

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Coram:

Shri Gireesh B. Pradhan, Chairperson

Shri M. Deena Dayalan, Member

Shri A.K.Singhal, Member

Date: 18.03.2014

In the matter of:

Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) (First Amendment) Regulations, 2014

Statement of Reasons

1. Background

- 1.1. The Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012, (hereinafter referred to as “the RE Tariff Regulations-2012”) provide for terms and conditions and the procedure for determination of tariff of various renewable energy technologies inter-alia biomass based rankine cycle power plants.
- 1.2. In accordance with Regulation 8 of the RE Tariff Regulations- 2012, the Commission issued an Order on determination of generic levellised generation tariff for the above mentioned categories of RE generating stations. (Petition No. 35/2012 (suo-motu) dated 27th march, 2012. While dealing with the comments received from the various stakeholders regarding biomass sector, in the above referred Order the Commission observed as under:

“Based on the suggestions received from the projects developers, Industry associations representing the biomass sector and Ministry of New and Renewable Energy (MNRE), the Commission has decided to constitute a Committee which will visit existing plants and conduct a detailed study on the performance/viability of such plants operating in the country including the prevailing biomass prices.”

- 1.3. Accordingly, the CERC constituted a Committee on 11th October, 2012 under the Chairmanship of the Secretary, CERC to undertake a detailed Study on the

“Performance/Viability of Biomass based plants operating in the Country including the prevailing biomass prices”.

- 1.4. The Committee deliberated and collected information and data from various stakeholders and also visited sites of power developers to understand the issues at stake in different operation of the biomass based power plants.
- 1.5. After detailed examination, the Committee felt that the challenges being faced by the biomass plants primarily stem out of fuel related issues, viz.:- lack of availability of surplus biomass, poor quality of biomass fuel, inadequate fuel collection, distribution & supply mechanism, competitive buyers of biomass and price rise, resulting into usage of waste biomass and lower plant load factor. After extensive deliberations, the Committee finalized its report and submitted to the Commission on 16th July, 2013.
- 1.6. The Committee recommended following normative parameters suggested by the Committee for the consideration of the Commission for determination of generic tariff:
 - i. Station Heat Rate (SHR):
 - a. 4200 Kcal/kWh for station using travelling grate boilers; and
 - b. 4125 kcal/kWh for stations using AFBC boilers
 - ii. Gross Calorific Value (GCV): 3100 kcal/kg
 - iii. O&M expenses: Rs. 40 Lakh/MW
 - iv. Auxiliary Consumption:
 - a. 10% with water cooled condenser, and
 - b. 12 % for air cooled condenser
 - v. Capital Cost (excluding evacuation cost and cost of water cooled condenser considered):
 - a. For project with water cooled condenser: Rs. 540 Lakh/MW
 - b. For project with air cooled condenser: Rs. 580 lakh /MW
 - c. For rice straw based project: Rs. 630 lakh/ MW
 - vi. Biomass Price: to be decided annually by a committee to be formed at State level representing State Commission, Nodal Agency, Government.
- 1.7. Based on the recommendation of the Committee, in exercise of the mandate in Section 61 read with Section 178 (2) (s) of the Electricity Act, 2003 (36 of 2003), the Central Commission issued draft Regulations on Central Electricity Regulatory Commission (Terms and conditions

for Tariff Determination for Renewable Energy Sources) (first amendment) Regulations, 2013 along with an explanatory memorandum. The Commission invited comments/suggestions/objections Last date of submission of comments/suggestions was 31st December, 2013. The list of stakeholders submitted their comments in writing is enclosed as **Annexure-I.**

1.8. Subsequently, public hearing was held on 6th February, 2014 to hear comments/suggestions/objections of all the stakeholders, if any. The list of participants in the public hearing held on 6th February, 2014 is enclosed as **Annexure-II.**

2. Consideration of the views of the stakeholders and analysis and findings of the Commission on important issues

2.1. The Commission considered the comments of the stakeholders on the draft regulations, views of the participants in the public hearing as well as their written submissions received during and after the public hearing. The regulations have been finalized after detailed analysis and due consideration of the various issues raised. The analysis of the important issues and findings of the Commission thereon are discussed in the subsequent paragraphs. Other comments of the stakeholders and observations thereon are enclosed as **Annexure-III.**

3. Amendment of Regulation 34 of Principal Regulations.-

Proposal in draft Regulations:

Regulation 34 of the Principal Regulations shall be substituted as under:

“The normative capital cost for the biomass power projects based on Rankine cycle shall be as under:

- a. ₹ 540 Lakh/MW for project (other than rice straw based project) with water cooled condenser;
- b. ₹ 580 Lakh/MW for Project (other than rice straw based project) with air cooled condenser;
- c. ₹ 630 Lakh/MW for rice straw based project with air cooled condenser.

Above capital cost shall be for the FY 2013-14 and shall be linked to indexation formula as outlined under Regulation 35.

Comments received:

It is suggested to include Juliflora based power plants in the category of rice straw based power plant as such plants are also required huge investment in fuel processing like: cutters, grabbers, chippers etc. It is further suggested that the cost of air cooled plant be fixed at ₹ 600 Lakh/MW, instead of ₹ 580 Lakh/MW, as represented by IBPA based on such plants establishing last 3 to 5 years. **(RBPDA)**

It is suggested that the cost of water cooled plant be fixed at ₹ 580 Lakh/MW, instead of ₹ 540 Lakh/MW. **(OGPL)**

It is stated that the capital cost of Rice Straw Project with Water Cooled Condenser not specified. The same needs to be specified. **(GPEP)**

It is suggested that the Commission may consider Capital Cost of Rs.590 Lakh/MW for water cooled condenser project and ₹ 630 Lakh/MW for air cooled condenser project. **(SWGEL, MPBEDA)**

Proposed capital cost for project (other than rice straw based project) with water cooled condenser is on the lower side. Capital Cost has gone up due to steep increase in the prices of steel, cement, equipments and transportation. Construction of Power Evacuation System for project located in remote area is high. Considering the same it is suggested that the capital cost should be fixed at ₹ 600 Lakh/MW. **(CBEDA)**

It is submitted that the capital cost of our plant is around ₹ 884.76 Lakh/ MW which is more than the normative capital cost of ₹ 540 Lakh/MW as proposed by the Commission. Therefore, it is suggested that the higher capital cost of ₹ 884.76 Lakh/MW may be considered in determining the normative capital cost. **(Viaton Energy Pvt. Ltd.)**

