

Energy Conservation Measure implemented in 2006-2007

ID to be filled by BEE	Title of the measure Plant Cycle Time reduction and its heat rate optimization by Cycle Time- Charts supported by Software.	Sector : General category
Year to be filled by BEE		Technology

Description of the energy conservation measure:

Plant Cycle Time reduction and its heat rate optimization by Cycle Time- Charts supported by Software.

Plant hot startup time for reaching full load of 220MW from 0MW was 2.50 hrs during FY 2005-06. **This was further effectively optimized by 2 hrs 02 min (average) for FY 2006-07 i.e. gain of 18.68% time (average) on each Start-up. Plant Shut-down time reduction achieved by 33.33% at 30min from 45 min.**

Improvement trend for Startup and Shut down time for last few years are shown below:

FY	Startup Time			Shutdown Time
	Hot (hr)	Warm (hr)	Cold (hr)	
2002-03	4	5.5	9	1hr 40min
2003-04	3	4	6	45 min.
2004-05	2.8	3.9	6	45 min
2005-06	2.5	3.5	6	45 min
2006-07	2.03	3.30	5.5	30min.

Plant start up of 0 to 220 MW was done in 2 hrs 02 min (average) during this operation cycle from December 06, and the **best start up time achieved was 1 hr 51 minutes**. Average reduction of 26 minutes during start up is due to plugging gaps by in depth analysis made available by commissioning of Plant cycle-time reduction charts

On-line time chart is made available, which is saving the time of the operation crew to carry out start-up effectively, with out any delay and procedures laid out for starting the plant.

In the sixth tariff year the plant generated 530.654 MU and exported 508.685 MU. The PPA Plant Load factor was 98.99% including deemed generation attributable to KPTCL. The NME plant load factor calculated on NME was 26.23 %. Plant net heat rate was 1950.5 Kcal/KWh.

Plant statistical data are listed below:

Parameter	2006-'07 (AOP) Target	2006-'07 Actual	2005-'06 Actual	2004-'05 Actual
Availability (%)	90.57	98.97	97.54	98.39
NME PLF (%)	15.20	26.23	12.54	32.70
Gross Gen (MUs)	312.075	530.66	257.757	661.400
Net Gen (MUs)	292.927	505.5	241.622	630.266
A.P.C. (%)	6.14	4.74	6.26	4.71
Heat Rate (kcal /kwh)	1909.9	1816.3	1884.8	1840.1

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Previous Scenario:

We were not having any plant start up and SD monitoring of the plant. We are trying to carry it out it as a part of ISO activity manually, which takes more time of Operator during start up.

Proposed Action Plan:

Developed In-house module/logic (supported by Visual basics) for start up and SD monitoring of the plant and connected to our online DCS Max 1000 + DCS

With this we will be able to monitor Daily start up and shut down more effectively and minutely.

Action Plan Implemented and Befits Achieved:

After commissioning Plant Cycle Time–Charts. Plant Startup time has reduced by **18.68%** and Shutdown time has reduced by **33.33%** by last year, there is substantial improvement in overall heat rate achieved through this cycle time reduction charts. It also helped us:

- In optimizing the Plant start up and SD effectively and soft records for in-depth analysis at each cycle interval with specific energy consumption, units etc are available for .
- As we are more like a peaking Plant, we do start up and SD as a part of our Daily activity. We had undergone total of 78 plant start-ups in the last FY 2006-07, an average of one start per day during the time of dispatch by KPTCL. There were a total of **480 GT starts**. PLF for the year was 26.23%.

Picture/ sketch/ drawing before modification
(if available)

Picture/ sketch/ drawing after modification

StartUp Time Chart Report was Started on **Date 22-May-2007** at **Time 16:39:51 Hrs**

Event ID	Activity	Tagname	Units	Value/Time
1	Contingency Pump A	XI-CCP4-A	Hrs	16:39:58
2	First Cooling Water pump Startup	XI-9000	Hrs	16:45:48
3	Type of Start(HOT/WARM/COLD)			WARM
4	STG Flange center temp before startup	MAN_TT3F05	DegC	277.00
5	MS temp TT4018 reqd for ESV opening as per SLD	MAN_TT4018	DegC	314.00
6	Main steam header temp before start up at First GT Start	TI-4018	DegC	157.65
7	HSD integrator Reading before start up at First GT Start	FODI-6003	Tons	1,338.69
8	Naphtha integrator Reading before start up at First GT Start	FODI-6001	Tons	208,690.20
9	GTG # 1 energy meter reading before startup at first GT start	JOL-1091P-1	MWH	26,239.20
10	GTG # 2 energy meter reading before startup at first GT start	JOL-1091P-2	MWH	151,552.40
11	GTG # 3 energy meter reading before startup at first GT start	JOL-1091P-3	MWH	35,158.23
12	GTG # 4 energy meter reading before startup at first GT start	JOL-1091P-4	MWH	21,490.88
13	STG energy meter reading before startup at first GT start	JOL-3841	MWH	26,745.76
14	UAT #1 energy meter reading before startup at first GT start	JO-8611	MWH	11,255.59
15	UAT #2 energy meter reading before startup at first GT start	JO-8624	MWH	8,880.00
16	First GT Start	HS-10003-3	Hrs	16:46:55
17	First OTSG Inlet temp	TI-2014-3	Deg C	33.35
18	First OTSG outlet temp	TI-2017-3	Deg C	35.06
19	CPU B Taken on Line	XI-4686B	Hrs	16:49:58

Agency that executed the project (with complete address and email): In-house done.

