

## RAJASTHAN ELECTRICITY REGULATORY COMMISSION JAIPUR

In the matter of amendments to RERC (Power Purchase & Procurement Process of Distribution Licensees) Regulations 2004 and RERC (Terms & Conditions for Determination of Tariff) Regulations 2004 under Section 61 & 86 of the Electricity Act 2003.

And

In the matter of review of the RERC order dated 31.3.06 in respect of power purchase from non-conventional energy sources in Rajasthan.

Petitioners for review of order: -

- |    |   |                |
|----|---|----------------|
| 1. | Rajasthan Vidyut Prasaran Nigam Ltd., Jaipur        | ('RVPN')       |
| 2. | Rajasthan Renewal Energy Corporation Ltd., Jaipur   | ('RREC')       |
| 3. | Shri Mahesh I. Mansukhani, New Delhi                | ('Mansukhani') |
| 4. | Kalpataru Power Transmission Limited, Sriganganagar | ('Kalpataru'). |
| 5. | Indian Wind Energy Association, New Delhi           | ('InWEA')      |
| 6. | Suzlon Wind Farms Services Ltd., Jaipur             | ('Suzlon')     |
| 7. | Indian Wind Power Association, Thane                | ('IWPA')       |

Commenters/ Suggestors (other than petitioner) and other parties :-

- |    |  |               |
|----|--|---------------|
| 1. | Kalpataru Power Transmission Ltd. (Biomass Division), Uniara | ('KPTL')      |
| 2. | Energy Department, Government of Rajasthan, Jaipur           | ('GoR').      |
| 3. | Rudhraksh Energy   | ('Rudhraksh') |
| 4. | Jodhpur Vidyut Vitran Nigam Limited, Jodhpur                 | ('JdVVNL')    |
| 5. | Shri P.N. Bhandari, Advocate                                 | ('Bhandari')  |
| 6. | Shri Vinayak R. Pandey, CUTS                                 | ('Cuts')      |
| 7. | Amrit Environmental Technology (P) Ltd., New Delhi           | ('Amrit')     |
| 8. | Sathyam Power Pvt. Ltd., Mumbai                              | ('SPPL')      |

Quorum :                      1-        Shri Shanti Prasad, Chairman  
   2-        Shri S.M. Dharendra, Member (Finance)  
   3-        Shri K.L. Vyas, Member (Technical)

Presents :-

- |     |   |            |
|-----|---|------------|
| 1.  | Shri Rajeeva Swarup, Chairman & M.D., RREC, Jaipur                    |            |
| 2.  | Sh. Yaduvendra Mathur, Secretary (Energy), Govt. of Rajasthan, Jaipur |            |
| 3.  | Sh. Dinesh Kumar, M.D., Ajmer Vidyut Vitran Nigam, Ajmer              | ('AVVNL')  |
| 4.  | Sh. A. K. Jain, Director/ Tech., RVPN, Jaipur                         |            |
| 5.  | Sh. Y. K. Raizada, CE (PP&M), RVPN, Jaipur                            |            |
| 6.  | Sh. P. N. Bhandari, Advocate, Jaipur                                  |            |
| 7.  | Sh. D. S. Agarwal, Rudraksh Energy, Jaipur                            |            |
| 8.  | Sh. N. M. Singhvi, SE (R.A & C), Jodhpur Vidyut Vitran Nigam, Jodhpur | ('JdVVNL') |
| 9.  | Sh. Umesh Gupta, Adviser (Legal affairs), RVPN, Jaipur                |            |
| 10. | Sh. N. M. Sareen, SE (Comml.), Jaipur Vidyut Vitran Nigam, Jaipur     | ('JVVNL')  |
| 11. | Sh. Anand Chopra, M/s Kalpataru Power Transmission Ltd.               |            |
| 12. | Sh. S. C. Srivastava, M/s Kalpataru Power Transmission Ltd.           |            |
| 13. | Sh. R. Vyas, M/s Enercon  |            |
| 14. | Sh. Balwant Joshi, InWEA  |            |
| 15. | Sh. Vinod Bishnoi, M/s Suzlon Wind Farm Services                      |            |
| 16. | Sh. A. V. Raghavan, C.A., IWPA  |            |

17. Sh. Pradeep Kumar, Synergy Global
18. Sh. Chintan Shah, Synergy Global & InWEA
19. Sh. Sanjay Kumar, Sathyam Power Pvt. Ltd. ('SPPL')
20. Sh. B. K. Anand, SPPL
21. Sh. Sharad Maheshwari, M/s Amrit Environmental Tech. Pvt. Ltd.
22. Sh. G. S. Dalal, SE, AVVNL, Ajmer
23. Sh. Arun Kumar, M/s CRISIL

Date of hearing : 31.8.06

Date of order : 29<sup>th</sup> September 2006

### **ORDER**

1. In terms of Section 61 & 86 (1) of the Electricity Act, following the due procedure, the Commission issued order on 31.3.06 in respect of various matters connected with purchase of power from non-conventional energy sources power plant. Based on the said order, the Commission has considered amendments to RERC (Power Purchase & Procurement Regulations') & RERC (Terms & Conditions for determination of Tariff) Regulations 2004 ('RERC Tariff Regulation'). However, the aforesaid order dated 31.3.06 was open for general review for 3 months. The Commission received eight petitions, including two from Rajasthan Renewable Energy Corporation (RREC) for reviewing the order. These petitions were admitted on 3.7.06 and clubbed together.
2. The Commission sent a copy of petitions to Rajasthan Rajya Vidyut Utpadan Nigam (RVUN), Prasaran Nigam (RVPN), AVVNL, JVVNL & JdVVNL, RREC, Energy Department, Government of Rajasthan and also members of Advisory Committee of the Commission (i.e. 'other parties') furnishing comments/suggestions, if any. It also issued public notice inviting suggestions on the above review petitions and draft Regulations by publication in two Hindi and one English news paper as listed below on the dates mentioned against each for filing suggestions etc. by 31.7.06: -
  - (i). Dainik Bhaskar (Hindi) 8.7.06
  - (ii). Rastradoot (Hindi) 8.7.06
  - (iii). Rajasthan Patrika (English) 8.7.06
3. The petitions were also forwarded to 'other parties' and were also placed on Commission's website. By due date, the Commission received two reference from petitioners (RREC), two from other parties viz. Jodhpur Vidyut Vitran Nigam Limited (JdVVNL), Energy Department and three others. Comments from CUTS was received after due date on 3.8.06. The Commission has considered all of these. The comments/suggestions from petitioners/stakeholders were forwarded to petitioners, other parties and commenters on 17.8.06 for their reply/response on or before 31.8.06, the date of hearing. In the meanwhile, the Commission also received comments/suggestions from M/s Sathyam Power Pvt. Ltd. and M/s Amrit Technologies (P) Ltd. & Energy Departments, GoR.
4. Hearing was held on 31.8.06. Shri Raghvan of IWPA represented IWPA, Suzlon and Enercon during the hearing. They were also requested to furnish their submissions in writing. The Commission has considered the petitions, suggestions and presentations made during hearing in passing this order. The Commission is first discussing on various issues raised in review petitions and suggestions thereon.

## Issues raised in Review Petitions & the representations on draft Regulations

### 5. Minimum purchase of NES Power

RREC, State nodal agency for Non-Conventional Energy Sources (NCES), has sought review on yearwise minimum purchase of power fixed by the Commission in its order dated 31.3.06 stating that these are low. In this respect they referred to the President of India's address to Nation on the eve of the Independence Day 2005 fixing target for renewable energy (by 2020) to 20-25% from the present level of 5%. RREC has stated that Discom will not be bound to enter into contract for purchase of energy beyond the mandatory minimum requirement, even if PPA have been signed. Under such a situation of uncertainty, no new investment in NES in the State would be made beyond such limit. It would become practically difficult for investors as well as STU to plan generation and transmission capacity, additions and augmentations thereof. RREC has requested for fixing capacity up to October 2009 (the validity period of NCES policy 2004) with a proviso of no penalty on Discom in case lesser amount of electricity is generated by NES in the State. Alternatively, RREC requested for fixing (in addition to minimum percentage), higher target to which extent PPAs can be signed. Further RREC stated that minimum percentage in terms of energy fixed by the Commission is not clear in respect of installed capacity, particularly in respect of varying Plant Load Factor (PLF). Therefore, it has been argued that the extent of capacity in MW may also be specified.

### 6. Wind Energy Power Plants

In respect of Wind Energy Power Plant, RREC stated that the existing installed capacity is 359 MW and as per the order of the Commission, capacity additions will be as per table-1 against the approved projects with RREC and projects anticipated by RREC :-

Table-1

Year	Total Energy M.U.	% for RE	Capacity, MW	Addition Capacity, MW	Proposed with RREC, MW
2006-07	31468	2%	389	6	565 approved 325 addl. If capacity restricted is removed
2007-08	33670	3%	576	217	825 approved
2008-09	36027	303%	678	102	600 addl. Capacity -do -
Upto Oct.09					109 #
				Total	2865 MW

#(worked out by difference)

7. However, looking to the implications on tariff, RREC has suggested pegging of installed capacity at 1565 MW by October 2009.
8. Shri Rajeeva Swarup, CMD, RREC stated that by March 07 and March 08, wind power plant capacity will be 470 MW and 770 MW respectively corresponding to 2.6% & 4.0% of energy purchases. In response to the query that capacity additions normally comes at the end of the year and may not add to energy availability, he stated that capacity at the end of year may be treated for next year. He also stated that the Commission may grant sectorwise as well as in totality the power purchase requirement from RE power plants.

9. **Biomass Power Plant**

RREC has stated that by the end of the current financial year, 6 plants with aggregate capacity of 46.8 MW will be commissioned and 10 more plants with aggregate capacity of 96 MW are likely to be commissioned by October 08. Taking these into consideration, they have recommended minimum purchase limit to 160 MW at 80% PLF by October 2009.

10. InWEA & Suzlon has stated that the estimated gross potential of the Rajasthan for Wind energy of 5400 MW and technical exploitable potential was assessed on the basis of studies conducted in mid 90s based on low mast height and small capacity 250 kW turbines etc. Now with higher mast height and higher capacity turbine of 1000 + kW being installed, and better transmission availability, it is possible to install approximately 1500 (plus) MW by the year 2012. They stated that for wind energy, growth rate of more than 30% per annum can be achieved. They also demanded fixation of minimum purchase obligation to be based on capacity instead of energy sales basis. They suggested minimum energy purchase to be specified as 3.46% for FY07-08, 4.77% for FY08-09 6.57% for FY09-10, 9.07% for FY10-11 & 12.5% for FY11-12.
11. IWPA has expressed the view that considering the potential and preparedness of developers, there is possibility of adding at least 500 MW wind power capacity year on year basis in Rajasthan. Minimum percentage of 2% fixed for FY06-07 is less than that available from the existing installed capacity of 337 MW as on March 06 and would send a wrong signal for the investment of nearly 300 MW in pipeline during FY06-07 and planned for installation in FY07-08. Wind farms are developed on large scale basis to optimize the cost of infrastructure and capacity to be developed would be in excess of 100 to 150 MW and this is more than around 50 MW proposed by the Commission. They have suggested fixing the percentage not less than 5% by 2007-08 with annual increase of not less than 1.5% thereafter so as to reach a level around 12.5% by 2011-12. Shri Raghavan of IWPA during hearing stated that 2 to 3% of minimum power purchase requirement specified by RERC has already exhausted and needs to be enhanced. Shri Balwant Joshi appearing for InWEA stated that commercially exploitable potential of wind energy may be around 2500 (plus) MW by 2012.
12. GoR has supported RREC's submission in respect of enhancing the minimum percentage, extending the date upto 31.3.07 for signing PPAs on the basis of NCEs policy of 2004, retaining 20 years' period for PPAs for wind & biomass, continue GoR's tariff for PPAs signed upto 31.3.07, expressing minimum purchase limit in MW, pegging it to 1565 MW by October 09 for wind and 160 MW for biomass, non-levy of augmentation charges where developer constructs his line upto 220 kV or higher voltage level, augmentation charges to be graded as per voltage level of interconnection.
13. Shri D.S. Agarwal, Rudhraksh Energy stated that minimum requirement specified by the Commission is more or less in order. In their written submission, M/s Rudhraksh Energy has suggested minimum energy procurement by distribution companies of wind energy as 2.5% for FY06-07 with 0.5% addition every year till 4% is achieved. In respect of biomass energy, they suggested minimum percentage as 0.50% for FY06-07 with 0.5% addition every year till 2% is achieved. If impact on retail tariff exceeds 2.5%, the above percentage may be reconsidered for review. If, however, Discoms are required to exceed minimum percentage, they should be allowed to go in for competitive bidding.
14. M/s CUTS have commented that Commission may have futuristic view in respect of purchase of NES power rather than just assuming business as usual and as Rajasthan is blessed with abundant potential for wind power development, and speedy advancement in technology is enabling harnessing of wind power in places where it

was not considered feasible in past. The Commission may increase target from 4% to 8%. As regards biomass energy, they agreed with target of 2% since the availability of biomass on a sustained basis is a cause of concern in draught prone state such as Rajasthan.

- 15- Thus, majority of commenters/suggestors have advocated for increase in minimum percentage. Before we proceed further, it is noted that though the gross wind energy potential assessed is 5400 MW based on studies conducted in mid 90s, the same study has found and specified 910 MW out of this to be the technical exploitable potential of wind energy. Neither RREC nor any other stakeholder viz. IWPA, Suzlon, InWEA corroborated their statement with the results of any authentic and scientific study to be relied upon in support of their statement about wind potential of the State that can be technically exploited. However, we observe that with the advancement of technology during the last decade, it should be possible to enhance this technically exploitable potential to be doubled. With this, it makes sense to agree to this suggestion to harness the wind energy potential of 1565 MW by October' 09 as suggested by RREC. While we agree that specifying the procurement maxima in terms of capacity (i.e. MW) will be better signal for investors and STU, we state that as per section 86 (1) (e) of the Electricity Act, we have to specify procurement of energy from cogeneration and renewal sources of energy as a percentage of the total consumption of electricity in the area of a distribution licensee. By implication, this is the minimum requirement as non-compliance will be subject to penal provisions of the Act. However, we would therefore compare such percentage suggested by various commenters. For this purpose, capacity in MW as suggested by RREC is converted in energy terms at table-2 based on :-

- (i) Additional anticipated capacity stated by RREC, is reduced proportionately to have 1565 MW by October 09 with no change in installed and approved capacity.
- (ii) Plant Load Factor or Capacity Utilization Factor (CUF) is taken as 22%.
- (iii) Energy projection is considered as per the Commission's order dated 19.9.2006 on petition number 99/06.

