Jharkhand State Electricity Regulatory Commission

Tariff Order
on
Determination of Generation Tariff
for
Rake Power Limited
(RPL)

Ranchi

October 2011

TABLE OF CONTENTS

List of Abbreviations

Abbreviation	Description
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CERC	Central Electricity Regulatory Commission
CFBC	Circulating Fluidized Bed Combustion
FY	Financial Year
GCV	Gross Calorific Value
GFA	Gross Fixed Assets
GoI	Government of India
IREDA	Indian Renewable Energy Development Agency
JREDA	Jharkhand Renewable Energy Development Agency
JSEB	Jharkhand State Electricity Board
JSERC	Jharkhand State Electricity Regulatory Commission
kCal	Kilocalorie
Kg	Kilogram
kWh	Kilowatt-hour
MAT	Minimum Alternative Tax
Ml	Millilitre
MT	Metric Tonnes
MUs	Million Units
MW	Megawatt
O&M	Operations and Maintenance
PLF	Plant Load Factor
PPA	Power Purchase Agreement
RPL	Rake Power Limited
R&M	Repair and Maintenance
RoE	Return on Equity
Rs	Rupees
SBI	State Bank of India
SERC	State Electricity Regulatory Commission
SHR	Station Heat Rate
SLM	Straight Line Method
WB	West Bokaro

A1: INTRODUCTION

Jharkhand State Electricity Regulatory Commission

1.1 The Jharkhand State Electricity Regulatory Commission (hereinafter referred to as the "JSERC" or "the Commission") was established by the Government of Jharkhand under Section 17 of the Electricity Regulatory Commission Act, 1998 on August 22, 2002. The Commission became operational with effect from April 24, 2003. The Electricity Act, 2003 (hereinafter referred to as "the Act" or "EA, 2003") came into force with effect from June 10, 2003; and the Commission is now deemed to have been constituted and functioning under the provisions of the Act.

1.2 The Government of Jharkhand vide its notification dated 22.08.2002 defined the functions of JSERC as per Section 22 of the Electricity Regulatory Commission Act, 1998 to be the following, namely:-

(a) to determine the tariff for electricity, wholesale, bulk, grid or retail, as the case may be, in the manner provided in section 29;

(b) to determine the tariff payable for the use of the transmission facilities in the manner provided in section 29;

(c) to regulate power purchase and procurement process of the transmission utilities and distribution utilities including the price at which the power shall be procured from the generating companies, generating stations or from other sources for transmission, sale, distribution and supply in the State;

(d) to promote competition, efficiency and economy in the activities of the electricity industry to achieve the objects and purposes of this Act.

1.3 With the Electricity Act, 2003 being brought into force, the earlier Electricity Regulatory Commission Act of 1998 stands repealed and the functions of JSERC are now defined as per Section 86 of the Act.

1.4 In accordance with the Act, the JSERC discharges the following functions: -

(a) determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the State:

Provided that where open access has been permitted to a category of consumers under section 42, the State Commission shall determine only the wheeling charges and surcharge thereon, if any, for the said category of consumers;

(b) regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licensees or from other sources through agreements for purchase of power for distribution and supply within the State;

(c) facilitate intra-state transmission and wheeling of electricity;

(d) issue licences to persons seeking to act as transmission licensees, distribution licensees and electricity traders with respect to their operations within the State;

(e) 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;

(f) adjudicate upon the disputes between the licensees and generating companies; and to refer any dispute for arbitration;

(g) levy fee for the purposes of this Act;

(h) specify State Grid Code consistent with the Grid Code specified under Clause (h) of sub-section (1) of Section 79;

(i) specify or enforce standards with respect to quality, continuity and reliability of service by licensees;

(j) fix the trading margin in the intra-state trading of electricity, if considered, necessary;

(k) discharge such other functions as may be assigned to it under this Act.

1.5 The Commission advises the State Government on all or any of the following matters, namely :-

(a) promotion of competition, efficiency and economy in activities of the electricity industry;

(b) promotion of investment in electricity industry;

(c) reorganisation and restructuring of electricity industry in the State;

(d) matters concerning generation, transmission, distribution and trading of electricity or any other matter referred to the State Commission by that Government.

