

PRAYAS

Initiatives in Health, Energy,
Learning and Parenthood



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June 10, 2002

BEFORE MAHARASHTRA ELECTRICITY REGULATORY COMMISSION, MUMBAI

Case No.

File No.

In the matter of approval of power purchase agreements of the MSEB with bagasse based co-generation power plants

Supplementary Submission

By

Prayas, Pune

1. Preamble:

Prayas had made a submission before the MERC in the course of earlier public hearing held on this issue in October 2001. We reiterate some of the important objections / points raised in that submission, which are still relevant and we urge the commission to take note of these points reiterated below:

- a. The commission should not comment on the overall demand-supply situation of MSEB in these proceedings as the data submitted by MSEB in this regard is grossly inadequate and this is not the main issue before the commission in these proceedings.
- b. As a prudent policy we need to support bagasse cogeneration as it has several advantages such as renewable energy source, modular nature, and generation near the load center.
- c. To encourage bagasse cogeneration adequate payment security in terms of letter of credit and escrow account should be given.
- d. While encouraging cogeneration projects, commission's mandate of promoting competition, economy and efficiency should not be ignored. Power purchase from new sources is one the most desirable area for introducing competition in the sector, and as such cogeneration projects should be required to sell power only through a process based on competitive bidding.

The commission has vide letter dt. 28th May 2002, supplied us copies of various objections / comments received by MERC in response to it's public notice. We are making this supplementary submission in response to these objections / comments.

2. Importance of present proceedings:

Though the present proceedings are for approval of five PPAs (with about 125 MW capacity) commission's decision on these PPA is very important from several aspects.

- a. First Major Power Purchase After Enron (DPC): This is the first major power purchase exercise after the Enron PPA. The drawbacks and disastrous impact of Enron PPA are now well known. The Energy Review Committee of the Government of Maharashtra (Godbole Committee) has clearly brought out several shortcomings in the process of Enron PPA – which include - lack of transparency, inadequate analysis, completely unjustifiable assumptions to favor the project. These observations led the committee to conclude that there was complete failure of governance during the Enron PPA approval process. This governance failure had led to the appointment of Judicial Commission of Inquiry to look into all aspects of Enron PPA by GoM.

One of the objectives of the ERC Act 1998 was to avoid such mistakes and decide tariff and power purchase costs in a professional and transparent manner. The consumers of Maharashtra expect the regulatory process to avoid the mistakes done while signing earlier PPAs and that the MERC would ensure protection of consumer interest.

- b. Significant implications of decision in these proceedings: Even though the present PPAs before commission are for small capacity and with limited financial impact on MSEB, MERC's decision on these PPAs will have significant implications for a large capacity addition and future PPAs. It is likely that in the next few years MSEB would sign PPAs for about 3,000 MW of capacity addition, such as 1000 MW from cogeneration, 500 MW from wind projects etc. Commission's decision in terms of various assumptions, methodology and guidelines would have significant bearing on proposed PPAs. As such while deciding on these five PPAs, the larger implications of this decision should not be ignored.

3. MERC's objective should be efficiency and economy and not to maximize cogeneration potential:

Generation potential from any technology and fuel depends on several factors such as availability of fuel, technological capabilities, social and environmental implications etc. But the economic efficiency or competitiveness is one of the major factors deciding the potential that can be realized (i.e. economically exploited). Higher the tariff chargeable, higher would be the potential from any technology. i.e. Power generation potential from Solar PV may not be even one megawatt if the tariff is say Rs. 2 p.u., but the potential from same technology could be hundreds of MW if the tariff payable is say Rs. 10 p.u. increasing at 10 % p.a. As such, the objective of the present exercise should be to ensure that efficiency and economy is achieved and the objective cannot be to maximize the cogeneration potential by offering higher tariff at the cost of consumers and overall efficiency and economy. The ERC Act casts a statutory duty on the MERC to promote efficiency and economy. If a higher tariff is to be justified on grounds of environmental and social benefits, then on one hand these benefits will have to be clearly quantified and on the other hand it will have to be demonstrated that the said option (cogeneration in this case) is the least cost option of achieving the said benefits.

Further, environmental benefits such as reduced global warming and lower usage of coal are not the issues for which the primary burden should be put on consumers in MSEB. First is a global issue, for which the developed nations are responsible and are also willing to foot the bill (at least partially). The second is a national issue. The country has not introduced any act / legislation to quantify its benefits or to say who should pay for this. We are by no means opposed to these consideration but we want to make a limited point that MERC cannot let this unarticulated national / environmental consideration override its legal mandate and burden MSEB/ consumers in the current precarious financial situation of MSEB.