Conversion of capacity addition, suggested by RREC to minimum energy procurement works as under :

Table-2

Year	2006-07	2007-08	2008-09	2009-10
Generation Envisaged at PH Bus, in MUs	30832	32186	34146	36396
Capacity addition, MW	565+107=672	273	198	126
Total, capacity, MW	1031	1304	1502	1628
Generation at 22% CUF, MUs	1988	2513	2895	3137
% of energy	6.45%	7.81%	8.47%	8.62%

Comparison of various suggestions

Table-3

Year	Commission's order	RREC (as worked out at table-2)	InWEA & Suzlon	IWPA	Rudhraksh Energy	Cuts (Max. 8%)
2006-07	2.00%	6.45%	-	-	2.5%	3.81%*
2007-08	3.00%	7.81%	3.46%	5.0%	3.0%	5.71%*
2008-09	3.30%	8.47%	4.77%	6.5%	3.5%	6.29%*
2009-10	3.60%	8.62%	6.57%	7.0%	4.5%	6.86%*
2010-11	3.90%	-	9.07%	-	-	7.42%*
2011-12	4.20%	-	12.80%	12.5%	-	8.0%*

(\* derived from 8.0%)

16- Monthwise wind generation during FY05-06 & FY06-07 is as tabulated below :

Table-4

Particulars	2005-06	2006-07
April to September (MU)	263	322
Full year (MU)	417	Projected as 512 MU
Capacity at the beginning of the year (MW)	279	353
Capacity at the end of the year (MW)	353	

Based on the above, projected generation for FY06-07 will be 512 MU, which works out to be 1.66% of energy purchased by three Discoms against 2% specified in the Commission's order. Thus, still there is a margin to procure around 20% more in FY06-07. The Commission is of the view that minimum percentage of energy to be purchased from wind power generators has also to take into consideration the availability of EHV transmission system and evacuation system. Transmission system has been envisaged for wind power generation/injection of 47 MW at Amarsagar, 106 MW at Temderia, 86 MW at Akal, 128 MW at Mada, 838 MW at Narsingho Ki Dhani (NKD) (i.e. 86 MW existing plant & 752 MW new plants) and 351 MW from Enercon's power stations near Phalodi (i.e. total 1556 MW). The existing and envisaged transmission systems conceived for evacuation of this generation have been as under with normal load flows indicated against main transmission line :

(i)	132 kV Amarsagar - Jaisalmer	44 MW
(ii)	220 kV Amarsagar - NKD -	Interlinking line
(iii)	220 kV Amarsagar - Phalodi	278 MW
(iv)	220 kV NKD -	Barmer 75 MW
(v)	220 kV NKD -	Giral 71 MW
(vi)	220 kV NKD -	Jodhpur (3 circuits) 751 MW
(vii)	220 kV S/S at Amarsagar	- Step up S/S
(viii)	220 kV Enercon PS to Tinwari	351 MW
(ix)	+250 to -250 MVar SVC at NKD	-

17- RVPN conceived system, lays heavy emphasis on 220 kV lines. With potential of 2500 MW or higher, envisaged in Jaisalmer-Barmer belt, ultimately, 400 kV system may have to be laid. The above conceived transmission system will then become underlying system. With strong 220 kV underlying system, it will become difficult to effect transmission on 400 kV as has been the case between Kota and Jaipur. We observe that wind tunnel in western Rajasthan extend practically from Mohangarh to Barmer. It would be appropriate to plan, in consultation with RREC, Mohangarh-Jaisalmer-Barmer 400 kV system to which pooling substations of wind generation may feed. Such system may be connected to two to three 400 kV substation in Western Rajasthan. Details of system and its phased execution (including initial charging on 220 kV) can be determined by power system studies. Even the Power of the order of 1100 MW from wind power plant itself will be more than the load of Jodhpur and adjoining area, and injection of so much power will require system augmentation beyond Jodhpur toward East. With higher injection by wind generation, this requirement will enhance. With strong 220 kV system, augmentation of 220 kV system even beyond Jodhpur would be required and it would pose problems. From this angle too, 400 kV system will be preferable. 400 kV system will have high charging current requirement and besides shunt compensation to contain no load over voltage, it will require higher capacity Static VAR Compensator (SVC) to contain voltage fluctuations. Such evacuation system will be costlier compared to 220 kV alternative but will be required from a long-term perspective. Laying of 400 kV system take longer time and as such, it will be appropriate to consider transmission capability by FY08-09 as 1275 MW, corresponding to 2458 MU at 22% CUF i.e. 7.2% of energy

purchased (as per energy requirement of 34146 MUs approved by the Commission vide its order dated 18.9.06). This is of the order of percentage suggested by InWEA, IWPA & CUTS. Thereafter, about 200 MW transmission capacity may be created annually corresponding to about 0.6% energy purchased. It is directed that RVPN must create the above transmission capacity for evacuation of wind power required to be procured as a statutory minimum obligation for Discoms.

- 18- Besides these, while determining the minimum percentage of power to be purchased from wind power generation, its impact on retail tariff is also to be considered, since RE generation may have to be encouraged to the extent of affordability of consumers. Implication of 1.0% purchase of wind power was worked out by the Commission in its order-dated 31.3.06 as 1.3 to 2.5 paisa per unit on retail tariff. The same was based on cost data for FY05-06. This implication was based on cost of purchase of wind power vis-à-vis average as well as the highest cost of purchase. Extra EHV transmission charges due to low load factor of wind energy and transmission losses were not factored in. Further, the comparison is not with respect to costlier power replaced by wind energy. It can be proved that impact on retail tariff in paisa per kWh will be  $P \times [W - C/(100 - DL)]$  where  $P = \% \text{ of wind power purchase}$ ,  $W = \text{cost in paisa/kWh of wind power to Discom}$  and  $C = \text{cost/kWh of costliest conventional power replaced by wind power in paisa per kWh}$  and  $DL$  is distribution losses in percentage.  $W$  &  $C$  will include applicable transmission charges (including exclusive transmission system). In coming years, cost of power purchase from new conventional power stations will enhance (due to fuel cost) and escalation in O&M expenses, while escalation in cost of wind power may not correspond to that extent. On this account, in future, higher % of wind energy power may have the lesser implication than worked out based on data for FY05-06. Shri Balwant Joshi of InWEA stated that impact on retail tariff need be reviewed say every 3 years suo moto by the Commission. Till such review is undertaken, no check on minimum power purchase requirement be placed. He apprehended that as tariff depends on consumer mix, with any change, impact in such mix may have to be worked out and as such, any check based on % impact on retail tariff will hinder execution of PPAs. He also referred to section 86 (1)(e) of the Act and stated that minimum percentage of power procurement is for the area of the distribution licensee. It is not for distribution licensee alone but can be enforced on open access consumers and also on conventional thermal captive power generation. While we appreciate his submission but state that enforcement of minimum percentage on open access consumers, CPP etc. shall have to follow due process of previous publication. Keeping the above discussion in view, we modify our earlier order and specify minimum % of wind energy to be provided as specified in table-4. The target for the execution of PPAs will be about 200 MW higher than the minimum requirement for the year and review will effected as per control period of RERC Tariff regulation. First such review will be due by March'09. Based on energy purchases, as envisaged and 22% CUF, this shall be equivalent to MW limit as indicated below:

Table-5

Year	Minimum percentage of energy to be purchased (during the years)	Maximum capacity for the execution of PPA, by end of the year			
		Max. % (not subject to penal provision)	Total Energy purchased by Discoms, in MUs	Energy to be purchased from wind power plants, in MUs	MW limit (at 22% CUF)
2006-07	2.0%	5.0%	30832	1541	800
2007-08	4.0%	6.0%	32186	1932	1002
2008-09	5.0%	7.0%	34146	2390	1240
2009-10	6.0%	7.50%	36396	2729	1415
2010-11	6.75%	8.00%	39506	3160	1639
2011-12	7.50%	8.50%	42883	3645	1890

19- **Biomass Power Plant**

The Commission has specified in its order minimum purchase from such projects as 0.37% for FY06-07, 0.83% for FY07-08, 1.13% for FY08-09, 1.43% for FY09-10, 1.73% for FY10-11 & 2.00% for FY11-12. RREC has stated that by the end of FY06-07 commissioned capacity will be 46.8 MW and by October 08 additional 96 MW capacity may be commissioned considering this installed capacity from biomass power plants may be pegged at 160 MW by October 09. It is observed that as per RREC, out of the plant registered under 1999 Policy, so far 15.3 MW only have been commissioned and 31.5 MW is expected to be commissioned in FY06-07. The capacity of the projects registered under 2004 policy is 95.50 MW, which are anticipated to be commissioned by October 08. However, it has been observed that though biomass projects being near load centers, do not have transmission constraint, these have longer gestation period and their installation have been at slower pace and are also seized of fuel supply problems. We, accordingly, specify the minimum and maximum as under :-

Table-6

Year	Minimum percentage of energy to be procured, during the year	For the execution of PPA, by end of the year			
		Max. % (not subject to penal provision)	Total Energy purchased by Discom, in MUs	Energy to be purchased from wind power plants, MUs	MW (at 80%PLF)
2006-07	0.5%	1.0%	30832	308	44
2007-08	0.88%	1.75%	32186	563	80
2008-09	1.25%	2.50%	34146	854	122
2009-10	1.45%	2.95%	36396	1074	153
2010-11	1.75%	3.25%	39506	1284	183
2011-12	2.00%	3.50%	42883	1501	214

- 20- Minimum percentage of energy to be purchased from wind & biomass power plant will be subject to availability of capacity from wind and biomass power stations installed in Rajasthan. These percentages can be further reviewed depending upon pace of development by March 09. PPA executed/to be executed shall be assignable, with mutual consent, by a distribution licensee to other distribution licensee or open access consumer or captive power plant within the State. In case, PPA upto the envisaged capacity are not executed and as per RREC's assessment, additional capacity is not likely to come up for biomass, it can be exchanged for wind power plant.

**Power Purchase Agreements (PPA)**

- 21- In its order, the Commission has specified that in respect of the PPAs already executed and likely to be executed up to 30.9.06 and to be commissioned within 6 months for wind power plants and 24 months for biomass power plants, the tariff as per PPAs/Government of Rajasthan's policy would be applicable for a period of 10 operational years. RREC has strongly argued against this provision, saying that wind energy being infirm power, investment decision is taken on the basis of return on investment for a period of 20 years based on back loaded tariff. It was further stated that the cost of power plant to new entrants is more than that of old ones and as such they would not be able to compete with old ones who have already got returns for the last 10 years period. RREC has also stated that 6 months period for the commissioning of wind power plant is inadequate for the completion of the project of large capacity like 100 MW wind farm project of M/s Enercon, which is likely to take 2 years for completion. RREC has sought protection of PPAs already signed as sanctity of PPA and credibility of State Government's policy is at stake. RREC proposed that for next 3 years i.e. upto October 2009, PPAs with 20 years term may continue. This



protection has also been proposed by RREC for biomass project on the plea that there are very few investors and its development is at a nascent stage.

- 22- InWEA & Suzlon stated that most of the investments in wind energy sector are getting initiated in second half of the financial year and thereafter projects get commissioned in a period of 3 to 6 months. They requested that the Commission may review last date to be extended upto 31<sup>st</sup> March 07 for execution of PPA and commissioning of the wind power plant. InWEA & Suzlon have also stated that investors have put up wind energy projects under "sell to Discom" model under various policies with cash flow projections on a 20 years period. Debt servicing being a major cost, most of investors are not having any equity pay off during debt repayment period. This period may become 2-3 years longer due to changes in operating parameters like wind speed, grid availability, timely payment etc. Considering these, MERC has increased the tenure for the support tariff for a period of 13 years instead of the normal 10 years. They have requested the Commission to retain 20 years period or at least keep 12-13 years for the term of PPA with specified tariff. The Commission observes that MERC in its recent order dated 16.8.06 has extended the validity of its order-dated 24.11.03 in respect of wind energy power plants commissioned from 31.3.03 to 31.3.2010 (vide para 2.3.14 & 3.1.7).
- 23- Shri Balwant Joshi, InWEA, raised preliminary objection to tariff determination by the Commission. He stated that Commission has initiated the proceeding under Section 86 (1)(e), whereunder it can fix terms & conditions of determination of tariff, whereas it can fix such tariff only under section 62 for which it to need to initiate separate proceedings and till then tariff as per GoR policy needs to be continued. We find force in his argument. In the written submission, IWPA has stated that restricting the period to ten years will result in an uncertainty of the tariff beyond the 10<sup>th</sup> year and shall render the investments in the state less attractive compared to states like Karnataka with higher capacity utilization factor (CUF) and would result in investment moving out of Rajasthan to other states, and those already invested in Rajasthan would lose their faith in GoR's policies. This would affect the growth of wind power in the State.
- 24- Shri Rajeeva Swarup, CMD, RREC also pleaded for continuing tariff as per GoR's policy for projects being established, as per PPA executed, by at least 31.3.07, if not upto tenure of policy (i.e. 31.10.09).
- 25- We would first examine the provisions in respect of term of PPA incorporated in PPAs executed under various policies of GoR.

**(A) Under Policy of 1999**

"1 (i) Initial term of the agreement shall be twenty (20) years from COD (Commercial Operation Date). COD means the date which falls thirty (30) days after the date of synchronization of last wind energy generator (WEG) of the power plant"

(ii) On the expiry of twenty (20) years of initial term, this agreement may be extended for further ten (10) years with mutual consent between RSEB & ....."