1.6 The State Commission ensures transparency while exercising its powers and discharging its functions.

1.7 In discharge of its functions, the State Commission is guided by the National Tariff Policy as brought out by GoI in compliance to Section 3 of the Act. The objectives of the National Tariff Policy are to:

(a) ensure availability of electricity to consumers at reasonable and competitive rates;

(b) ensure financial viability of the sector and attract investments;

(c) promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimize perceptions of regulatory risks;

(d) promote competition, efficiency in operations and improvement in quality of supply.

Rake Power Limited

1.8 Rake Power Limited (hereinafter referred to as the Petitioner or 'RPL') is a developer of biomass power project and is operating biomass and other renewable energy plants across the country. Currently, the Company has 35MW of biomass based power plants, 15.4 MW of Municipal Solid Waste (MSW) and 3.4 MW of wind based plants operating across the country. Further, more than 300 MW of renewable energy projects are at various stages of development.

1.9 Projects in Operation in other parts of India:

(a) 7.5 MW at Adilabad, Andhra Pradesh

(b) 7.5 MW at Tumkur, Karnataka

(c) 10 MW at Yavatmal, Maharashtra

(d) 10 MW at Nagpur, Maharashtra

1.10 The Petitioner has proposed to start a 23 MW biomass based Power Project near Gola, Ramgarh District, in Jharkhand.

1.11 The capacity of the proposed biomass based power project is 23 MW and the plant will use direct combustion based technology for power generation. The plant shall procure CFBC type boiler and can be useful for burning fuels such as Cotton Stalks, Red gram, Jowar, Soyabean Stalks & Rice Husk, also other crop residues and coal. A 105 TPH boiler with 89-at pressure and 520 ± 5 degrees Celsius temperatures has been selected for the power plant with a condensing type turbine of 23 MW capacity.

1.12 The plant will require about 233,056 MT of biomass, which it expects will be available within the command area – Ramgarh and nearby districts. The project is expected to be completed within a period of 18 months from the date of signing of the agreement with the Govt. of Jharkhand.

Scope of the Present Order

1.13 This Order relates to the petition filed by RPL before JSERC for approval of generation tariff for the proposed 23 MW power plant using biomass as the primary fuel.

1.14 While approving the generation tariff for the Petitioner, the Commission has taken into consideration the following:

(a) Provisions of the Electricity Act, 2003,

(b) Provisions of the National Electricity Policy (NEP),

(c) Provisions of the National Tariff Policy (NTP);

(d) Principles laid down in the 'JSERC (Terms and Conditions for Tariff Determination for biomass and non fossil fuel based co-generation projects) Regulations, 2010' (hereinafter referred to as the 'JSERC Biomass Tariff Regulations 2010');

(e) Principles laid down in the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 and CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) (First Amendment) Regulations, 2010 (hereinafter referred to as "the CERC RE Tariff Regulations");

(f) Methodologies and principles adopted by the Central Commission (CERC) in determination of generic levellised generation tariff for biomass power plants for FY 2010-11 and FY 2011-12.

A2: PROCEDURAL HISTORY

Background

2.1 The Petitioner filed its petition for approval of generation tariff to be charged for the power produced from the proposed biomass power plant on July 15, 2011.

2.2 The Commission scrutinized the petition submitted by the Petitioner and found certain data gaps and discrepancies in the petition which were communicated to the Petitioner vide letter no JSERC/23/2011/RPL/319 dated August 4, 2011. Simultaneously, the Commission also admitted the petition on August 4, 2011.

2.3 The Petitioner submitted its reply to the queries raised by the Commission vide letter dated September 9, 2011.

2.4 The Petitioner was also asked to submit, in writing, its response to various queries raised by the public during the course of the public hearing process (detailed in Section 4), which was submitted by the Petitioner on October 19 and October 20, 2011.

Inviting Public Comments/Suggestions

2.5 After the acceptance of the tariff petition filed by the Petitioner, the Commission directed the Petitioner to make available copies of the same to the members of general public on request, and also issue a public notice inviting comments/ suggestions on the tariff petition.

2.6 The aforesaid public notice was issued by the Petitioner in various newspapers and a period of twenty one (21) days was given to the members of the general public for submitting their comments/suggestions.