The other considerations such as dispersed generation (for part of the year) can reduce the transmission losses and improve load profile when the cogeneration plants are operating. On one hand these benefits can be quantified and on the other hand cost of generation from conventional large centralized plants located at remote locations could be increased to account for transmission losses and expenses so as to make it equivalent to cogeneration plants. Thus, for these benefits also clear, rational and quantifiable adjustments to tariff need to be done and higher tariff should not be justifiable on un-quantified and vague arguments.

4. Comparative evaluation of economics of cogeneration plants:

- (a) Evaluating economics of cogeneration plants is a complex and time consuming exercise. This is because operating parameters as well as capital and other costs of these projects vary widely from case to case. This is also reflected in the present case whereas one project before the commission claims a capital cost of Rs. 2.8 Cr./ MW where as other project claims a capital cost of Rs. 4.8 Cr. /MW. This fact is also brought out by the Cogeneration Association of India in it's submission dt. May 27, 2002. Cogen Association has submitted representative economics of six different models of cogeneration with large difference in financial as well operating parameters.
- (b) Cogeneration Association as well as several other promoters have urged the commission for a tariff as per MNES guidelines (i.e. Rs. 3.3 /unit in 2002-03 increasing at 5% compound rate per year). As against this MSEB has proposed a tariff of Rs. 3.1 / unit (in year 2002-03) with 11 paise / year increase for the first 10 years, constant tariff for next three years and then again an increase of 11 paise per year for seven years¹. Unfortunately, neither the MNES guidelines nor MSEB's proposal is backed by any analysis or calculations regarding cost of generation from cogeneration plants and their profitability or how the tariff compares with cost of generation from a comparable new coal generation plant². While deciding the cogeneration tariff it is essential to evaluate the impact of adopting either MNES or MSEB tariff on consumers (i.e. to what extent the tariff is less or more than the comparable new coal generation cost and what is the profitability offered to cogeneration promoters.) We have carried out such an analysis based on the typical cogeneration costs and parameters submitted by Cogeneration Association of India.

¹ Though MSEB proposal also includes a ceiling of 90 % of HT energy tariff, in this submission that is not considered being highly unpredictable.

² Since cogeneration plants have characteristics similar to coal plants, i.e. base load generation, slow start-up and low load variation limits, high O & M costs etc. only the cost of new, relatively efficient coal plant should be considered for comparative analysis.

(c) Unfortunately, the Cogeneration Association's tariff calculation is only for the first year and tariff lines for remaining years are not given. For proper evaluation of any project it is essential to compare tariff during the entire PPA duration. (In our opinion PPA should be for 20 years. Refer section 5.1). We have carried out such an analysis on the basis of extrapolating the tariff calculation of Cogeneration Association for 20 years. Tariff is calculated for two scenarios – (i) Base scenario, and (ii) Improved scenario. In base scenario all parameters of the project (e.g. capital cost, generation levels, fuel consumption and fuel cost) are same as assumed by Cogeneration Association. While extrapolating first year calculations for further years, interest on debt is assumed for 10 years (as loan would be repaid by 10th year) and 7% p.a. escalation is assumed for fuel cost (in season as well as off season)³. In second scenario (Improved scenario) only two changes are made. First, the export to MSEB in season as well as off-season is increased by 10-15% to correct for low PLF (large idle capacity) considered in the Cogeneration Association calculations⁴. Second, the per unit fuel cost for off-season generation is considered as 1.10 Rs. / unit, instead of the cost considered by Cogeneration Association⁵. For both scenarios cost of generation is calculated assuming 30% return on equity. Some other factors such as less / concessional interest rate, incentives / grants which would result in lower cost of generation are ignored for conservative estimates. This analysis is carried out for all six models considered by Cogeneration Association. The resultant tariff lines are then compared with MNES guidelines, MSEB proposed tariff and cost of generation from a (new) typical coal power station. Cost of generation from coal new plant is adjusted (increased) by 12% to account for transmission losses and charges. More details about the various assumptions and methodology are given in Annexure I.

