

# Chhattisgarh State Electricity Regulatory Commission

**Petition No.7 of 2005**

**O R D E R**  
(Passed on 11/11/2005)

**In the matter of determination of tariff and related dispensation for procurement of power from biomass based generation projects.**

|   |      |                        |
|---|------|------------------------|
| Chhattisgarh Biomass Energy Developers Association      | .... | <b>Petitioner</b>      |
| 1. Government of Chhattisgarh                           | .... | <b>Respondent No.1</b> |
| 2. Chhattisgarh Renewable Energy Development Agency.... |      | <b>Respondent No.2</b> |
| 3. Chhattisgarh State Electricity Board                 | .... | <b>Respondent No.3</b> |

The Chhattisgarh Biomass Energy Developers Association (CBDA) which represents 29 promoters of biomass (mainly rice husk) based electricity generation units in the State has filed a petition before the Commission for determination of tariff at which the Chhattisgarh State Electricity Board (CSEB or Board, for short), presently the only distribution licensee in the state of Chhattisgarh, may purchase power generated by such power plants in the State, and other related issues, including wheeling charges etc. During hearing it has been clarified by the petitioner that the petition does not seek directions and orders of the Commission with regard to generating units based on other non-conventional energy sources and that it relates only to units based on biomass, mainly rice husk, and other agricultural residue as fuel.

2. Biomass comprising mainly of rice husk, other agriculture residue and woody mass has emerged as an important non-conventional source of energy in the country. The generating plants based on such biomass generally have shorter gestation and can be commissioned early to meet the present peak power shortage. More importantly,

biomass is a clean fuel and environmentally benign as compared to the conventional fuels. The electricity generation based on biomass in the country increased from 5,01,057KWh in 2001-02 to more than 14,00,000 KWh in 2003-04 (Source: Operation Norms for Biomass Power Plants. CEA. Sept, 2005). Chhattisgarh also has abundant biomass, mainly rice husk and woody biomass from regeneration plantation crops, which can be used for generation of electricity in the State. The State presently has a peak supply shortage of about 10% (about 200 MW). The hydel capacity in the state is as low as 9%. The peak deficit can be met to an extent by biomass based generating units. Paddy is the main crop of the State and is grown extensively, in nearly 35.80 lakh hecs. and the production of paddy is nearly 57.50 lakh tons (Source - Chhattisgarh Economic Review 2004-05 published by Directorate of Economics and Statistics, Govt. of Chhattisgarh). There are nearly 1000 rice mills in the State with capacities ranging between 2 to 8 tones per hour. Assuming rice husk as 20 to 22% of paddy, the total availability of rice husk in the State, based on 2004-05 data, comes to about 12 lakh tons per year. On a rough estimate, the rice husk availability is sufficient for generation of about 180 MW of power in the State. Presently there are only two generating units in the State with an installed capacity of 6 MW and 8 MW, based on biomass as fuel. The CEA's survey referred to later in this order has taken into account the operation of one of these two units. It is to be noted that although with mono-crop pattern in the State, the availability of other agriculture residue is very small, woody biomass availability is likely to be large considering that the total forest area (excluding revenue forest) in the State is about 44.746 sq. kms. which yields large quantities of biomass. Plantation crops are also grown in Chhattisgarh in large areas. However, this biomass potential has not been assessed so far.

In pursuance of the policy of the State Government to tap the generation potential based mainly on rice husk, the Chhattisgarh Renewable Energy Development Agency (CREDA, for short), the nodal agency for the development of non-conventional energy sources in the State has selected 29 developers with a total project capacity of 280MW based on such biomass in the State. CBEDA, the petitioner in this case, is the association of these developers.

### 3. Policy framework regarding non-conventional energy sources

Section 86(1)(e) of the Act mandates the State Regulatory Commission to *"promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee."*

The National Electricity Policy also gives a similar mandate. In para 5.12 of the policy a reference has been made to the provision in the Act and a duty has been cast on the SERCs to prescribe a percentage for purchase of power from non-conventional sources and to determine a differential price for such purchase at the earliest. The policy stipulates: "such purchase by Distribution Company will be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost with conventional sources, the Commission may determine an appropriate differential prices to promote these technologies". Thus, the Act as also the National Policy mandate (i) a minimum purchase by the distribution licensees and (ii) at a differential price, both to be specified by the State Commissions.

4. Even before the present Act and the national policy came into being, the Ministry of Non-conventional Energy Sources (MNES), Government of India had issued guidelines to the State Governments during 1994-95 for fixation of purchase price for power produced from non-conventional energy sources including guidelines for promotional and fiscal incentive by the State Government for power generation from such sources. As per these guidelines the base energy purchase valid for 1994-95 was a minimum of Rs. 2.25 per KWh to be escalated at a minimum rate of 5% every year. Third party sale was to be permitted at a uniform wheeling charge of 2% of the energy fed into the grid. The MNES also recommended other incentives. In pursuance of these guidelines, Government of Chhattisgarh (GoC, for short) vide notification No.38/Å-fo/2002 dated 8.4.2002 granted certain incentives to all generating units based on renewable source of energy viz. wind, agriculture, waste, biomass, cogeneration, municipal/industrial waste and, mini-hydel units and provided for purchase of power by

the CSEB from such units. The GoC vide its notification No.33 I@Å-fi/02-03 dated 4.2.2003 made it mandatory for the CSEB to purchase power from a developer who desires to sell power to the Board at Rs.2.25 per unit. It was also stipulated in this notification that the tariff for start-up power will be the normal tariff but the contract demand charge shall be levied for minimum 50% contract demand.