Table 1: List of newspapers and dates on which the public notice by RPL appeared

Newspaper (Jamshedpur edition)	Date of Publication
Hindustan (Hindi)	06.09.2011
The Hindustan Times	06.09.2011
The Telegraph	07.09.2011
Ranchi Express	07.09.2011

2.7 Subsequently, the Commission also issued a notice on its website www.jserc.org and various newspapers for conducting the public hearing on the Tariff petition filed by RPL. The details of the newspapers where the notice was issued by the Commission are as under:

Table 2: List of newspapers and dates on which the public notice by JSERC appeared

Newspaper (Jamshedpur Edition)	Date of Publication
AAJ	14.10.2011
Hindustan	14.10.2011

Newspaper (Jamshedpur Edition)	Date of Publication
Prabhat Khabar	14.10.2011
Ranchi Express	14.10.2011
Dainik Jagran	14.10.2011
Sanmarg	14.10.2011
The Hindustan Times	14.10.2011

Submission of Comments/Suggestions and Conduct of Public Hearing

2.8 A public hearing was held on October 18, 2011 at the Commission's Office in Ranchi and many respondents voiced their views on the tariff petition filed by the Petitioner. The comments/suggestions voiced by the respondents and the Petitioner's response thereon along with the Commissions analysis on the response provided by the Petitioner are detailed in the Section 4 of this Order.

A3: SUMMARY OF THE PETITION FILED BY THE PETITIONER

Overview of the Proposed Biomass Generating Station

3.1 RPL has filed a petition before the Commission for determination of tariff for the proposed biomass power plant at Gola Ramgarh District of Jharkhand by using the surplus biomass of the Ramgarh and other surrounding districts, with in the command area of the proposed site. The specifications of the proposed plant are detailed below.

Table 3: Specifications of the Plant

S. No.		
1	Capacity	23 MW
2	Boiler Type	CFBC, 105 TPH boiler with 89-at pressure and 520 ± 5 Degree Celsius temperatures
3	biomass Requirement	233,056 MT
4	Power Evacuation	132/33 kV Sub-station of JSEB at Gola

Total Cost and Tariff

3.2 The Petitioner has submitted its petition before the Commission for determination/approval of two part tariff – energy charges and fixed charges for the proposed biomass power plant. The energy charge rate and the fixed cost as submitted by the Petitioner for the first 13 years of operation of the plant are shown in the following table.

Table 4: Summary of Tariff as submitted by the Petitioner

Year	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Capacity	23	23	23	23	23	23	23	23	23	23	23	23	23
PUF (%)	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Gross Generation (MU)	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04
Auxiliary Consumption	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Auxiliary Consumption (MU)	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
Net Generation (MU)	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93
Station Heat Rate (kCal/kWh)	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
Gross Calorific Value (kCal/kg)	2873	2873	2873	2873	2873	2873	2873	2873	2873	2873	2873	2873	2873
Rate of Fuel (Rs./MT)	2800	2940	3087	3241	3403	3574	3752	3940	4137	4344	4561	4789	5028
Fuel Cost (Rs. Lacs)	5773	6062	6365	6683	7017	7368	7736	8123	8529	8956	9404	9874	10367
Variable Cost (Rs/kWh)	4.55	4.78	5.01	5.26	5.53	5.80	6.09	6.40	6.72	7.06	7.41	7.78	8.17
Interest on loan (Rs. Lacs)	1420	1341	1183	1026	868	710	552	394	237	79	-	-	-
Interest on working capital(Rs. Lacs)	567	590	611	635	659	685	712	741	772	805	830	870	913
O & M (Rs. Lacs)	580	613	648	685	724	765	809	856	904	956	1011	1069	1130
Depreciation (Rs. Lacs)	879	879	879	879	879	879	879	879	879	879	251	251	251
Return on Equity(Rs. Lacs)	734	734	734	734	734	734	734	734	734	734	927	927	927
Fixed Cost (Rs. Lacs)	4180	4157	4056	3958	3864	3774	3687	3605	3527	3453	3019	3117	3221
Fixed Cost (Rs./kWh)	3.29	3.27	3.20	3.12	3.04	2.97	2.90	2.84	2.78	2.72	2.38	2.46	2.54
Total Cost (Rs./kWh)	**7.84**	**8.05**	**8.21**	**8.38**	**8.57**	**8.78**	**9.00**	**9.24**	**9.50**	**9.78**	**9.79**	**10.23**	**10.71**

A4: PUBLIC CONSULTATION PROCESS

4.1 The public hearing was held on October 18, 2011 in Ranchi. The list of participants is attached as **Annexure-I**.

4.2 The comments and suggestion of the members of the public along with the response thereon of the Petitioner and the views of the Commission are detailed herein under:

Availability of biomass

Public Comments/Suggestions

4.3 During the public hearing it was highlighted that the Petitioner has not submitted any data regarding availability of biomass in the command area of its plant.