The results of this analysis are depicted in figure 1 (for base scenario) and in figure-2 (improved scenario). Based on this analysis we have also calculated I) Average return on equity if either MNES tariff or MSEB proposed tariff or comparable coal tariff is made applicable for these projects. Further, we have also calculated what will be the loss to consumers if these tariffs (MNES, MSEB or comparable coal) are made applicable. This loss is calculated as the amount paid to the promoters over and above the 30% return on equity every year. The yearly loss in Rs. Cr. is then converted into one time present loss on the basis of net present value calculated at 12% discount rate. For ease of comparison this net present value (NPV) of loss is represented as Rs. Cr. / MW. Table 1 depicts the results of this analysis.

³ The Association's submission mentions that repayment of debt from project cash flows has not been considered. But the interest calculation at 16% for 10 years and depreciation at 5.28% p.a. is certainly sufficient to repay the entire loan and interest on that within 10 year, which is the typical loan repayment duration.

⁴ For example, in models 4- 6 there is a large difference of 20 % in installed capacity and co-gen or off season capacity. The possible extension of generation period also needs to be considered.

⁵ When the plant is using coal or such other fuel in the off season to extend the plant utilisation, the fuel cost should not be more than the fuel cost from conventional coal generation plants. Hence, in this case a fuel cost of Rs. 1.10/unit is considered which is more than the average fuel (coal) cost of MSEB.

Figure 1: Cost of generation (including 30% RoE) for various cogeneration models – Base Scenario

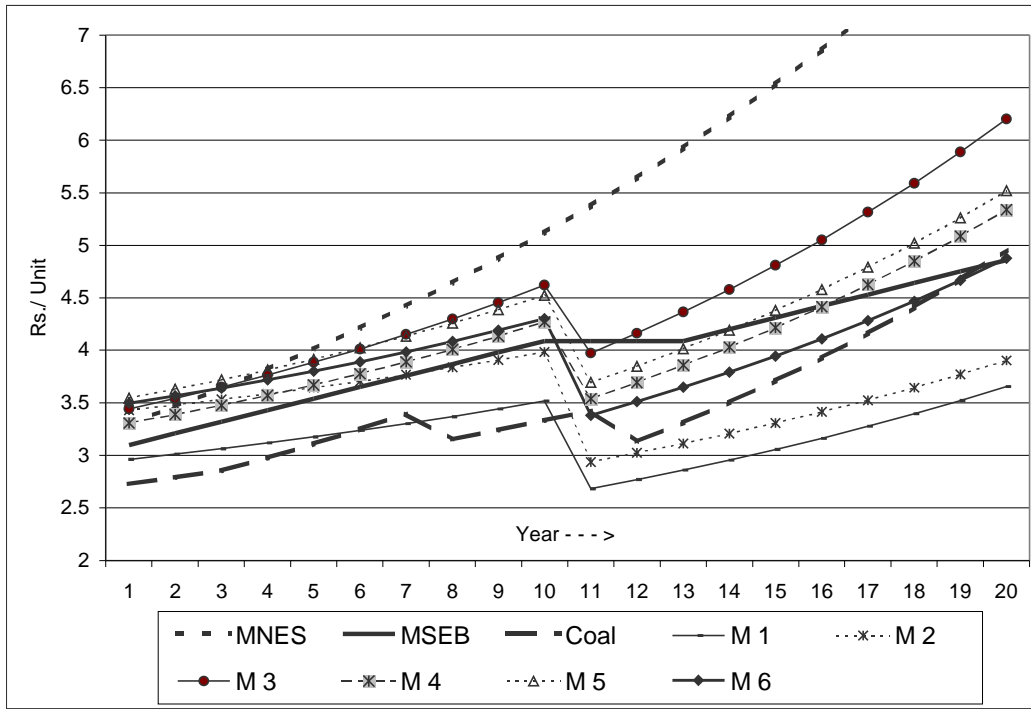


Figure 2: Cost of generation (including 30% RoE) for various cogeneration models – Improved Scenario