**(B) Under Policy of 2000**

"1 (i) Initial term of the agreement shall be twenty (20) years from COD (Commercial Operation Date). COD means the date which falls thirty (30) days after the date of synchronization of last wind energy generator (WEG) of the power plant"

(ii) On the expiry of twenty (20) years of initial term, this agreement may be extended for further five (5) years with mutual consent among RVPN, ..... Discom & ....."

- (C) **Under Policy of 2003 & 2004**  
“(3) The term of the agreement shall be twenty (20) years from the date of commercial operation (COD) of the power plant. The power plant has been commissioned in the month .....
- (D) **Under Policy of 2004 (Amended)**  
“(3) The term of the agreement shall be twenty (20) years from the date of commercial operation (COD) of the power plant. The power plant will be commissioned in the month of March 06 unless extended by RREC/State Government.
- (E) The wheeling & banking agreements executed under policy of 2004 (amended) also have the similar term.

26- Thus, the period of agreement in all the policies has been 20 years. Extension of term, as provided in PPAs executed under policy of 1999 and 2000, was not mandatory but subject to mutual consent only. No directive was issued to the Regulatory Commission in respect of term of PPA on the policy of 1999, 2000 & 2003 & 2004 (amended). The State Government directive has been only in respect of policy of 2004 (original). In this respect, it will also be relevant to see other provisions in respect of tariff etc. of these PPAs, which are as under (description under bracket added for clarity) :-

- (A) **Under Policy of 1999**  
3.1 (ii) RSEB will purchase electricity offered by the .....(name of generator) based on a price level of Rs.2.75/unit applicable for the years 1998-99 with no restriction on time or quantum supplied for sale. This basic rate will be increased at the rate of 5% every year on first April of the year for a period of ten operational years. Thereafter the rate shall be mutually settled between RSEB and .....
- (B) **Under policy of 2000**  
“3.1 (ii) The ..... (name of Discom) will accept energy offered by ..... (name of generator) on behalf of RVPN. .... (name of generator) will raise the bill to RVPN for the energy supplied based on a price level of Rs.3.18/unit applicable for the year 2001-02, with no restriction on time or quantum supplied for sale. This basic rate will be increased at the rate of 5% every year on first April of the year for a period of ten (10) years from the date of signing of this agreement. Thereafter, the rate shall be mutually settled between RVPN and .....
- (C) **Under Policy of 2003**  
“4.5.1 (ii) The Discom would pay a rate of Rs.3.32 per kWh for power supplied from power producer during the year 2003-04, which shall be increased at a simple rate of 2% (of Rs.3.32) each year on 1<sup>st</sup> April of the year for a period upto 10 years i.e. upto year 2012-13 with base year 2003-04 rounded off to the nearest second decimal place. Thereafter from year 2013-14 and onwards, a fixed rate of Rs.3.92 per unit for a period upto 20<sup>th</sup> year of the project shall be payable.  
  
5.1 (iii) The power purchase agreement shall be subject to RERC scrutiny/approval or may be required under regulatory process/ directives”.
- (D) **Under Policy of 2004 (original)**  
“5 (i) The Discom would pay a rate of Rs.2.91 per kWh for power supplied from power producer during the year 2004-05 which shall be increased by 5.0 paisa each year on 1<sup>st</sup> April of the year for a period of 10 years i.e. upto year 2013-14 with base year 2004-05. Thereafter, from year 2014-15 and onwards a

fixed rate of Rs.3.36 per unit for a period upto the 20<sup>th</sup> year of the project shall be payable.

The clause 5.1 (iii) of PPA is the same as that under policy of 2003.

(E) **Under policy of 2004 (amended)**

"5 (ii) The Discom would pay a rate of Rs.3.25 per kWh for power supplied from power producer during the year 2005-06 which shall be increased by 6.0 paisa each year on 1<sup>st</sup> April for a period upto 10 years i.e. upto year 2014-15. Thereafter from year 2014-15 and onwards a fixed rate of Rs.3.79 per unit for a period upto the 20<sup>th</sup> year of the project shall be payable."

Clause 5.1 (iii) of PPAs is the same as that under policy of 2003.

- 27- Thus, even though period of agreements has been 20 years under policy of 1999 & 2000, tariff has been valid for 10 years and was negotiable thereafter. Thus, 20 years period is not relevant so far as tariff is concerned. Under policies of 2003 and thereafter, though tariff was specified for 20 years, PPA was subject to RERC's scrutiny and approval as may be required under the regulatory process/directions. As per section 62 (1) (a) of the Electricity Act-2003, the tariff for supply of electricity by a generating company to a distribution licensee is to be determined by the Commission. The policy directive has been issued on 12.11.2001 by the Government for its policy of March 99 and February 2000 as under :-

- "(a) RERC shall regulate power purchase by the RVPN in such a manner that procurement of power from non-conventional energy sources reaches a level equivalent to 10% of installed capacity of generating stations owned by the State (including share in partnership projects) by 2005 subject to creation of adequate capacity within the State to enable fulfillment of this direction.
- (b) The RERC shall consider a uniform wheeling charges of only 2% of energy fed into the distribution system of the grid by non-conventional energy producers".

- 28- The first directive has already come to an end on 31<sup>st</sup> December 2005. Second directive will apply only to power plants commissioned under the policy of 1999 and 2000 because the State Government has revised wheeling charges to 10% in its policy 2003 (issued on 30.4.03). Policy directive dated 30.4.03 was issued by the State Government on this policy. The Commission sought directives on specific matter, which is awaited. However, as regards State Government's policy of 2004 (i.e. of 25.10.04), the State Government issued policy directive on specific paras of the policy which, inter alia, includes execution of PPA upto 400 MW, developer to pay to RVPN/Discoms Rs.2 lacs per MW for creation of proper facility for receiving power (at 33 KV level) and to pay to RVPN/Discoms Rs.15.00 lacs per MW for development and augmentation of transmission and distribution system to evacuate power from receiving station, wheeling charges @ 10%, banking during calendar year, tariff for supply to Discom/consumers, term of PPA (20 years for wind and 10 years for others), NCES power Stations not to be subjected to merit order dispatch, commissioning date for power plants under earlier policy (to be 31.3.06 for biomass and 31.3.05 for others). The Commission has made reference to the Government, inter alia, on quantum of PPA, wheeling charges, provision of banking and tariff on the ground of the directive being not as per provisions of Electricity Act. However, reply is still awaited and as such in view of the provisions of the Electricity Act 2003, the policy directive of the State Government on the above aspects has no legal sanctity.

- 29- Thus, specifying the tariff for 10 years by the Commission was clearly not infringing on any of the policy/policy directives of the State Government. We may also state that term of agreement and period of validity of tariff need not be coterminous. The former

only assures the purchase of power for the specified period. If, however, negotiated/determined tariff after the validity of tariff becomes unacceptable, agreement will fall apart. The Commission conceives that with the competition growing in electricity generation, it shall accept the tariff through competitive bidding under provision of Section 63 and will not determine the tariff under section 62 (1) (a) and sector will get practically deregulated. In order to ensure that with deregulation/competition should grow, it is appropriate that regulated tariff period be as short as possible taking care of the concern of financial institutions about debt servicing and concern of investor about return on investment. Though agreemental period may remain 20 years, there can be freedom to generating company to select seller and procure power by bidding/negotiations. Presently SERC's are specifying minimum percentage of power to be purchased in the area of distribution licensee within the State under section 86 (1) (e). Presently, this obligation is met by distribution licensees only and only they are executing PPAs for wind power, but this obligation may be cast upon open access consumers and CPPs situated in the area of distribution licensee as contended by Shri Balwant Joshi. Not only this, in near future, a uniform all India Policy on purchase of RE policy may be evolved. Under such scenario, either (i) existing PPAs may have to be assigned to CPP or open access consumers or other distribution licensees within or outside the State or (ii) generating companies (e.g. CPPs) may directly invite bid from wind generators. PPAs must have such flexibility after some specified period and regulations may provide for criterion of determining tariff, which acts as support price to RE generators. Mechanism of support price may follow cost plus approach with tariff sufficient to earn Return on Equity (RoE). Twelve years period of determined tariff shall be sufficient to meet financial institutions concern. PPAs already executed will be protected with the above relaxation and further option of the RE generators to have wheeling charges as per PPA or as per Commission's order. Changeover to latter alternative may be exercised at any stage.

- 30- The Commission has issued order on 31.3.06 with tariff to be as per GoR's policy for 10 years operational period for PPAs to be executed upto 30.9.06 subject to the condition that wind power plants and biomass power plants are commissioned by 31.3.2007 and 30.9.2008 respectively. M/s Suzlon Wind Farm Services Ltd. & Indian Wind Energy Association have pleaded that wind power plants commissioned upto 31<sup>st</sup> March 2007 may be governed by the tariff of GoR policies. The review petitions have been filed and are disposed off by this order. The date of execution of PPAs under GoR's tariff policies is extended upto 31.3.07 to cover the intervening period. The tariff determined by the Commission as per RERC (Terms & Conditions for determination of tariff) Regulations as modified by the draft Regulations discussed hereinafter will apply on PPAs executed and plants commissioned after 31.3.07. PPAs will specify commercial operations date.

#### **Transmission & Augmentation**

- 31- The Commission has prescribed (based on State Government Policy) a uniform rate of Rs.15 lacs per MW towards augmentation charges of the transmission system for power evacuation and Rs.2 lacs per MW towards Grid Connectivity. RREC have represented stating that investment differs substantially, if the developer creates own transmission system of 220 kV, 132 kV & 33 kV to provide connectivity with RVPN's system. Accordingly, the cost entailed by RVPN for augmentation also vary. Shri Rajeeva Swarup, stated that in the policy of 1999 & 2000, no charges for system augmentation was specified. In later policies, these have been specified. GERC has specified creation of transmission system upto receiving station. MERC has specified that developer shall bear cost of switchyard and interconnection facility upto point of energy metering and beyond that utility shall bear it. For such improvement required in the EHV system for power evacuation to be borne by the utility, investor shall provide interest free advance for 50% of the cost and it is refunded in five equal annual installments. He stated that in case of Maharashtra, developer is to bear cost

of transmission up to the extent of Rs.25 lakhs/MW and 50% of the cost incurred beyond this is interest free advance, which is refunded. It was prayed by him that :-

- (i) Where developer constructs own transmission line upto 400 kV GSS of RVPN and feed into northern region, no charges be levied. This provision may be extended to 220 kV & system also.
  - (ii) Where developer construct own pooling station upto 220 kV, 132 kV, 33 kV GSS level of RVPN, graded charges be levied,
  - or
  - (iii) Maharashtra pattern may be adopted wherein developer contributing initially towards augmentation/transmission costs to partially meet the capital costs, with the same being refunded without interest in 6 annual installments.
32. He stated that from the consideration of funding and meeting time schedule, investor can create transmission system. It is immaterial whether investment on transmission system is considered in tariff for supply of wind power or separately as transmission tariff but more important is to give above relief on account rising prices as otherwise investment will go to other States.
- 33- M/s Kalpataru has expressed that connectivity charges of Rs.2 lacs per MW for biomass power plant be made applicable to generators selling power to third party and such connectivity charge be one time only.
- 34- InWEA and Suzlon have expressed that providing interconnectivity is primarily the responsibility of STU (i.e. RVPN) and in case there are cash flow issues (for RVPN), wind developer may finance the whole or part of transmission assets and recovers the cost over 5-6 years period. They have expressed that capacity for injection of power at any bus is a function of circuit length of line, average power factor and voltage regulation limits as per IEGC and it will be possible to feed 12.5 MW and 20 MW on a 33 KV employing Dog & Panther Conductor. They requested the Commission to allow these as it would increase the viability of the projects. Shri Raghavan stated that capital cost of Rs.450 lakhs per MW for wind power plant indicated by InWEA & IWPA does not include Rs.17 lakhs per MW specified by the Commission (based on GoR policy).
- 35- IWPA has brought out that evacuation infrastructure are being developed by the investors. Considering the same, in the event of the development of evacuation infrastructure being carried out by the investor/developer, the augmentation charges of Rs.15 lacs per MW, as specified by the Commission, may be specified to be not payable.
- 36- Shri D.S. Agarwal stated that where wind power plant does not require large transmission system, some incentive must be paid.
- 37- M/s Enercon state that they have created step up 220 kV Substation and 220 kV double circuit 100 km. transmission line. The cost of construction of transmission line is Rs.40 lakhs/km and investment for step up substation is Rs.19 Crores.
- 38- Shri Sharad Maheshwari of M/s Amrit Energy Tech. Pvt. Ltd., Baran that grid connectivity charges may not be levied for biomass power plant as these are near load center and evacuation line is only upto 5-6 km.
- 39- We may state that Rs.2 lakhs/MW is the charges for connectivity with the Grid i.e. for providing at RVPN/Discom's sub-station a bay for interconnection, these will include breaker, CTs, PTs, isolators, protection and metering equipments. The charges of Rs.15 lakhs/MW is towards augmentation of transmission/distribution system to evacuation power from the receiving station. Both are one-time charges. These charges were

also specified in Government of Rajasthan's policy and have been relaxed by the Commission for biomass, solar and other than wind energy projects.

- 40- We state that InWEA, IWPA & Suzlon have indicated in their written submission that Rs.25 lakhs /MW have been included in the capital cost of the project. As per data given by M/s Enercon cost of evacuation system borne by them, will eventually be Rs.17 lakhs per MW. As such these charges have been accounted for in determination of tariff under Government policies. The refund of or non-levy of augmentation charges will have tariff implications of capital cost. However, we state that various charges payable by developer, as per Government policy for generation of electricity through non-conventional energy sources, are as under :-

(i)	Registration of application	Rs.0.5 lakh/MW
(ii)	Security deposit (Jaisalmer district)	Rs.10.0 lakhs /MW (refundable on COD)
(iii)	Connectivity Charges	Rs.2.0 lakhs/MW
(iv)	Augmentation charges	Rs.15.0 lakhs/MW
(v)	Execution of PPA	Rs.1.0 lakh/MW
(vi)	Assignment of PPA	Rs.1.0 lakh/MW

Although other ERCs have considered, some part of evacuation system as part of the project, yet above charge alongwith exclusive transmission system of the wind power plant is high. The Electricity Act 2003 mandates under Section 86 (1)(e) for promoting generation from RE by providing suitable measures for connectivity with the grid and under Section 39, the S.T.U. is supposed to ensure development of intra-state transmission system for smooth flow of electricity from generating stations to load centers. The intent of the State Government is also to encourage such development in the State. Wind power plants are in no way different from other power plants. Hence, there seems no reason to give such treatment by way of subjecting the developer of RE power plant to such a large number of charges, which other IPPs are not required to pay. Thus, the above charges are not justified.

