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Issue # EE 19

This issue addresses **aggregated** data reporting and other topics under the EC Act. In the future BEE may introduce a minimal set of aggregated energy reporting data satisfying the criteria of being (i) innovative, (ii) value added to designated consumers, (iii) can be electronically evaluated and analyzed by BEE, (iv) satisfies BEE's mandate to contribute validated and accurate national energy consumption and conservation statistics leading to allocation efficient national EC policies.

Readers are asked to contribute in the following way:
(i) Expand the table of section 5. "Pop up explanations for change in consumption and costs". Only one-line reasons are allowed, but further explanations are welcome in the small print.
(ii) Submit for a real case the appropriate graph fort the year 2003/04 with explanations

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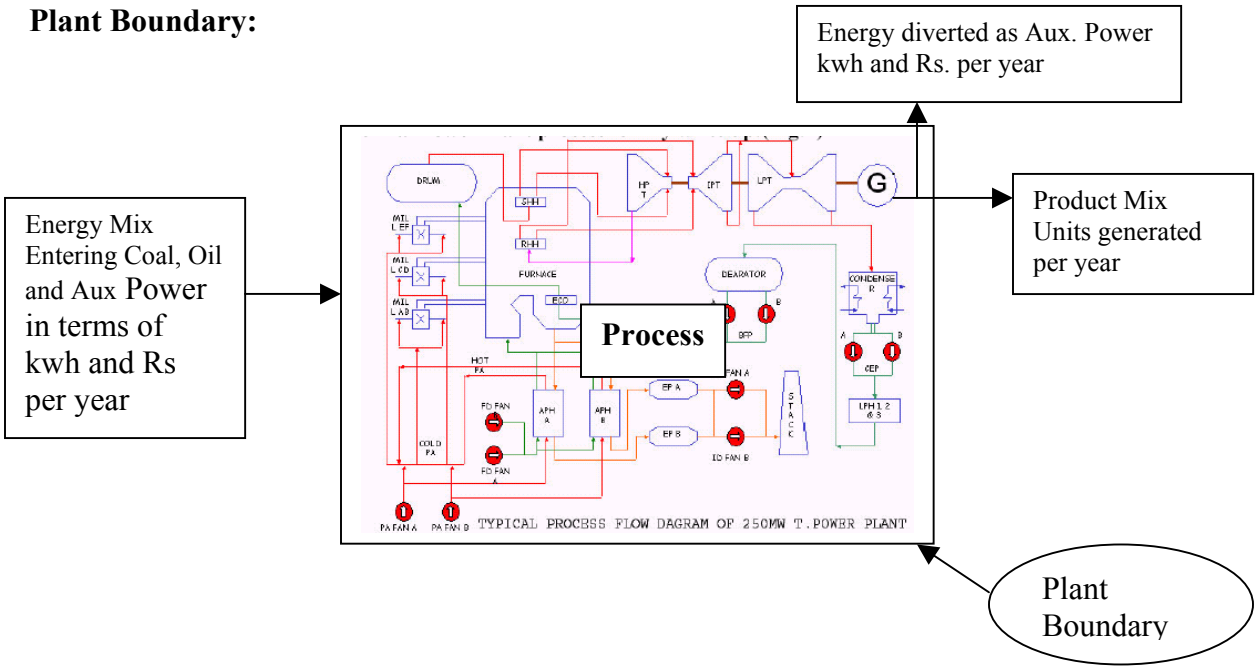
Here I taken a India's first **250 MW** coal base power plant for my write up

Plant Boundary:



Considerations: 250 MW coal base power plant.