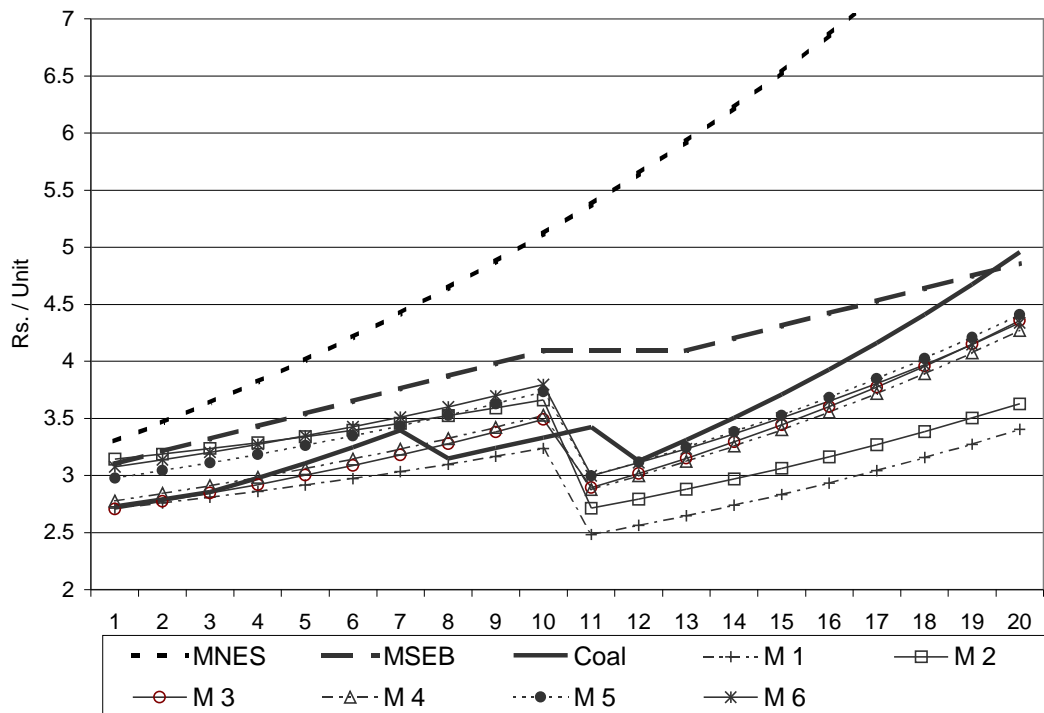


Table 1: Impact of different tariff levels to cogeneration projects

Scenario	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Base	Imp.	Base	Imp.	Base	Imp.	Base	Imp.	Base	Imp.	Base	Imp.
Average Return on equity												
MNES	123%	143%	94%	110%	74%	142%	90%	135%	76%	117%	83%	110%
MSEB	63%	78%	45%	57%	8%	65%	27%	63%	20%	52%	31%	50%
Coal	43%	56%	29%	39%	-15%	40%	6%	39%	1%	31%	13%	30%
NPV of Loss (Rs. Cr. /MW)												
MNES	3.96	5.1	2.86	4.0	1.80	6.2	3.08	6.5	2.13	5.4	3.04	5.6
MSEB	1.54	2.4	0.41	1.3	-1.43	2.5	-0.34	2.5	-1.17	1.6	-0.50	1.5
Coal	0.17	0.9	-0.99	-0.2	-3.25	0.4	-2.28	0.3	-3.04	-0.5	-2.51	-0.8

Note: Negative NPV indicates benefits to consumers – if cost comparable to the coal plant is paid instead of cost calculated for the specific project (with 30% RoE)..

Conclusions of above analysis:

The above analysis clearly demonstrates that

- A. If MNES guidelines are adopted for cogeneration projects then the consumers of MSEB would be burdened with unjustifiable loss (at today's cost) of around Rs. 2 Cr. to Rs. 5 Cr. for each MW of cogeneration capacity added. Similarly if MSEB's proposed tariff is adopted then the consumers would be burdened by unjustifiable costs to the tune of Rs. 1.5 Cr. / MW to Rs. 2.5 Cr. / MW.
- B. As the difference in cost of generation for different models in Base scenario and Improved scenario shows, there is every likelihood that the actual cost of generation would be much less than that indicated in the illustrative calculation of Cogeneration Association. Here it is essential to note that the tariff substantially reduces in the improved scenario by changes in just two assumptions; increased exportable energy and rational fuel cost. In practice there are several other factors, which would reduce actual cost of generation (and would lead to exorbitant profitability to promoters at the cost of consumers). These factors include capital cost, interest rate, fuel consumption norms, cost of fuel (bagasse) as well as proper valuation of steam and power supplied to the sugar factory. For example, reduction in interest rate from 16% to a more realistic 14% would reduce the cost of generation by 10 to 14 paise/kWh.
- C. As "Improved scenario" demonstrates (coupled with many areas for reducing cost of generation mentioned above), several efficient cogeneration projects would be able to get profitability above 30% (ROE) even if a tariff substantially less than MSEB's proposed tariff is made applicable. It is commission mandate to tap potential of only such efficient projects.