Capital cost of biomass power project for Paddy Straw as the primary fuel will be more. These projects rely on the biomass collection of huge volume within a limited period of time. A lot of mechanization is involved requiring additional investment such as large no. of trolleys, tractors, rippers, dozers and balers are used for the collection of Paddy Straw. PBPL has set up Rice Straw based plant in Patiala has costed over ₹ 78 Crs, which works out to about ₹ 650 Lakh/MW. Post installation and commissioning of the projects, further investments are being

made for solving some of the technology issues learned from operation of the plant. The costs for new projects are working out at over ₹ 700 Lakh/MW. It is therefore, submitted that the guideline for capital cost for straw fired projects is revised to ₹ 700 Lakh/MW including fuel handling equipments as part of Project Cost. It is further submitted that the cost of land is another critical component which has shot up exponentially with economic growth. The minimum requirement of land for 12 MW plant is about 20-25 acres. It is suggested to consider the capital cost of paddy straw based biomass power projects being implemented with Water-Cooled-Condenser and Air-Cooled-Condensers for minimum Project Cost as ₹ 705 Lakh/ MW and ₹ 740 lakh/MW respectively, for deciding the tariff rate for our specific fuel based project. **(Bermaco Energy Ltd., Punjab Renewable Energy Systems Pvt Ltd.)**

It is suggested to clarify whether the cost mentioned are excluding taxes and duties or not. It is requested to consider taxes such as, Excise Duty, VAT and Service Tax which are on the tune of 12 – 15% of odd cost. **(IL&FS, Punjab Renewable Energy Systems Pvt Ltd.)**

It is requested that the capital cost of rice straw based biomass project with water cooled condenser may be fixed at Rs.650 Lakh per MW. **(Sukhbir Agro Energy Limited & Universal Biomass Energy Private Ltd.)**

Incremental capital cost of straw based project including cost of fuel logistics is about ₹ 1 Crore/MW as against ₹ 50 lakhs considered. **(Development Environergy Services Limited)**

Commission's Decision:

The Committee had considered normative capital cost as recommended by the MNRE as well as the Capital Cost data collected from a biomass developer for 10 MW size plant with air cooled condenser. Capital cost of such project considered by the Committee at Rs.600 Lakhs/MW also included cost of evacuation arrangement from project site to nearest grid sub-station. CERC RE Tariff Regulations, 2012 defined the term “interconnection point” and capital cost considered upto this point. Evacuation responsibility beyond the “interconnection point” belongs to concerned transmission /distribution licensee as the case may be. After deducting such cost, the Committee suggested ₹ 580 Lakh/MW for Project (other than rice straw based project) with air cooled condenser, which seems to be reasonable. It also includes the costs of the pre-processing

equipment used for a typical 10 MW size biomass plant which is in the range of Rs. 45 Lakhs/MW. One of the stakeholders submitted that incremental capital cost of straw based project including cost of fuel logistics is about Rs.1 Crore/MW. The Committee has already considered ₹ 630 Lakh/MW for rice straw based project with air cooled condenser which takes care of concerns of the stakeholder. Some of the stakeholders have submitted that the capital cost of Rice Straw Project with Water Cooled Condenser not specified. The same needs to be specified. The Committee has considered ₹ 40 Lakh/MW as cost difference between air cooled condenser and water cooled condenser and recommended ₹ 540 Lakh/MW for project (other than rice straw based project) with water cooled condenser. Considering the same, the Commission decided to specify norm for the capital cost of Rice Straw Project with Water Cooled Condenser ₹ 590 Lakh/MW. It is also suggested by some of the stakeholders that the Juliflora based power plants should also be considered in the category of rice straw based power plant as such plants also require huge investment in fuel processing like: cutters, grabbers, chippers etc.

Biomass based power plant in the country based on dedicated energy based plantation models has been identified and recommended by the Committee of CERC. Juliflora based power plants use prosopis Juliflora growing and existing wildly in large quantity and area in states of Rajasthan, Gujarat, Tamil Nadu, Madhya Pradesh, etc in the country. It is an important source of generating clean power as Juliflora grows on all types of saline, degraded and even rocky soil requiring very less water for growing. Some of the States (like Rajasthan and Gujarat) are promoting the use of Juliflora for power generation by providing the use of Juliflora already existing on government land for power generation and also for fresh cultivation on empty government barren land vide a separate provision in the state Biomass policy. The cultivation and promotion of energy plantation has been identified as an agenda item of the 12th Five year plan of the country. Juliflora is ready for re-harvesting in 18 months time from its cutting. There is a large area of barren and saline land existing in the country especially in the states of Rajasthan, Gujarat, Madhya Pradesh and Tamil Nadu, which can be affectively put to use for cultivating dedicated energy based plantation models based on Juliflora for power generation. Juliflora based power plant requires additional and separate investments to be done on Biomass fuel processing equipment, which includes tractor mounted cutters, grabbers, JCB machines etc. required for harvesting/ cutting Juliflora and also Biomass feeders, Chippers, Harvesters etc for

processing Juliflora and converting Juliflora into chips required for feeding them into boilers for power generation. Accordingly, the Commission decided to amend the Regulation 34 of the Principal Regulations as under:

“The normative capital cost for the biomass power projects based on Rankine cycle shall be as under:

- a. ₹ 540 Lakh/MW for project (other than rice straw and Juliflora (plantation) based project) with water cooled condenser;
- b. ₹ 580 Lakh/MW for Project (other than rice straw and Juliflora (plantation) based project) with air cooled condenser;
- c. ₹ 590 Lakh/MW for rice straw and Juliflora (plantation) based project with water cooled condenser;
- d. ₹ 630 Lakh/MW for rice straw and juliflora (plantation) based project with air cooled condenser.

Above capital cost shall be for the FY 2013-14 and shall be linked to indexation formula as outlined under Regulation 35.

b. Amendment of Regulation 37 of Principal Regulations.-

Proposal in draft Regulations:

Regulation 37 of the Principal Regulations shall be substituted as under:

“37. Auxiliary Consumption

The auxiliary power consumption shall be as under:

- a. 10% for the project using water cooled condenser;
- b. 12% for the project using air cooled condenser.”