5. In the present petition the petitioner has sought the orders and directions of the Commission with regard to the following:

- (a) The power generated using biomass as fuel is presently carried by the Board for a wheeling charge of 2% irrespective of distance in the State. The wheeling charges at the above rate should be fixed for at least the first 10 years.
- (b) Twelve months' banking facility be allowed to encourage use of non conventional energy sources.
- (c) Tariff be fixed at Rs.3.12 per unit with an escalation of 5% per annum.
- (d) Demand charges collectible either by Board or power developer from a prospective HT consumer (third party) should be collected pro rata to their respective energy supplied by each of them to HT consumers.
- (e) Minimum demand charges should not be chargeable from biomass power producer.
- (f) Respondent No.3, i.e. Board recovers value of energy in form of start up power in terms of money. Exchange facilities should be allowed and Board directed by the Commission to charge for imported power from the power developer only when imported power is in excess of exported power in any billing month.
- (g) A new mechanism of issuing "Power Deposit Certificate" (PDC) in case the power developer opts for sale to third party other than the Board, should be allowed.

## 6. Procedure followed

The following main issues were identified as arising out of the petition to be considered by the Commission:

- (1) Determination of tariff for non-conventional energy generators based on agricultural residues.
- (2) Obligation of Board to purchase power from such units.
- (3) Permission of third party sale.

- (4) Wheeling charges.
- (5) Banking facilities.
- (6) Demand charges payable by units availing start up and emergency power.
- (7) Start up power issue.

7. In course of the hearing of the petition, the Commission directed CREDA to formulate their views on the issues raised in the petition and submit to the Commission. CREDA submitted a draft policy on non-conventional sources of energy to the State Govt. and submitted the same as their views to the Commission. On behalf of GoC, respondent No.1, reply to the petition was filed by the Energy Department on 6.7.05. The Board, respondent no.3, submitted its reply to the petitioner's proposals on tariff, the most important issue for consideration in this petition. The petitioner has submitted detailed proposals on tariff and the Board has submitted comments on these proposals. On the direction of the Commission, the representatives of the petitioner discussed the tariff issues in detail with the officers of the Commission. The petitioner also submitted a written statement on the issues framed for consideration by the Commission, on 19.9.05.

8. After hearing on 11.8.05, a discussion paper on fixation of tariff for purchase of power by licensees from biomass plants and allied issues was issued on the Commission's website on 5.9.05. The last date for receiving comments was fixed as 19.9.05. The following submitted their comments/suggestions on the discussion papers:

1. M/s Desh Group. Raipur
2. M/s Shyam Warehousing & Power Pvt. Ltd. Janjgir.
3. M/s Neraj Power Ltd.
4. M/s Rukmani Power Industries, Bilaspur.
5. Shri P.Kotaiah, Former Chairman, NABAD, A.P.

6. M/s Sudha Agriculture Industries Ltd.
7. M/s Vyas Steel Pvt. Ltd.
8. M/s Maa Usha Urja Ltd.

On 24.9.05 the Commission held a public hearing in its office at Raipur on the suggestions received and generally on the issues framed for consideration. Only 14 persons participated in the public hearing and most of them were representatives of the parties to the petition. There was no additional input in the public hearing.

9. The Commission has also gone through the orders and directions on the matter of this petition by SERCs of other States as also the policies of other State Governments. There are very few State Commissions, namely Andhra Pradesh, Karnataka and Maharashtra, which have issued directions and orders on biomass-based power plants in the respective States. APERC was the first to issue orders on non-conventional energy sources on 20.3.04. These orders are based on the local availability of biomass and the tariff in these orders take into account the local conditions including shortage of power in the State, the potential of non-conventional energy sources etc. This Commission has had the benefit of these orders and directions and this order generally follows the principles adopted in these orders.

10. The Central Electricity Authority appointed a technical expert committee on 29.04.05 to go into details of normative values pertaining to heat rate, O&M cost, etc. applicable for the biomass-based power plants. The committee listed 16 plants (13 from Andhra Pradesh, one from Karnataka, one from Rajasthan and one from Chhattisgarh) for collection of data. The data received from these states related to all important aspects of these projects, such as gross generation, energy sent out, consumption of biomass, calorific value of fuel used, PLF of the station, station capacity, capital cost, O&M cost, etc. The Committee also visited three such plants, two of Andhra Pradesh and one of Rajasthan. Based on the report of the committee, the Central Electricity Authority has issued operation norms for biomass-based power plants in September 2005. The conclusion and recommendations of the CEA in this regard are as follows:

- (i) The normative values recommended for existing biomass plants: -

|  |             |
|--|-------------|
| <b>Gross Heat Rate (kCal/kWh)</b>      | <b>4500</b> |
| <b>Auxiliary Power Consumption (%)</b> | <b>10</b>   |
| <b>O&amp;M Expenses (%)</b>            | <b>7.0</b>  |
| <b>PLF (%)</b>                         | <b>80</b>   |

The CEA, however, feels that the O&M expenses of 7% are very high and biomass power plants should make efforts to reduce the same. It has recommended that these expenses would need to be reviewed after 2 to 3 years.

