पावर ग्रिड कोर्पोरेशन ऑफ इंडिया लिमिटेड
Power Grid Corporation of India Limited
सूचना का अधिकार अभिनियम 2005 के अंतर्गत केन्द्रीय लोक सूचना अधिकारी
Central Public Information Officer under the RTI Act, 2005
केन्द्रीय कार्यालय, 'सौदामिनी', प्लाट नं. 2, सैक्टर-29, गुडगांव, हरियाणा-122007
Corporate Centre, 'Saudamini', Plot No. 2, Sector-29, Gurgaon, Haryana-122007

CP/RTI /2016/442 Date: 08th December, 2016

Shri Sanjeev Jain
Under Secretary
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg
New delhi-110001

Sub: **Information under Right to Information Act, 2005**

Dear Sir,

This is in reference to your letter dated 1st December, 2016. It may please be noted that the copy of CERC's D.O. letter no. 2/8/Policy (Statutory advice)/2009-CERC dated 14.05.2010 is submitted herewith as Annexure-1. Further, the letter can be downloaded from CERC website available at following link:

http://www.cercind.gov.in/2010/Advice_Gov/timeframe_tariff_based_16-09-2010.pdf

Thanking you,

भवदीय,

(अजय होलानी)
अपर महाप्रबंधक (के.आ.) एवं के. लो. सू. अधिकारी
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केन्द्रीय विद्युत विनियामक आयोग
CENTRAL ELECTRICITY REGULATORY COMMISSION

Dr. Pramod Deo
Chairperson

D.O. No. 2/8/Policy(Statutory advice)/2009-CERC
Dated : 16th September, 2010

Subject : Statutory advice of CERC regarding timeframe for tariff based competitive bidding.

Dear Shri Uma Shankar,

Please refer to my D.O. letter No. 2/8/Policy(Statutory advice)/2009-CERC dated 1st June 2010 on the above mentioned subject through which the Commission had conveyed its advice to the Central Government that the deadline of January 2011 for completing the transition to procurement of power through tariff based competitive bidding even from State/Central Government owned entities should not be extended any further except in case of large sized multipurpose storage hydro projects and the peaking stations.

2. As mentioned in my letter referred to above, the Commission had undertaken a more detailed exercise to further verify the finding that the tariffs being discovered through competitive bidding are lower than the cost plus tariffs. This exercise has been completed and a copy of the report is enclosed. The study has covered 14 projects. The study has concluded that the computed prices under cost plus methodology (even after computing the same conservatively) are higher than the levelized tariffs discovered under competitive bidding in respect of 12 out of 14 projects. The differences in the prices too are significant.

3. The study has also drawn attention to the fact that the capital cost of the projects in cost plus tariff route is open ended as there are numerous subsequent 'additional capitalization' which keep on expanding the equity base for allowing return on equity. Further, subsequent unforeseen increase in tariffs in case of cost plus tariffs is fully passed on to the consumers whereas a sizeable

Contd...2

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portion of such subsequent increase in tariffs is borne by the suppliers in case of tariff based competitive bidding because the seller often quotes non-escalable components both in capacity charges and energy charges.

4. In view of the findings of the detailed study, the Commission reiterates its earlier advice that the Central Government should not defer the date for completing transition to tariff based competitive bidding for all future procurement of electricity and also transmission services.

Best regards.

Yours sincerely,

Pramod Deo

(Dr. Pramod Deo)

Encl: As above

Shri P. Uma Shankar
Secretary (Power)
Ministry of Power
Government of India
Shram Shakti Bhawan
Rafi Marg, New Delhi.

Comparison of Levelized Tariffs as Discovered under Competitive Bidding Process with Levelized Tariffs Calculated under Cost plus Methodology

Introduction

The basic purpose of the exercise is to examine how the price of electricity as determined under section 62(1)(a) by the appropriate Commissions in terms of section 79 and 86 of the EA, 2003, which basically uses the cost plus methodology and the norms specified by appropriate Commissions in their respective Tariff Regulations (The MOU route of price determination) compares with the price of electricity as discovered under competitive bidding guidelines notified under section 63 of the EA, 2003.

Methodology

Under the competitive bidding guidelines, the price of electricity is determined in terms of "levelized" per unit price over the contract period, which, almost in all cases has so far been 25years. Therefore, to be able to compare the price of electricity as discovered under the competitive bidding process with that obtained under the cost plus methodology or the MOU route, we would need to determine the levelized price of electricity under the MOU route.