Comments received:

Proposed norms are accepted. (**Sukhbir Agro Energy Limited, Universal Biomass Energy Private Ltd.**)

It is submitted that during this stabilization period, higher auxiliary consumption is required. It is suggested that in the first year, auxiliary consumption of 13% should be considered for air cooled plants and thereafter 12% should be considered as adopted in the State of Rajasthan. It is also

suggested that auxiliary consumption in the first year for water cool plants should be considered as 11% and subsequently 10% should be considered. **(RBPDA)**

It is requested that the Commission should consider a slightly higher Auxiliary Consumption at 15% for newly commissioned plants. It is also submitted that due to frequent grid failures and different climatic conditions in winter, summer and rainy seasons, it is suggested that the Auxiliary Consumption should be considered at 15% for the first six months and then 11% after stability of the plant. **(Viaton Energy Pvt. Ltd.)**

It is submitted that the fuel used in Travelling Grate Boiler in the States of Punjab are: Paddy Straw, Sarkanda, Maize Stalks, Cane Trash, Cotton Stalks, Wheat Straw, Mustard Husk, Popular/Eucalyptus Trees pruning. Barring Wheat Straw and mustard husk, all other varieties of Agri waste have to be shredded to 15-20 mm size for pneumatic spreading over the Travelling Grate. With average fuel requirement of 1.8 MT/MW/Hr, shredders have to be run round the clock to ensure uninterrupted feed to the Boiler which adds considerably to Aux Consumption. On an average, connected load of the shredders (each having average 3 MT/Hr shredding capacity) works out to be 200 KW approx. (considering 3 no. shredders for 6 MW capacity Biomass Power Plant). In view of above, it is recommended that Auxiliary consumption norm may be increased to 12.5% in case of Water Cooled Condenser and 14.5% in case of Air Cooled Condenser based Biomass Power Projects. **(GPEP)**

Auxiliary Consumption of 10% is on lower side as frequent tripping of 33 KVA Grid, frequent tripping of boilers due to silica deposits on bed coil/super heaters, high moisture Content in raw material during rainy seasons results in number of re-startup of Power Plant consuming higher auxiliary power. Frequent Tripping due to reasons stated above makes the power plant operations unstable & even 12% auxiliary consumption is difficult to achieve. It is suggested that the auxiliary consumption should be set at minimum of 15%. **(CBEDA)**

Average Auxiliary Consumption of the biomass plant in operation has been experienced about 12% of gross generation. Therefore, it should be increased to 12% as against 10% proposed in the draft Regulation. **(SWGEL, MPBEDA)**

Straw fired plants require 4-5% additional power for fuel preparation and handling and some power (overall assessment is about 1-2%) for operation of fuel depots. In many states where the biomass power plants are in operation, the Auxiliary Consumption on average has been experienced as about 12% of the gross generation. As per study carried out by NPC it varies between 10% and 18%. If projects with Air Cooled Condensers are considered, the auxiliary consumption will further increase. It is also a factor depending on the ambient temperature conditions of the area. Based on the experience, it is suggested that the auxiliary consumption for straw fired plants be fixed at 14% with water cooled condenser and 16% for air cooled condenser. **(Bermaco Energy Ltd., Punjab Renewable Energy Systems Pvt. Ltd.)**

It is suggested that Auxiliary Consumption should be fixed at 11% for water cooled condenser & 12% for air cooled condenser. For a project based of Rice Straw, Juliflora and Cotton stalk should be allowed to have Auxiliary Consumption of 12% in case of water cooled condenser and 13% in case of air cooled condenser. **(IL&FS)**

Auxiliary Consumption norm may be further relaxed for both air cooled and water cooled project as such plants are running on low load and fuel preparation, processing and feeding are power intensive activities. **(Tata Power)**

Commission's decision:

The Stakeholders expressed different views on the Auxiliary Consumption. Some of the stakeholders are in agreement with the Commission's proposal. Some of the stake holders have demanded 1% higher norm for the first year of operation during this stabilization period. The Commission is of the view that the auxiliary consumption factor is one of the key performance factors and is dependent on the type of condenser used in the plant. The Commission also notes that the auxiliary energy consumption is a function of plant efficiency and the energy conservation methods adopted by the developers. Further, the auxiliary consumption factor may vary according to the need of pre-processing requirement of the biomass fuel. Requirement of pre-processing of the biomass fuel rice straw and Juliflora are already covered in such fuel prices. The Commission has allowed lower plant load factor during initial year during stabilization. Considering the same, the Commission decided to amend the Regulation 37 of the

Principal Regulations allowing higher Auxiliary consumption during the first year of operation as under:

“37. Auxiliary Consumption

The auxiliary power consumption shall be as under:

- a. For the project using water cooled condenser:
 - i. During first year of operation: 11%
 - ii. From 2nd Year onwards: 10%
- b. For the project using air cooled condenser.
 - i. During first year of operation: 13%;
 - ii. From 2nd Year onwards: 12%.”

c. Amendment of Regulation 38 of Principal Regulations.-

Regulation 38 of the Principal Regulations shall be substituted as under:

“38. Station Heat Rate

The Station Heat Rate for biomass power projects shall be as under:

- a. 4200 kcal/ kWh for project using travelling grate boilers;
- b. 4125 kcal/ kWh for project using AFBC boilers.”

Comments received;

SHR as recommended in the CEA Report at 4500 kcal/kWh is reasonable. **(Matrix power)**

Considering historical data on SHR, degradation in heat rate over the life of the project, variation in the moisture level in the biomass as well as as per CEA report, the Commission may consider SHR for project with travelling grate Boiler 4400 kcal/kWh,. **(IL&FS)**

Data submitted by IBPA as available in the explanatory memorandum reflects with all the plants have specific fuel consumption in the ratio of 1.5 kg/kWh and above. It is suggested that SHR of 4500 kcal/kWh be taken for air cooled plant and 4200 kcal/kWh be taken for water cooled plant.

(RBPDA)

Due to non-availability of quality Bio-mass, the operate plant with whatever Bio-mass available which resulted into Station Heat Rate of above 4600 kcal/kWh. **(GPEP, SPPL, BPPA, T.N.)**

It is submitted that as per the limited operational experience, the average SHR is about 4635 kcal/kWh. As per the feedback received from the industry, SHR of both 4200 kcal/kWh is bit on lower side. It is requested that Commission should consider extreme weather conditions where the temperature ranges from 4⁰C to 50⁰C in the State of Punjab. Therefore, higher SHR may be allowed. **(Viaton Energy Pvt. Ltd.)**

Based on our operational experience, average SHR is around 4400 kcal/kWh because of inferior quality of fuel which increases specific consumption and un-burnt carbon fly ash which leads to higher SHR. **(DEE Piping System)**

The SHR of the Biomass Power Plant depends predominantly on the pressure and temperature rating of the plants, type of fuel, Fuel Characteristics and variation in fuel quality from the time of purchase and time of actual use, loading of the units etc. All these variations in quality of fuel and operational parameters get reflected in the performance of boiler and its efficiency. Inferior quality of fuel increases the specific fuel consumption and un-burnt carbon in fly ash. This leads to higher Station heat rate. Also due to higher moisture content of the fuels, the operating SHR is always far higher than the design SHR. It is suggested that the SHR should be fixed at 4400 kcal/KWh. **(CBEDA)**