- (ii) Third party sale with minimum wheeling charges may be permitted to encourage biomass power generation.
- (iii) Regional/state load dispatch centers should ensure dispatch instructions to biomass generating stations to their full capacity/availability irrespective of their merit order ranking.
- (iv) The tariff policy may consider, including necessary guidelines, for fixation of minimum tariff of biomass power plants.

The Commission has taken note of the detailed recommendations of the CEA in this order.

11. This order is passed keeping in view the provision of Electricity Act, 2003, the National Electricity Policy, operation norms recommended by the CEA as above, written submissions made by the petitioner and respondents from time to time, detailed calculations of tariff and the reply of CREDA, discussion held during the hearing of the petition and public hearing on the discussion paper, and norms adopted by other Regulatory Commissions in respect of fixation of tariff for generation from biomass plants.

## 12. Wheeling Charges

The petitioner has requested that the existing wheeling charges of 2 % should be continued for the first 10 years of the agreement period. It has been submitted that the projects coming up in various parts of the State will avoid cost of transmission to a certain extent. However, open access charges should be at differential rates. The

projects based on biomass energy cannot compete with conventional sources of energy, unless some incentives are given to them and high open access charges will not allow them to sell power to consumers.

The Government of Chhattisgarh, in their written submission, have opposed the proposal that wheeling charges of 2% remain unchanged for the next 10 years. The State Govt. has pleaded that the CSEB is in the process of unbundling and the successor companies will have to be financially viable. As the Government is not in position to compensate the CSEB for any deficit on account of the wheeling charges, any concession in such charge will affect the finances of the CSEB/successor utilities.

The CSEB has submitted that there is no provision in the Act for fixation of differential rates of transmission/wheeling charges and levy of surcharge under open access, except for self-use. The assessed technical losses at 33 KV voltage level are 10 % at present. The transmission /wheeling charges should be payable in cash and loss compensation may be in kind as is the prevailing practice in the inter-state open access system.

The Maharashtra Electricity Regulatory Commission (MERC) has fixed the transmission charges at 5% and wheeling charges at the rate of 2% (both in energy terms) whereas the Karnataka Electricity Regulatory Commission has fixed an overall transmission and wheeling charges of 5% of the energy input to the system.

Considering that promotion of generation from renewable energy sources including biomass, is in the overall interest of the State and as a promotional measure the Commission decides that the transmission and wheeling charges payable by biomass plants shall be 6% of the energy input into the system irrespective of the distance. Other than this charge, they shall not be liable to pay any transmission charges or wheeling charges either in cash or in kind.



### 12.1. Cross Subsidy Surcharge.

Section 42 of the Act provides that cross subsidy surcharge is leviable in case open access is provided to a person except in the case of captive power plants carrying electricity to the destination of their own use. For promoting the use of electricity generated from non conventional energy sources, the consumers willing to purchase electricity from such generators through open access should be liable to pay cross subsidy surcharge at a lower rate than others. The Commission decides that this rate shall be 50% of the rate of cross subsidy surcharge prescribed by the Commission from time to time.

### 13. Banking

The Board does not offer any banking facility at present .The petitioner has pleaded that to encourage the use of energy from biomass, banking for 12 months may be permitted. They have suggested introduction of Power Deposit Certificate (PDC), which can be utilized for sale to third party. The petitioner has pleaded that banking facility plays a vital role in the development of biomass power and it will facilitate investment in this sector.

The Government of Chhattisgarh is not in favour of the provision for banking. They have also stated that the concept of PDC is outdated and should not be accepted. The CSEB has expressed the view that in the real time transaction of electricity, banking concept has no relevance. They have averred that if any developer wishes to utilize/consume the energy banked during off-peak hours, during peak hours, it would entail additional cost to the CSEB for purchase of power at expensive rates to supply power to such consumers.

The concept of banking of electricity, no doubt, is a means to encourage generation from such sources. However, it would benefit those who want to get back the banked

electricity at some later point of time for their own use or for the use of the group companies. The important issue here is the incidence of the demand of electricity. A number of NCE facilities in the future, all requesting banking of electricity and wanting to consume the banked energy at their own preferred times, could create problems for utilities in managing their own operation and may also put additional financial burden on them. The provision of banking, moreover, should be consistent with the open access regulation framed by the Commission. The power generated from biomass-based power projects has been claimed to be firm power. Besides, the Commission is making it mandatory for the distribution licensee to purchase 5% of its power consumption from biomass-based projects in the latter part of this order, the Commission is of the view that the provision for banking of power would not be required.

#### 14. Tariff for biomass based power plants.

The main issue is determination of generation tariff at which the Board/distribution licensee may purchase power generated by these units. As per the present policy of the State Govt., the Board is purchasing such power at a fixed rate of Rs.2.25 per unit and no escalation has been allowed. The petitioner has pleaded for review of this tariff, which was fixed in 1994-95 and has asked for tariff to be fixed at Rs.3.12 per unit with an escalation of 5% per annum. In course of hearing of the petition, the petitioner also submitted calculations indicating that the selling price should be still higher at Rs.3.39 per unit. CREDA (Respondent No.2) has also separately submitted calculations for tariff based on the norms recommended by the CEA for the purpose and has suggested the following selling price per unit:

| <b>S.No.</b> | <b>Gross calorific value</b> | <b>Fuel Cost (Rs.per MT)</b> | <b>Selling price per unit (Rs./Kcal)</b> |
|--------------|------------------------------|------------------------------|--|
| 1            | 3200                         | 800                          | 3.16                                     |
| 2            | 3200                         | 900                          | 3.33                                     |

|   |      |     |      |
|---|------|-----|------|
| 3 | 3300 | 800 | 3.12 |
| 4 | 3300 | 900 | 3.28 |