- 41- A point has been raised as to the responsibility of RVPN to lay transmission system. The functions of RVPN, as STU vide Section 32 (2) (C) is to ensure development of an efficient, coordinated and economical system of intra-state transmission lines [and associated sub-station vide Section 2(72)] for smooth flow of electricity from a generating station to the load centre. Once such development plan is made, it can undertake transmission of electricity either itself or through transmission licensee. Transmission system planning is to be effected as per Section 4 of Grid Code (issued by RVPN with the Commission's approval). Shri Y.K. Raizada, RVPN stated that coordinated development is the responsibility of the Prasaran Nigam. The creation of transmission system for wind project will require huge cost and it is to be paid by as contribution to capital cost and/or by the consumers to STU. He stated that for evacuation of 1550 MW wind power, they will have to strengthen 400 kV Jodhpur-Merta line with additional circuit. The charges of Rs.15 lakhs per MW towards augmentation are towards these (as per the GoR's policy). We have stated in earlier order that for wind power plants because of low gestation period, it was not possible to match the commissioning of transmission system if its construction is taken after the execution of PPA. This has to be conceived and created well in advance and it can be done by associating RREC, the nodal agency for non conventional energy power plants, in the process of planning.
- 42- With this objective, we direct that Chairman & MD, RREC shall be included as member of State Power Committee and Technical Committee, constituted by RVPN (under clause 3.4 and by SPC under clause 3.2. 3 of Grid Code Part-I) and 'user' defined at Section 2 of Grid Code part-I shall include 'generating stations and transmission licensee' for the purpose of planning. RREC shall furnish data for envisaged NCE generation in the various pockets of the State under clause 4.6.1 of

Grid Code Part-1 appendix-A. These data shall be A.1.1.1 [except (ii)], A.1.1.2 & A.1.1.3 for one or cluster of such power stations. Grid Code Part-1 shall be amended accordingly. RVPN shall plan transmission system for 33KV, 132KV, 220KV and 400KV for envisaged capacity based on about 1.5 to 2 times SIL upto 220 kV voltage short length lines (i.e. 5.5 MW for 33 kV, 90 MW for 132 kV, 180 MW for 220 kV and SIL for long lines). Once an EHV system is planned by RVPN, the exclusive transmission system of WEG consisting of pooling station and transmission line upto RVPN's substation upto 30 km thereafter will be drawn by wind generator(s) and transmission system beyond this will be RVPN's responsibility. It may be constructed, operated and maintained by RVPN or prospective transmission licensee, which may include wind generator(s). In later case transmission charges as determined by the Commission as per RERC (Terms & Condition for determination of Tariff) Regulations shall be payable in addition to generation tariff by distribution licensee purchasing the wind power (to the generator or transmission licensee). Such transmission charges shall be payable by the RVPN. These charges alongwith transmission charges of RVPN's system shall be pooled to work out transmission charges for use of transmission system by distribution licensee, open access consumer, deemed licensee and other licensees. Pooled transmission charges shall be payable in case of third party sale. We feel that exclusive/internal transmission system upto 30 km can be created by developer(s) at a cost of about Rs.20 lakhs/MW (of ultimate capacity of wind farm). We do not find any justification for augmentation charges, agreement execution and agreement assignment charges, and also application fee, specially when Government also desires to promote wind power development in the State. We specify that except connectivity charges of Rs.2 lakhs per MW no augmentation and agreement execution and assignment charges will be charged by the RVPN. We recommend, GoR to reduce the amount of application fee & security deposit, in such a way so that these may not exceed Rs.25000/MW. The Commission will not consider any item at para 40 above, other than connectivity charges, as part of capital cost or operating cost for determination of tariff.

- 43- RVPN in their comments have also requested for specifying capacities of wind generation in terms of MW and criterion for investment to be made for the evacuation system exclusively for wind generation to enable RVPN to carry out advance planning. The capacity in MW is already indicated above. The criterion for investment may not be necessary with transmission system constructed, operated and maintained by generators (or company formed by them with grant of transmission licensee). Such criterion will be required only to assess techno-economic viability, where it is created by RVPN. Rajadhyaksha Committee has recommended investment in generation and transmission in the ratio of 4:2. However for infirm power, investment may be lower as system may be designed with lesser security and reliability as outage during low wind periods can be tolerated.. Further some investment will be made by generators on transmission system. Keeping these in view a rough guide may be around Rs.75 lacs per MW for transmission system (including augmentation) planned by RVPN, and this will be considered by the Commission in investment plan of RVPN.
- 44- RVPN has also stated that limits of injection of non-firm power have been prescribed for 33KV, 132KV and 220KV Sub-stations. There may be more than one sub-station on the same feeder. As such these limits be specified feeder wise and not sub-station wise. We clarify that upper limit of injection mentioned at proposed clause 111(3) is for each feeder at that voltage class sub-station. If number of such feeders catered by a sub-station or number of sub-station on the same transmission line, load catered by a transmission line exceeds its capability then higher voltage sub-station/ additional lines of same or higher voltage shall be planned by RVPN.

45- **Competitive bidding**

The Commission in its order dated 31.3.06 has specified that tariff from wind power for PPAs executed after 30.9.06 shall be effected through competitive bidding among wind energy power producers. RREC has submitted that open competitive bidding for wind energy at this point of time is not practical on account of:-

- (i) Wind energy is non-firm power and for this it is not possible for wind energy producer to enter into any kind of agreement for sale of electricity to other part except Discoms. As such there can not be fair open competitive bidding to determine rate on market basis with Discom as sole purchaser.
- (ii) Open competitive bidding has not yet been tried out in any state in this country and even at international level, open competitive bidder for wind energy has still not been tried successfully.
- (iii) On account of infirm power, investment decision has to be taken on the basis of 20 years period with back loaded tariff.
- (iv) New investors will not be able to compete with those who have already got returns for the last 10 years.
- (v) Para 6.4(iii) of tariff policy states that Central Commission will lay down guidelines for pricing non firm power, especially from NCES, to be followed in case where such procurement is not through competitive bidding. No such guidelines have been received.
- (vi) In wind power generation, developers develop the wind farm, commission the machines and thereafter transfer WTG (wind turbine generation) to individual investors having stakes varying from 0.6 to 5 MW. Investors will not be in a position to bid and developer will have no locus standee to bid on their behalf.

46- Shri Rajeeva Swarup stated that RREC feels that at this stage, in view of competitive bidding being not successful elsewhere, Rajasthan may not take lead and defer the decision to such time when mechanism of such bidding is established.

47- In respect of biomass power plants also RREC has expressed that because of very few investors and development of this sector being at a nascent stage and grappling with initial teething troubles, it would be difficult for the producers to try competitive bidding. Shri Rajeeva Swarup expressed that for biomass projects, tariff be on generalized basis and not on individual unit basis.

48- RREC has proposed PPAs for wind energy for the next 3 years (up to 2009) may be allowed to be continued on Govt. of Rajasthan's Policy of 2004 and the Commission may examine the emerging possibilities of bidding during this period and then take appropriate decision. CMD, RREC stated that in respect of attracting investors for setting up of wind based projects, state is virtually at competition with Maharashtra and Gujarat, as such, tariff determined may not be disadvantageous to developers and period on which levelised tariff is determined need be respected. He also stated that tariff for biomass projects as per GoR's policy of 1999 may be allowed till its tariff is determined.

49- InWEA and Suzlon have objected to competitive bidding and have also referred para 6.4(3) of tariff policy as has been argued by RREC. They referred to the competitive bidding attempted by U.K. under NFFO (Non Fossil Fuel Obligation), by Ireland for 1500 MW wind power under AER (Alternative Energy Requirement), by China for 1000MW of wind energy and Kerala SEB and Maharashtra Energy Development Agency during past 2-3 years and stated that efforts in India for these (& even for conventional power plants) has not succeeded while in Ireland only 400-500 MW of wind energy and in China about 50% of bidding could come up. U.K. & Ireland has replaced NFFO/AEC by ROC (Renewable Obligation Certificate). They stated that on the other side with fixed tariff regime in Germany and Spain, or cost



plus approach followed in India, market has grown up. IWPA has also expressed that competitive bidding will not be feasible stating that:-

- (i) Under market determined prices buyer would go in for purchase of power from the cheapest available source and wind being relatively expensive source as compared to conventional sources of power and as such market determined prices cannot be followed.
- (ii) In a market-determined price, it will be difficult to predict the changes in renewable cost.
- (iii) ABT mechanism provides for marginal price determination based on current (time block) frequency of the grid and wind power dependent on wind flow patterns can not be dispatched as per conditions of the grid.
- (iv) Generation from wind and other RE sources is insignificant as compared to conventional and any change in (their) generation price is unlikely to have impact on generation market.

- 50- They have stated that based on these, MERC, MPERC, KERC, TNERC, Kerala ERC and APERC have adopted cost plus approach and generalized tariff structure.
- 51- M/s CUTS have welcomed determination of tariff through competitive bidding. Shri D.S. Agarwal expressed that beyond minimum specified percentage of energy purchases, additional RE projects be promoted on competitive bidding basis.
- 52- Shri Balwant Joshi stated that under Non-Fossil Fuel Obligation (NFFO), UK Govt. had five competitive biddings for different type of RE sources. The success rate has progressively reduced whereas under NFFO (1), 61 out of 75 bidders established power plants while in NFFO (5), only 17 out of 260 bidders established the power plant and UK Govt. replaced it by ROC (Renewable Obligation Certificate) scheme. He stated that even for conventional power plants by competitive bidding has not been able to build generation capacity in India. Tariff policies emphasize on competitive bidding. However, MERC & GERC have determined the tariff of RE power projects under section 62 (1) (a). In consideration, he pleaded for not pursuing the competitive bidding route for wind and biomass projects.
- 53- Shri Dinesh Kumar, MD, AVVNL supported the concept of competitive bidding and stated that RREC should have taken steps in this direction and that if need be, Discom can prepare documentation for competitive bidding. Shri Rajeeva Swarup was of the view that in competitive bidding, RREC has no role and it can be effected by the purchaser(s).
- 54- On the submission of RREC, InWEA, Suzlon, and IWPA against competitive bidding, we state that apprehension of competitive bidding for wind power being not feasible due to this being infirm and costlier is not well founded as competitive bidding for wind power is conceived among wind power plants only. Competitive bidding could be for long term (i.e. 7 years to 10 years) basis and on vintage basis, this could take care of apprehension as investment decision based on long term perspective for new plants being not able to compete with old ones. Experience of competitive bidding in China and Ireland cannot be considered as failure.
- 55- Renewable Obligation Certificate (ROC) was made effective in UK with effect from 1.4.02. It provides for electricity suppliers (i.e. Discoms) to source specified percentage of their sales from renewable energy sources. Target for the same was at 3% for first period upto 31.3.03, at 4.3% for second period upto 31.3.05 and 4.9% for third period upto 31.3.07. The target will rise to 10.4% in 2010-11. Suppliers to demonstrate compliance with their obligation by retiring ROCs or paying the penalty of £30 per MWh (indexed annually). A ROC is created with every MWh of output from an eligible renewal energy facility and can be traded separately from the undergoing physical power. One quarter or 25% of a supplier's obligation can be achieved through submission of ROCs generation in previous period. Suppliers are to demonstrate

compliance with target by October of any given year or otherwise pay penalty for any shortfall. The penalty payments are pooled together to form the buyout fund. These funds are recycled back to supplier on a proportionate basis for every ROC, which they retired for compliance. As the market is currently short and is likely to remain so for the coming year, prices for stand alone, ROCs generated in first three obligation years are priced well above the buy out penalty. There is no single market value for ROCs. ROCs is market based mechanism and value of individual ROCs varies according to different factors including volume, liquidity, supply and demand. However, non-fossil purchasing agency operates on behalf of its clients, a biannual ROC auction. Majority of stand alone trades of first period ROCs have been in the range of £45 to £48. The average price of a ROC in last auction on 20.10.05 was £39.17 (sources- NatSource.ROC of UK.htm & ROC-House of Commons-2060116w18.htm). Thus, ROC is a market-based mechanism overtaking the competitive bidding mechanism and generators, participating in it, get price based on market.