Petitioner's response

4.4 The Petitioner has submitted that there is sufficient agro based biomass available in the command area of the proposed plant. RPL also submitted that it may participate in the auctions, as and when organized, for the biomass from forest and wasteland, but biomass from the agro based sources is sufficient for the proposed power plant.

4.5 The following table summarizes the biomass availability in the two districts located close in vicinity to proposed power plant:

Table 5: Biomass potential in districts in vicinity of the proposed plant

District	Crop Production (kT/Yr)	biomass Generation (kT/Yr)		biomass Surplus (kT/Yr)		Power Potential (MWe)	
		Agro	Forest & Wasteland	Agro	Forest & Wasteland	Agro	Forest & Wasteland
Hazaribagh	239.4	271.8	447.8	63.1	298.4	7.8	41.8
Ranchi	388.0	562.6	397.4	139.4	264.8	16.6	37.1
Total	**627.4**	**834.4**	**844.2**	**202.5**	**562.2**	**24.4**	**78.9**

Commission's View

4.6 The Commission observes that the biomass power projects are to be designed in such a way that it uses different types of non fossil fuels available within the vicinity of the project such as crop residues, agro-industrial residues, forest residues etc. and other biomass fuel as may be approved by the Ministry of New and Renewable Energy (MNRE). Further the Petitioner are to ascertain the fuel management plan to ensure availability of fuel to meet the project requirements.

Subsidies Available to the Biomass Projects

Public Comments/Suggestions

4.7 The Petitioner has not taken into consideration the various subsidies available to biomass projects. Consumers pointed out that the availment of these subsidies may ultimately lead to less cost and in turn less tariff to be borne by the beneficiaries.

Petitioner's response

4.8 The Petitioner has submitted that the Ministry of New and Renewable Energy (MNRE) supports both on/off-grid power generation from rrenewable sources like small hydro, wind, solar, biomass, and industrial/urban wastes through promotional policies like Central Financial Assistance and Fiscal Incentives.

4.9 The Petitioner has submitted that its estimate of the capital cost of Rs 5.6 Cr/MW is net of any subsidy available. However, there is uncertainty on the continuation of the subsidy and it cannot be assumed for certain that subsidies will be available in FY 2012-13 at the time of the commissioning of the plant.

Commission's View

4.10 With regards to the availability of subsidy, the Commission has consulted the JREDA on the matter and has been informed that while subsidies are currently available for setting up of biomass power plant, quantum and availability of the subsidy in FY 2012-13 is not confirmed.

4.11 In view of the above, the Commission finds the response given by the Petitioner as satisfactory. However, the Petitioner is directed to inform the Commission as and when such subsidies/concessions become available to it.

Concessional Financing

Public Comments/Suggestions

4.12 Some consumers highlighted that the Petitioner has not considered the option of getting concessional financing from IREDA.

Petitioner's response

4.13 The Petitioner submitted that there is no concessional financing available for a grid connected biomass based power plant with capacity greater than 7.5 MW. The concessional financing is available for biomass projects upto 7.5 MW with captive biomass/ energy plantation and is off grid.

4.14 The Petitioner also submitted the following guidelines issued by IREDA for concessional financing of a biomass power project:

(a) 11.5% Interest Rate on loan with a moratorium period of maximum 10 years. Maximum moratorium period that can be availed is 3 years.

(b) Minimum promoter contribution is 30% of the project cost and loan is available up to 70% of the project cost.

4.15 Conditions for financing biomass power projects as specified by IREDA:

(a) Normally one independent Biomass Power project other than Biomass/ Bagasse based Co-generation, in one district will be funded, whether by IREDA or other FIs.

(b) Projects set up for captive consumption without grid inter-connectivity are encouraged.

(c) Projects based on captive biomass/ energy plantation are encouraged.

(d) Use of high energy efficient equipment in Biomass Power Plants is encouraged.

(e) In case of Biomass direct combustion power projects exceeding 7.5 MW capacity, if any, they will be considered on case to case basis subject to careful examination, particularly with reference to Biomass availability, presence of other Biomass power / Biomass cogeneration projects in that area, linkage for off-season fuel, water availability etc., and the loan from IREDA shall not exceed 50% of the total loan to the project or loan for 7.5 MW of the project whichever is less.