The levelized price of electricity from a power plant/project, however, depends on several variables and factors such as: unit size, number of units per plant/project, technology, environmental considerations, ambient conditions, water source, soil type, nature and type of balance of equipment, plant load factor, plant location - whether the plant is a pit head plant or needs coal transportation, fuel type, nature of fuel and fuel source - whether the plant uses imported or domestic fuel, year of procurement of plant and equipment, escalation rates used for fuels, escalation rates used for O&M costs, discounting rate used, etc. Unless all such variables and factors are similar in case of both the options, i.e., competitive bidding as well as cost plus methodology, an apple to apple comparison of the price is not possible.

The methodology used in this exercise has attempted to effect such an apple to apple comparison by gathering detailed data on variables and factors of the kind mentioned above with respect to power plants/projects associated with non-UMPP winning bids

under the competitive bidding guidelines over the past 3 to 4 years and then determining the price of electricity from such plants/projects by asking the question – what would the levelized price of electricity obtained from such plants/projects be if the same was calculated under the cost plus method with norms and escalation values as given in appropriate CERC Tariff Regulations and CERC Notifications on escalation rates. The levelized prices thus obtained have been compared with the levelized price for the same plant/project discovered under competitive bidding process. Thus, for example, to effect apple to apple comparison with respect to the Prayagraj project of UP, the levelized price discovered under competitive bidding process for the Prayagraj power project in UP has been compared with the price of electricity for the same project as obtained under the cost plus methodology by using the corresponding CERC norms and escalation rates and discounting rates values as mentioned in corresponding CERC Notification. Corresponding norm and notification values means that the norms and notification that were current when the bidding for Prayagraj project was done were used for calculating the levelized tariff. Thus if the bidding had taken place in place in November 2007, then the norms and values as per CERC 2004-09 Tariff Regulations, and CERC's 1/10/2007 to 31/03/2008 Escalation Notification were used to calculate the levelized tariff under cost plus bidding methodology.

In order to be able to calculate the price of power under cost plus methodology, following data was collected with respect to power plants/projects associated with 14 non-UMPP winning bids based on domestic coal as fuel source:

- the unit size
- technology
- Source of water and its probable distance from the plant
- Source of coal and its probable distance from the plant
- Type of coal and its GCV
- date of commercial operation & date of LOI to enable fixing of the probable order date for main plant and equipment and also to fix the probable date for or to arrive at:
    - Capital cost of the plant from CERC developed model
    - Bid date cost of coal and cost of transportation of coal

- CERC Tariff Regulation to be used (2004-9 or 2009-14) to arrive at operating and O&M charge norms with respect to design heat rate, auxiliary consumption, working capital norms, secondary fuel consumption, ROE rates, debt to equity ratio, etc.
- CERC Escalation notification to be used to arrive at discounting rate, and rates of escalations for coal, coal transport, and O&M costs

In addition, the exercise assumed that while finding price of electricity under the cost plus methodology (MOU route), the value of interest rate on long-term debt would be 7.0595% per year (same as average rate paid by NTPC for its Sipat Project), and that on financing of working capital would be 9% per annum. It has also been assumed that there would be about 0.8% loss of coal in transportation of coal. These rates and assumptions have been used across all projects to arrive at cost plus levelized price. Annex 1 gives details of the assumptions used for each of the 14 projects/plants.

Results

Based on above basic methodology, levelized prices for 14 projects (all with domestic coal as fuel source) were calculated using the cost plus methodology and the results and their comparison with the levelized tariff as discovered under competitive bidding are shown in Table 1. It can be seen that, the prices under cost plus methodology are higher in respect of 12 of the 14 projects. The differences in the prices too are significant.