A) Energy Mix 1) Coal
2) Oil
3) Auxiliary power

B) Conversion Factors
3600 kJ = 1 kWh
4.18580 kJ = 1 kCal

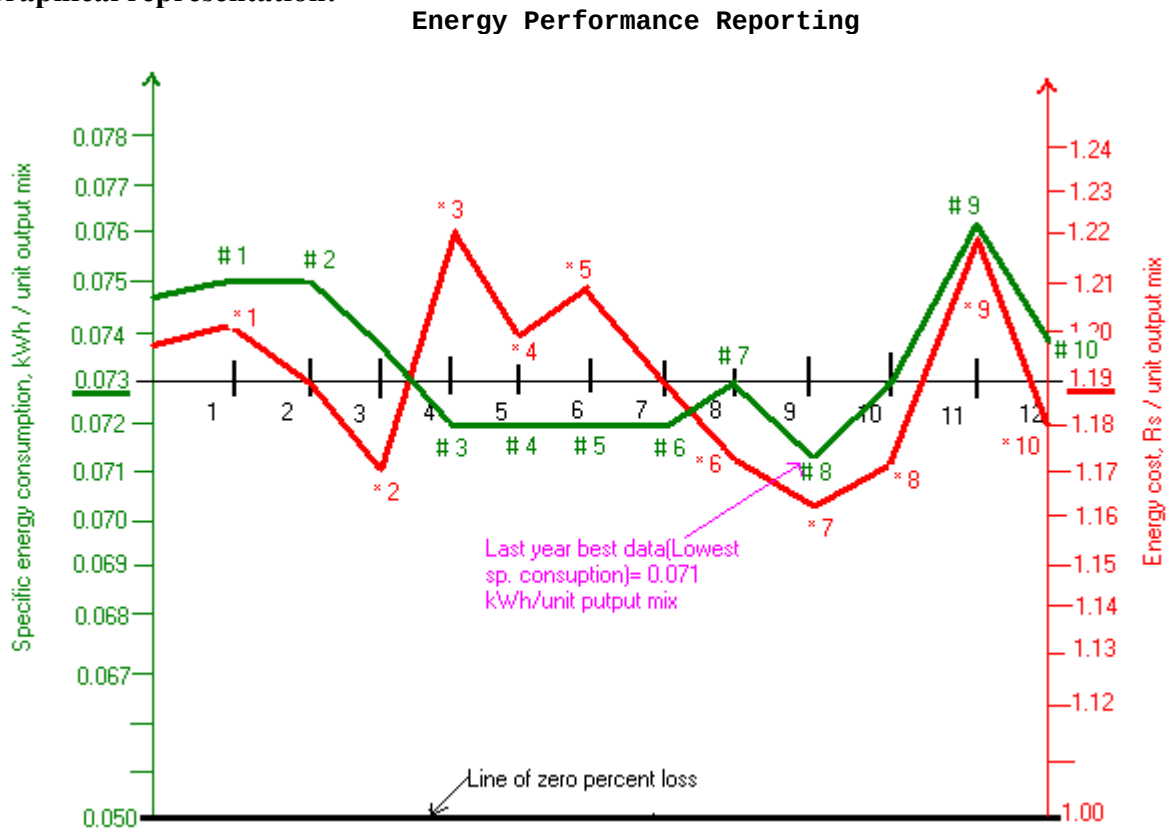
C) Gross Calorific Value
GCV of Coal = 4200 kCal / kg
GCV of Oil = 10500 kCal / kl

D) Price
Coal Cost = 1950 Rs./ MT
Oil Cost = 13000 Rs./ kl
Electricity Cost = 2.40 Rs./ kWh

E) Aggregated data sheet

Month	Generation	Sp. Oil	kwh oil	Sp.Coal	kwh coal	Aux power	kwh aux	Kwh/ unit out put mix	oil cost	coal cost	aux.p. cost	Rs./ unit out put mix
	kWh	ml/kWh		kg/kWh		%			Rs/kwh	Rs/kwh	Rs/kwh	
1	188000000	0	0	0.523	2.55	7.45	14006000	0.075	0	1.02	0.18	1.20
2	193000000	0	0	0.517	2.52	7.53	14532900	0.075	0	1.01	0.18	1.19
3	187000000	0	0	0.511	2.50	7.35	13744500	0.074	0	1.00	0.18	1.17
4	194000000	0	0	0.535	2.61	7.21	13987400	0.072	0	1.04	0.17	1.22
5	195000000	0	0	0.524	2.56	7.23	14098500	0.072	0	1.02	0.17	1.20
6	188000000	0	0	0.533	2.60	7.20	13536000	0.072	0	1.04	0.17	1.21
7	194000000	0	0	0.523	2.55	7.20	13968000	0.072	0	1.02	0.17	1.19
8	188000000	0	0	0.511	2.50	7.28	13686400	0.073	0	1.00	0.17	1.17
9	191000000	0.045	0.5494	0.508	2.48	7.14	13637400	0.071	0.0000585	0.99	0.17	1.16
10	172000000	0.410	5.0055	0.510	2.49	7.25	12470000	0.073	0.000533	0.99	0.17	1.17
11	180000000	0	0	0.530	2.59	7.62	13716000	0.076	0	1.03	0.18	1.22
12	196000000	0.157	1.9167	0.513	2.51	7.37	14445200	0.074	0.0002041	1.00	0.18	1.18