- 56- The Commission has excluded wind power plant from application of intra-state ABT and apprehension of IWPA is unfounded. Further wind and other RES power producers being small compared to conventional power producer and Rajasthan need not to take lead is no valid argument not to attempt for fair price from wind power plants by competition. Para 6.4(ii) of tariff policy states that procurement by distribution licensee for future requirement shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within the suppliers offering energy from the same type of non-conventional sources. Thus as per policy, competitive bidding is to be attempted to the extent feasible. The reason for snag in competitive bidding can be traced from RREC's submission at Sr.No. (vi) of para 42 above. The developer of wind energy in Rajasthan are M/s Suzlon, M/s Enercon and M/s NEPC. All of them are the manufacturer as well as the supplier of wind turbine generator and its parts. After development of site and development of wind farm, the capacity of wind energy power plant established by them, is transferred in full or parts to one or more investor at cost as determined by them. After transfer, they are only involved in O&M, billing and accounting and have no other interests. Though Shri Raghvan has stated that cost have been based on one to one negotiations, but apparently, the cost is established between them and investor based on revenue stream. Thus, revenue stream by tariff become the means to fetch better price for their plant. The real cost of plant is thus not transparent and benefit of its reduction due to technological advancement is not passed on to the consumer. During hearing, it was contended that some projects have been developed on call of tenders like that of RSMML, RREC etc. but capacity established is quite small and may not bring out competitive prices as other manufacturers could not evince interest for such small business. Unless competition is generated among developers, real price will not be determined. However, in spite of advantage of competitive bidding, stage is not set for solely dependent on it. The nodal agency (i.e. RREC or the Discoms jointly) will be in better position to evolve mechanism of generating competition. For example, mechanism can be that bidding is resorted to by dividing say prospective sites of 100-200 MW capacity wind farms in two or more blocks and having competitive bids for such blocks from companies formed by developers and/or investors (with no further sub-division of site/plant permitted for specified period of 10 years or more) and they may be asked to quote for % discount in the tariff as determined by RERC for wind power plant. Thus competition will be generated among producers/ developers and tariff as offered by successful bidder may be adopted by the Commission under Section 63 of the Act and will become benchmark price for subsequent PPAs and offered for PPAs signed thereafter. In case tariff is high, all offers will be considered non-responsive and fresh bids will be invited. Another mechanism of competition can be to keep a small percentage (say 10%) of each wind energy power plant to be outside the provision of PPAs and this energy be sold by power producers at the negotiated price or mechanism similar to ROC of UK to deemed licensees /CPPs / open access consumers or to distribution licensees outside the State for whom compliance with minimum

mandatory purchase is specified. RERC may specify surcharge payable to RVPN non-compliance as say Rs.3.59 per kWh (i.e. tariff for FY08-09) to start with surcharge so realised will be considered as other income of STU. There may be other mechanisms also. We shall appreciate Discoms, in consultation with RREC, develop bid documents to be presented to the Commission by 31<sup>st</sup> March 07. Till competitive bidding materializes for substantial capacity, tariff as determined by the Commission, shall be applicable.

- 57- For competitive bidding for biomass power plant we agree that because of nascent stage, the time is not ripe for competitive bidding for such plants.

#### Parameters of tariff determination for Wind Power Plant

- 58- On perusal of tariff computation worksheet of RREC for prescribing the tariff of NES power plants in GoR policy of April 2003, October 2004 & February 2006, we find that following assumption have been made in respect of the various parameters involved therein :-

Table-7

Particulars	Policy of		
	April 2003	Oct. 2004	Feb. 2006
Capital cost Rs. in lakhs/MW	400	400	450
Evacuation charges Rs. in lakhs/MW	-	25	18.5
Total capital cost, Rs. in lacs/ MW	400	425	468.5
Life in years	20	20	20
Salvage value (%)	5	10	10
Depreciation (%)	7.92	7.5	7.5
Debt to Equity Ratio	70:30	70:30	70:30
O&M (%)	1.67%	1.67%	1.67%
Escalation in O&M (%)	5	5	5
Term of loan (Years)	9+1	9+1	9+1
Return on Equity (RoE) (%)	16	12	12
Interest Rate (%)	12.00	8.50	9.00
Capacity Utilization Factor (CUF) (%)	22.37	22.37	22.37

#### (A) Capital Cost

- 59- As discussed above, the capital cost indicated by InWEA, Suzlon and IWPA is Rs.4.25 Crores to 4.75 Crores per MW inclusive of component of Rs.25 lakhs/MW for cost of evacuation system up to pooling station and additional Rs.50 lakhs/MW for cost of evacuation beyond pooling station, if created by developers. During hearing IWPA, submitted break up of estimated cost of Rs.466.50 lakhs per MW as under :-

Table-8

Sr. No.	Particular	Rs. lakhs per MW
1-	Tower	75.00
2-	FRP Blades	62.50
3	Generator	75.00
4	Hub with associated controllers	36.75
5	Nacelle including all controllers & sensors	43.75
6	Power & control cabinets	43.75
7	Cables, hardware, safety kits etc.	20.00
8	DP structures, transformer & other associated electricals	15.00
9	Land & land development	5.00
	Gross total	376.75
10	Foundation and erection	42.75
11	External lines, substations etc.	30.00
12	Grid connectivity & evacuation charges	17.00
	Total	466.50

- 60- M/s Enercon during hearing stated that cost of power plant exclusive of augmentation is Rs.4.50 Crores per MW.
- 61- Shri Rajeeva Swarup stated that price of power plant against tenders of RSMML (in Dec.'05) and of RREC (in Jan.06) was respectively Rs.4.50 Crores per MW and Rs.4.74 Crores per MW. The Commission has found that for 7.5MW wind power plant of RSMML is Rs.4.56 Crores per MW (out of which WEG cost is Rs.3.88 Crores per MW). Transmission system has cost Rs.0.25 Crores extra.
- 62- GERC in their recent order dated 11.8.06 has considered capital cost of Rs.4.65 Crores per MW inclusive of Rs.0.30 Crores/MW towards transmission system.
- 63- Our consultants M/s CRISIL Infrastructure Advisory Services after considering capital cost of wind projects in and outside country, has recommended wind power plants cost of Rs.4.50 Crores per MW exclusive of transmission and evacuation cost.
- 64- As per annual report of FY05-06 of M/s Suzlon Energy Limited, cost of wind power generators of size 0.35 MW to 2.1 MW, inclusive of gear box, generator parts, tower, land and land rights is as under :

Table-9

Sr. No.	Particulars	FY04-05	FY05-06
(i)	Capacity sold, (MW)	507.70	980.50
(ii)	Cost (which is also the sales for the year) Crores of Rs.	1917.50	3788.46

Source : Annual Report of Suzlon Energy Ltd.

- 65- Accordingly, average cost varies from Rs.3.78 Crores/MW (FY04-05 to Rs.3.86 Crores/MW (FY05-06). This apparently does not include foundation and installation cost, which may add about 10% to cost giving cost of wind power plant as Rs.4.25 Crores per MW. WPI (all commodities) increase for the period June'05 to June'06 is 5.2% (i.e. 203.1/193.1). Accounting for increase in WPI, the capital cost for FY07-08, as per Suzlon's data, will work out about Rs.4.47 Crores/MW. However, IWPA has indicated cost of Rs.4.20 Crores/MW (exclusive of transmission system and connectivity charges). The cost of plant & CUF will also vary as per technology, i.e. synchronous machine with gear box as adopted by M/s Suzlon or variable frequency generator with investor as adopted by M/s Enercon. Taking all these factors into consideration, the Commission considers capital cost of Rs.4.22 Crores/MW, including connectivity charges of Rs.2 lakhs/MW, but exclusive of transmission system of Rs.20 lakhs/MW, for which tariff is to be determined for plants commissioned after 31.3.07.

#### (B) Capacity Utilisation Factor

- 66- InWEA & Suzlon, based on CUF in different sites in Rajasthan varying from 15.14% to 22.21%, have suggested CUF of 20%. Enercon stated that CUF was as low as 16% & was close to 19% in FY05-06 and suggested it to 20% during hearing. IWPA has suggested it as 22%. CUF adopted by other ERC's is as under :-

MPERC	22.5%
MERC	20% with deration of 5% during the life of the plant.
KERC	26.5%
TNERC	25.29% to 26.7%
GERC	23%

- 67- CUF is site specific and may vary among States and sites. Rajasthan does not have wind potential as high as that of Karnataka and Tamilnadu having dual monsoon region. Further, it may vary from year to year depending on climatic conditions and

no conclusion can be drawn on the basis of one or two years' performance. With higher hub height and better technologies, high CUF can be achieved. As per data available with the Commission, CUF as high as 23.97% has been achieved. Taking these into consideration, our consultants have suggested CUF as 22%. However as per past data, we consider CUF as 22% in Jaisalmer, Barmer & Jodhpur districts and 20% for other districts as discussed in next para with deration of 5% during 20 years life of the project (i.e. 1.25% reduction in CUF in 6<sup>th</sup>, 10<sup>th</sup>, 14<sup>th</sup> & 18<sup>th</sup>) as reasonable.

- 68- We would like to state that wind power potential, being presently, exploited mainly in Jaisalmer districts, are remote from load center, requiring long exclusive transmission line for wind projects because of low CUF (or PLF), the cost of transmission on RVPN system, which on an average is Rs.0.16 per kWh, will be around three times i.e. Rs.0.48 per kWh for wind power plants. Other sites near load centers, even with lesser CUF may be relatively economical to Discoms/consumers, as transmission cost will reduce significantly & transmission losses will also be reduced. The Commission, therefore, considered lower CUF for other districts where wind power plants will be near to load centers.

### (C) Plant Life & Depreciation

- 69- CMD, RREC suggested adopting depreciation @ 4.5% p.a. on 20 years tariff period or @ 7% p.a. on 10 year tariff period. InWEA, Suzlon, IWPA have suggested 20 years life of the plant. This has been considered by APERC & five ERCs listed above. Rate of depreciation of 4.5% has been suggested by InWEA, Suzlon & IWPA. The Commission shall consider 20 years life as per straight-line method, rate of depreciation of 4.5% for power plant, excluding the cost of land and its development. For transmission system, life shall be considered as 25 years and rate of depreciation as 3.6% p.a.
- 70- RERC (Terms & Conditions for determination of tariff) Regulations provided for Advance Against Depreciation (AAD) for conventional power station. GERC has not considered AAD requirement in view of accelerated depreciation benefit under section 80 IB of the Income Tax Act. In view of these and the fact that in case of back loaded tariff being adopted, revenue by tariff will be less than that as per cost plus approach during initial years and will be high during later years. As loan repayment will fall during initial years, so the Commission considers no logic of Advance Against Depreciation (AAD).
- 71- Section 80-IA of the Income Tax Act 1961, allows deduction in respect of profits and gains from industrial undertakings or enterprises engaged in infrastructure development, etc. Sub-section (1) & (2) of Section 80-IA read as under :
- “[(1) Where the gross total income of an assessee includes any profits and gains derived by an undertaking or an enterprise from any business referred to in sub-section (4) (such business being hereinafter referred to as the eligible business), there shall, in accordance with and subject to the provisions of this section, be allowed, in computing the total income of the assessee, a deduction of an amount equal to hundred percent of the profits and gains derived from such business for ten consecutive assessment years.]”
- “(2) The deduction specified in sub-section (1) may, at the option of the assessee, be claimed by him for any ten consecutive assessment years out of fifteen years beginning from the year in which the undertaking or the enterprise develops and begins to operate infrastructure facility or starts providing telecommunication service or develops an industrial park [or develops a special economic zone referred to in clause (iii) of sub-section (4) or generates power or commences transmission or distribution of power [or undertakes substantial renovation and modernization of the existing transmission or distribution lines] :”

Sub-clause (iv) & (v) of subsection(4) of Section 80-IA deals with power sector. Clause (iv) & (v) read as under :

- “(iv) An [undertaking] which, -  
(a) is set up in any part of India for the generation or generation and distribution of power if it begins to generate power at any time during the period beginning on 1<sup>st</sup> day of April, 1993 and ending on the 31<sup>st</sup> day of March, [2006];”
- “(v) An undertaking owned by an Indian company and set up for reconstruction or revival of a power generating plant, if –  
(a) Such Indian company is formed before the 30<sup>th</sup> day of November 2005 with majority equity participation by public Sector Companies for the purposes of enforcing the security interest of the lenders to the company owning the power generating plant and such Indian company is notified before the 31<sup>st</sup> day of December 2005 by the Central Government for this clause;  
(b) Such undertaking begins to generate or transmit or distribute power before the 31<sup>st</sup> day of March, 2007 [Now amended to 31<sup>st</sup> March 2010].”

Section 115JB of the Income Tax Act 1961, defines – Special provision for payment of tax by certain companies:

“(1) Notwithstanding anything contained in any other provision of this Act, wherein case of an assessee, being a company, the income tax, payable on the total income as computed under this Act in respect of any previous year relevant to the assessment year commencing on or after the 1<sup>st</sup> day of April 2007, is less than ten percent of its book profit, (such book profit shall be deemed to be the total income of the assessee and the tax payable by the assessee on such total income shall be the amount of income tax at the rate of ten percent)”

- 72- On the basis of above, provisions of Income Tax Act, Sub-clause (iv) of sub-section (4) of Section 80-IA provides deduction in respect of generation of power if undertaking begins to generate power at any time during the period 01.4.2003 and 31.3.2010. Thus, deduction u/s 80-IA is allowable to power producers if they commence the generation within the specified period of time, an amount equal to 100% of profits derived from such business for 10 consecutive years. However, according to the provisions of section 115JB(1), enterprise is liable for MAT, which is applicable @10% on Book Profits. The rate of depreciation for plant & machinery used by such power producers is given in Appendix-I to Income Tax Rules, 1962. Item no.(xiii) of para III, Machinery & Plant provides depreciation in respect of Renewable energy devices @ 80%. The depreciation is allowable @80% from the year in which plant started generation. Claim of depreciation is allowable from the first year, without any option of choice of years, subject to the period of acquisition of the asset (if the asset is acquired during previous year and put to use for the purpose of business for a period less than 180 days in that previous year, the depreciation shall be restricted to 50% of the normal rate, otherwise 100%). For the subsequent years depreciation shall be claimed @ 80% on written down value of the block of assets.
- 73- Present rate of Minimum Alternate Tax (MAT) is 10% plus surcharge of 10% plus Education Cess of 2% on tax and surcharge i.e. 11.22% and corporate tax at present rate is of 30% plus 10% surcharge plus 2% Education Cess i.e. 33.66%. This will be considered by the Commission for determining the tariff.

**(D) O&M Expenses**

- 74- O&M expenses considered by MPERC is 1% of capital cost, by MPERC, 1.5%, by MERC, 1.25%, by KERC, 1.5% by GERC and 1.1% by TNERC. Annual escalation in O&M is considered @ 5% per annum by GERC & KERC. It is considered @ 5% per annum after

5<sup>th</sup> year by TNERC and MPERC. MERC has considered it as 2% for fourth year and 5% per annum thereafter.

75- InWEA, Suzlon & IWPA have stated that O&M expenses is 1.0% of capital cost in Denmark, 1.2% in Germany & 1.4% in USA and that O&M expenses in India is 1.5% of cost of power plant including other installations like roads, transmission line, substations, CT-PTs, insurance, annual statutory fees and charges etc. O&M expenses are stated to be high in Rajasthan because of difficult access and sand abrasion in Rajasthan requiring regular maintenance of blades and other equipments. They have suggested O&M @ 1.5% of project cost with 5% annual escalation.

