

## A Financial Study of Electricity Generation Unit & Plant of Thermal Power Station, Paras

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### Abstract

Power sector is undergoing continuous change and becoming more and more market driven and competitive. This shall equip young engineers to play a very important role by providing effective and relevant knowledge in pursuance of the mission and vision of MAHAGENCO. Energy manager examination of bureau of energy efficiency to become accredited energy auditors and certified energy managers. The main object of this study is to study the financial position of plant of TPS Paras. Survey method was adopted for conducting the research. Primary data has been obtained by using questionnaire, personal interviews and telephonic interviews. Secondary data is collected from company manuals and written documents related to text book of power generation and financial management in TPS MAHAGENCO, magazines, reports & websites. As compared to 2011 the net assets are increased. The financial position of MAHAGENCO, Paras is improved in 2014.

**Keywords:** MAHAGENCO, Financial Management, Energy Efficiency Power Generation

### Introduction:

On restructuring of Maharashtra State Electricity Board, responsibilities of power generation are entrusted to Maharashtra State Power Generation Co. Ltd. All generating plants are under the management control of MSPGCL since 6<sup>th</sup> June, 2005. Power scenario in the country is continuously changing. The MSPGCL is responding to the changes with enthusiasm. MSPGCL is preparing itself for new challenges of the changing time. To take up the challenges of power sector, young engineers are being inducted in the organization.

In today's scenario, MSPGCL has much bigger responsibilities. As a company it must be a profitable and fighting fit to the challenges of the liberalized and open power sector, researcher look forward to MSPGCL becoming the organization of excellence in technology and management area.

Power sector is undergoing continuous change and becoming more and more market driven and competitive. This shall equip young engineers to play a very important role by providing effective and relevant knowledge in pursuance of the mission and vision of MAHAGENCO. During the year 2011-12 number of in house energy audits in the areas of compressed air system, feed water system, cooling water system, main stream, vacuum system, heaters, coal mills, FD /PA and ID fans, air pre-heaters, economizers, condensers, lighting loads, Luwa coolers, ACC fans were carried out at different power stations of MAHAGENCO. In addition, staff awareness/training program was conducted under the guidance of Chief General Manager (Training), Koradi & Chief General Manager, Bhusawal at GTPS Uran & Bhusawal TPS, respectively. At Khaperkheda, Koradi, GTPS Uran, Parli & Nasik TPS energy audit for number of units are carried out by ERDA Vadodara in the areas of coal handling plant, water treatment plant, booster pump house, river water pump house and ash handling plant & corrective actions have been taken as per findings of Energy Audits as an Energy Saving measures. In addition a competition on energy conservation was also conducted at Chandrapur STPS. Till now 138 engineers of MAHAGENCO have passed Energy Auditors. Energy manager examination of bureau of energy efficiency to become accredited energy auditors and certified energy managers. The financial study of Paras unit is important in this regard.

**Significance:**

This study includes the detailed study about electricity unit cost & plant MAHAGENCO having generation capacity of 10612 MW comprising 7300 MW Thermal, 2460 MW Hydel and 852 MW Gas Turbine was established by Government of Maharashtra under the control Electricity Act 2003, with the principle objective of engaging in the business at generation of electricity. It is committed to expanding the generation capacity to meet the ever growing power supply need of Maharashtra. It generates power for more than 1, 30, 00,000 end consumers in Maharashtra at economical and affordable rates. It is powered by a dedicated and committed highly skilled work force more than 15000.

It has established its first of its kind centralized generation control room at corporate office for monitoring on. Line real time parameters for economical load dispatch.

Electricity generation unit cost (Approximate) to be calculated as.

Coal cost	-	40 Cr.
Oil cost	-	10 Cr.
Auxiliary consumption cost	-	5 Cr.
Chemical cost	-	5 Cr.
Total cost	-	60 Cr.

Cost ratio, divided by one month (thirty days)  
60

Cost ratio = ----- = 2 Rs/Unit Cost.

30

Electricity sales to the distribution Co. through transition Co. rates are increased all Co. may get profit while purchase & sales of electricity at their own respect.

**Research Methodology:**

Survey method was adopted for conducting the research. Primary data has been obtained by using questionnaire, personal interviews, and telephonic interviews. Interviews and noting information from few engineers and employees in MAHAGENCO related to development and implementation of Electricity generation cost. Even the different sources of information related to MAHAGENCO also used. Secondary data is collected from company manuals and written documents related to text book of power generation and financial management in TPS MAHAGENCO, magazines, reports & websites. This study is limited only to MAHAGENCO Unit of Paras.