Commission's View

4.16 In view of the aforementioned conditions for financing of biomass power projects by IREDA, the Commission directs the Petitioner to approach IREDA for concessional financing. The Petitioner is also directed to inform the Commission as and when such concessions become available to it.

CDM (Clean Development Mechanism) /CER (Certified Emission Reductions) Financing

Public Comments/Suggestions

4.17 The Petitioner has not taken into consideration the option of getting funding through the CDM/CER mechanism.

Petitioner's response

4.18 The Petitioner submitted that the following uncertainties are associated with this option of funding which has impacted the interest of developers:

(a) Structure of CDM post 2012: The Kyoto Protocol ends in 2012; however there has been no consensus on the structure that will emerge post 2012. Though it is more or less certain that CDM shall continue, its form, structure and framework of working is still not known. So the risks include change in methodology, additionality, monitoring, DNA approval etc.

(b) Shifting India from Annex II to Annex I country: A contentious point that has been is whether given the economic development being seen in China and India, if both these countries are no more developing countries and need to be clubbed along with other Annex I countries then India will need to abide by emission reduction commitment and projects developed in the country may not qualify for funding under the CDM mechanism.

(c) CER Price Risks: There are typical price risks associated with CERs, like any other commodity prices and its value is created based on demand and supply balance in the markets. The uncertainty in the CDM market magnifies the uncertainty in prices of CER and thus has implications on the expected cash flow from this source of finance.

4.19 Apart from the above risks there is some inherent unpredictability in the CDM system, which adds to the risks associated. For instance while registering a project, the time taken for validation of the project can be as long as 2 years. Consequent to such long time lags a number of projects have dropped out in the validation stage. Similarly, there is uncertainty in the time taken for issuance of CERs. Thus, at present the risks and uncertainty associated with CER financing is at peak and developers may not be able to access the finance that they are expecting from the source to flow to them.

Commission's View

4.20 The Commission in Clause 5.16 of the JSERC Biomass Tariff Regulations 2010 has clarified that the proceeds of carbon credit from the biomass power projects or non-fossil fuel based co-generation projects should be shared between the developer and the energy off-taker in the following manner:

(a) 100% of the CDM benefits to be retained by the project developer in the first year after date of commercial operation of the generating station

(b) In the second year, the share of energy off-taker shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, where after the CDM benefits shall be shared in equal proportion by the project developer and energy off-taker.

4.21 The Commission believes that the Petitioner should make all attempts to get its project registered for availing the CDM mechanism as it shall be beneficial to both the Petitioner and the beneficiaries. The Petitioner is also directed to inform the Commission as and when such concessions become available to it.

Capital Cost

Public Comments/Suggestions

4.22 The capital cost of the plant submitted by the Petitioner is very high. Also, some consumers mentioned the need for clarification on the part of the Petitioner regarding the technology used for the proposed biomass plant.

Petitioner's response

4.23 The Petitioner has submitted that the proposed power plant will use air cooled condensation system as it conserves water significantly. Jharkhand is a drought prone region and the air cooled condensation system reduces water consumption to 25% of what is consumed in a water cooled condensation system.

4.24 Further, the air cooled condensation system also has the following advantages:

(a) Eliminates losses. i.e.., Evaporation, Blow down, Drift

(b) Reduce the waste water usage.

(c) Reduce the Chemical treatment for cooling water

(d) Free from noise. i.e.., Fans as well as motors

(e) Flexibility in power plant site selection.

(f) Decreased time required for plant permitting.

(g) Environmental impact associated with an increase in the temperature of a body of water.

(h) Eliminates civil works. i.e.., Pipe line work & construct of cooling tower.

Commission's View

4.25 The Commission has dealt with this issue in sections 5.33 to 5.40 of this Order.

A5: TARIFF DETERMINATION

5.1 The Commission has scrutinized the petition filed by RPL for determination of Generation Tariff for its proposed biomass power plant and has determined the same in accordance with the provisions laid out in the JSERC Biomass Tariff Regulations, 2010. The component-wise description of the Petitioner's submission and the Commission's analysis thereon is given below.