Thus, in order to protect consumer interests, and to fulfill the statutory duty of promoting efficiency and economy, it is imperative to fix tariff for cogeneration projects which is substantially less than even the MSEB proposed tariff (i.e. Rs. 3.1 / unit in 2002-03 increasing at 11 paise / unit). As demonstrated above, even at a tariff of around Rs 2.60 increasing at 10 paise p.a., efficiently designed, implemented and operated cogeneration projects would be viable and would offer reasonable profitability to promoters. In light MSEB's precarious financial situation only efficient and highly cost competitive projects need to be promoted. In order to minimize the payment risk, the MSEB should be directed to provide letter of credit as well as escrow facility to cogeneration projects.

5. Comments on the Draft PPA proposed:

5.1 PPA duration of 20 years and No third party sale post PPA:

As in any other project, the cost of generation substantially falls after the loan is repaid (see figure 1 and 2). As such consumers who have paid this higher cost in the initial years should get the benefit of low cost generation in the later period. Hence, the PPA duration should be comparable to useful life of the plant i.e. at least 20 years. Here it is essential to specify that we are arguing for a tariff that will reduce (in real terms) over a period of time. If long duration PPA is done without this condition being satisfied then it would be locking consumers in high cost contract.

Similarly, the proposed provision in the PPA of allowing third party sale in case of payment default by MSEB should be removed. In order to mitigate the risk of non-payment revolving letter of credit or escrow facility should be provided as mentioned above. Other option would be to allow stringent delayed payment charges in case of delay in payment by MSEB. These charges should be same as the delayed payment charge levied by MSEB for its HT consumers. With any of these provisions the promoters would be assured of payment and then they should not be allowed to go for third party sale. Allowing third party sale after few years would deny MSEB's consumers benefit of low cost generation in later years (when loan is repaid). In this case PPA with MSEB would reduce to a tool for securing debt funding for the project

If the MERC considers promoting third party sale desirable and feasible (in the context of tariff impact on remaining consumers, T&D infrastructure, complex issues of reliability and financial as well as energy accounting requirements etc.) then the promoters should be asked to make a choice of third party sale at the beginning only and MSEB should not be allowed to enter into PPAs with such promoters at all.

5.2 Wheeling and Transmission charges:

As mentioned above, we urge the commission not to allow third party sale if the promoter has entered into a PPA with MSEB. In that case there will be no question of deciding on wheeling and transmission charges. But if the commission decides to allow the third party sale then without prejudice to above prayer, we request the commission to consider following factors while deciding wheeling and transmission charges.

- (i) When the cogeneration plant is not generating, MSEB will have to provide standby capacity to the consumer, which has significant financial implications for MSEB and its consumers.
- (ii) The wheeling and transmission charges should be sufficient to cover the technical as well as commercial (T&D) losses of MSEB apart from investment and O & M cost of grid. All consumers of MSEB, irrespective of their size, paying capacity and purpose of use have to bear these charges and consumers using the grid should not be allowed to avoid this liability.
- (iii) Banking should be allowed only for energy fed into the grid during peak period. Otherwise, in order to maintain frequency MSBE's low cost generation will have to be backed down. Though, currently this is not a significant issue, in light of large capacity addition through cogeneration as well as other projects, implementation of availability based tariff and strict grid code, this issue is important.
- (iv) Since, in the current techno-economic scenario the cogeneration can not follow the hour to hour combined demand of number of consumers, the energy accounting procedure should not

lead to any loss to MSEB in terms of providing peak power to consumer while accepting off peak power from the co-generator.

5.3 Sale of non-firm power to MSEB:

Since the MSEB is expected to pay tariff sufficient to cover the entire capital cost of the projects, the PPA should clearly specify minimum power that the project should sale to MSEB in a given year. Strict penalties should be levied in case of failure to sale the committed power to MSEB. Also to avoid any possibilities of loading costs of hidden capacity the PPA should specify that the project can not sale energy to any other party and entire excess energy generation (above firm commitment) should be sold to MSEB at a variable cost of MSEB's coal thermal generation.