The Commission has considered the information and data submitted by CREDA and the norms as recommended by the CEA in the matter of determination of tariff. The following parameters for fixation of tariff for electricity generated by biomass-based plants have been considered:

(1) Tariff to be project specific or uniform? (2) Tariff to be on cost plus basis or otherwise? (3) Tariff to be two part or single part / application of merit order? (4) Project cost (5) Plant load factor (6) Auxiliary consumption (7) Operation & maintenance expenses and escalation (8) Interest on working capital (9) Interest on term loan (10) Return on equity (11) Depreciation (12) Fuel cost and Fuel cost escalation (13) Specific fuel consumption. The first three are general issues while the remaining are the basic inputs in the determination of tariff. These are discussed in the following paragraphs which also contain the comments /decisions of the Commission thereon.

#### (1) Tariff to be project specific or uniform

The first general issue before the Commission is whether tariff should be project specific or uniform for all projects. The petitioner has stated that since the projects coming in this sector are of different but low capacity, the process of tariff fixation for individual projects will be cumbersome and time consuming. A uniform benchmark tariff mechanism will be more appropriate and obviate the need for tariff determination for individual plants. The Petitioner also pleads that the tariff should be fixed with the year of commissioning as the base year and escalated for a period of ten years.

CREDA has brought out that of the 29 projects based on biomass which have been sanctioned in the state, most have a capacity of around 7.5 MW. It would, therefore, be appropriate to determine tariff on the basis of an average unit capacity of 7.5 MW.

Adequate data on projects of this size are available and could form the basis of tariff. The Commission agrees with the petitioner and decides to determine a uniform tariff for biomass-based generators, rather than project-specific tariff.

(2) Tariff to be fixed on cost plus base or otherwise:

The petitioner has requested for cost plus base for determination of tariff. Respondents 2 & 3 have offered no suggestion in this regard. Some State Commissions such as, APERC and MERC have adopted this approach while calculating tariff.

Although the cost-plus approach is generally not recommended mainly because it does not include any incentive for efficiency, considering that the technology of such plants is not yet fully developed and this sector needs to be promoted, the Commission decides to adopt a cost-plus approach to fix the tariff so that the element of fixed cost and variable cost are properly addressed. As per the information available with the Commission, 7 projects of installed capacity each of 7.5 MW, 8 projects of installed capacity of 8 MW and 1 project of 8.5 MW are likely to be commissioned in the State. Hence, for the purpose of determination of cost of generation, the Commission has considered a plant with an installed capacity of 7.5 MW as standard.

(3) Tariff to be two-part or single part and application of merit order.

The petitioner has favoured a single part tariff. The Board has suggested that the energy sale from this sector will be covered under the UI mechanism after the introduction of ABT regime and it would prefer a two-part tariff for energy to be purchased from this category of suppliers.

The Commission is of the view that there will be practical difficulties in implementing a two-part tariff for a large number of such projects of low capacity. Implementation of

two part tariff may involve large administrative machinery for monitoring and settlement. Considering such difficulties the Commission decides to apply a single part tariff for biomass-based power projects.

Ideally, the overall cost of power purchase by a licensee could be optimized following the principles of merit order. However, in practice it would be difficult to follow this approach with a large number but relatively smaller units. Moreover, the entire exercise of dispatch of electricity as per merit order could be cumbersome. Since the tariff will be fixed in single part, it has been decided that application of merit order dispatch for purchase of biomass based energy would be detrimental to the interest of promotion of such plants. The Commission, therefore, decides that merit order shall not be applied for power purchase from biomass-based plants.

#### Costing the environmental benefits.

It may be appropriate to consider whether environmental benefits are to be factored into in the determination of tariff. The petitioner has not suggested that such benefits be taken into account in the tariff determination. There is no easy method of calculating environmental benefits. Although, some SERCs have made efforts in this regard, the calculations are open to question. Secondly, we are not taking into accounts the fiscal and other concessions being offered to such generators by the Central and the State Governments. Moreover, the Commission has adopted a cost plus approach and has allowed a reasonable rate of return and hence costing such environmental benefits may not be necessary.

#### (4) Project Cost

The project cost estimated by the petitioner in initial submission was Rs.4 Crore per MW. The project cost was enhanced in the additional filing to Rs. 4.1 Crore per MW. The Board has suggested that the project cost approved by bankers and other financial institutions should be taken into account for determining capital cost. The CEA has worked out projects cost at Rs.3.98 Crore per MW by averaging out the cost of 16

projects whose project cost varies from Rs.3.33 Crore to Rs.6.04 Crore per MW. Most of the State Commissions which have determined tariff for biomass-based plants, such as KERC, MERC and APERC, have considered the project cost at an average Rs.4.00 Crore per MW.

The project cost given in the DPRs of 14 projects proposed to be implemented in the State which the Commission has seen, (list enclosed as Annexure 1) ranges from Rs. 2.63 Crore to Rs. 4.03 Crore per MW for different installed capacity. The capital cost for projects of 7.5 MW ranges from Rs.3.17 Crore to Rs.3.94 Crore per MW. The Commission has noted that at present the project cost per MW of the latest project under implementation in the State, based on the DPR prepared in the year 2005, is Rs. 3.94 Crore. Considering various aspects, such as the land cost, infrastructure availability in the State and technologies being used for such projects and the trend of inflation, the Commission has arrived at the conclusion that it would be appropriate to assume the project cost at Rs.3.9 crores/MW for calculation of tariff.