Results in Table 1 on the Conservative Side

It may be mentioned that the levelized price values calculated as per cost plus methodology are on the conservative side. Thus, while calculating the levelized price under the cost plus methodology no allowance has been made for additional capital costs. NTPC's experience shows that additional capital needs to be employed for almost every plant/station during the useful operational life of the plant/station. For example, it is seen that, for Singrauli STPS of NTPC, due to additional capital infusion, the capital base during the period 1992 and 2009 has gone up from Rs. 1018.36 crore to Rs. 1275.19 crore. Similarly, for Korba STPS, the capital base has gone up from a level of Rs. 1352.36 crore in 1992 to a level of Rs. 1754.58 crore in 2009, due to additional capital infusion. Ideally, therefore, appropriate allowance

should have been made for arriving at the levelized prices calculated under the cost plus methodology for additional capital costs. However, as mentioned, the present exercise does not take into consideration any additional capital infusion over the 25 year period over which the levelized prices have been computed. Had some allowance been made for additional capital costs, the levelized price of electricity as obtained under the cost plus methodology for the 14 project/plants considered in the present exercise would have been higher than what has been indicated in Table 1 and consequently the difference between the levelized price as discovered under the competitive bidding process and as obtained under the cost plus methodology also would have been higher than what has been shown in Table 1.

Just as additional capital, coal transportation costs too affect the level of levelized prices. However, while calculating the levelized price as per the cost plus methodology; it has been assumed that the coal transportation distance would be near to the minimum value. Thus, wherever the coal transportation distance is mentioned to be less than 500 KM, the distance that has been assumed for arriving at the levelized price is 100 KM. Similarly, wherever the coal transportation distance is mentioned to be over 1000 KM, the value assumed in the calculations is 1000 KM (exception being Talwandi Sabo, where it is assumed as 1100 KM). Similarly, in the calculation of levelized prices, the escalation rate for prices of secondary fuel has conservatively been taken as 5% per year even though the index value for the same has been rising at over 10% over the past 14 years (Index in 1995-96 was 99.4 and that in 2009-10 was 495.8) .

Thus, the levelized prices as depicted in Table 1 are on the conservative side.

Sensitivity

Base year coal costs and coal cost escalation rates are two variables that have relatively higher bearing on the level of levelized prices. Sensitivity analysis, therefore was carried out with respect to these two variables and the results of the sensitivity analysis have been presented in Table 2 (sensitivity with respect to base year coal cost), and Table 3 (sensitivity with respect to coal cost escalation rates). What are depicted in Table 2 are the breakeven coal costs on COD Date and bidding date at which the levelized price as calculated as per the cost plus methodology becomes same as the levelized Tariff as discovered under competitive bidding.

Similarly, what are depicted in Table 3 are the breakeven values of the coal cost escalation rates at which the levelized price as calculated under the cost plus methodology become same as the levelized Tariff as discovered under competitive bidding.

Interpretation of results

1. The levelized prices discovered under competitive bidding process are lower as compared to levelized prices under cost plus methodology for 12 of the 14 projects examined, even when levelized prices have been calculated conservatively.
2. Sensitivity analysis also shows that levelized prices discovered under competitive bidding process would continue to be lower as compared to levelized prices arrived at under cost plus methodology even after accounting for considerable variation in coal costs and coal cost escalation rates.
3. What is seen that, for recent projects (Maharashtra), the levelized price as discovered under competitive bidding process are tending to be higher than the levelized prices as determined under cost plus methodology.

Conclusion

The exercise shows that the levelized prices discovered under competitive bidding process are generally lower as compared to levelized prices under cost plus methodology. This is what is generally to be expected as competition provides incentive to bring efficiency and innovation.

Efficiency and innovation apart, competition also leads to lowering of risk for the consumers. The levelized price, whether under cost plus methodology or under competitive bidding process, is not the price that consumer ultimately ends up paying. The actual price that the consumer pays depends on the actual escalations rates of coal cost, coal transportation costs, and O&M costs, etc. In the case of competitive bidding process, the actual price paid is also dependent on how the bid is structured in terms of escalable and non-escalable components. Therefore, it is true that it is only in hind-sight that one can definitely say if the price discovered under cost plus methodology is indeed higher than the price discovered under the competitive bidding process. However, under the cost plus methodology, while almost all the variations (which are almost entirely in the nature of escalations and hardly any de-escalations)

in cost of inputs are passed on to the consumers, the same is not true in case of competitive bidding process. Here the bidder is under competitive pressure to quote large part of his tariff as non-escalable component to get selected as the least cost supplier, which in turn reduces the amount by which tariffs can go up in future even though the actual escalations turn out to be of very high order. Thus, while the consumer carries almost the entire risk of future increases in costs when the price of electricity is determined under cost plus methodology, risk of future increases in costs when the price of electricity is discovered under competitive bidding process is shared between the consumer and the developer of power project. Of course, the risk sharing proportion depends on how much of the total cost has been quoted as escalable and how much non-escalable. Nevertheless, the risk is shared between consumer and the supplier under competitive bidding, whereas under cost plus methodology, the risk is almost completely/entirely borne by the consumer as all the escalations are generally required to be allowed as pass through. Clearly, from the view point of competition, any policy that transfers the risk from consumers to suppliers has to be the preferred policy.

