr	320931000	
Energy of Spray Water	Kcal/hr	5202000	
Energy of Steam resultant	Kcal/hr	326133000	
Enthalpy of Steam for power generation	Kcal/kg	776.51	
Enthalpy of Steam at Turbine Inlet with 7 TPH at Desuperheater			
Energy of Steam	Kcal/hr	320931000	
Energy of Spray Water	Kcal/hr	1213800	
Energy of Steam resultant	Kcal/hr	322144800	
Enthalpy of Steam for power generation	Kcal/kg	811.45	
Savings Calculated through Increased Power Generation			
Difference in Steam Enthalpy at Turbine Inlet	Kcal/kg	34.94	
Steam Flow Rate	TPH	397	
Increased Energy Input to Turbine	Kcal/hr	13871464	
Increased Input in terms of steam flow	TPH	17.1	
Increased Input in terms of steam flow	TPD	410	
Less Steam consumption for soot Blowers	TPD	110	
Net increased steam Input to Turbine	TPD	300	
Net Increased Power generation	MW	3.6	Energy Saving
Net Increased Revenue Realization	Rs Lac	500	Money Saving
Investment for Soot Blower Repairing	Rs. Lac	400	
Simple Payback Period	Months	10	