**Objectives:**

- 1) To Study the financial aspect of Electricity Generation Unit.
- 2) To study the financial position of plant of TPS Paras.

**Financial Study:**

In the following table calculations of electricity unit rate are showed.

**Table No. 1: Monthly Financial Performance for January-14**

Sr. No	Particulars	(Rs. Crs.)			
		Actual for the month Dec-13	Cumulative up to the Dec-13	Actual for the month Jan-14	Cumulative up to the Jan-14
1	Total Units Generated (MKWH)	132.773	832.623	116.45	949.073
2	Less - Auxiliary consumption (MKWH)	14.153	103.635	13.232	116.867
	Auxiliary consumption (%)	10.66%	12.45%	11.36%	12.31%
3	Net Units sent out (MKWH)	118.620	728.988	103.218	832.206
	PLF (%)	71.38%	50.46%	62.61%	51.69%
	Monthly Capacity Charges	6.17	55.53	6.17	61.7
	Energy Charges (Rupees Per Unit)	1.72	1.72	1.72	1.72
	FAC	8.01	29.73	4.63	34.3606

4	Revenue	<b>34.52</b>	<b>210.29</b>	<b>28.50</b>	<b>238.79</b>
	<b>Variable Charges Per Unit</b>	<b>2.39</b>	<b>2.12</b>	<b>2.16</b>	<b>2.13</b>
	<i>Sp. Coal cons.</i>	0.7528	0.8183	0.7222	0.8066
5	Coal consumption (Tones)	99948	681374	84104	765478
6	Coal Cost (including handling cost)	23.41	168.02	19.75	187.770637 1
	<i>Coal Price</i>	2342.69	2465.97	2347.80	2452.99
7	Furnace Oil & Light Diesel Oil (KL)	607	8957	539	9496
8	Furnace & L.D. Oil Cost	2.58	37.24	2.49	39.73
9	Water charges	1.24	11.12	1.25	12.37
10	Other Fuel related Cost	0.09	0.89	0.11	0.998
<b>11</b>	<b>Total Variable Cost (6+8+9+10)</b>	<b>27.32</b>	<b>217.27</b>	<b>23.60</b>	<b>240.87</b>
	<b>Variable Cost per Unit</b>	<b>2.30</b>	<b>2.98</b>	<b>2.29</b>	<b>2.89</b>
12	Contribution (4-11)	7.20	-6.98	4.90	-2.08
	Fixed Cost Approved	6.17	55.53	6.17	61.70
13	Fixed Cost (Actual)				
	(a) Consumable Stores	0.16	1.39	0.15	1.54
	(b) Repairs & Maintenance	4.22	14.31	4.21	18.52
	(c) Salary & Wages	1.31	11.44	1.30	12.74
	(d) Admin., General & Other Expenses	0.15	1.43	0.16	1.59
	(e) Depreciation	4.50	40.50	4.50	45.00
	(f) Interest & Finance Charges	0.00	0.00	0.00	0.00
	<b>Total Fixed Cost</b>	<b>10.34</b>	<b>69.07</b>	<b>10.32</b>	<b>79.39</b>
<b>14</b>	<b>Surplus/ (-) Deficit (12-13)</b>	<b>-3.14</b>	<b>-76.05</b>	<b>-5.42</b>	<b>-81.47</b>
	Less:- Dis-allowance due to lesser PLF	0.00	0.00	0.00	0.00
	Add:- Other Income	0.14	0.68	0.15	0.83
	<b>Net Surplus / Deficit</b>	<b>-3.00</b>	<b>-75.37</b>	<b>-5.27</b>	<b>-80.64</b>
	<b>Total Cost</b>	<b>37.66</b>	<b>286.34</b>	<b>33.92</b>	<b>320.26</b>
	<b>Cost Per Unit</b>	<b>3.18</b>	<b>3.93</b>	<b>3.29</b>	<b>3.85</b>

(Source: Sr. Manager ( F& A)MSPGCL, T.P.S., Paras - V.)