Table 1: Comparison of Levelized Tariff as Calculated under Cost plus Methodology with Levelized Tariff as Discovered Under Competitive Bidding

S. No.	Project	Size	Status	State	Developer	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding	Calculated levelized Tariff under MOU Route (Rs/kWh)	Remarks
1	Talwandi Sabo	3 x 660 MW	Tariff Approved	Punjab/Case 2	Sterlite	Aug 2012	**2.8643**	**3.0703**	
2	Rajpura	2 X 660 MW	Tariff Approved	Punjab/Case 2	L&T	Jan 2014	**2.89**	**3.4822**	
3	Kamalanga	3 X 350 MW	Tariff Approved	Haryana, Case 1	PTC/GMR	Oct. 2011	**2.54, Bus bar#**	**2.6237Bus bar@**	2.86 is delivered price under Competitive Biding
4	Babandh	4 X 660MW	Approved	Haryana, Case 1	LANCO	July 2012	**2.075, Bus bar#**	**2.5695@**	2.355 is delivered price under Competitive Biding
5	Jhajjar	2 X 660 MW	Approved	Haryana, Case 2	CLP Power	Nov-Dec., 2012	**2.996**	**3.3027**	
6	Mandva	2 X 660 MW	Approved	Maharashtra, Case 1	LANCO Mahanadi	Oct. 2012 *	**2.70**	**3.0062**	
7	Tiroda Ph.I	2 X 660 MW	Approved	Maharashtra, Case 1	Adani Maharashtra	Aug. 2012	**2.642**	**2.9703**	
8	Chitrangi, Ph 1	3 X 660 MW	Petition	MP, Case 1	Reliance	June, 2012	**2.45**	**2.5652**	

S. No.	Project	Size	Status	State	Developer	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding	Calculated levelized Tariff under MOU Route (Rs/kWh)	Remarks
9	Mahan	2 X 600 MW	Petition	MP, Case 1	Essar	May, 2011*	**2.45**	**2.3119**	
10	Nandgaonpeth	2 X 660MW	Petition	Maharashtra, Case1	India Bulls	Mar. 2014	**3.26**	**3.2958**	
11	Tiroda Ph. 2	2 X 660 MW	Petition	Maharashtra, Case 1	Adani Maharashtra Power	Sept. 2014	**3.28**	**2.8752**	
12	Mahanadi	3 X 600 MW	Petition	Gujarat	KSK Energy	Mar. 2015	**2.345**	**2.5137****	**=Excludes transmission cost to Gujarat periphery
13	Prayagraj	3 X 660MW	Petition	UP, Case 2	JP Associates	July 2014	**3.02**	**3.4673**	
14	Sangam	2 X 660 MW	Petition	UP, Case 2	JP Associates	Jan, 2014	**2.97**	**3.3045**	

*= lack of clarity regarding actual COD date, assumed as obtained from CEA data

@ = No escalation in transportation cost of coal

= Arrived at after subtracting Rs. 0.28/kWh of transmission charges

Table 2: Breakeven Coal cost On COD Date and Bidding Date at Which Levelized Tariff as Calculated under Cost Plus Methodology is Same as Levelized Tariff as Discovered Under Competitive Bidding