5.4 Fuel cost pass through:

Several promoters have argued for a facility of fuel cost pass through, especially for alternate fuel procured in off season. The problems associated with fuel consumption of even a large and centralized utility such as MSEB are well before the commission (transit loss etc.). In this situation it would be very difficult to correctly calculate and control the financial implications of such a facility for large number of small projects. As such we urge the commission to reject this request, or at the most a fuel cost pass through only for very limited energy generation and benchmarked to average coal cost of MSEB's plants should be considered.

6. Other comments on the various documents and reports:

I. Comments on the TERI report:

1. The IRR indicated in the TERI report for various projects seems to be under estimated as, (i) IRR is not calculated for bagasse cost of less than Rs. 550 / ton, which TERI itself indicates to be high pg. 16 (ii) The IRR is calculation is not fully transparent and no step by step calculations are given. (iii) The calculation is only for the first 10 years when the cost of generation is high due to loan repayment. After this period the cost reduces substantially, leading to increased profitability, and (iv) The report has not pointed out and accounted for several areas where the actual cost of generation would be lower such as increased generation than the generation shown in the DPR as substantial generation capacity is hidden. e.g. Jawahar DPR mentions that the installed capacity of the plant is 24 MW with one set of 12 MW for export of power. But only 8 MW of export capacity is considered. Also in case of this project report mentions that the bagasse consumption rate assumed in the DPR is very high, but while evaluating the economic aspects, this high bagasse consumption rate is used.

2. Steam cost assumed by TERI study is Rs 200 / ton. As suggested by one of the commentator, this is low and if it is increased to Rs 250 it can imply a tariff reduction of about Rs 0.17/kWh. So this assumption is critical and on the lower side. TERI calculations only assume fuel usage but no auxiliary consumption or the O&M charges (which would have been necessary without the co-generation plant). The boiler evaporation ratio assumed in annex 4 of the report is 2.75 whereas in annex 2 and 3 it is 2.2 (kg steam / kg bagasse). This discrepancy also has cost implications. Hence a cost of Rs 250/- per ton of steam seems more reasonable.

3. TERI report recommends linking the tariff to marginal cost of generation. This is highly risky. This would imply linking a block of very large plants with the worst mistake done in the past. Our system, which is already in serious financial stress, simply cannot afford this.

II. Kay pulp's claim of bagasse cost:

Kay pulp promoters have claimed that the cost of bagasse is more than Rs. 900 / ton ! The promoters should be asked to clarify whether the claimed cost is for one day or for the entire year. Also it needs to be noted that the moisture content of bagasse varies substantially with season. If the bagasse has such high value (comparable to the cost of cane in some cases) then the entire rationale for promoting bagasse based cogeneration needs to be reevaluated.

7. Decision only for five PPAs currently before the commission:

Commission's decisions in present proceedings should be restricted to only five PPAs presently before the commission and the commission should not approve or decide on tariff and other issues for future / other bagasse cogeneration projects. The reasons for this are given below:

- a. Government of Maharashtra's proposed policy for cogeneration is before the commission for consideration and the commission has not taken any decision on the same.
- b. Deciding MERC's overall policy, tariff and other issues for future cogeneration projects requires in-dept analysis of various issues such as long term demand supply situation, analysis of costs and potential of various supply as well demand side management options to meet electricity demand in the state at LEAST COST, tariff impact analysis, etc. Neither MSEB nor MERC has conducted any analysis of these issues as yet.
- c. The public notice and other process in present proceedings never clearly specified that through these proceedings MERC would decide on tariff and other aspects of future cogeneration projects also.
- d. When several agencies and experts are arguing even for bulk as well as retail competition, not purchasing even the new capacity through competitive bidding is difficult to justify. Hence, we urge the commission to fix the tariff as suggested in section 4 above (conclusions) as a ceiling only and actual capacity purchase should be only on the basis of competitive bidding for a pre-defined limited quota every year. If properly planned, this can ensure competition, economy and efficiency.

8. Need for fully transparent and speaking order by MERC:

As in other states, Maharashtra has also witnessed disastrous financial impacts of power purchase agreements concluded in a non-transparent manner. Present PPAs are the first to seek approval of the MERC. In this context one of the important responsibility of MERC is to ensure that the proposed MERC order on these PPAs is fully transparent and speaking order. In the present case when the commission has appointed same advisors who are representing wind project promoters before the commission and when several issues are similar in both cases (such as wheeling and transmission charges, decision regarding third party sale, treatment of dispersed renewable energy projects) this need of giving fully transparent and speaking order attain heightened significance. As such we urge the commission that the order should clearly cover following aspects of this important decision.