Total investment:
Nil (Rs.50, 000 for

Year of implementation: 2006-07

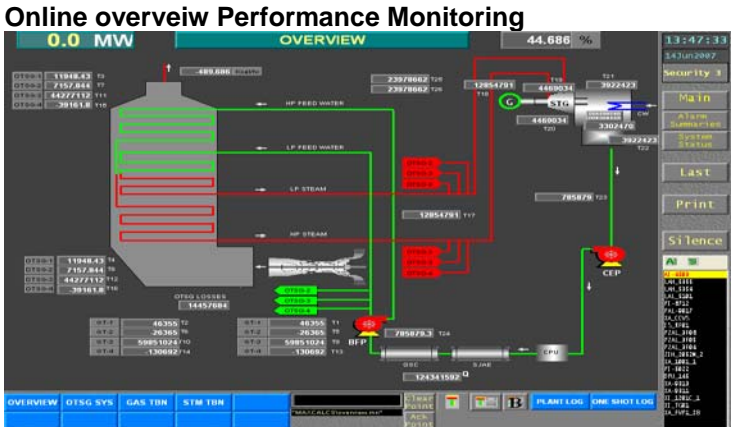
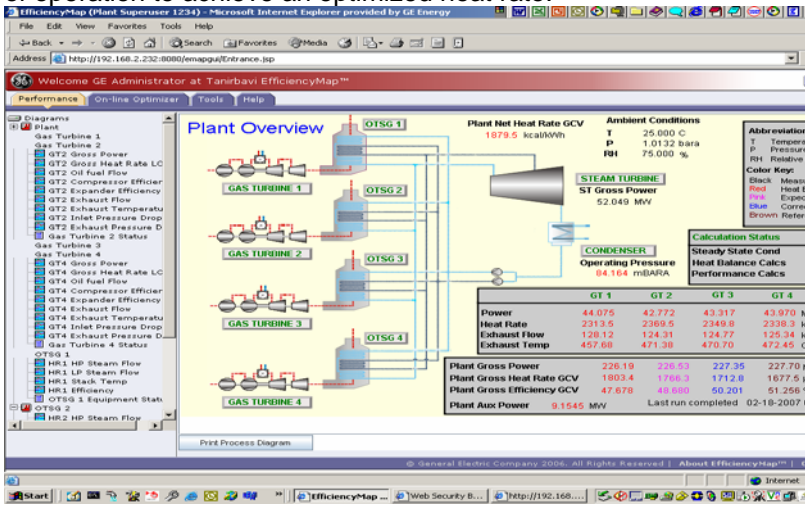
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one site engineer to visit and be available during testing of online soft module installation.)					
First year energy cost savings, Rs: 6.86 Crores for Plant cycle time optimization.					
First year other savings, Rs.					
On annual basis	Rs/ kWh	Coal (Tons)	Gas Nm ³	Oil (MT)	Other
Energy consumption before	-	NA	NA	89901	NA
Energy consumption after	-	NA	NA	86148	NA
Energy tariff, Rs/ kWh	6.75	-	-	-	-
<p>Company complete address:</p> <p>220 MW Barge Mounted Power Plant, Tanir Bavi, Panambur, Mangalore-575010. Phone : 0824-2400830-36 Fax : 0824-2400839-40</p> <p>Contact person who could be contacted for more information: Mr. Bharat Saxena GM (Operations) Mobile : +919980137407 Phone : 0824-2400830-36 Fax : 0824-2400839-40 E-mail : bharat.saxena@gmrgroup.in</p>				<p>We authorize Bureau to use this information for dissemination</p> <p>Signature</p> <p>Date: 25.10.07</p>	