S. No.	Project	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding	Calculated levelized Tariff under MOU Route (Rs/kWh)	Coal cost assumed for COD Year under MOU Route in Rs/ton	Break-even Coal cost in COD Year in Rs/ton	% Change Possible	Coal cost Assumed for Bid year under MOU route in Rs/ton	Break-even Coal cost in Bid Year in Rs/ton
1	Talwandi Sabo	Aug 2012	**2.8643**	**3.0703**	1279*@	1070	(-) 19.53%	984*	823@
2	Rajpura	Jan 2014	**2.89**	**3.4822**	1380*	800	(-) 42.03%	1088*	631
3	Kamalanga	Oct. 2011	**2.54, Bus bar**	**2.6237Bus bar@**	825	772@	(-) 6.42%	614	575@
4	Babandh	July 2012	**2.075, Bus bar**	**2.5695@**	927	544@	(-) 41.32%	690	405@
5	Jhajjar	Nov-Dec., 2012	**2.996**	**3.3027**	942	697	(-) 26.01%	701	519
6	Mandva	Oct. 2012 *	**2.70**	**3.0062**	983	770	(-)21.67%	732	573
7	Tiroda Ph.1	Aug. 2012	**2.642**	**2.9703**	1038	804	(-) 22.54%	773	598
8	Chitrangi, Ph 1	June, 2012	**2.45**	**2.5652**	806	719	(-) 10.79%	624	557
9	Mahan	May, 2011*	**2.45**	**2.3119**	806	912	(+) 13.15%	624	706
10	Nandgaonpeth	Mar. 2014	**3.26**	**3.2958**	1412	1376	(-) 2.55%	1113	1085
11	Tiroda Ph. 2	Sept. 2014	**3.28**	**2.8752**	1072	1394	(+) 30.04%	845	1099
12	Mahanadi	Mar. 2015	**2.345**	**2.5137****	862	728	(-)15.55%	680	574
13	Pragraj	July 2014	**3.02**	**3.4673**	1500	1109	(-) 26.07%	1037	767
14	Sangam	Jan, 2014	**2.97**	**3.3045**	1393	1101	(-) 20.96%	1037	820

*= Coal cost for washed coal; ** = Excludes transmission cost till Gujarat periphery

@ = with no escalation assumed in coal transportation cost

Interpretation: E.g., in case of Talwandi Sabo, the coal cost on COD date will have to come down to a level of Rs. 1070/t (OR Rs. 823/t on Bid date) to make the Levelized tariff discovered under competitive bidding process and as obtained under the cost plus methodology to be same; provided that the coal cost escalation rate is 6.77%. In other words, if the actual coal price on COD date is above Rs. 1070/t (OR above Rs. 823/t on bid date), the levelized tariff discovered under competitive bidding will be lower than as obtained under the cost plus methodology; provided that the coal cost escalation rate is 6.77%.

Table 3: Breakeven Coal cost Escalation rate at Which Levelized Tariff as Calculated under Cost Plus Methodology is Same as Levelized Tariff as Discovered Under Competitive Bidding

S. No.	Project	COD Date: 1st Unit	Levelized Tariff (Rs/kWh) as per Competitive Bidding	Calculated levelized Tariff under MOU Route (Rs/kWh)	Coal cost Escalation Rate assumed under MOU Route in (%)	Break-even Coal cost Escalation Rate in (%)	% Change
1	Talwandi Sabo	Aug 2012	**2.8643**	**3.0703**	6.77	5.40	(-)20.23%
2	Rajpura	Jan 2014	**2.89**	**3.4822**	6.12	1.80	(-)70.58%
3	Kamalanga	Oct. 2011	**2.54, Bus bar**	**2.6237Bus bar@**	7.66	7.16	(-) 6.52%
4	Babandh	July 2012	**2.075, Bus bar**	**2.5695@**	7.66	3.50	(-) 54.31%
5	Jhajjar	Nov-Dec., 2012	**2.996**	**3.3027**	7.66	5.38	(-) 29.77%
6	Mandva	Oct. 2012 *	**2.70**	**3.0062**	7.66	5.78	(-)24.54%
7	Tiroda Ph.1	Aug. 2012	**2.642**	**2.9703**	7.66	5.70	(-) 25.59%
8	Chitrangi, Ph 1	June, 2012	**2.45**	**2.5652**	6.61	5.73	(-) 13.31%
9	Mahan	May, 2011*	**2.45**	**2.3119**	6.61	7.55	(+) 14.22%
10	Nandgaonpeth	Mar. 2014	**3.26**	**3.2958**	6.12	5.93	(-) 3.10%
11	Tiroda Ph. 2	Sept. 2014	**3.28**	**2.8752**	6.12	8.10	(+) 32.35%
12	Mahanadi	Mar. 2015	**2.345**	**2.5137****	6.12	4.85	(-) 20.75%
13	Pragraj	July 2014	**3.02**	**3.4673**	7.66	5.51	(-) 27.55%
14	Sangam	Jan, 2014	**2.97**	**3.3045**	7.66	5.87	(-) 23.37%

** = Excludes transmission cost till Gujarat periphery

Interpretation: E.g., in case of Talwandi Sabo, the escalation rate in coal cost will have to come down to a level of 5.4% to make the Levelized tariff discovered under competitive bidding process and as obtained under the cost plus methodology to be same; provided that the Bid date rate of coal is Rs. 984/ton. In other words, if the actual coal price escalation is above 5.4%, the levelized tariff discovered under competitive bidding will be lower than as obtained under the cost plus methodology; provided that the BID date coal price is Rs. 984/ton.