- Ø All assumptions, calculations and parameters on which the proposed tariff is based
- Ø Detail calculations for all years for all options / assumptions / methodologies evaluated
- Ø Sensitivity analysis for various key assumptions
- Ø Detail profitability and other financial statements covering the entire period of PPA
- Ø The methodology (cost- based or bench mark based) adopted by the commission and various supporting data relied upon by the commission. i.e. If the cost- based approach is adopted then details of how the commission has evaluated reasonableness of capital cost of each of these projects or if the bench-mark approach is adopted then which projects were considered and why etc.
- Ø MS Excel worksheets of above calculations / analysis should form integral part of the order and should be made available on the commission's website along-with the order.
- Ø Year on year comparison of approved tariff with MSEDCL proposed tariff with full assumptions and calculations.
- Ø Full details of various objections and comments made by objectors and commission's decision on the same with adequate reasoning
- Ø Full and final order should be issued and summary order, if any should be issued at the time of issuing the full / final order.

9. PRAYER:

In light of various issues mentioned and the reasoning provided above we urge the commission to consider our following specific favorably.

- a. The commission should desist from commenting on overall demand-supply situation in the state
- b. We urge the commission not to adopt either MNES guidelines or MSEDCL's proposed tariff for bagasse cogeneration projects as that would lead to enormous loss to consumers and exorbitant profitability to project promoters. Based on the analysis in section 4 above, we urge the commission to fix a maximum tariff of Rs. 2.6 / unit with 10 paise increase per year.
- c. If the commission decides to fix separate tariff for each of these five projects on the basis of project specific financial and operating parameters then we urge the commission to investigate in detail (based on audited statements and firm offers / contracts etc.) the capital cost as well as other techno-economic parameters. This approach would effectively imply that the MERC will have to own the financial and operating parameters and the same should be justified on efficiency and economy mandate of the ERC Act.
- d. No third party sale should be allowed once the promoter has chose to enter into a PPA with MSEDCL. But adequate payment security mechanism such as letter of credit or escrow account should be provided. The duration of the PPA should be for 20 years and fuel cost pass through should be allowed only on the basis of pre-defined norm of fuel consumption and on the basis of MSEDCL's average fuel cost for coal thermal plants.
- e. Wheeling and transmission charges should consider various parameters mentioned in section 5.2.
- f. Since this is the first major approval for PPAs after the disastrous Enron PPA, we urge the commission to ensure that the order in these cases is fully transparent and includes various aspects and MS Excel worksheets etc. mentioned in section 8 above.
- g. Since the GoM has already approached the commission for approval of cogeneration policy and since the entire public notice etc. was only for approval of five specific PPAs present decision should be only for tariff and other aspects of these five PPAs only.

- h. The commission should ensure that the projects have not received any other subsidies that are not disclosed to the commission – and that formed the basis of calculations done by the commission.
- i. Considering the possibility (mentioned in some projects reports) of these projects obtaining other subsidies for their environmental considerations, such as avoided carbon benefits, the MERC should take precaution that these also benefit the consumers.
- j. The commission should ensure that the tariff of these projects falls in future, after correcting for inflation (WPI). Hence, we request the commission to allow tariff increase (if it so desires) only in Rs/year and not in terms of some percentage of tariff.