Table No. 2: Station – Wise Estimated Generation and PLF during FY 2011-12 and FY 2012-13

Generation station	FY2011-12 (Estimated)		FY2012-13 (Estimated)	
	Generation (MU)	PLF (%)	Generation (MU)	PLF (%)
<b>Thermal – Coal</b>				
Khaperkheda	5804	79%	6141	83%
Paras	410	81%	410	81%
Bhusawal	3335	80%	3352	80%
Nasik	5924	74%	6167	77%
Parli	5020	83%	5160	85%
Koradi	6532	69%	6825	72%
Chandrapur	14150	69%	14665	72%

<b>Sub -Total (Thermal – Coal )</b>	<b>41176</b>	<b>73%</b>	<b>42720</b>	<b>76%</b>
Uran gas	3591	48%	3800	51%
Hydel	5510		3964	
<b>Total MAHA GENCO</b>	<b>50277</b>		<b>50484</b>	

(Source: Sr. Manager ( F & A) MSPGCL, T.P.S., Paras - V.)

MSPGCL has projected the generation during FY 2011- 12 on the basis of the actual generation for the period April to August 2012 and projected generation for the balance period during the year. For FY 2012-13 the generation has been projected based on the actual generation during the past three years and considering the planned and forced outages. The PLF of thermal generation plants is projected to increase to 76% from the level of 73% in FY 2011-12, with three plants having PLF above the benchmark PLF of 80%. The PLF of Koradi and Chandrapur is on the lower side due to planned and forced outages, as discussed in detail in section 2 of the Petition. The Hydel generation in FY 2011-12 has been very good on account of projected equivalent to the actual generation in FY 2010-11 which is also consistent with the average generation during the past five years.

#### **MSPGCL's Fixed Cost of Generation:**

MSPGCL has provided separate data on un-audited expenses for the period from 1<sup>st</sup> April, 2012 to 5<sup>th</sup> June, 2012 and of the period from 6<sup>th</sup> June, 2012 to 30<sup>th</sup> September, 2012 as prior to 5<sup>th</sup> June, 2012 the erstwhile MSEB was the existing utility, and the expenses of MAHA GENCO have been apportioned from the total expenses of MSEB. The expenditure for FY 2013-14 has been estimated on the past trends in the overall expenditure. Projections for FY 2013-14 have been made on the basis of past trends and expenditure allocated to MAHA GENCO.

The employee expenses have been projected after considering the impact of wage revision, normal increase in DA expenses and a nominal increase of 4% in basic salary and other allowances. A&G expenses have been projected to increase at a nominal rate of 5% R&M expenses for FY 2012-13 and FY 2013-14 have been projected at 5.1% and 7% of the opening GFA respectively.

Depreciation has been projected on the opening GFA at an average rate of 4.7%, which is lower than the depreciation rate of 6.3% approved by the honorable commission for the erstwhile MSEB. Interest on long-term loans has been projected on the outstanding loans allocated to MSPGCL as per the repayment schedule. The outstanding loans in FY 2011-12 include certain Government of Maharashtra (GOM) loans, SPSU dues and private placement bonds, which have been serviced by the erstwhile MSEB. The average interest has been reduced from around 13.4% in FY 2001-02 to around 11.7% in FY 2011-12 and is expected to reduce further to around 8.7% in FY 2012-13 and FY 2013-14.

The capital expenditure has been assumed to be undertaken at a normative debt: equity ratio of 80:20, which is lower than the normative debt: equity ratio of 70:30 allowed in the MERC (terms and conditions of Tariff) regulations 2005 notified in August 2012. The lower equity funding will help in reducing the fixed costs and hence the generations tariff.

MSPGCL has considered lease rent payable to the GOM at Rs. 386.5 Corer and Rs. 373.2 Corer in FY 2012-13 and FY 2013-14 respectively. On the basis of the consultant's report and the 'in-principle' agreement between the GOM and MAHA GENCO to increase the lease rent payable in accordance with the scientific basis for computing the same.

The income tax liability of MSPGCL in FY 2012-13 and FY 2013-14 has been projected by applying the current effective income tax rate of 33.66% on the projected ROE.

#### **MSPGCL's Aggregate Revenue Requirement:**

The Aggregate Revenue Requirement Of MSPGCL is the summation of the Variable Cost of Fuel and the Fixed Cost of Generation as discussed in detail in sections 3 and 4 and as summarized in the table below:

**Table No.3: Requirement of Revenue**

(Source: Sr. Manager ( F & A) MSPGCL, T.P.S., Paras - V.)