CEA in its Report also suggested additional 5% over 4234.65 to take care of fuel related losses like qualitative and quantitative degradation of biomass which works out to 4446.38 kcal/kWh say 4500 kcal/kWh. MNRE submitted their recommendation for tariff guidelines vide letter dated 30th September, 2011 wherein it was stated that the SHR depends upon type of fuel which in turn decides the plant configuration and technology. Considering the same, it is suggested to consider SHR of 4400 kcal/kWh for paddy straw fired biomass power plant instead of 4200 kcal/kwh for project using travelling grate boilers. **(Bermaco Energy Ltd., Punjab Renewable Energy Systems Pvt Ltd.)**

It is well known fact that ash of non woody Biomass especially rice straw tend to slag in the super heater zone beyond 850⁰ C. Therefore, efforts have to be made to keep the furnace temperature around 700⁰ C which considerably lowers the Main Steam parameters. It has been observed that even Boilers designed for MS temp. of 485 – 495⁰ C in fact operate at 455– 475⁰ C

range to avoid sagging in the super heater zone. Under these conditions, average efficiency of Travelling Grate Boilers remains around 74-75% only. Considering the same it is suggested that the SHR of 4450 kcal/kWh for travelling Grate Boilers. **(GPEP)**

Due to non availability of quality fuel, it is required to operate plant with lower quality fuel results in higher SHR. It is suggested that SHR of 4500 kcal/kWh may be taken for air cooled plants. **(SPPL)**

Operating data reflects that the plants have specific fuel consumption of 1.8 kg/kWh and above. It is suggested that SHR of 4500 kcal/kWh may be taken for air cooled plants. **(OGPL)**

Earlier guideline of CERC has considered SHR at 4000 kcal/kWh which has not reflected in the most of the tariff orders of the SERCs. There is a need to see that all the SERCs adopt the same while fixing the tariff of biomass power project. **(SWGEL, MPBEDA)**

Taking into account of inferior quality of fuel generally available for running the plant and based on our experience, the Station Heat Rate should be specified at 4500 kcal/kWh for biomass project using travelling grate boilers and 4400 kcal/kWh for project using AFBC boilers. **(Sukhbir Agro Energy Limited, Universal Biomass Energy Private Ltd.)**

Efficiency difference between AFBC & Travelling Grate Boiler technology is about 5% against 2% difference is provided (i.e. difference between 4200 & 4125 kcal/kWh). **(Development Environergy Services Limited)**

Commission's Decision:

Most of the stakeholders submitted that biomass plants are operating with specific fuel consumption of 1.5 -1.8 kg/kWh and above. As such they have suggested that the SHR be fixed 4500 kcal/kWh for projects using travelling grate boiler and for air cooled condenser and 4400 kcal/kWh for project using AFBC boiler and 4200 kcal/kWh for project using water cooled condenser. Stakeholders have suggested such parameters based on the operational experience, CEA Report, 2005, fuel related losses (i.e. qualitative and quantitative degradation of biomass), inferior quality of fuel, limitation in keeping operating temperature parameters as per boiler design resulted into lower boiler efficiency. One of the stakeholders has suggested 5% efficiency difference between AFBC & Travelling Grate Boiler technologies should be considered.

Different biomass fuels have different calorific values, and hence the Specific Fuel Consumption (SFC) varies from one type to another type of biomass, which has direct bearing on the SHR achieved. Further, Biomass being a low density fuel often clogs and jams the feeding systems adversely affecting the SHR. The SHR for a biomass plant, being very sensitive to the local conditions and local fuels having widely varying properties, cannot be fixed on theoretical basis alone without allowing adequate margin for variations. The Committee in its report considered the average design SHR of 3750 kcal/kWh and operating margin of 10-12% over the design heat rate. This translates into a SHR of 4125-4200 kcal/kWh. Accordingly, the Committee recommended the SHR of 4200 Kcal/kWh for station using travelling grate boilers and 4125 kcal/kWh for stations using AFBC boilers for determination of tariff of bio-mass power plants. The Committee's above recommendation is also based on the actual results of some of the plants visited. Considering the above, the Commission decided to retain the norms as suggested in the draft Regulations.

d. Amendment of Regulation 39 of Principal Regulations:

Proposed Amendment:

Regulation 39 of the Principal Regulations shall be substituted as under:

“39. Operation and Maintenance Expenses

- a. Normative O&M expenses for the second year of the Control period (i.e. FY 2013-14 shall be ₹ 40 Lakh per MW.
- b. Normative O&M expenses allowed for FY 2013-14 under these Regulations shall be escalated at the rate of 5.72% per annum.”

Comments received

The proposed amendment is accepted. **(Sukhbir Agro Energy Limited, Universal Biomass Energy Private Ltd., DEE Piping System)**

Annual escalation should be average of 60% CPI and 40% WPI and the same should be reviewed semi annually. It is further submitted that the revised O & M expenses norm are also to be made applicable to all existing project commissioned priori to control period of the principal Regulation. **(IL&FS)**

It is suggested that escalation factor should be considered as 7% considering the rate of inflation. It is further submitted that the Bio-mass power plant are establishing in the rural backward area and in order to retain the manpower, there is higher cost, increments and facilities required to be given. **(RBPDA)**

Enhanced normative O&M expenses must be made applicable to all biomass Power Projects irrespective of year of commissioning otherwise operation of these plants shall become unviable forcing their closure. **(GPEP)**

It is suggested that the escalation factor may be corrected to 10% instead of presently taken at 5.72% as the plants are located in remote backward area and in order to maintain manpower, there is a higher cost, increment and facility required to be given. **(GPEP, SPPL, BPPA T.N., OGPL)**

As per the Committee Report, O&M expenses of various biomass based plants, having size of 6-12 MW, varied from Rs. 35 lakhs per MW to Rs. 78 lakhs per MW. It is further submitted that the O&M expenses depend on the size and age of the plant. Hence every biomass plant cannot have the same Lakhs/MW of O&M expenses for each year. It is submitted that adopting Rs.40 lakhs per MW is totally arbitrary and not fair. It is suggested that the norm as suggested in the CEA Report, 2005, i.e. 7% of Capital Cost of project, may be adopted for the first year of operation for any biomass based power plant. O&M expenses escalation should be fixed at the weighted average inflation considering WPI:CPI at 60:40. The APTEL has also adopted the same in some of its orders. **(Matrix power)**

The manpower cost for bio-mass power plant especially smaller capacity is higher in comparison with the other power plants. Therefore, it is submitted that the Commission may revise annual O & M cost in line with the empirical data based on market trends. **(Tata Power)**