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+ID to be filled by BEE	Title of the measure	Sector: General Category
Year to be filled by BEE	Online Plant Performance monitoring in DCS and Efficiency mapping module for Gas Turbine.	Technology
<p>Description of the energy conservation measure:</p> <p><i>Online Plant Performance monitoring in DCS and Efficiency mapping module for Gas Turbine.</i></p> <p>Plant statistical data shows substantial process improvement for FY 2006-07. There is improvement in annual Heat rate by 5% at 1950kcal/kwhr from 2030 at PLF of 26.33%, this is the sixth tariff year and this overall Heat Rate is the best since commissioning of plant. This was achieved by continual effort of optimizing the Plant operations at all levels listed below. During this year the plant generated 530.654 MU and exported 508.685 MU. The PPA Plant Load factor was 98.99% including deemed generation attributable to KPTCL. The NME plant load factor calculated on NME was 26.23 %. Plant net heat rate was 1950.5 Kcal/KWh.</p> <p>Previous Scenario Plant Overall performance monitoring was done manually through excel sheet by entering parameters from one-shot log and applying correction curves, this was done offline and operator had to give considerable time for entering the data.</p> <p>Proposed Action Plan It was proposed to have Online Performance Monitoring of the equipments mainly Gas turbines, Steam turbine, boilers, Condenser, Chillers, heat-exchangers. Heat Mass balance at each section was decided to be incorporated.</p> <p>Action Plan Implemented and Benefits Achieved: After In-house developing and practicing Off-line performance Monitoring of the Plant, Performance module was further developed and fine tuned. Offline Performance module was made compatible to Online in DCS. Heat and Mass balance On-line monitoring development and compatibility checks done In-house and following benefits achieved.</p> <ul style="list-style-type: none"> • Gas turbine degradation/fouling is early detectable and efficiency is re-covered by giving GT water-wash or as the case be. • Being a Peaking Plant, and with 480 GT starts in last FY2006-07, it has tremendously aided in decision making for selection of GT to be started and its inlet temperature (T2) to be kept (deciding criteria for chillers to be run). GTs operating at base load has different efficiency levels. "Off- line Optimizer" and "On-line Optimizer" helps us in determining which GT to be run at varying dispatch conditions. E-Map software installation in GEL is first in India. It indicates "best combination" of equipment and optimum set point of operation to achieve an optimized heat rate. • Plant equipments like condenser online performance is available to operator, bottom cycle efficiency is directly effected by any deterioration in steam path equipments (whether any maintenance activities like roto-jet condenser cleaning to be done, can be early detectable).In addition to this On-line performance monitoring for Gas turbines, Steam turbine, boilers, Chillers, heat-exchangers have also been implemented and benefits accrued. • Heat and Mass balance On-line monitoring of complete plant is implemented. Operator can take actions based on any deviations from overall efficiency of combined cycle or on efficiency deviations of various equipments, with this with out delaying corrective actions are regularly taken. • Monthly Combined Cycle Performance Test is done through this online module and reports are generated for analysis and for MIS. Performance Test is done for any time interval and at any call time. 		

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<p>Picture/ sketch/ drawing before modification (if available)</p>	<p style="text-align: center;">Picture/ sketch/ drawing after modification</p>																									
<p>E-Map software installation in GEL, Mangalore is first in India.</p>	<div style="text-align: center;">  <p>Online overview Performance Monitoring</p> <p>0.0 MW OVERVIEW 44.686 %</p> </div> <p>E-Map Performance Indicates “best combination” of equipment and optimum set point of operation to achieve an optimized heat rate.</p> <div style="text-align: center;">  <p>E-Map Performance</p> <p>Plant Overview</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>GT 1</th> <th>GT 2</th> <th>GT 3</th> <th>GT 4</th> </tr> </thead> <tbody> <tr> <td>Power</td> <td>44.075</td> <td>42.772</td> <td>43.317</td> <td>43.970</td> </tr> <tr> <td>Heat Rate</td> <td>2313.5</td> <td>2369.5</td> <td>2349.9</td> <td>2338.3</td> </tr> <tr> <td>Exhaust Flow</td> <td>120.12</td> <td>124.31</td> <td>124.77</td> <td>125.34</td> </tr> <tr> <td>Exhaust Temp</td> <td>457.68</td> <td>471.39</td> <td>470.70</td> <td>472.45</td> </tr> </tbody> </table> <p>Plant Gross Power: 228.19 226.33 227.35 227.70 Plant Gross Heat Rate GCV: 1803.4 1798.3 1712.8 1677.5 Plant Gross Efficiency GCV: 47.678 48.888 50.201 51.258 Plant Aux Power: 9.1545 MW Last run completed: 02-18-2007</p> </div>		GT 1	GT 2	GT 3	GT 4	Power	44.075	42.772	43.317	43.970	Heat Rate	2313.5	2369.5	2349.9	2338.3	Exhaust Flow	120.12	124.31	124.77	125.34	Exhaust Temp	457.68	471.39	470.70	472.45
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<p>Agency that executed the project (with complete address and email):</p>																										
<p>Total investment, Rs.: 1.1 lacs</p>	<p>Year of implementation:</p>																									
<p>First year energy cost savings, Rs. 9 crores (Post implementation of the above Performance measures, benefits realized is 50Kcal.)</p>																										

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First year other savings, Rs.					
On annual basis	Lakhs KWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	394	NA	NA	NA	-
Energy consumption after	273	NA	NA	NA	-
Energy tariff, Rs/ kWh	-	-	-	-	6.75
<p>Company complete address: 220 MW Barge Mounted Power Plant, Tanir Bavi, Panambur, Mangalore-575010. Phone : 0824-2400830-36 Fax : 0824-2400839-40</p> <p>Contact person who could be contacted for more information: Mr. Bharat Saxena GM (Operations) Mobile : +919980137407 Phone : 0824-2400830-36 Fax : 0824-2400839-40 E-mail : bharat.saxena@gmrgroup.in</p>				<p>We authorize Bureau to use this information for dissemination</p> <p>Signature</p> <p>Date: 25.10.07</p>	