Graphical representation:



Pop up explanations for change in consumption and costs:

a) **Increased Specific consumption or cost list:**

#	Reason of Increased energy consumption kWh / unit output	*	Reason of Increased energy cost Rs / unit output
# 1	Boiler efficiency decreased due to increase moisture in coal	* 1	Grid frequency higher side
# 2	Condenser vacuum lower side	* 3	Low grade coal
# 7	Un-burnt carbon increased	* 5	Leakage in HP heater
# 9	Malfunctioning of UPS system	* 9	Specific consumption increased

b) Decreased Specific consumption or cost list:

#	Reason of Decreased energy consumption kWh / unit output	*	Reason of Decreased energy cost Rs / unit output
# 3	Optimum running of HT equipments	* 2	Optimum ball loading in mills
# 4	Condenser vacuum improved	* 4	Modified debris filter taken in service
# 5	Regular preventive maintenance of equipments.	* 6	On line efficient condition monitoring
# 6	Fuel management –use of best blended coal	* 7	Reduced coal handling operation hours

# 8	Regular efficiency test	* 8	Close monitoring of operating parameters
# 10	Mill fineness improved	* 10	Trained operation and maintenance staff

The monthly energy savings potential assuming theoretical specific energy consumption 0.050 kWh/unit output mix at no-loss (line of zero loss) is as follows:

Month	Generation (kWh)	kwh/unit out put mix	Energy saving potential kWh
1	188000000	0.075	4700000
2	193000000	0.075	4825000
3	187000000	0.074	4488000
4	194000000	0.072	4268000
5	195000000	0.072	4290000
6	188000000	0.072	4136000
7	194000000	0.072	4268000
8	188000000	0.073	4324000
9	191000000	0.071	4011000
10	172000000	0.073	3956000
11	180000000	0.076	4680000
12	196000000	0.074	4704000
		Total	52650000

The monthly energy cost savings potential assuming theoretical energy cost 1.00 Rs /unit output mix at no-loss (line of zero loss) is as follows:

Month	Generation (kWh)	Rs./ unit out put mix	Energy cost saving potential (Rs)
1	188000000	1.20	37600000
2	193000000	1.19	36670000
3	187000000	1.17	31790000
4	194000000	1.22	42680000
5	195000000	1.20	39000000
6	188000000	1.21	39480000
7	194000000	1.19	36860000
8	188000000	1.17	31960000
9	191000000	1.16	30560000
10	172000000	1.17	29240000
11	180000000	1.22	39600000
12	196000000	1.18	35280000
		Total	430720000

Other points which helps to reduce Sp. Energy Consumption, kWh/unit output mix and Energy cost, Rs / unit output mix.

1. For all forced outages of major equipments and units analysis to be carried out – recommendations in the form of- **logic /scheme/operation mechanism/system** modifications to be implemented.
2. All events leading to loss of generation/unit trippings to be analysed, corrective & preventive action to be taken.
3. Feedback to all Operating Engineers to avoid repetitive mistakes.
4. Units to be operated-close to Rated Capacity, within defined limits.
5. Setting of various O&M section.
6. Deployment of appropriate (O&M) personnel
7. Best possible training in O&M field.
8. Ensuring availability of mandatory spare.
9. Regular efficiency test & feed back to O&M staff.
10. Good house keeping (It play very important role in cost reduction & work Environment).
11. Define parameters and limits.
12. Control defined efficiency parameters
13. Monitor online efficiency.
14. Heat rate improvement program -daily monitoring of losses corrective & preventive action
15. Monitoring and corrective action to be taken in deviation of main critical parameters.
16. Aux. Power reduction programme.
17. Optimum operation of offsite auxiliaries.
18. Report abnormal/emergency events/occurrences.
19. Register defects/problems.
20. Observe safety-isolation and P & I.
21. Follow change over schedules.
22. After change over of HT equipments checking of stand by equipment breaker healthiness.
23. Monitor online condition monitoring.
24. Trial of emergency auxiliaries.
25. Prepare all types of reports like Daily plant report, Efficiency Parameter deviation report, Plant statistical report, Daily heat rate losses report, Turbine metallurgical report and generation cost report.

Conclusion

By adopting suitable Strategies in O&M, high degree of reliability can be achieved which helps to reduce Sp. Energy Consumption, kWh/unit output mix and Energy cost, Rs / unit output mix.