It is submitted that O&M expenses for low capacity plants is comparatively higher. The primary reason being that the fixed costs like: manpower cost, administration cost, consumable costs are significantly high in per MW terms. It is further submitted that the biomass plant being located in the remote rural locations adds to higher cost of labour and manpower that are unwilling to stay in such places. It is further submitted that due to high corrosion and high erosion in the biomass based boilers around 3% of capital cost shall be incurred in every three years against

major replacement/major repairs/replenishment such as boiler tubes, super heaters etc. This should also be accommodated in O&M cost. Considering the same, higher O&M expenses of Rs.52 lakhs per MW may be considered in determining the normative O&M expenses. (**Viaton Energy Pvt. Ltd.**)

The operation cost of lower size plant goes higher as compared to higher size plant. Most of the plants in Chhattisgarh are 6-7 years old now. Older plants need higher maintenance. Further, due to high corrosion and high erosion in the biomass based boilers against major replacement / major repairs / replenishment, such as boiler tubes, super heaters, etc., should also be accommodated in the O & M cost. It is suggested that the O & M expenses for the F.Y. 2013-14 should be Rs. 60 lakh per MW with escalation at the rate of 7% per annum. (**CBEDA**)

The CEA came out with a report in September 2005 based on analysis of data furnished by 10 biomass projects at 7% of Capital cost. Straw fired projects require large expenses in replacing worn out blades of cutter. Additional provision may be made for the same. It is also suggested that the annual escalation of at least 7% be considered. It is requested that the Capital Cost of the Plant may kindly be considered with determining of O&M expenses with an annual escalation at the rate of 7%. (**Bermaco Energy Ltd., Punjab Renewable Energy Systems Pvt Ltd.**)

Commission's Decision

It appears from the above that some of the developers are in agreement with the Commission's proposal of increasing O&M expenses at Rs. 40 Lakhs/MW. Some of the developers as well as associations have suggested only revision of annual escalation rate. Some of the stakeholders have suggested specifying separate norm for lower size of biomass power plant. The proposed norm is almost around 7% of the proposed project cost. Considering the same, the Commission decided to retain the norm as proposed in the draft Regulations. Regarding escalation factor, the Commission dealt this issue in the Statement of Objects and Reasons Order issued on dated 14.03.2012 along with the notification of RE Tariff Regulations, 2012, which reads as under:

“4.8.2 COMMISSION'S DECISION

The Commission would like to clarify that, the escalation factor specified of 5.72% per annum is in line with the escalation factor considered for conventional power projects as per CERC (Terms and Conditions for Tariff) Regulation, 2009

for the Control period FY 2009 to FY 2014. If the provision in the said 2009 Regulations is amended, during the new Control period of the Renewable Energy Tariff, the Commission may consider extending the same prospectively to all the RE projects as well.”

The Commission has already notified new Tariff Regulations i.e. The CERC (Terms and Conditions for Tariff) Regulation, 2014. The Commission will come out separately draft amendment for public consultation in escalation rate in O&M for all RE technologies projects. Till that time the prevailing provisions in respect of annual escalation of O&M expenses for biomass based power projects shall remain unchanged. Considering the above, Clause (1) of Regulation 39 of the Principal Regulations shall be substituted as under:

“39. Operation and Maintenance Expenses

(1) Normative O&M expenses for the second year of the Control period (i.e. FY 2013-14 shall be ₹ 40 Lakh per MW.”

e. Amendment of Regulation 41 of the Principal Regulations.-

Proposal in draft Regulations:

Regulation 41 of the Principal Regulations shall be substituted as under:

“41. Use of Fossil Fuel

The use of fossil fuels shall not be allowed.”

Comments received:

The proposed amendment is accepted. **(Sukhbir Agro Energy Limited, Universal Biomass Energy Private Ltd., Viaton Energy Pvt. Ltd., CUTS International)**

Coal needs to be used for co-firing which act as a supporting fuel and also help in retaining the heat of bio-mass thus making the process more efficient. Bio-mass plants which are already commissioned would be suffered if use of coal as a supporting fuel disallowed. It is also submitted that the plant having a high Station Heat Rate (SHR) i.e. 4200 kcal/kWh, using coal from the market at high price, would not be viable as the requirement of coal would be much higher due to higher SHR. **(A2Z)**

Earlier policy of Government allowed 30% usage of fossil fuel which was subsequently reduced to 15%. Such fuel is used only at the time of non availability of bio-mass, normally in monsoon season and also because of its usage in the alternate industry. It is submitted that by stopping the use of fossil fuel would put more pressure on the biomass price and also affect the operation of the biomass power plant. Considering the same it is requested to increase the level of fossil fuel usage upto 25%. **(RBPDA)**

Use of fossil fuel is permitted with the view to allow the biomass plants to sustain its operation during monsoon season when biomass becomes totally wet. It is suggested that level of fossil fuel usage should be increased from 15 to 25%. **(GPEP, IBPA, BPPA TN, OGPL, SPPL)**

Technically it is not possible to stop the use of fossil fuel especially in case of biomass power plants using rice husk. Fossil fuel is required during the start up of power plants and for proper burning of biomass in the boilers. Biomass fuel contains high moisture & especially during the rainy seasons it is very difficult to operate the plant with rice husk containing high level of moisture. Use of fossil fuel is required for proper burning of biomass in the boiler otherwise it will reduce the efficiency and plant load factor. Considering the same it is suggested that the usage of fossil fuel should be allowed as per the guidelines of MNRE. **(CBEDA)**

It is suggested that the Commission may change the provision of Fossil Fuel as and when the MNRE review the policy on usage of Fossil Fuel by Bio-mass project. Various Bio-mass associations have approached MNRE to permit Fossil Fuel utilization up to 15 to 30% to maintain the plants stability during the monsoon season. It is further submitted that in case of biomass project using rice husk as main fuel, its super-heater coil get eroded due to silicon contain in the fuel and reduce the life of the super-heater coil. Burning mix of coal with rice husk would increase the coil's life and ultimately reduce the maintenance cost. It is further submitted that during the rainy season and winter season, utilization of coal is essential for Bio-mass power project to maintain the furnace temperature. **(SWGEL, MPBEDA)**

Commission's Decision:

From the above it appears that the stakeholders have divergent views on the proposal. Some of the stakeholders are in agreement with the Commission's proposal. It has also been reported that in some States the biomass-based power plants are not strictly maintaining the fuel ratio and are

using fossil fuel more than the limit prescribed in the Regulations. Regular monitoring and verification of the same by the State Nodal Agency also seems to be difficult. In such a situation, where electricity is generated using coal beyond the limit, biomass based power projects lose the status of RE, but are still getting the preferential tariff is generally higher than the cost of generation from coal. The Committee visited plants in the State of Rajasthan, Punjab and Andhra Pradesh and found that biomass plants can operate with 100% biomass fuel. Considering the same, the Commission decided to retain the amendment as proposed in the draft Regulations.

f. Amendment of Regulation 43 of Principal Regulations.-

Proposal in Draft Regulations:

Regulation 43 of the Principal Regulations shall be substituted as under:

“43. Calorific Value

The Calorific Value of the biomass fuel used for the purpose of determination of tariff shall be at 3100 kcal/kg.”