76- We state that sites of wind power plant in India and other countries, will be at remote locations and will have difficult access. Each site will have their peculiarities. In consideration of O&M expenses of wind power plant being also dependent on CUF. Considering the range of 1% to 1.5% adopted by other Commissions. We consider O&M expenses @ 1.25% with annual escalation of 5% per annum.

**(E) Debt – Equity Ratio**

77- This ratio is suggested as 70:30. Other State Electricity Regulatory Commissions (SERCs) has also adopted this ratio. RERC (Terms & Conditions for Determination of Tariff) Regulations specifies this ratio for thermal and hydro power plant. We consider the Debt Equity ratio as 70:30 for wind power plants.

**(F) Interest on Debt**

78- This considered by MPERC, MERC & KERC varies from 10.5% to 12.5%. InWEA has suggested adoption of interest rates on debt as per IREDA norms for renewables (i.e. 9% p.a.). However, Shri Raghavan pleaded for interest @ 11% p.a. CMD, RREC stated that in determining tariff for GoR's policy interest average @ 9% was considered but thereafter, it has shown rising trend and at present it may actually be 10% p.a. M/s CRISIL, our consultant, have suggested the same as 9% p.a. based on fixed interest rates at which IREDA advances loan and has suggested to consider lower rate, if investor arrange at lower rate of interest charges. GERC has recently considered it as 10.25% based on RBI rates of 7% and lending rates of banks as 10.5% to 11.5%. We will be determining common tariff for all wind power stations based on normative and generalized data. In such determination considering individual cases as suggested by CRISIL, will not be appropriate. IREDA in its letter to the Commission has indicated interest rate of 8% to 12% depending cost of project, debt-equity ratio, promoter's strength, repayment period etc. As wind power developers may avail term loan from banks and other financial institutions also, we are considering 10% per annum interest rate. In view of these, interest rate at 10.00% p.a. is considered for all power stations, irrespective of actual rate of interest charges.

**(G) Term of Loan**

79- Repayment of loan is suggested by InWEA, Suzlon IWPA & CRISIL (our consultant) as 10 years with one year's moratorium with effect from first disbursement. The same is considered with first disbursement as 6 months before COD.

**(H) Return on Equity**

80- Shri Rajeeva Swarup stated that RoE adopted to determine tariff was 12% but higher value is to be considered with interest charges showing rising trend. Return on equity considered by MPERC, MERC & KERC is 16%. GERC has considered it as 14%. InWEA has suggested RoE as 16% on the consideration that it be higher than 14% due to higher risk involved on account of variation in annual energy output. RREC also suggested RoE of 16%. The Commission had specified return on equity as RBI rate + 5%

for thermal and hydro power plants, transmission and distribution system. However, as per para 5.3 (a) of tariff policy, published by Government of India, return of equity as specified by CERC, may be adopted by SERC. Accordingly, RERC has specified 14% (post tax) for conventional thermal & hydro power plants. Hydro power plants also have risk of variation in energy output depending upon monsoon. However, RoE specified for them is also the same. As such, there is no reason to deviate from it and 14% post tax return on equity will be considered by the Commission.

(I) **Interest charges on working capital**

- 81- InWEA, Suzlon & IWPA have not considered working capital (WC) requirement and hence interest thereon. MPERC has not allowed it, MERC has considered interest on WC as part of O&M expenses of 1%. KERC has considered WC requirement as two month's billing. We state that as per RERC (tariff) regulation working capital for hydro plant consists of one month's O&M, one-year's spares and two month's receivable in above regulations. Against two month's receivable, prompt payment rebate is considered payable, which is not the case for wind power plant tariff and as such there is no justification of considering 2 month's receivable. Further for wind plants, there is practically no wind period of about 6 months and maintenance can be done during lean wind period requiring practically no stock of spares for annual maintenance like that of conventional thermal and hydro plants. In view of all these, we are not considering interest on working capital.

82- **Parameters of Tariff Determination – Biomass Power Plants**

- (i) The debt equity ratio, return on equity, interest charges, term of loan, life of plant & depreciation rates for biomass power plant cannot be different from those adopted for wind energy power plants. These, as considered for wind power plants, are considered for biomass power plants also.

(ii) **Capital Cost**

The capital cost of biomass power plants of 7.8 MW (net capacity 7.0 MW) power plants, installed and to be instated by M/s Kalpataru Power Transmission Ltd. are indicated on website as Rs.30 Crores. During hearing M/s Kalpataru Power stated it as Rs.33 Crores for Uniara Power Plant, which works out as Rs.4.23 Crores per MW. New Plants are stated to cost even higher and due to rise in steel prices and future projects, they stated may cost upto Rs.4.50 Crores/MW. Shri Sanjay Kumar stated that cost of new plants may go up to Rs.4.25 Crores per MW. Shri Sharad Maheshwari of M/s Amrit stated that cost of power plant as per DPR is Rs.30 Crores for 7.5 MW power plant which has risen to Rs.32 Crores. For next power plant, it may be around Rs.36 Crores. No documents have been furnished by any one. Capital cost considered by UPERC is Rs.3.5 Crores per MW and that by APERC, KERC, MERC and TNERC is Rs.4 Crores/MW. IREDA has indicated it to be Rs.3.25 to Rs.4.23 Crores/MW depending on capacity of 6 MW to 20 MW. M/s CRISIL have recommended it as Rs.4 Crores per MW based on the orders of various SERCs. In view of these, cost of Rs.4.00 Crores per MW is considered.

It was observed that these plants have been 7-8 kms from the GSS and are usually connected by single circuit 33 kV line with panther conductor and incidence of transmission system will be around Rs.10 lakh per MW, which alongwith connectivity charges of Rs.2 lakhs per MW will be considered.

(iii) **Plant Load Factor**

Biomass power plant can achieve high plant load actor. Biomass power plant of M/s Kalpataru at Padampur, Sriganganagar district initially had teething trouble with boiler, which has been sorted out. However, it has sold 46.7 million



units during FY05-06, i.e. attained plant load factor of 76.2%. UPERC, KERC, APERC & TNERC have adopted PLF of 60%, 75%, 80% & 80% respectively. MERC has adopted PLF of 70% in first year and 80% thereafter. In consideration to these & UPERC's PLF is for baggasse based power station, our consultant has suggested PLF of 75% power plant's performance is dependent on biomass and mustard residue is attempted only in Rajasthan in consideration to these, we consider PLF of 60% during stabilization period & 70% for one year after stabilization period and 75% thereafter. Stabilization period will be 6 months.

(iv) **Auxiliary consumption**

Norms of Auxiliary consumption for 110 MW thermal units at Kota has been considered by the Commission as 10.5%. M/s Kalpataru has considered net out put of 7.0 MW from their 7.8 MW power plant i.e. auxiliary consumption of 10%. Auxiliary consumption of M/s Chambal Powers Limited's power plant at Rangpur, as per few months data supplied by them is 10.5% to 12% with low PLF of 33 to 39%. At higher PLF, it will be less. Other ERC's have adopted auxiliary consumption norm of 8.5% to 10%. Our consultant has suggested it as 9%. Auxiliary consumption by other SERC will be less relevant for the reason stated for PLF. The Commission in consideration to these considers auxiliary consumption as 10% with 0.5% extra during stabilization period.

(v) **O&M Charges**

Norms adopted by various ERC's are as under :

UPERC	2.5%	of capital cost to be escalated	@ 4.0% p.a.
APERC	4.0%	"	@ 4.0% p.a.
Karnataka ERC	4.0%	"	@ 5.0% p.a.
Maharashtra ERC	4.0%	"	@ 5.0% p.a.
TNERC	4.5%	"	@ 5.0% p.a.

M/s Kalpataru Power stated that mustard residue has characteristic of sticking with the boiler tubes and these may require replacement after every 3-4 years, which will cost around Rs.100 lakhs and as such causing higher O&M expenses.

Though, RERC has adopted O&M expenses norms of Rs.5.10 Lakhs/MW for coal based and Rs.6.24 lakhs per MW for other thermal power stations, based on actuals, with annual escalation based on WPI less 1%. However, these norms are for 110 MW & higher capacity power plants.

It cannot be applied for small capacity biomass power plants. Biomass power plants in UP are baggasse based cogeneration plants, while those in Rajasthan are mustard residue based stand alone plants with stocker fixed boiler. As such, O&M charges @ 4% p.a. are adopted with 5% annual escalation as recommended by our consultants.

(vi) **Working Capital Requirement**

Unlike wind power plants, biomass power plants will have to have stock of biomass created at the time of crop cutting. The period of receipt of biomass is 4 months commencing normally from mid February. Thus, stock of biomass for 8 months will have to be created. The average stock of biomass will, thus, be of 4 months. Further, biomass power plants have been permitted by MNES to generate up to 30% of electricity using conventional fuel (i.e. coal) to cater to the contingency of short supply of biomass. Some of stock of coal may have to be kept by them. Besides this, their annual maintenance is to be effected after taking shutdown and for that stock of spares are to be created

well in advance. Keeping these in view, the Commission will be considering working capital requirement as 4 month fuel stock, 1 month's O&M and 1 year spare @ 1% of capital cost. No receivables are considered as the tariff is not subject to prompt payment rebate. Stock of coal will cause corresponding less stock for biomass and cost differential is considered to be covered in fuel price adjustment.

(vii) **Station Heat Rate (SHR)**

The Station Heat Rate (SHR) and Gross Calorific Value (GCV) of biomass considered by various SERCs is as under :-

Table-10

	SHR, kcal/kWh	GCV, kcal/kg.
APERC	3700	3200
KERC	3700	3200
MERC	3650	3250
TNERC	3700	3200
IREDA	4200-4600 (6.6 to 20 MW)	Varying from fuel to fuel

Kalpataru has requested for considering GCV of biomass as 3300-3500 kcal/kg. M/s Kalpataru Power stated in the hearing that GCV of biomass (mustard residue) is about 4000 kcal/kg when received but it deteriorates with storage and average ranges between 3400-3500 kcal/kg. Mr. Anand Chopra of Kalpataru Power Transmission Ltd. stated that station heat rate of biomass plant as 4000-4500 kcal/kg average consumption to be 1.3 kg/kWh. RREC in their tariff calculations has considered SHR and GCV as 5400 kcal/kWh and 4000 kcal/kWh respectively. M/s CRISIL, our consultant has suggested GCV of 3200 kcal/kg and SHR of 3700 kcal/kWh with specific fuel consumption of 1.16 kg/kWh based on other ERCs. We feel that GCV and station heat rate is dependent on biomass and steam temperature. It has been stated during the site visit that due to acidic nature of mustard residue, lower boiler temperature has to be adopted to reduce tube corrosion and hence plant has lower thermal efficiency. Norms of 110 MW and higher, capacity units will not be relevant as SHR of small power station will be high due to lower Rankine cycle efficiency as steam pressure and temperature are low. RREC has considered GCV of 4000 kcal/kg and SHR of 5400 kcal/kWh, which is apparently very high. We, therefore, consider GCV of 3400 kcal/kg and normative SHR of 4200 kcal/kWh for water-cooled biomass power plant as reasonable. During stabilization period, CERC has considered SHR to be higher by 100 kcal/kWh in their regulations. Accordingly for stabilization period SHR shall be considered 100 kcal/kWh higher.

(viii) **Air-cooled Condensers**

RREC has stated that Rajasthan has an acute shortage of water and limited ground water availability. The average consumption of water of a 7.5 MW biomass power plant is 1000 kL per day for water-cooled condensers. With air-cooled condensers, it gets reduced by 90%. However, air-cooled condensers will have implications on cost and thermal efficiency. RREC has requested the Commission to consider a higher tariff for such plants as air-cooled condensers are environmentally more sustainable. Shri Mahesh I. Mansukhani, in written submission, has also requested this and have attached a note of M/s DSCL Energy System indicating water requirement for 8 MW power plant as 1100 kL/day with water cooled system (with recycling of cooling water) and 158 kL/day with air cooled system. The implication on cost is estimated as 4.4 Crores (i.e. Rs.0.55 Crores per MW), and increase in auxiliary power consumption by 2.5% and reduction in operational efficiency by 8%. Financial

impact is indicated as increase in 6 p/kWh in fixed cost and 20 p/kWh in variable cost at fuel cost of Rs.1000 per ton. We state that air cooled condensers have not been used in the country and as such there is no database. We are in agreement with RREC that water availability is scarce in Rajasthan and water need be conserved. No cost is high for water conserved in Rajasthan. We consider it appropriate to specify separate norms for air-cooled condenser type biomass power plants and their tariff. Norms are provisionally considered based on M/s DSCL's note. Additional auxiliary consumption is to be set off against auxiliary consumption of cooling tower and reduction in operational efficiency, will also be due to increased auxiliary consumption. In consideration of these facts, the Commission is considering capital cost higher by 0.4 Crores per MW, auxiliary consumption as 12% after stabilization plus 0.5% extra (i.e.12.5%) during stabilization period and station heat rate as 4000 kcal/kWh + 6% = 4240 kcal/kWh after stabilization and with 100 kcal/kWh extra for stabilization period. These norms are subject to being reset based on actual data after such plant become operational for 2-3 years.