Norms of Operation

Plant Load Factor

Petitioner's submission

5.2 The Petitioner has submitted that, in line with the JSERC Biomass Tariff Regulations 2010, it has considered a load factor of 70% while determining generation of proposed power project.

Commission's analysis

5.3 The Commission in Clause 4.17 of the JSERC Biomass Tariff Regulations 2010 has considered normative PLF of 70% for biomass based power projects. Accordingly the Commission considers normative PLF for determining the tariff for biomass project at 70%.

Auxiliary Consumption

Petitioner's submission

5.4 The Petitioner has submitted that, in line with the JSERC Biomass Tariff Regulations 2010, it has considered auxiliary consumption of 10% while determining generation of proposed power project.

Commission's analysis

5.5 The auxiliary consumption is a function of efficiency and the energy conservation methods adopted by the generators. The Central Electricity Regulatory Commission (CERC), in CERC RE Tariff Regulations has specified normative auxiliary consumption of 10% for biomass power projects.

5.6 The Commission in Clause 4.20 of the JSERC Biomass Tariff Regulations 2010 has also considered auxiliary consumption of 10% for biomass based power projects. The petitioner in its petition has not suggested any change.

5.7 The Commission therefore considers an auxiliary consumption of 10% for the biomass power project.

Station Heat Rate (SHR) and Gross Calorific Value (GCV)

Petitioner's submission

5.8 The Petitioner has requested for approval of SHR higher than that provided in the JSERC Biomass Tariff Regulations 2010.

5.9 The Petitioner has submitted that the Expert Committee of CEA in its report on "Operation Norms for Biomass based Power Plants" of September, 2005 has recommended specific fuel consumption of 1.36 Kg/ kWh with average calorific value of fuel as 3300 Kcal/kg. This has an implicit assumption of the SHR and the same has been assumed at 4488 kCal/kg.

5.10 Considering the above, the Petitioner has requested that it be allowed station heat rate of 4200 kCal/kWh for the proposed biomass power project.

5.11 The Petitioner has requested for approval of GCV lower than that provided in the JSERC Biomass Tariff Regulations 2010.

5.12 The Petitioner has submitted that the proposed plant will not run on single fuel and a mix of woody and non-woody biomass shall be used to fire the plant. Each fuel in the mix has different calorific value and hence average gross calorific value of fuel would depend on the percentage mix of the fuel that will be used for generation of power. The fuel mix will be a function of the availability of the fuel in the proposed location.

5.13 To determine the gross calorific value of the proposed fuel mix, RPL has taken samples of various fuels and got it tested in an independent Laboratory, Vision Labs. According to the laboratory testing, the weighted average calorific value of the proposed mix of fuel will be 2873 kCal/kg.

Commission's analysis

5.14 The Commission observes that CERC RE Tariff Regulations specify a maximum fossil fuel consumption corresponding to 15% of total fuel consumption on annual basis for biomass power projects. Also as per MNRE/GOI circular no. 14/8/2004-SHP, biomass power projects wishing to avail Central Financial Assistance (CFA) can use fossil fuel to provide a maximum of 15% of total energy consumption in kCals on annual basis or as per Detailed Project Report (DPR) whichever is less.

5.15 The Commission also observes that Station Heat Rate (SHR) is a key performance parameter for a power plant. The SHR depends on several factors such as plant capacity, plant design and configuration, technology (boiler type and pressure levels etc.), plant operation and maintenance practices, quality of fuel received, and operational performance over varying load conditions.

5.16 CERC in its order dated November 9, 2010 has considered GCV at 3467 Kcal/kg and Station Heat Rate at 3800 Kcal/kWh for the FY 2011-12 for 'Other States' including Jharkhand.

5.17 The Commission in Clause 4.22 and 4.26 of the JSERC Biomass Tariff Regulations 2010 has also considered GCV at 3467 Kcal/kg and Station Heat Rate at 3800 Kcal/kWh. The Petitioner in its petition has submitted that there is substantial difference in variable cost in applying the parameters as per the JSERC Biomass Tariff Regulations 2010 as against the expected actuals.

5.18 During the process of finalization of the JSERC Biomass Tariff Regulations 2010, the Commission had conducted a detailed analysis of norms provided for biomass power plants by the Central Commission, other State Commissions and other available material and had accordingly finalised the norms and parameters contained in the said Regulations. Further, considering that any biomass power plant in the state will not run on single fuel and a mix of woody and non-woody biomass shall be used to fire the plant and in order to incentivize biomass producers in the state, the Commission has already kept the normative PLF at 70% for each year of the operation of the plant as opposed to other states where the PLF has been fixed at 80% from second year of operation. Thus, the Commission does not believe that there is any reason to review the parameters contained in JSERC Biomass Tariff Regulations 2010 and the same are retained as such.