Comments received:

The proposed amendment is accepted. **(Sukhbir Agro Energy Limited , Universal Biomass Energy Private Ltd.)**

We are in agreement with the Commission’s proposal. **(RBPDA)**

Mixed fuel being used due to lower availability of the fuel at various regions and seasons. Proposed GCV of 3100 kcal/kg is closure to realistic 3000 kcal/kg. **(SWGEL, MPBEDA)**

In the Explanatory Memorandum the average fuel consumption from most of plants is 1.5 kg/kWh and above. It is due to moisture content which varies from 15 – 30% at the end of the season. It is further submitted that the GCV referred in the Explanatory Memorandum in many of the instances on air dried basis considering the moisture level and loss in handling etc. GCV on as fired basis is generally in the range of 2800 to 3000 per kcal/kg. It is submitted that the Commission may revise calorific value to 3000 kcal/kg. **(IL&FS)**

It is suggested that GCV to be fixed at 2800-3000 kcal/kg. (**Punjab Renewable Energy Systems Pvt Ltd.**)

In the State of Chhattisgarh, only rice husk is available to be used as fuel for biomass based power generation. Degradation of fuel due to mixing of mud, presence of dust etc. is not considered. Actual achieved GCV in rice husk is between 2800-3000 kcal/kg. There are losses due to various reasons like mixing of sand, mud and foreign materials, losses by wind and small to major fires and losses in handling. There is also qualitative loss in terms of GCV due to exposure to wind and rain. Considering the same, it is suggested that the GCV be considered at 2800 kcal/kg. (**CBEDA**)

The Bio-mass fuel available to our plant in agricultural based, agro industry based, land based containing heat value as less 2100 to 2500 kcal/kg. Moreover, such fuel has received more than 50% moisture and GCV has received in the range of 2100 to 2500 kcal/kg and also due to deterioration in the heat value due to storage. The GCV for agricultural waste should be considered as 2300 kcal/kg. (**BPPA T.N., OGPL, SPPL**)

Various Bio-mass fuel received in different States are different in characteristics and pending moisture value above 50% and the GCV around 2200 kcal/kg in most of the power plants in Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Maharashtra. As firing after allowing for drying the GCV is only around 2200 primarily due to deterioration during storage even though there is substantial reduction in moisture over time. It varies from 2300 to 3100 kcal/kg and an appropriate GCV acceptable to all is to be fixed at 2500 kcal/kg. (**IBPA**)

All agri residues (except Wheat Straw and Mustard Husk) available in Punjab have moisture content in the range of 30-50% which lowers the average GCV of Agri residue in the range of 2100-2700 kcal/kg (as on fired basis). Farmers in Punjab are always eager to get rid of Agri Residue in shortest possible time for preparing their fields for next crops. So, Bio-mass has to be collected when moisture levels are still very high. Storage of high moisture Bio-mass (in baled or loose form) lowers the CV due to natural decay (biomethanation). In view of above, it is recommended that Calorific Value of Fuel used for the purpose of tariff calculation may be lowered to 2500 kcal/kg. (**GPEP**)

The Commission has assessed fuel losses from 7 – 10% on account of storage handling habitation and exposure to wind and rains. It is suggested that the representative of Bio-mass GCV should be 3000 kcal/kg as against 3100 kcal/kg as proposed in the draft Regulation. **(Tata Power)**

The GCV of fuel deteriorated gradually to around 10 – 15% from the procurement time till consumption due to various factors such as problems in storage, rain etc. and therefore more fuel is required for generating same quantity of power, thus, increasing consumption factor. **(DEE Piping System)**

It is submitted that in the GCV of the fuels are those with the inherent moisture content as indicated in the said table. However, the fuel as received has a much higher moisture content as already noted in the CEA Report. The CEA omitted to consider this in working out the effective GCV and the SFC related to the purchase quantity of fuel. For the purpose of the specific fuel consumption, what is relevant is the weight of fuel that has to be purchased in the “as received” condition. The fuel prices will have to be applied on such a gross weight. For example, taking the case of agricultural residues above, with an inherent moisture content of 15% the following calculation illustrates the GCV adjusted for the free moisture that is present in the “as received” condition for the actual weight of fuel purchased.

Assume 1 kg of agri-residue with 40% moisture purchased.

Weight of dry combustible fuel therein = 0.60 kg

Weight of moisture in the above fuel = 0.40 kg.

Let x be the weight of inherent moisture in residual fuel after air drying.

So $[x / (0.60 + x)] = 0.15$; if air dried fuel is to have 15% moisture

Solving, $x = 0.106$ kg

Hence weight of air dried fuel with 15% moisture = $0.60 + 0.106 = 0.706$ kg

In the 1 kg purchased, heat value in fuel is $3320 \times 0.706 = 2343$ kcals.

So adjusted GCV of fuel in “as purchased” condition = 2343 kcal/kg.

Therefore the adjusted GCV of the relevant fuels adjusted for the free moisture in “as purchased” condition is :-

S.No	Biomass	Moisture%	GCV kcal/kg
1	Rice Husk	10	3090
2	Juliflora	20	2850
3	Agricultural Residues	15	2343

The above can be analysed as follows to arrive at the weighted average GCV for biomass fuels in Andhra Pradesh.