Sr. No.	Particulars	Previous Year FY 2011-12	Current Year FY 2012-13	Ensuing Year FY 2013-14
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		(Unaudited)	April – March	( Forecast )
1	Fuel Related Expenses	4804.00	4989.00	<b>5581.00</b>
2	Operation & Maintenance Expenses	729.92	883.43	1121.25
2.1	Employee Expenses	345.63	374.23	401.47
2.2	Administration & General Expenses	24.00	24.60	25.83
2.3	Repair & Maintenance Expenses	360.28	484.60	693.95
3	Depreciation, Including Advance Against Depreciation	439.92	447.66	468.16
4	Interest On Long-Term Loan Capital	251.52	116.17	111.94
5	Other Interest & Finance Charges, Including Working Capital Interest	41.24	206.77	223.54
6	Lease Rentals	85.00	386.50	373.20
7	Income Tax	0.00	103.88	126.81
8	Fixed Cost of New Paras & Parli Stations			93.49
9	<b>Total Revenue Expenditure</b>	<b>6351.59.59</b>	<b>7133.41</b>	<b>8099.40</b>
10	Return of Equity Capital	122.12	332.04	376.74
11	<b>Aggregate Revenue Requirement</b>	<b>6473.71</b>	<b>7465.46</b>	<b>8476.14</b>

Thus, the aggregate revenue requirement of MSPGCL is projected to increase from Rs.6473.7 corer in FY 2010-11 to Rs. 7465.46 corer in FY 2011-12 and Rs.8476.14 corer in FY 2012-13.

**Table No. 4 :Earned and Spent (Financial Position of MAHAGENCO, Paras)**

Particulars	(Rs. in Lacs)			
	1st April 2012 to 31st March 2014		1st May 2011 to 31st March 2012	
<b>Revenue:</b>				
Revenue from Sale of Power		734495.76		536170.12
Other Income		9567.63		10693.90
Total Income		744063.39		546864.02
<b>Expenses:</b>				
Expenditure on				
Generation of Power,				
Repairs and Maintenance, Employees costs		663308.27		492258.42
Less: Capitalized		9662.85	653645.42	5494.27
				486764.15

Depreciation & Related Debits	<b>34762.62</b>		<b>32769.13</b>	
Less: Capitalized	<b>32.02</b>	<b>34730.6</b>	<b>19.03</b>	<b>32750.10</b>
Interest and Finance Charges	<b>27915.01</b>		<b>13568.46</b>	
Less: Capitalized	<b>7632.9</b>	<b>20282.11</b>	<b>3242.69</b>	<b>10325.77</b>
Provision for Income Tax		<b>12053.11</b>		<b>5730.28</b>
<b>Total Expenditure</b>		<b>720711.24</b>		<b>535570.30</b>
<b>Surplus/Deficit</b>		<b>23352.15</b>		<b>11293.72</b>

(Source: Sr. Manager ( F & A) MSPGCL, T.P.S., Paras - V.)

The revenue and expenditures both also increased in 2014. The surplus amount is increased by two times. This indicates the improvement in the financial position of MAHAGENCO, Paras.

#### Conclusions:

Installed capacity of MAHAGENCO and Thermal power station unit details installed Hydro, Gas and Thermal capacity of MAHAGENCO, with ongoing projects (3730 mw), installed capacity trading account, profit & loss account, working capital cycle. Typical gross unit heat rates energy balance of auxiliary, monthly financial performance unit rate calculation, estimated generation & PLF net generation. Heat rate, coal transit & stacking loss fuel cost variable cost.

The contribution to provident fund has been considered at 12% of the sum of basic salary and DA, as per the normal industry practice. The gratuity payments have been projected to grow at the rate of 5% on the extent of increase in basic salary and DA, over the levels in the previous year. The leave encashment pm retirement has been projected to increase at the nominal rate of 4% per annum, in FY 2012-13 and FY 2013-14.

The activities of generation, transmission, distribution and supply of electricity in the state of Maharashtra. The mix of R&M requirements between the GENCO, TRANSCO and DISCOM has however been around 3.9% of opening GFA in FY 2011-12 though the overall level of R&M. The MSPGCL is of the view that the current level of R&M expenditure is very much on the lower side, and has been at the current levels, because of the MSPGCL's inability to undertake scheduled outages of its generating units at the stipulated time, on account of the severe demand-supply shortage in the state. Unless MSPGCL significantly increases its expenditure on R&M its ability to maintain its generation at the desired levels is likely to be adversely affected, which will in turn increase the demand-supply gap and increase the requirement for load shedding. Accordingly, MSPGCL has budgeted a higher level of R&M expenditure for FY 2011-12. There is improvement in the financial position of MAHAGENCO, Paras.

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