#### (5) Plant Load Factor

CREDA in its calculations of tariff has considered 80% PLF. The petitioner during the technical validation admitted that PLF of over 80% is achievable. It was, however, suggested that the PLF for first year should be considered as 70 % and for the second and subsequent years it should be 80%. The Board has proposed an annual PLF of 80 %, irrespective of year of operation. The CEA has also recommended annual PLF of 80%.

Based on the information in DPRs and PLF of existing biomass-based units, the Commission considers annual PLF of 80% for computation of tariff.

#### (6) Auxiliary Consumption

The auxiliary consumption proposed by the petitioner is 10 to 12%. The CSEB has suggested that auxiliary consumption at 9% of the gross generation based on DPRs can be considered. The CEA has recommended auxiliary consumption of 10%.

The Commission is of the view that the biomass projects are of low capacity and the auxiliary consumption for such small size installations would be slightly higher than the larger units. Hence the Commission considers auxiliary consumption of 10 %, appropriate for the purpose, which is also as per the DPRs of most of the projects.

#### (7) Operation and Maintenance expenses & escalation

The petitioner has proposed that O & M expenses as 6 % of the project cost with an annual escalation of 5 %. The Board has proposed that O & M expenses should be 2.5 % of the capital cost. The CEA in its recommendation has suggested O & M expenses as high as 7 % of the capital cost for biomass projects. However, as has been noted earlier, it has also felt that O&M expenses of 7% are very high and that biomass power plants should make efforts to reduce the same. Other State Commissions, such as KERC, MERC and APERC have considered O&M expenses at 4% of the project cost for the purpose of determination of tariff.

The Commission has noted that the CEA has recommended 2.5 % of the project cost as O & M expenses per year for the purpose of calculating the cost of generation only of conventional plants above 210 MW. For projects of smaller capacity of the range of 7.5 MW, the O&M expenses will be more. The Commission notes that biomass-based projects are labour-intensive and require additional manpower for fuel handling purpose. Hence for the purpose of tariff, the Commission considers O & M expenses at 4% of the project cost, including insurance, as reasonable. The Commission also decides that escalation on O & M expenses may be fixed equal to the average escalation of Cost Inflation Index (CII) for the last five years, which comes to approximately 5%.

### (8) Interest on Working Capital

The petitioner has requested for interest on working capital at 13% p.a. It has also been suggested that the working capital schedule should cover fuel stock for 3 months, O& M expenditure for one month and receivables for 1.5 months. The Board has suggested that fuel stock for one month only should be considered. As per the latest sanction letter of a bank submitted by the petitioner, the interest on short-term loan is charged at 2% above PLR. At present the maximum PLR is 10.75%. Hence the Commission considers 12.75% a reasonable rate of interest on Working Capital. The CERC in its Terms and Conditions of Tariff Regulations has considered working capital as cost of coal for 2 months for non-pit head generating station, cost of secondary fuel oil for two months, O & M expenses for one month and receivables equivalent to two months of fixed and variable charges for sale of electricity. The working capital for biomass generators shall include fuel stock of 3 months, O & M expenses of 1 month and receivables equivalent to one and half months of fixed and variable charges for sale of electricity.

### (9) Interest on term loan

Petitioner has proposed 12 % towards interest on term loan. As per the latest sanction letter of a bank submitted by the petitioner, the interest on long term loan is charged 1% above PLR. Therefore, interest on loan capital is 10.75 %. In view of the above the Commission considers 11.75% as the rate of interest on term loan for biomass-based projects for the purpose of tariff determination.



## (10) Return on Equity

The petitioner has pleaded for 16 % return on equity. Other State Commissions, such as KERC, MERC and APERC have considered 16% return on equity for the purpose of determining the cost of generation.

The Central Electricity Regulatory Commission has recommended ROE for generation at 14% and to meet the minimum alternate tax at the rate of 7.5% of above ROE, i.e. 1% may be increased and with this it comes to 15%. Considering the overall benefits from such projects and in order to promote their development, a ROE of 16% p.a. on equity capital is considered appropriate by the Commission for the purpose of determination of the tariff.

## (11) Depreciation

The rate of depreciation proposed by the petitioner is 7.84 %. The CSEB has suggested that the depreciation schedule proposed by Ministry of Power should be followed for computation of tariff. The APERC has considered 7.84% as appropriate rate of depreciation, KERC has recommended 7% while MERC has approved 5.28% per annum on straight-line method.

In most of the DPRs, the rate of depreciation on buildings, has been taken at 3.34% and on plant and machinery and other misc. fixed assets at 5.28% on straight line method (SLM). The total amount of depreciation in this manner, in any case shall be less than the annual amount of repayment of loan capital considering a 10 years repayment schedule. In the DPRs the repayment schedule of loan capital has been taken as 10 years with a initial moratorium period varying between 1 and 3 years. A sanction letter of Allahabad Bank in case of NRI Power and Steel Pvt. Ltd. has been submitted by the petitioner in which repayment schedule of loan capital has been fixed for 10 years with a initial moratorium of 1 year. The annual loan capital repayment obligation shall thus be  $1/10^{\text{th}}$  of the loan capital. To meet the annual repayment obligation, the Advance Against Depreciation (AAD) is also needed to be allowed along

with the normal depreciation. Hence the Commission is of the view that the total amount of normal depreciation plus AAD may be allowed at 7% of the project cost per annum on SLM for 10 years for the purpose of tariff computation. Since the project cost includes certain non-depreciable assets like land and margin money for working capital, 7% on the entire project cost is considered appropriate as benchmark depreciation for the purpose of computation of tariff.