Sl	Biomass Fuel	% in mix	GCV (adjusted)
1	Rice Husk	36.8	3090
2	Juliflora	42.9	2850
3	Agri. Residues & others	20.3	2343
	Total	100.0	
Weighted Average GCV			2835
Rounded off for uncertainties & variations			2800

(Matrix power)

Storage degradation loss of fuel calorie ranges from 5 to 10% depending upon many location specific variables. (Development Environergy Services Limited)

It is submitted that due to rain, storage and contamination by fuel suppliers and inherent mud in agricultural residues there is a significant reduction in GCV of biomass fuels. It is further submitted that the quality of biomass is not uniform and containing varied moisture, sand and inert material which has direct relation to GCV. It is also submitted for reduction of moisture, only economical solution is natural drying. Due to huge inventory levels upon storage in the open space seasonal rains and extreme winter makes the fuel further wet. On an average, biomass plants are operated with minimum moisture content of 25 to 30% which affects the GCV. It is also submitted that project developer get biomass as feed basis is only between 2200 to 3000 kcal/kg. It is also submitted that due to degradation of fuel, grounding loss, transport loss, wind loss, rain loss, pilferage loss and loss due to internal combustion of fuel. GCV of fuel gradually deteriorate to around 25 to 30% from the procurement time till consumption. Therefore, more fuel is required for generating the power. Considering the same, it is suggested

that GCV of 2800 kcal/kg should be considered instead of GCV of 3100 kcal/kg. (**Viaton Energy Pvt. Ltd.**)

Commission's Decision

The Committee collected GCV details of various fuels used from the project developers located in the States of Hyderabad, Rajasthan, Gujarat and Punjab and based on the same recommended GCV in its Report. Some of the stakeholders are also in agreement with Commission's proposal which was based on the Committee Report. Some of the stakeholders have suggested further reduction in GCV in the range of 2300 to 3000 kcal/kg. The Committee also recognised that the plants are keeping minimum inventory of various types of biomass for three to four months and in this duration there is reduction in GCV due to various reasons like mixing of sand, mud and foreign materials, losses in handling, exposure to wind and rain etc. Such losses are between 7-10% for the entire year. Based on the above factors, the Committee recommended the normative GCV value for the Biomass Plants for determination of generic tariff as 3100 kcal/kg for mustard husk, rice husk and other kinds of biomass fuel under as fired condition. Considering the same, the Commission has decided to retain the norm as proposed in the draft Regulations which is also in line with the recommendation received from MNRE (Given vide its letter dated 30th September, 2011) and as recommended in the CEA Report.

g. Amendment of Regulation 44 of the Principal Regulations.-

Proposal in the draft Regulations:

The following shall be added at the end of Regulation 44 of the Principal Regulations namely:

“Alternatively, biomass fuel price shall be decided annually by the State level committee constituted by the appropriate Regulatory Commission consisting of representatives of Nodal Agency, State Government, Distribution Licensees and any other organization as may be decided by the appropriate Regulatory Commission.”

Comments received:

The proposed amendment is accepted. It is also suggested that the tariff should also be revised annually based on revised biomass price. **(Sukhbir Agro Energy Limited, Universal Biomass Energy Private Ltd.)**

We agreed with the Commission's proposal for determination of fuel prices that it should be fixed at the beginning of the year on independent survey which can be conducted by the State Nodal Agency. It is also suggested to consider the periodic revisions in biomass price by determining the tariff. **(Viaton Energy Pvt. Ltd.)**

Proposed amendment is welcome as the State Level Committee shall be in a better position to understand the State specific problems. **(GPEP)**

It is proposed that setting a State level committee of 4 to 5 different organization would be a very difficult task. Since, distribution licensee is an affected party who never wants any increase in fuel price and increase the tariff. It is suggested that the fuel price should be set on independence survey at the end of every year by State Government Nodal Agency or CERC or by MNRE. **(RBPDA, GPEP, SPPL, BPPA T.N., OGPL)**

We welcome the methodology proposed by the Commission for fixing the fuel price by constituting a state level Committee. However, the price stipulated by the Commission in the Regulation should be act as a guiding factor for determining the fuel price. It is also submitted that the representative of respective biomass association of the State or Indian Bio-mass Association as a member/representative in the state level committee being proposed. **(IL&FS)**

We suggest that one representative from Biomass power producers association of the respective State also should be a member of the proposed state level committee for fixing of biomass fuel price in that state. **(CBEDA)**

It is suggested that the scope of this Committee may be widened to address fuel supply related issue. The Commission may issue an advisory to the States for formation of Bio-mass supply companies at the regional and State levels and allocation of suitable warehouse space at the

district level for storage and sale of biomass. Such company should guarantee in supply a good quality fuel at their door step at competitive price. **(Tata Power)**

Commission's Decision:

Most of the stakeholders are in agreement with Commission's proposal that the apart from the existing mechanism of determination of biomass prices, it could be decided annually by the State level committee constituted by the appropriate Regulatory Commission. Some of the stakeholders have suggested that the State level committee should also have representation from respective State biomass association. Some of the stakeholders suggested that distribution licensee, being an affected party, would never want to an increase in fuel price and suggested that the fuel price may be set by independent survey by State Government Nodal Agency or CERC or MNRE to capture the fuel price every year. The Commission has decided that the following shall be added at the end of Regulation 44 of the Principal Regulations namely:

“Alternatively, biomass fuel price shall be decided annually by the appropriate Regulatory Commission through an independent survey which could be carried out by constituting a State level committee consisting of representatives of State Nodal Agency, State Government, Distribution Licensees, biomass power producers association and any other organization.”

h. Applicable to Amendment of Existing Project:

Comments received:

Proposed amendment should be applicable to all the existing projects prior to control period and the tariff of these projects should be revised. The Commission may advise all SERCs to follow operative norms as stipulated as minimum guiding factors for determining the tariff by SERCs. **(IL&FS, Punjab Renewable Energy Systems Pvt Ltd.)**

It is submitted that the tariff should be determined annually considering Bio-mass price for both on new and old price. It is submitted that the revised norms should be made applicable prospectively to both old and new projects. This will bring viability to strengthen Bio-mass segments and enhance the competitive of the developers. **(DEE Piping System)**

It is submitted that the revised norms should be applied prospectively to determine the tariff for old and new biomass power projects. This will bring viability to the struggling old biomass power project and enhance the confidence of developers to invest further in the biomass power sector. **(Sukhbir Agro Energy Limited & Universal Biomass Energy Private Ltd., RBPA)**

Commission's Decision:

The revised norms may be prospectively applicable to the existing projects if the project developer and the distribution licensee agree to the norms through appropriate amendment to the PPA subject to approval of the respective State Commission.

Other Suggestions which are not under the scope of current regulatory process of amendment in the Regulations.