ANNEX 1

ASSUMPTIONS: COMMON ACCROSS ALL 14 PROJECTS/PLANTS

S.No.	Description	NORMS ASSUMED
1	Debt:	70%
2	Equity:	30%
3	ROE:	23.2468%, pre tax
3.1	Moratorium on debt repayment	One year
3.2	Repayment Amount per year	Same as Depreciation
3.2	Interest Rate	7.0595%
4.1	Secondary fuel Oil Consumption: Base Year (ml/kWh generated)	1 ml/kWh
4.2	Escalation if any in consumption	No Escalation
4.3	Escalation in secondary fuel oil cost over base year cost	5% per annum
5	Depreciation Rate	5.28% of total Cost from 1-12 Years, and 2.0491 % from 13-25 years; total charged is 90% of the total cost, excluding land cost
6.1	Base Year Capacity Utilization/PLF in %)	85% of the capacity
6.2	Subsequent Years	Assumed constant all through the life
7.1	Base Year oil GCV	10000 Kcal/Lit
7.2	subsequent Years	Assumed constant all through the life
8	Working Capital Requirement	As per CERC 2009-14 Tariff Regulation
9	Working Capital Interest Rate	9%

ASSUMPTIONS: TALWANDI SABO

S.No.	Description	Talwandi Sabo
1	Unit/Plant Capacity (MW)	3*660
2	Capital cost Rs. Crore	9320
3.1	Auxiliary Consumption: Base Year (%)	7
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	13.30
5.2	O&M: Escalation Rate per year (%)	4.98
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	4500
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1279
8.2	Coal Cost: Escalation Rate per year (%)	6.77
8.3	Coal Type: Washed/Unwashed	Washed
9.1	Coal Transportation Distance in KM	1000
9.2	Coal Transportation Base Year cost in Rs/ton transported	909
9.3	Coal Transportation Escalation Rate per Year (%)	NIL
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	38524
11	Discounting Rate (%)	10.49

ASSUMPTIONS: RAJPURA

S.No.	Description	Rajpura
1	Unit/Plant Capacity (MW)	2*700
2	Capital cost Rs. Crore	6862
3.1	Auxiliary Consumption: Base Year (%)	6
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	14.24
5.2	O&M: Escalation Rate per year (%)	5.04
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	4080
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1380
8.2	Coal Cost: Escalation Rate per year (%)	6.12
8.3	Coal Type: Washed/Unwashed	Washed
9.1	Coal Transportation Distance in KM	1000
9.2	Coal Transportation Base Year cost in Rs/ton transported	999
9.3	Coal Transportation Escalation Rate per Year (%)	2.39
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	36465
11	Discounting Rate (%)	10.19

ASSUMPTIONS: KAMALANGA

S.No.	Description	Kamalanga
1	Unit/Plant Capacity (MW)	3*350
2	Capital cost Rs. Crore	4540
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2450
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	825
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	100
9.2	Coal Transportation Base Year cost in Rs/ton transported	125.1
9.3	Coal Transportation Escalation Rate per Year (%)	NIL
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: BABANDH

S.No.	Description	Babandh
1	Unit/Plant Capacity (MW)	4*660
2	Capital cost Rs. Crore	12079
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3780
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	927
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	100
9.2	Coal Transportation Base Year cost in Rs/ton transported	125.1
9.3	Coal Transportation Escalation Rate per Year (%)	NIL
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: JHAJJAR

S.No.	Description	Jhajjar
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	6934
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	3
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	942
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	1000
9.2	Coal Transportation Base Year cost in Rs/ton transported	980
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: MANDVA

S.No.	Description	Mandva
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	6934
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	983
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	200
9.2	Coal Transportation Base Year cost in Rs/ton transported	229
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: TIRODA PH.1