### Biomass Price

- 83- RREC and KPTL expressed concern over rising trend of prices of bio mass (mustard crop residue) and its transportation charges. Shri Mahesh I. Mansukhani, have indicated fuel price to be around Rs.1100 to 1500 per ton. KPTL has desired that escalation in fuel prices be allowed in addition to escalation provided in GoR's NES policy.
- 84- Shri Sharad Maheshwari stated that they considered biomass price of Rs.725 per ton in DPR, but price is now ranging between Rs.1150 to 1550 per MT (average Rs.1350 per ton). He stated that mustard crop residue is not at par with other crop residue. In the boiler of biomass plant rice husk can possibly be fired but not Julia flora. M/s Kalpataru stated that mustard price considered as Rs.45 to Rs.60 per ton at the stage of project conception has risen to Rs.90 to Rs.145 per ton.
- 85- The Commission had visited biomass-based projects of M/s Chambal Power limited at Rangpura and of M/s KPTL at Uniara. M/s Chambal Power Limited supplied following breakup of current prices :-

Table-11

Sr. No.	Particulars	Cost
(i)	Basic price	Rs.700 per MT
(ii)	Dozzer Exp.	Rs.89 per MT
(iii)	Feeding contract	Rs.75 per MT
(iv)	Tarpaulin covering, cost	Rs.31 per MT
(V)	Foreign particles (25%)	Rs.175 per MT
(vi)	Biomass yard lease sent	Rs.9 per MT
	Total	Rs.1079 per MT

- 86- It also transpired that other buyers, mainly brick kiln operators within/outside the State have distorted the market and escalated the fuel price. Another reason of high cost is transportation cost, which is about Rs.75 per metric ton. It was also learnt that power plant operation effects deductions for foreign particles. Further, biomass lease rent is part of O&M expenses. The RREC has considered biomass cost on COD as Rs.941.44 per MT in determining tariff of Rs.3.32 per kWh for first year (i.e. 04-05). The escalation in fuel cost considered is 5% p.a. i.e. fuel cost so determined for FY 05-06 is Rs.988.51 per MT and for FY 06-07 is Rs.1037.94 MT in their tariff of respectively of Rs.3.39 per kWh and Rs.3.45 per kWh for these years. We observe that price of mustard crop residue vary very widely, as it is dependent on local conditions, month of biomass sale and proximity with other prospective buyer. Our consultant, based on other SERC's orders,

have suggested adopting rate of Rs.1000 per MT subject to truing up on yearly basis on the availability of actual price. Considering the rate as per RREC's calculations being not much different compared to the landed cost at Uniara and Kota, the Commission does not consider adopting the rate on provisional basis. In view of the above analysis, the Commission considers the rate of Rs.1050 per MT for FY06-07. As regards, escalation in fuel price, we observe that presently there is no index to which it can be related. As biomass is a non-conventional fuel and its cost has to be less than that of coal of equivalent GCV, otherwise biomass developer will switchover to coal, its cost can be linked to coal prices for fuel component, to WPI for labour component and HSD for transportation component. Further, policy permits utilization of coal upto 30%, though this is not utilized at present at any of the power station. In view of the fact that 5% escalation has already been considered, escalation in fuel price cannot be considered in addition to escalation, provided in tariff as per NES policy. Escalation in biomass price shall be based on index as under with weighted pit head price of coal and HSD, received at Kota Thermal Power Station.

$$P_n = P_o \times a \times (WPI_n/WPI_o) + b \times P_{cn}/P_{co} + (c \times P_{dn}/P_{do})$$

Where  $P_n$  = Price per ton of biomass for the year nth to be considered  
for tariff determination

$P_o$  = Rs.1050 per ton

$a$  = factor representing labour cost

$b$  = factor representing fuel cost

$c$  = factor representing transportation cost

$P_{cn}$  = weighted average pit head price of coal received at Kota  
Thermal Power Station (KTPS) for nth year in Rs./MT

$P_{dn}$  = weighted average price of HSD, received at KTPS for nth Year in  
Rs./Ltr.

$P_{co}$  = weighted average pit head price of coal received at KTPS in  
Rs./MT for FY06-07

$P_{do}$  = weighted average price of HSD, received at Kota in Rs./Ltr. for  
FY06-07

$WPI_n$  = Wholesale Price Index for the month of April of nth year

$WPI_o$  = Wholesale Price Index for the month of April of FY06-07

Where  $a$ ,  $b$  &  $c$  will be specified by the Commission from time to time for first 2 years these will be 0.2, 0.6 & 0.2 respectively.

87- As and when, coal is used, upto 30% of consumption may be considered by applying fuel cost adjustment with price taken as audited and verified cost of coal and other parameters defined in this order.

88- The Commission shall specify formats in which fuel receipt and stock account be maintained and got audited by biomass generators. The information will be supplied quarterly to RREC and the Commission to generate database on which subsequent review of fuel cost can be made.

### **Tariff Philosophy**

89- InWEA & Suzlon have stated that though tariff can be based on :

- (i) Cost plus approach or avoided cost method or short run and/or long run marginal cost or competitive bidding.
- (ii) Single part or two-part tariff, and project specific or generalized tariff,

- 90- They have stated that so far State Government/Regulatory Commissions have adopted generalized back loaded tariff based on cash flow or levelised tariff determined based on cost plus approach.
- 91- The Commission do not consider it feasible to determine project specific tariff because of a large number of such small capacity wind plants. The Commission will determine backloaded tariff corresponding to levelised tariff for wind power plants based on cost plus principle with escalated rate for first 10 years to be higher than annual O&M escalation. The Commission will check feasibility of adopting prevalent tariff as per GoR policy for the specified period. In respect of biomass-based power plants, the Commission will specify two-part tariff consisting of fixed and variable components.

#### **Area Reservation**

- 92- KPTL has stated that in respect of each biomass based power plant as per clause 8 (iv) of GoR policy 1999, no power station can be established within 50 km radius. This is to protect biomass availability to each power plant. They stated that RREC is permitting bio mass based projects just outside 50 km radius from their projects already existing at Padampur and another power plant coming up at Unara which is against the policy. The prices of biomass have steeply risen because of their export to nearby States for use in brick kilns. Permission of projects just outside 50 km radius, with overlapping areas (between two power plants) will lead to competition and cost of fuel will rise, affecting the viability of projects adversely. In view of these clear radial distance of 100 km between two biomass-based plants was advocated. Shri Sharad Maheshwari expressed that 50 km. radius is adequate but out flow which is going up to 50% need be checked up. We state that reservation of radial distance and its enforcement, is within State Government's perview. However, with a view to avoiding unhealthy competition, steep hike in the biomass resulting in inadequate supply to feed plants in closer proximity, it is advised that the State Government may suitably revise radial distance between two plants. The State Government may take appropriate action in this matter.

#### **Term of PPA and provisions of PPA of Biomass Projects**

- 92- Kalpataru have requested for retaining 20 years period for PPA for bio mass project and honouring the contract for wheeling charges and banking. We find that under GoR policy of 1999 & 2000, though PPA's term is 20 years to be extended by 5 or 10 years with mutual consent as provided in PPA executed for wind power plants, the tariff specified is only for 10 years and is negotiable thereafter. The period of agreement is, thus, of no significance beyond 10 years, so far as tariff is concerned. PPAs executed before the enactment of the Electricity Act-2003 are protected under section 185 (2) (a) to the extent not inconsistent with the provisions of the Act. As per provision of Section 62 (1) (a), 86 (1) (a) & 42 (2) of Act, tariff & wheeling charges cannot be prescribed by GoR. In view of this inconsistency, these are not protected under the above section. However, directive to the Commission issued before the enactment of the Act, (i.e. 10.6.03), are saved under section 185 (2)(e). The directive of wheeling charges of 2% issued on 12.11.99 will be binding in respect of six PPAs executed under 1999 policy. It is observed that one plant registered under 1999 policy, have been commissioned in FY2003-04, and another in FY05-06 and the rest will be commissioned in FY06-07. In view of investment decision having been taken as per GoR policies, the Commission will not interfere with tariff and wheeling charges for these PPAs. For other PPAs, the Commission will determine the tariff as per this order. Wheeling charges shall be as per the Commission's order from time to time.

## Banking

- 93- As regards banking of energy, the same is not consistent with Act as the Commission can regulate power purchase and procurement process of distribution licensee under section 86(1)(b). This Section is attracted by the provisions of banking as and when electricity is injected and banked, and as & when banked energy is drawn. As such, banking of electricity shall be governed by the provisions of the Commission's order.
- 94- The Commission in its order dated 31.03.06 have specified banking on quarterly basis instead of annual basis. InWEA and Suzlon has stated that wind energy projects for 'Captive' and 'third party sale' has been established based on HT tariff and wheeling & banking provision of GoR policy. Any change will affect economics of their viability. They urged to maintain statusquo of wheeling, transmission charges and banking provision for a period of 10 to 12 years period for existing projects. They also stated that since bulk of the energy generation in wind energy is available in the first and second quarters of the financial year, it may not be feasible to absorb the same in the same quarter and have requested that for new projects, the commission may consider six monthly settlement mechanism. Shri Rajeeva Swarup, CMD, RREC stated that wheeling charges as per the Commission's order works out more than 10% and therefore, the same be continued as per GoR's policy. He referred to wheeling charges specified in other State and expressed the view that in those states too, wheeling charges may be higher but still the Commissions have specified the same ranging from 2%, 4% to 12.5% to promote RE power generation. He prayed for banking on six monthly basis in view of peak agricultural season in December to February. Shri Dinesh Kumar, MD, AVVNL expressed the view that quarterly banking is in order and for effecting any change, RREC should give data of wind generation on quarterly basis. He stated that when wind generation is at peak, 20% to 25% of Discom's load is transferred to wind generation and higher cost of wind energy and transmission losses will be passed on to the Discoms and ultimately, to the consumers. This and voltage fluctuation associated with such generation will create problems to the consumers also and as such, share of wind generation be reduced. Shri Singhvi of Jodhpur Discom also desired reduction in power purchase requirement, stating 2% to be high. We state that the aspect of wheeling charges & banking has already been discussed. In majority of cases, wind and bioenergy power plants are supplying to distribution licensees and as such, presently banking & wheeling is not affecting the viability of the project. It is a security mechanism in case of default in payment. For wind energy producers already supplying power for captive use or to third party, the existing provisions of wheeling charges, for the PPAs executed under GOR policies will continue. However, Commission will permit such Genco to opt for wheeling charges as per GoR policy or wheeling charges (i.e. transmission and distribution charges with their losses) as per the Commission's order. As regards banking, the Commission is of the firm view that utilization of banked energy during Dec., Jan. and Feb., i.e. peak rabi session, will not be in the interest of consumers, as for supply of banked energy, Discom will have to purchase energy at very high rates. As per data furnished by RSMMML and also by three Discoms in respect of determination of surcharge) wind energy available during first and second quarter of financial years is about 71% of the total. Considering peak generation from wind energy projects being during first and second quarter of financial year, the Commission reviews the provision of banking and specify it to be on six monthly basis i.e. April to September and October to March for wind power plants. Biomass based projects are not dependent on nature and can regulate their generation as per sale to third party. No biomass based project have so far effected any sale to third party. We, therefore, specify monthly banking for them.
- 95- Shri P.N. Bhandari, advocate has referred to the Commission's observation that billing provisions of wheeling and banking agreement in respect of billing is faulty and because of its distorted interpretation of accounting wheeled energy first and then applying the provisions of minimum billing, substantial quantum of wheeled units goes

to the Discom free of cost. He has stated that this was never the intent of the Govt. and will go against provisions of wheeling & banking in GoR policy. He proposed a clause to provide solution to this problem as well as to prevent exploitation. The proposed clause broadly provides for adjustment of electrical energy first towards minimum charges and then wheeled and banked energy is to be adjusted. It appears that Shri P.N. Bhandari was referring to the Commission's order dated 25.7.06 in case of M/s Balakrishna Industries, Bhiwandi v/s Jaipur Vidyut Vitran Nigam Ltd., wherein the Commission has held that clause 7 of wheeling and banking agreement is faulty but it has not been quashed (as it would have affected billing in other cases) and has held that generator as owner of generated energy will have option to declare on or before meter reading the energy to be banked and /or supplied out of the quantum of energy generated during the month plus banked up to previous month. We state that Genco can supply to one or more captive units and/or consumers under third party sale. In that case it is for generator to declare as to how much energy (generated plus banked) is to be supplied to each unit or consumer. This cannot be accomplished by clause as provided by Shri Bhandari. Further, where available energy (i.e. generated and wheeled plus banked) is much above minimum billing, clause proposed will not operate correctly as consumption (equivalent to minimum billing under HT industrial Tariff) will be first considered against supply of energy by Discom, thereafter wheeled & banked energy will be adjusted and then balance, if any, is to be considered towards billing under HT industrial tariff. In our formulation of exercising option, there is apprehension of distorted billing, if option is not exercised timely or not received timely. We clarify that where option is not exercised/received on or before the meter reading date, such option exercised previously at any time shall be considered as applicable for the month. We further clarify that billing under HT industrial tariff shall be for the energy consumption equal to either recorded consumption less available energy (i.e. wheeled plus banked) or energy equivalent to minimum billing, whichever is higher, and balance of available energy will be banked.

96- **Energy drawl during start up and shut down**

The Commission has specified that generating stations supplying entire generation to Discom shall be permitted to adjust energy drawn during startup and shut down (during current month) against their generation during the current month or next month. M/s Kalpataru has desired its application from COD and applicability of such adjustment during scheduled maintenance and forced outage. We state that shut down is a general term and it covers scheduled annual maintenance as well as other maintenances shutdown during the year, including forced outage. This shall apply prospectively and not retrospectively, as the Commission's order will have prospective effect.

97- **kVARh Tariff**

It was submitted by petitioners that Discoms have made arbitrary deductions towards reactive drawl upto 20% of billed amount of wind power generator. We do find any justification for such deduction. No such deductions need be made and that already made, need be refunded within one month. Requisite meters need be installed. Till such meters are installed, net reactive energy (kVARh) drawl be billed at the tariff specified.

98- M/s Kalpataru has referred to clause 3.1.7 of PPA, which states maintaining 0.8 lagging power factor, and has stated that provision of 0.9 power factor goes against PPA. We agree with their observation and specify that words "unless specified otherwise in PPA" will be added after '1.0' in 2<sup>nd</sup> line of clause 112 (b) of the draft Regulations.

- 99- Shri Vinayak Pandey of M/s CUTS have stated that even though there is not much potential of hydro power generation in Rajasthan, Discoms should be encouraged to bid for procuring hydro power from other states like; Himachal Pradesh, through open access and Commission may specify criterion of minimum procurement of hydel energy. We appreciate his suggestion and are of the view that such a policy will enable utilization of vast potential of hydro energy. In another petition by RPPC, it is observed that hydro thermal ratio in respect of Rajasthan is adverse compared to Northern region. However, hydro plants upto 25 MW only is covered as renewal energy sources and there will practically be no possibility of bidding for such a small capacity plant and transmission of their energy to Rajasthan will be costly. As such, when RPPC/Discoms calls for competitive bids, they need consider reserving a part thereof for hydro energy for long/short term procurement either through competitive bidding or otherwise.