Biomass price

It is suggested that to re-determine the fuel prices in particularly for the state of Punjab a price of at least Rs. 3000/MT with a normative escalation factor of 10% annum instead of 5% annually escalation. It is also suggested that CERC should direct all SERCs to revisit the Biomass fuel cost on half yearly basis instead of review at the end of control period. **(BERMACO, Punjab Renewable Energy Systems Pvt Ltd.)**

Fuel cost adjustment and true-ups

It is suggested that due to high variability of fuel cost and resulting uncertainty of frequency of fuel price, adjustment in bio-mass price should be done on semi-annual base. It is also submitted that in case such adjustment are not done as per the schedule, provisional adjustment say 5 – 6% increase, should be done automatically subject to approval of SERCs. This will improve the revenue stability Bio-mass power plant. **(Tata Power)**

RE Tariff for FY 2014-15

Tariff for the year 2014-15 need to be determined based on the new norms. **(RBPA)**

Separate Norms for Small Bio-mass Power:

There is an urgent need to encourage small Bio-mass based distributed generation assets which become less than 5 MW during direct combustion and gasification technology. Due to non-availability of fuel and seasonality issues, large Bio-mass power plants converted into non-performing assets. Therefore, smaller/modular Bio-mass power plant will help address this problem as the size is commensurate with the fuel application. It is suggested that capital cost may be fixed in the range of Rs. 7.50 to 8.00 crore per MW and O&M cost should be fixed at Rs.0.65 to 0.75 crore per MW for such small Bio-mass power plants. **(Tata Power)**

Fuel Cost:

One time correction of fuel price may be made for current financial year for establishing credible base line. It is also suggested that differential FIT payments by project size shall reflect actual project cost and help in improving viability of this project. **(Tata Power)**

Process of constituting the Committee for determination of fuel price may take some time, therefore, we request the Commission that in the interim to fix some realistic figure of Rs.3000 per MW for the next financial year which has in fact been experienced some operational plants.

(SWGEL, MPBEDA)

The State of Chhattisgarh considered in “other States”. Unfortunately, the State Commission has incorporated the CERC norms for determination of tariff for biomass.Generators is making undue advantage out of these inflated norms as compared to actually available price of Rice Husk. There was not a single member from any Discom in the Country. The data are not true representation of generators based on biomass and Commission should not rely on the same. The Commission should not bring this amendment in haste, instead comprehensive data need to be collected from entire Country.

(Chhattisgarh State Power Distribution Co. Ltd.)

Plant Load Factor:

An overall assessment of Bio-mass power plant indicates annual average consumption factors are approximately 70%. It is suggested that the Commission may notify PNF of 60% in the first

year and 70% from second year onwards as against 70 & 80% provided in the draft Regulation respectively. **(Tata Power)**

It is suggested that the PLF should be fixed at 60% for first three years for straw based plants. **(Punjab Renewable Energy Systems Pvt Ltd.)**

It is submitted that the Commission may reduce the threshold PLF to 60% and accordingly the component of tariff should be worked out. Any energy dispatched to distribution licensee over and above threshold PLF, only annual charges with an incentive of 50 paise per unit may be considered by the Commission. **(IL&FS)**

Assessment of impact of Regulation

It is submitted that a practice should be developed to assess the impact of Regulation on broad goal and purpose of such Regulations. Based on such assessment, corrective action should be taken by respective Commission on periodic basis. It is also suggested that a guideline for this should be prepared by CERC/FOR. It is further submitted that the major challenge is development of consensus amongst CERC and SERCs on approach and methodologies for regulations for different renewable energy systems. **(Development Environment Services Limited)**

It is submitted that with so much inconsistency with fuel/feedstock, untenable operation of the plants, initiation should be taken to develop clean renewable energy sources other than biomass. It is submitted that the draft regulations clearly amend the provisions of the tariff determination in order to safeguard the interest of the ailing biomass project and consequently leading to rise in tariff of power sourced from such projects. In the time where the consumer needs affordable, reliable and consistent electricity biomass projects varying production and adverse tariff plans, is not providing any solution. It is submitted that the under-utilised plants and other clean RE sources should be watered rather than investing and redeeming unviable, ineffective and untenable biomass power plants.

It is also submitted that keeping in mind that transitioning period for biomass projects for closure would be long. It is pertinent to keep them economically viable till then. Currently, power sector is facing considerable peak load deficit to manage production from biomass power projects to facilitate such peak load gap as the tariffs are higher can be sought as probable solution to maintain the economic viability of biomass project. It is also submitted that the emission norms are to be fulfilled by the biomass based power projects. **(CUTS International)**

Till date, the cumulative registered capacity of Renewable Energy Generating plants under REC mechanism is 4030 MW including 1360 MW of Biomass/cogeneration plants. Determination of generic tariff will have a direct impact on REC mechanism. It is likely that many renewable energy plants may move away from REC mechanism. **(POSOCO)**

Sd/-
(A.K.Singhal)
Member

Sd/-
(M Deena Dayalan)
Member

Sd/-
(Gireesh B. Pradhan)
Chairperson

List of Stakeholders submitted written comments

- i. M/s. A to Z Maintenance Engineering Services Ltd.
- ii. M/s. Rajasthan Bio-mass Power Trading Association (RBPTA)
- iii. M/s. Matrix Power Ltd.
- iv. M/s. Punjab Renewable Energy System Pvt. Ltd.
- v. M/s. Global Power Tech Equipments Pvt. Ltd. (GPEP)
- vi. M/s. Sriram Power Gen Pvt. Ltd.
- vii. M/s Bio-mass Power Association, Tamil Nadu
- viii. M/s. Orient Green Power Co Ltd.
- ix. M/s. Green Planet Energy Pvt. Ltd.
- x. M/s Chhattisgarh Biomass Energy Developers Association (CBEDA)
- xi. M/s Bermaco Energy Limited
- xii. M/s IL&FS Management Renewable Energy Ltd.
- xiii. M/s Tata Power Ltd.
- xiv. M/s DEE Piping Systems Limited
- xv. M/s Shalini Wahan Green Energy Ltd.,
- xvi. M/s MP Bio-Mass Energy Developer Association
- xvii. M/s Sukhbir Agro Energy Limited
- xviii. M/s Universal Biomass Energy Private Ltd.
- xix. M/s Development Environenergy Services Limited (DESL)
- xx. M/s Viaton Energy Pvt. Ltd.
- xxi. M/s Indian Wind Power Association
- xxii. M/s Chhattisgarh State Power Distribution Co. Ltd.

List of Stakeholders made submission before the Commission during public hearing

- i. M/s Sukhbir Agro Energy Limited
- ii. M/s Development Environergy Services Limited (DESL)
- iii. M/s Viaton Energy Pvt. Limited
- iv. M/s DEE Piping Systems Limited
- v. M/s Universal Biomass Energy Private Limited
- vi. M/s. A to Z Maintenance Engineering Services Ltd.
- vii. M/s. Rajasthan Bio-mass Power Trading Association (RBPTA)
- viii. M/s. Matrix Power Ltd.
- ix. M/s. Punjab Renewable Energy System Pvt. Ltd.
- x. M/s Development Environergy Services Limited (DESL)
- xi. M/s IL&FS Management Renewable Energy Ltd.
- xii. M/s. Orient Green Power Co Ltd
- xiii. M/s Power System Operation Corporation Limited (POSOCO)