S.No.	Description	Tiroda Ph. 1
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	6934
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3400
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1038
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	100
9.2	Coal Transportation Base Year cost in Rs/ton transported	135
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: CHITRANGI, PH.1

S.No.	Description	Chitrangi, Ph 1
1	Unit/Plant Capacity (MW)	3*660
2	Capital cost Rs. Crore	10529
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	1
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	806
8.2	Coal Cost: Escalation Rate per year (%)	6.61
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	100
9.2	Coal Transportation Base Year cost in Rs/ton transported	135
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: MAHAN

S.No.	Description	Mahan
1	Unit/Plant Capacity (MW)	2*600
2	Capital cost Rs. Crore	4860
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	1
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	12.39
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	806
8.2	Coal Cost: Escalation Rate per year (%)	6.61
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	<100
9.2	Coal Transportation Base Year cost in Rs/ton transported	100
9.3	Coal Transportation Escalation Rate per Year (%)	5.18
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	32244
11	Discounting Rate (%)	11.1

ASSUMPTIONS: NANDGAONPETH

S.No.	Description	Nandgaonpeth
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	7315
3.1	Auxiliary Consumption: Base Year (%)	6
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	15.41
5.2	O&M: Escalation Rate per year (%)	5.04
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	4200
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1412
8.2	Coal Cost: Escalation Rate per year (%)	6.12
8.3	Coal Type: Washed/Unwashed	Washed
9.1	Coal Transportation Distance in KM	600
9.2	Coal Transportation Base Year cost in Rs/ton transported	592
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	34465
11	Discounting Rate (%)	10.19

ASSUMPTIONS: TIRODA, Ph.2

S.No.	Description	Tiroda Ph. 2
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	6710
3.1	Auxiliary Consumption: Base Year (%)	6
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	15.41
5.2	O&M: Escalation Rate per year (%)	5.04
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1072
8.2	Coal Cost: Escalation Rate per year (%)	6.12
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	100
9.2	Coal Transportation Base Year cost in Rs/ton transported	136
9.3	Coal Transportation Escalation Rate per Year (%)	2.12
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	34465
11	Discounting Rate (%)	10.19

ASSUMPTIONS: MAHANADI

S.No.	Description	Mahanadi
1	Unit/Plant Capacity (MW)	2*600
2	Capital cost Rs. Crore	5362
3.1	Auxiliary Consumption: Base Year (%)	6
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	2
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	15.41
5.2	O&M: Escalation Rate per year (%)	5.04
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	3300
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	862
8.2	Coal Cost: Escalation Rate per year (%)	6.12
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	110
9.2	Coal Transportation Base Year cost in Rs/ton transported	158
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	38288
11	Discounting Rate (%)	10.19

ASSUMPTIONS: PRAYAGRAJ

S.No.	Description	Pryagraj
1	Unit/Plant Capacity (MW)	3*660
2	Capital cost Rs. Crore	11270
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	1
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	14.09
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	4175
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1500
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	350
9.2	Coal Transportation Base Year cost in Rs/ton transported	345
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	38524
11	Discounting Rate (%)	11.1

ASSUMPTIONS: SANGAM

S.No.	Description	Sangam
1	Unit/Plant Capacity (MW)	2*660
2	Capital cost Rs. Crore	7242
3.1	Auxiliary Consumption: Base Year (%)	7.5
3.2	Auxiliary Consumption: Escalation Rate per year (%)	Assumed constant through life
4	Land Cost as % of Total Cost not taken for Depreciation	1
5.1	O&M: Base Year Norm (Rs. Lakh/MW)	14.09
5.2	O&M: Escalation Rate per year (%)	5.18
6.1	Heat Rate - Base Year: Kcal/kWh	2317
6.2	Heat Rate: Subsequent Years	Assumed constant through life
7.1	Coal - Base Year GCV: Kcal/Kg	4175
7.2	Coal GCV - Subsequent Years	Assumed constant through life
8.1	Base Year COAL COST in Rs/Ton	1393
8.2	Coal Cost: Escalation Rate per year (%)	7.66
8.3	Coal Type: Washed/Unwashed	Unwashed
9.1	Coal Transportation Distance in KM	350
9.2	Coal Transportation Base Year cost in Rs/ton transported	345
9.3	Coal Transportation Escalation Rate per Year (%)	1.91
10	Base Year secondary Fuel Oil Cost in Rs./Kiloliter	38524
11	Discounting Rate (%)	11.1