## (12) Fuel Cost

The petitioner had suggested a fuel cost of Rs. 900/- per metric ton in the initial filing. Subsequently, a fuel price of Rs. 1000 per MT for biomass fuel has been proposed. During hearing and discussions, the petitioner submitted that the prevailing prices of rice husk varies from Rs. 850 to Rs. 900 per metric ton. Due to increase in the capacity of biomass-based generation plants in the State, the cost of rice husk is likely to go up as has been the experience in Andhra Pradesh. It was also argued that their fuel requirement is to be met from rice husk only. The petitioner submitted that landed cost of coal varies from Rs. 1200 to Rs. 1500 per metric ton and hence the usage of coal is uneconomical. CREDA in its calculations has proposed the fuel cost at Rs.800/900 per MT. The CSEB, on the other hand, has stated that the price of rice husk in the State varies from Rs. 400-700 per MT and hence the average price based on actuals should be considered.

The price of biomass is the key factor in the variable cost of generation. The Commission notes that the fuel cost determination for biomass projects is a complex exercise as it depends upon the nature of fuel and its availability, combination of fuels used by different plants, location of the plants near to the fuel source, etc. The prices quoted by various agencies vary widely. The fuel used in these power plants will be rice husk, agricultural residues, coal and in some cases wood chips as mentioned in different DPRs submitted by the petitioner. In Chhattisgarh rice husk is available in large quantities and most of these non-conventional plants will use rice husk as a major fuel, which may be supplemented by wood chips and any other biomass. Transportation

cost of rice husk is likely to be less. As per the DPRs the location of the most of the biomass plants is such that their need for fuel can be met from the nearby areas. Further, coal is also available in the State, which may be mixed with rice husk to the extent permissible. Thus the transportation cost of fuel will be low. The price of the rice husk in the DPRs ranges from Rs.500 to 850 per MT. Although the petitioner has demanded for Rs.1000/- per metric ton as fuel cost, the Commission is of the view that considering the over all position, the average fuel cost should be Rs.800 per metric ton. Based on the information provided, the Commission has decided to consider the fuel price at Rs 800 per MT. The Commission also decides that the use of a maximum of 25% conventional fuels would be allowed on yearly basis in such projects, if required to be used as support / supplementary fuel.

#### Fuel Cost escalation:

The petitioner has proposed fuel price escalation of 6 %. CREDA has suggested escalation of 5% in O&M expenses for computation of tariff. The other State Commissions, such as of Karnataka, Andhara Pradesh and Maharastra, have considered fuel cost escalation of 5%. This Commission also considers escalation on fuel cost on the same basis, as the escalation considered in O&M expenses, of 5% per annum.

#### (13) Specific Fuel consumption

The petitioner has assumed 1.16 kg /kwh based on calorific value of 3200 kcal/kg and station heat rate of 3700 kcal/kwh. The CEA has specified a gross heat rate of 4500 Kcal/Kwh and average calorific value of 3300 Kcal/kg. Considering these parameters, the CEA has arrived at specific fuel consumption of 1.36kg/kwh. Out of the 16 power stations considered by the CEA, 13 are from Andhra Pradesh, where rice husk, julie flora, cotton stalk, wood chips maize shells, sugar cane trash, dall shell, chilly stalk, are

being used as biomass fuel. However, in the state of Chhattisgarh, rice husk is available in adequate quantity as also woody biomass from forests. Hence it is expected that these plants will be using mainly rice husk as fuel supplemented by wood chips and other agro residues. Other State Commissions, such as KERC, MERC and APERC have considered specific fuel consumption at 1.16 kg/kwh.

For the existing Indo Lahari Plant in the State gross heat rate of 4047.5/kcal/kwh has been indicated in the document of the CEA for operation norms of biomass based plants. The Station Heat Rate (SHR) is another key performance (efficiency) parameter. SHR depends on the plant design and technology, operation & maintenance practices adopted and the quality of the fuel received. The Commission had sought information from the petitioner regarding fuel consumption. The DPRs of the proposed projects indicate SHR of around 3700 kcal/kwh. The Commission notes that a heat rate of 4047 kcal is achievable. The Commission after considering the above facts decides to consider SHR as 4047 kcal/kwh equal to the station heat rate of Indo Lahari plant which is running in the State since 1998, as indicated in the report of the CEA and the calorific value of 3200 kcal/kg, which corresponds to specific fuel consumption of 1.26 kg/kwh. The Commission considers this specific fuel consumption as 1.26 kg/kwh as the most reasonable for the purpose of computation of tariff.