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Annexure I - Assumptions and Details of Calculations for Economic Analysis of Cogeneration Projects								
Scenario 1 - Base - All assumptions as per Cogen Association								
								Rs. Cr.
Sr. No.	Sr. No. of Cogen	Item	Incidental / BP Type		Condensing type			
			M 1	M 2	M 3	M 4	M 5	M 6
1	15.1	Interest on Debt	1.68	3.36	6.05	14.56	9.8	22.4
2	15.2	Depreciation	0.79	1.58	2.85	6.86	4.62	10.56
3	15.3	O&M Cost	0.75	1.2	1.89	4.55	2.63	6
4	15.4	Admin Overheads	0.15	0.23	0.41	0.98	0.44	1
5	15.5	Interest on Working Capital	0.28	0.46	1.21	2.79	1.72	3.75
6	15.6	Fuel cost for generation in Season	0.440	0.720	0.680	1.150	0.720	1.150
7	15.7	Off season fuel cost			7.33	12.48	7.80	12.48
8	Note 1	Total cost	4.09	7.55	20.42	43.37	27.73	57.34
								MU
9	9	Power export (season)	18.36	29.86	36.72	88.13	51.41	117.5
10	12	Power export (off season)			36.72	78.34	48.96	97.92
11	13	Total power export	18.36	29.86	73.44	166.47	100.37	215.42
12		Equity (Rs. Cr.)	4.5	9	16.2	39	26.25	60
<----- Escalation Factors ----->								
Sr. No.	Sr. No.	Item	M 1	M 2	M 3	M 4	M 5	M 6
1	15.1	Interest on Debt	0	0	0	0	0	0
2	15.2	Depreciation	0	0	0	0	0	0
3	15.3	O&M Cost	0.05	0.05	0.05	0.05	0.05	0.05
4	15.4	Admin Overheads	0.05	0.05	0.05	0.05	0.05	0.05
5	15.5	Interest on Working Capital	0.05	0.05	0.05	0.05	0.05	0.05
6	15.6	Fuel cost for generation in Season	0.07	0.07	0.07	0.07	0.07	0.07
7	15.7	Off season fuel cost	0.07	0.07	0.07	0.07	0.07	0.07
Desired ROE			0.3		Discount Rate for Rs. Cr. loss			0.12

Scenario - Improved - Increase in Exportable MU and ceiling on off season fuel cost							
							Rs. Cr.
Sr. No. of Cogen	Item	Incidental /BP Type		Condensing type			
		M 1	M 2	M 3	M 4	M 5	M 6
15.1	Interest on Debt	1.68	3.36	6.05	14.56	9.8	22.4
15.2	Depreciation	0.79	1.58	2.85	6.86	4.62	10.56
15.3	O&M Cost	0.75	1.2	1.89	4.55	2.63	6
15.4	Admin Overheads	0.15	0.23	0.41	0.98	0.44	1
15.5	Interest on Working Capital	0.28	0.46	1.21	2.79	1.72	3.75
15.6	Fuel cost for generation in Season	0.484	0.792	0.748	1.265	0.792	1.265
15.7	Off season fuel cost			4.85	10.34	6.46	12.93
Note 1	Total cost	4.13	7.62	18.01	41.35	26.46	57.90
							MU
9	Power export (season)	20.196	32.846	40.392	96.943	56.551	129.25
12	Power export (off season)			44.064	94.008	58.752	117.504
13	Total power export	20.196	32.846	84.456	190.951	115.303	246.754
	Equity (Rs. Cr.)	4.5	9	16.2	39	26.25	60
		<----- Escalation Factors ----->					
No of Cogen	Item	M 1	M 2	M 3	M 4	M 5	M 6
15.1	Interest on Debt	0	0	0	0	0	0
15.2	Depreciation	0	0	0	0	0	0
15.3	O&M Cost	0.05	0.05	0.05	0.05	0.05	0.05
15.4	Admin Overheads	0.05	0.05	0.05	0.05	0.05	0.05
15.5	Interest on Working Capital	0.05	0.05	0.05	0.05	0.05	0.05
15.6	Fuel cost for generation in Season	0.07	0.07	0.07	0.07	0.07	0.07
15.7	Off season fuel cost	0.07	0.07	0.07	0.07	0.07	0.07
Desired ROE		0.3		Discount Rate for Rs. Cr loss			0.12

Cost of generation from a typical coal thermal power plant								
Initial parameters								
Installed Capacity (MW)			500		Fuel cost at bus-bar Rs./kWh		0.8	
Capital cost					Plant Load Factor		85%	
	Rs. Cr. / MW		4		Auxillary Consumption		8%	
	Total Capital cost		2000		Bus-bar PLF		77%	
Financing Plan								
	%		%	Rs.	\$ Mln.		Interest	Duration
Total Equity	30%	Rs. Equity	15%	300				
Total Debt	70%	Rs. Loan	40%	800			15%	10
TOTAL	100%	\$ Equity	15%	300	60			
		\$ Loan	30%	600	120		7%	7
		Base Yr. Rs. -\$ rate	50					
Other assumptions and escalations								
	Rs. Depreciation w.r.t \$ (%p.a.)		5%		Insurance, WC, O& M etc.			5%
	Depreciation p.a.		7%		Escalation in Insurance etc.			5%
	Depreciation allowed upto		90%		Escalation in fuel cost			7%
	Return on Rs. Equity		25%		Loading for transmission			12%
	Return on \$ Equity		25%					