#### **General**

- 100- Jodhpur VVNL has stated that as availability from NCES is not firm and cannot be forecasted, the Commission may relax the bidding limit for purchase from these sources. They have stated that as energy from NCES will be costlier than average pooled rate from conventional energy sources, the Commission may advise GoR to compensate the difference. We state that by section 86 (1) (e), legislators have intended to promote NCES power generation, even though it is costly. Meeting the minimum requirement as specified at this section will not attract section 65 of the Act regarding the subsidy and its impact is to be reflected to consumers. The Commission has, accordingly, considered impact on retail tariff while specifying such percentage.

#### **Regulations**

- 101- Shri Raghavan stated that plant load factor below 25% specified in the definition of non-firm power is not called for and may be deleted as dependence on nature clearly defines the infirm power. We agree with his suggestion and words "and having plant load factor below 25%" shall be deleted in clause 107 (3) of the regulation.
- 102- Shri Raghavan stated that provisions of clause 109 (1) & (2) are not consistent. As per former wind power plant tariff is for 20 operation years, while as per later it is for 10 years. Shri Rajeeva Swarup, CMD, RREC also said that in clause 109 (1), duration of PPA may be protected. He stated that wind power plants, e.g. 100 MW wind farm at Phalodi, may not be commissioned within 6 months of 30.9.06. As such the Commission may consider date of execution of PPA only for application of policy. He stated that at the time of approval of the project, developer makes a deposit of Rs.10 lakhs per MW and nodal agency specify time of completion of the project. In case of failure to commissioning within the specified time, approval is terminated and land allotment is cancelled. Time period can be extended with payment of liquidated damages. We clarify that this mix up has been due to GoR policy of 1999 & 2000 & 2003 specifying 10 years tariff, while of later policy specifying 20 years tariff. Table-1 too will require recasting, as tariff under 1999 & 2000 policies is for 10 operational years and not on financial year basis as has been the case for later policies. In view of foregoing, we state that clause 109 (c) is regarding tariff only and it shall be corrected as under :-

"109(1) The tariff for supply of electricity to the distribution licensee by renewable energy sources power plants, for which PPAs have been executed under GoR policy of 1999 & 2000 and power plant has been commissioned or shall be commissioned by 31.3.07, shall be as under for a period of 10 years from the date of signing of PPAs beyond which , tariff shall be as specified by the Commission.



Table-12

Sr. No.	Generation during	Tariff in Rs. Per kWh under GoR policy of	
		11.3.99 (Wind & biomass)	4.2.2000 (for wind power plant only)
1-	FY98-99	2.7500	-
2-	FY99-00	2.8875	-
3-	FY00-01	3.0319	3.0300
4-	FY01-02	3.1835	3.1815
5-	FY02-03	3.3426	3.3406
6-	FY03-04	3.5098	3.5076
7-	FY04-05	3.6853	3.6830
8-	FY05-06	3.8695	3.8671
9-	FY06-07	4.0630	4.0605
10-	FY07-08	4.2662	4.2635
11-	FY08-09	4.4795	4.4767
12-	FY09-10	4.7034	4.7005
13-	FY10-11	4.9386	4.9356
14-	FY11-12	5.1855	5.1823
15-	FY12-13	5.4448	5.4414
16-	FY13-14	5.7171	5.7135
15-	FY14-15 and onwards	-	-

109 (2) The tariff for supply of electricity to the distribution licensee by renewable energy sources power plants other than those covered by sub clause (1) and which are commissioned upto 31.3.07 under GoR policies of 2003 & 2004 (original or revised) shall be as under:-

Table-13

Sr. No.	Renewable generation during	Tariff in (Rs. per kWh)			
		30.4.03	25.10.04	25.10.04	25.10.04
		(wind)	(wind)	(biomass)	(wind) (Amended on 24.2.06)
1	FY2004	3.3200	-	-	-
2	FY2005	3.3864	2.91	3.32	-
3	FY2006	3.4528	2.96	3.39	3.25
4	FY2007	3.5192	3.01	3.45	3.31
5	FY2008	3.5856	3.06	3.52	3.37
6	FY2009	3.6520	3.11	3.59	3.43
7	FY2010	3.7184	3.16	3.65	3.49
8	FY2011	3.7848	3.21	3.72	3.55
9	FY2012	3.8512	3.26	3.78	3.61
10	FY2013	3.9176	3.31	3.85	3.67
11	FY2014	3.9200	3.36	3.92	3.73
12	FY2015	3.9200	3.36	3.92	3.79
13	FY2016	3.9200	3.36	3.92	3.79
14	FY2017	3.9200	3.36	3.92	3.79
15	FY2018	3.9200	3.36	3.92	3.79
16	FY2019	3.9200	3.36	3.92	3.79
17	FY2020	3.9200	3.36	3.92	3.79
18	FY2021	3.9200	3.36	3.92	3.79
19	FY2022	3.9200	3.36	3.92	3.79
20	FY2023	3.9200	3.36	3.92	3.79
21	FY2024	3.9200	3.36	3.92	3.79

109 (3). After first ten operational years, a renewable energy sources power station shall have option to terminate PPA and supply energy generated to open access consumer, captive power station or other licensee or trader within or outside the State."

- 103- Shri Raghavan stated that clause 110 regarding competitive bidding will require review in view of submission made by him. He stated that data of 31.12.06 mentioned in clause 110 first para and 10 MW mentioned in 110 (3) does not appear to be correct. In view of foregoing discussions, clause 110 first para shall be replaced by the following and existing subclause shall be renumbered as 5 & 6.

"110 (1). The tariff for all wind & biomass based power plants, whose tariff is not fixed by the competitive bidding and power plants are commissioned after 31.3.07 shall be determined by the Commission for each tariff period, as specified at clause 12 and tariff so fixed shall be applicable for the power plants, commissioned during the tariff period."

"110 (2). The performance parameters for determination of tariff of wind power plant shall be as under for the tariff period upto 31.3.09 :-

- (a) Return on equity 14% post tax.
- (b) Interest charges 10.0% p.a. payable quarterly with repayment period of 10 years and moratorium period of one year from first drawl considered six months before Commercial Operation Date (COD).
- (c) (i) Life of the power plant 20 years.  
(ii) Life of transmission system 25 years.
- (d) The rate depreciation shall be as under :-  
(i) Power plant 4.5% p.a.  
(ii) Transmission system 3.6% p.a.
- (e) Operation and maintenance expenses shall be considered as under :  
(i) Wind power plant 1.25% of capital cost  
(ii) Transmission system 3.0% of capital cost
- (f) Escalation in O&M expenses @ 5% p.a.
- (g) Income tax shall be considered as per prevalent laws.
- (h) Capital cost of project shall be Rs.442 lakhs/MW towards power plant, out of which Rs.2 lakhs per MW is for connectivity charges and Rs.20 lakhs/MW towards exclusive transmission system.
- (i) Debt equity ratio shall be 70:30.
- (j) Plant load factor/capacity utilization factor (CUF) 22% for wind power plant in Barmer, Jaisalmer & Jodhpur district and 20% in other districts. Deration in plant load factor/capacity utilization factor shall be 1.25% of CUF from 6<sup>th</sup>, 10<sup>th</sup>, 14<sup>th</sup> & 18<sup>th</sup> year.
- (k) Tariff so worked out shall levelised for twenty years. First year tariff shall be applicable from the commercial operations date to the end of the financial year.

"110(3). The performance parameters for the determination of tariff for all biomass based power plants for the first tariff period upto 31.3.09 shall be as under :-

- (a) Performance parameters to determine fixed charges shall be as per clause 110 (2) with following changes :-  
Capital cost - Rs.412 lakhs/MW towards water cooled condenser power plant (including connectivity charges of Rs.2 lakhs per MW & Rs.10 lakhs towards transmission system). For air-cooled condenser additional capital cost will be Rs.40 lakhs/MW.  
(i) Debt equity ratio 70:30.  
(ii) Annual operation and maintenance expenses @ 4% of capital cost.  
(iii) Working capital requirement (for fixed charges) consists of:-  
(a) one month's O&M charges and

- (b) annual maintenance spares at 1% of capital cost with annual escalation of 5%.
- (v) Plant load factor - 60% during stabilization, 70% during one year after stabilization & 75% thereafter.
- (vi) Auxiliary consumption – 10%; 0.5% extra during stabilization period and 2% extra for air-cooled condensers.
- (b) Fixed cost of tariff shall be determined as stated at clause 110 (2)(k).
- (c) Base variable cost of first year tariff shall be determined based on :
  - (i) Station heat rate of 4200 kcal/kWh extra 100 kcal/kWh during stabilization period. Extra 240 kcal/kWh for water cooled condenser.
  - (ii) GCV of biomass 3400 kcal/kWh.
  - (iii) Auxiliary consumption as specified above.
  - (iv) Biomass price as Rs.1050 Per MT during first year.
  - (v) Working capital requirement for variable charges shall consist of cost of biomass stock of four months.
- (d) Interest charges on working capital shall be allowed as per clause 24.
- (e) Base biomass price shall be applicable for FY06-07 and shall be increased by the ratio of the following indexes for the current year and that for FY06-07. Variable cost applicable for the year shall be determined as per above parameters, and biomass price so determined.

$$P_n = P_o \times a \times (WPI_n/WPI_o) + b P_{cn}/P_{co} + (c \times P_{dn}/P_{do})$$

Where  $P_n$  = Price per ton of biomass for the nth year to be considered for tariff determination

$P_o$  = Rs.1050 per ton

$a$  = factor representing labour cost

$b$  = factor representing fuel cost

$c$  = factor representing transportation cost

$P_{cn}$  = weighted average pit head price of coal received at Kota for nth year.

$P_{dn}$  = weighted average price of HSD at Kota for nth Year.

$P_{co}$  = weighted average price of coal at Kota for FY06-07.

$P_{do}$  = weighted average price of HSD at Kota for FY06-07.

$WPI_n$  = Whole sale price index for the month of April of nth year

$WPI_o$  = Wholesale price index for month of April'07.

Where  $a$ ,  $b$  &  $c$  will be specified by the Commission from time to time for first 2 years these will be 0.2, 0.6 & 0.2 respectively.

- (f) Where due to shortage of fuel, coal is utilized for generation of electricity, audited and verified cost of coal will be considered, for the variable cost of electricity so generated subject to fuel cost adjustment.
- 104- (i) The first para of renumbered clause 110 (4) shall be as under:  
 "The purchase of power as per clause 108 shall be effected by tariff as determined by this clause or that determined by competitive bidding, whichever is applicable".

Note :- The distribution licensee shall endeavour to effect power procurement upto 25% of the additional requirement through competitive bidding based on bidding documents prepared in consultation with nodal agency and approved by the Commission.

- (ii) The renumbered clause 110 (5) shall be replaced by the following :-  
 "(5) The Commission may effect changes in parameters and methodology of tariff determination based on guidelines in this respect prescribed by the Central Commission".

- (iii) In the renumbered clause 110 (6), "Words "having potential .....10 MW" shall be deleted."
- 105- Shri Rajeeva Swarup requested for changes in clause 107 (2) to define RREC as nodal agency. This is agreed.
- 106- During the hearing, treatment to be given to carbon credit under clean development mechanism, while determining tariff also came up. Shri Raghavan stated that carbon credit depends on type of contract for the same and contract may have provisions of payment of penalty. Shri Chintan Shah of Synergy Global & CMD consultant stated that RSMML is already registered for availing carbon credit. He stated that there can be two types of contract. One type is "take or pay" contract in which carbon credit may range from \$4 to \$5 per credit and other are firm contracts with penalty for non-delivery. In such contracts, credit shall be high and may range \$10to \$11 per credit. For availing credit execution of agreement in standard EPRA format is required. Besides this, for availing credit application-processing fee and consultation charges may be of the order of Rs.12 lakhs per case, which will be forfeited, if application is rejected. On account of this, small producer may not endeavour to avail such credit. Credit also depends on type of plant and equivalent CO<sub>2</sub> replacement. One MW power plant may earn upto 1500 credit. He stated that Maharashtra ERC has, therefore, not considered sharing of carbon credit for the first year. As per news report, M/s Kalpataru's biomass power plant at Padampur shall sale at \$5 per CER and will get roughly Rs.1 crore per year of CDM credit. As per press release, M/s IIEC, Netherland has signed carbon emission purchase agreement from M/s Enercon's wind farm of 75 MW capacity in Rajasthan and Karnataka. As project finance is based on revenue stream from tariff, so a part of CDM credit, having became due on account of high cost of wind/biomass power been borne by Discoms, need be shared between Discom and generator. GERC has specified for sharing it between distribution licensee in the ratio of 25:75. The Commission decides that the sharing of CDM credit as 25:75 from FY07-08 onwards. The appropriate clause will be added.
- 107- Shri Dinesh Kumar of AVVNL expressed that tariff fixation is within the purview of the Commission and be determined on time bound manner by the Commission. He stated that existing tariff has inherent error as it incentivise the delay (as project commissioned later, get better revenue stream). It is observed that levelised tariff for project commissioned in financial year is about 4 paisa/kWh higher than that commissioned in previous year. This increase to some extent cover escalation in O&M charges but main contribution is towards enhancement in capital cost. As the Commission will be determining tariff every control period valid for projects commissioned during control period, so escalation in capital cost will not be appropriate and the Commission will specify tariff for 1<sup>st</sup> to 20<sup>th</sup> year, with 1<sup>st</sup> year taken as C.O.D. of the power station so that delay does not incentivise the generator.
- 108-- Based on the tariff parameters specified above, the commission, after notifying its Regulations incorporating the provisions as above, shall separately determine the tariff for wind energy power plants and biomass (mustard residue) based power plants under Section 62 of the Act for the plants, which shall be commissioned after 31.3.07.

[K.L. Vyas]  
Member [T]

[S.M. Dharendra]  
Member [F]

[Shanti Prasad]  
Chairman