## 15. Approved Tariff

Taking into account the technical and financial parameters considered in the preceding paragraphs, the fixed and variable cost for biomass based projects are determined as follows:

**Fixed Cost**

| <b>Year of operation (nth year)</b> | <b>Fixed Cost Rs./unit</b> |
|-------------------------------------|----------------------------|
| 1 <sup>st</sup>                     | 1.55                       |
| 2 <sup>nd</sup>                     | 1.51                       |
| 3 <sup>rd</sup>                     | 1.47                       |
| 4 <sup>th</sup>                     | 1.44                       |
| 5 <sup>th</sup>                     | 1.40                       |
| 6 <sup>th</sup>                     | 1.37                       |
| 7 <sup>th</sup>                     | 1.34                       |
| 8 <sup>th</sup>                     | 1.30                       |
| 9 <sup>th</sup>                     | 1.27                       |
| 10 <sup>th</sup>                    | 1.24                       |

**Variable Cost**

| <b>Financial year</b> | <b>Variable Cost Rs./unit</b> |
|-----------------------|-------------------------------|
| 2005-2006             | 1.12                          |
| 2006-2007             | 1.18                          |
| 2007-2008             | 1.24                          |
| 2008-2009             | 1.30                          |
| 2009-2010             | 1.37                          |
| 2010-2011             | 1.43                          |
| 2011-2012             | 1.51                          |
| 2012-2013             | 1.58                          |
| 2013-2014             | 1.66                          |
| 2014-2015             | 1.74                          |

The Commission decides that the biomass-based projects shall be entitled to a tariff with the component of fixed charge based on the year of operation (nth year) and variable charge corresponding to financial year of operation as per the rates indicated above. This tariff shall be applicable only to the new biomass-based projects, which may commence generation of electricity on or after 01/04/2005. The cut off date of 1.4.2005 is adopted as the tariff has been calculated on the basis of financial parameters, pertaining to the financial year 04-05. This tariff shall be operative for ten

years till 2014-15, but may be reviewed after 5 years on the request of any biomass-based generating unit or a licensee.

The above tariff shall be subject to the condition that in case a supplier delivers energy less than 70 % of the scheduled energy to the licensee in the given period or if it injects power more than 105% of the scheduled energy, then the tariff for sale of energy for such power will be the variable cost only plus 30 paise per unit. The plants should give monthly schedule for energy proposed to be sold to a distribution licensee at least 15 days in advance. However sale of energy prior to commercial operation date may be treated as infirm power and rate of sale of this infirm power will be the variable charges only.

#### 16. Sharing of Demand Charges.

The petitioner has pleaded that when supply of power to a consumer is by more than one supplier, collection and appropriation of the entire demand charges by the Board based on contracted maximum demand, is not justified. It has been requested that demand charges collectible either by Board or power developer from prospective HT consumers (third party sale) should be collected pro rata to the energy supplied by each of them to the consumers. The CSEB has submitted that the demand charges have been approved by the Commission keeping in view the ARR of CSEB and total revenue receipt through approved tariff structure. Hence sharing of demand charges would not be justified and would adversely affect the finances of the Board. The State Government has stated that the plea of the petitioner should not be accepted since the consumer in such case makes full use of the system as per the contracted capacity and hence is liable to pay the full demand charges.

The Commission has already settled this issue vide interim order passed on 23.07.05 in this petition. For using the transmission and distribution network of a licensee, transmission and wheeling charges in cash and in kind are to be levied from a generator or licensee or a consumer. The transmission and wheeling charges in kind are meant for loss compensation and the charges in cash are meant for meeting the fixed

cost for using the licensee's system. The transmission and wheeling charges of 6% of the energy input has been fixed for the biomass-based generators for using licensee's system, which does not even cover the assessed technical losses of about 10% up to the 33 KV voltage level. Therefore, sharing of demand charges would not be justified.

#### 17. Demand charges for start-up-power and mode of payment there of.

All non-conventional energy plants require power for starting up the generating sets. They do not have any other activity other than generation of power. Normally, they avail HT/EHV connection for availing the start up power and the same line is utilized for injecting their generated power into the grid. The CSEB vide no. 02-02/SE-tariff/3071 dated 24/02/04 had introduced new tariff for the HT connection availed on EHV for the purpose of start up power which was applicable to non-conventional power plants and generating companies. While submitting petition for the determination of tariff for the FY 2005-06, the CSEB did not include this tariff in its petition. As such, the Commission did not make any separate tariff for the start up power. The tariff earlier fixed by the CSEB no longer exists.

Presently the Board recovers the value of energy supplied for start up power in money term. The petitioner has pleaded that they may be allowed to pay imported power back to Board only in kind. They have also pleaded that the minimum demand charges should not be chargeable from them as there is temporary rise in demand for a short duration.

The CSEB has expressed the view that the Commission has determined the tariff for sale of power under the provision of the Act. Demand charges are levied to recover a part of fixed expenditure involved to meet out the required quantum of power at any time irrespective of actual use of energy. Therefore the levy of fixed charge can not be exempted. The exchange of power is not possible in terms of kind.

The Commission feels that since the non-conventional power plants require power only in case of any outage for short duration for start up purpose not very frequently as well

as the quantum of power required is also small, the Commission is of the view that it will be appropriate to have a separate tariff for this purpose. The Commission decides to apply HV-6 tariff (for other industries) prescribed in the tariff order dated 15/06/2005 for the purpose of start up power. However, in case of non-conventional energy plants, in order to encourage promotion, the demand charge on contract demand may be reduced to 50% of the existing charge with no monthly minimum guaranteed consumption. The minimum charges will be only the demand charge on contract demand and for the actual energy consumed by them, the energy charge as applicable in the aforesaid tariff shall be made applicable. Non-conventional energy plants will not be permitted to use start up power for any other purpose except for starting the generating units. The issue relating to reactive power drawal and compensation thereof shall be decided separately.

#### 18. Security Deposit.

The petitioner has stated that when power is sold to consumers other than the Board (third party sales) the power producers are unable to collect any deposit by way of security in the manner the Board collects from consumers. In case of default, the looser is the supplier, as the Board does not commit the realization of revenue to the energy supplier.

The Board has submitted that since supply of power is a bilateral agreement between generator and power purchaser, the Board does not come into the picture at all.

The Commission agrees with the Board that the matter should be resolved through bilateral agreement between the generator and the power purchaser.

#### 19. Mandatory minimum purchase of power by the Board/licensees.

Section 86(1) (e) of the Act mandates that the Commission specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. The petitioner has pleaded that in order to encourage investment in generation of power from biomass the Commission should fix a



reasonable percentage of generation of such plants to be procured by the distribution licensees. The petitioner has requested for an agreement period of ten years and renewal of the percentage fixed by the Commission every five years. The petitioner has also pleaded that no licensee should be exempted from purchasing the target percentage.

The CSEB has, however, pleaded that there are at present two non-conventional energy producers and none is supplying firm power. Since the power is infirm in nature there is no need for fixing minimum/maximum limits. However, a reasonable percentage of electricity to be procured from biomass-based projects can be fixed at the time of tariff approval for the Board. In case of there being no requirement for purchase of power by the licensee, based on current demand, exemption from the target percentage fixed should be considered.

As has already been mentioned elsewhere in this order, there is a peak shortage of about 10% (200 MW) in the state. The Board is purchasing power from outside sources other than Central power, at an average rate of Rs.2.70 per kwh (2005-06). The cost of purchase goes up with any upward move in demand. There is scope for generation of electricity of about 100 MW from only rice husk in the state. The biomass sector has a potential to grow in the future as the demand for energy based on clean fuels increases. The Commission after considering the potential of generation of electricity from biomass sources and the current installed capacities in the State, is of the view that it would be appropriate to make it mandatory for each distribution licensee to purchase 5 % of its total power consumption during a year, from biomass-based plants located in the State. Such purchases by distribution licensees shall, however, be subject to availability of power from such sources. No distribution licensee shall be penalized for failure to procure power if such power is not available. The licensee shall indicate the proposed quantum of purchase from such sources for the ensuing year in the tariff filing, duly indicating the sources of purchase. The Commission shall review the quantum of purchase from such sources after 3 years of this order or if

the installed capacity of the biomass based plants reaches 100 MW, whichever is earlier.

The Commission also decides that distribution licensees shall purchase power from the biomass plants on first come-first serve basis. Power available from biomass plants beyond this fixed percentage, they may purchase through a bidding process within the tariff approved by the Commission in this order.

Distribution licensees in whose area of distribution there is no biomass-based power may seek exemption from the Commission from purchase of power as specified above.

#### 20. Term of PPA for purchase of power from Biomass Plant within the percentage fixed by the Commission:

The Commission agrees with the view of the petitioner in this regard and decides to fix the term of the PPAs at 10 years from the date of commercial operation. PPAs may be renewed for such further period of ten (10) years, ninety (90) days prior to the expiry of the initial period of the PPAs, on terms and conditions and tariff decided at the time of renewal. The distribution licensees shall get the PPAs which they may enter into with biomass-based power producers approved by the Commission.

#### 21. Conditions for disqualification.

In case a biomass plant uses conventional fuel more than 25%, on yearly basis, then this order will not apply to such generators and the tariff decided by this order will not be applicable to them.

#### 22. Existing biomass-based generation plants.

So far as the existing biomass-based generation plants are concerned, the Commission has noted that these plants i.e. M/s Vandana and M/s Indo Lahari are selling power to the Board at Rs. 2.25/unit, under a PPA. For changes in their PPAs already existing, if desired by the CSEB or these plants, approval of the Commission shall be necessary.

-Sd-  
**Member**

-Sd-  
**Chairman**

## Annexure- I

| <b>S. No</b> | <b>Name of Company</b>       | <b>Year Of Project Report</b> | <b>Capacity(MW)</b> |
|--------------|------------------------------|-------------------------------|---------------------|
| 1            | <b>ISA Po.Pvt.Ltd.</b>       | Sep-03                        | 7.5                 |
| 2            | <b>Eco Fren</b>              | Sep-03                        | 7.5                 |
| 3            | <b>Rayapati</b>              | Nov-03                        | 7.5                 |
| 4            | <b>Agrawal Vidyut</b>        | Jan-04                        | 7.5                 |
| 5            | <b>Sesha Sails</b>           | 2004                          | 7.5                 |
| 6            | <b>Maa Usha Urja</b>         | Apr-04                        | 6                   |
| 7            | <b>NRI Power &amp;Steel</b>  | Apr-04                        | 6                   |
| 8            | <b>Shanti GD Ispat</b>       | 2004                          | 8                   |
| 9            | <b>Neeraj Power Pvt.Ltd.</b> | 2004                          | 7.5                 |
| 10           | <b>Rukmani Power</b>         | 2004                          | 8                   |
| 11           | <b>Shivalik Power</b>        | 2005                          | 9.8                 |
| 12           | <b>Arora Inf.Def Co.</b>     | 2005                          | 8                   |
| 13           | <b>R.R.ENERGY</b>            | 2005                          | 15                  |
| 14           | <b>Sudha Agro</b>            |                               | 9.99                |