5.19 Considering all of the above factors, the Gross Calorific Value of fuel is approved at 3467 kCal/kg and Station Heat Rate is approved at 3800 kCal/kWh.

Fuel Cost

Petitioner's submission

5.20 The Petitioner has requested for approval of fuel cost that is higher than that provided in the JSERC Biomass Tariff Regulations 2010.

5.21 The Petitioner has submitted that one of the determinants of price for the fuel is the price at which farmers are willing to sell the residue. The agriculture residue available in the fields can only be put to use for generation of power only if the farmer is willing to sell it at a price that he considers viable. If this price does not compensate him for the labour cost incurred in collecting residue he prefers to burn it to clear his fields for the next round of harvesting. Supply of fuels such as rice husk and bagasse etc. is seasonal, and it changes with shift in farming & consumption patterns of such fuels. Moreover, availability of the biomass to the Independent Power Producer (IPPs) is becoming further scarce, as biomass has competing uses in other consumers/industries which may offer a better price for the fuel.

5.22 Further, biomass fuel has to be brought to a collection centre or storage location at plant site, has to be dried due to high moisture content, before shredding or processing. After this, the biomass once again has to be transported to the feeding point. This whole process of shredding, segregation and loading/ unloading is highly labour-intensive and expensive.

5.23 The Petitioner has submitted that the biomass fuel is procured from unorganized market and presently, it has led to unpredictable price increase on account of involvement of various middlemen. The prices for biomass are being quoted at very high rates.

5.24 RPL has obtained quotations from various agencies for supply of biomass for their Orissa biomass power plant in FY 2010-11. The quotes are in the range of Rs. 2700/MT to Rs. 2800/MT. The proposed 23 MW biomass power plant is likely to be commissioned in FY 2012-13 and by that time, prices are like to increase further. Also, the NGO, Jai Durga People Welfare Charitable Society which will supply to the proposed biomass power plant has quoted biomass price ranging from Rs 2640 per ton to Rs 2770 MT. Considering the price increase trend, RPL has requested the Commission to consider the base price of biomass of Rs. 2800/MT.

5.25 Currently, RPL has used an escalation factor of 5% as proposed under JSERC Biomass Tariff Regulations 2010. However, it has requested that for the future, the Commission may allow an escalation factor same as prevailing inflation rate.

Commission's analysis

5.26 As regards the constraints faced by the Petitioner in procuring the biomass and the fuel cost of biomass, the same were duly taken into account at the time of drafting of the JSERC Biomass Tariff Regulation 2010. The Commission had also taken into account the norms set by the Central Commission regarding the same while fixing the fuel cost provided for biomass producers in the state.

5.27 The Commission in JSERC Biomass Tariff Regulations 2010 has considered biomass fuel cost at Rs. 1797 per MT for the first year with provision of escalation of 5% per annum. Thus the Commission has already provided an annual escalation of 5% per annum on the fuel cost fixed for FY 2009-10 to compensate the biomass producers for the expected increase in cost of fuel.

5.28 The Commission thus approves the fuel cost for FY 2012-13 by providing an escalation of 5% per annum on the fuel cost of FY 2009-10 to arrive at the fuel cost of Rs 2080.25 per MT for FY 2012-13.

5.29 Also, the Commission observes that the biomass power projects are to be designed in such a way that it uses different types of non fossil fuels available within the vicinity of the project such as crop residues, agro-industrial residues, forest residues etc. and other biomass fuel as may be approved by the Ministry of New and Renewable Energy (MNRE). Further the Petitioner are to ensure fuel management plan to ensure availability of fuel to meet the project requirements.

Determination of Fixed Cost

Capital Cost

Petitioner's submission

5.30 The Petitioner has submitted that the proposed biomass power plant will get commissioned in FY 2012-13 and hence the capital cost of the plant shall be determined as per the indexation formula specified by the Commission in JSERC Biomass Tariff Regulations 2010 applied on capital cost of FY 2009-10. Based on the indexation formula provided in the said Regulations, the capital cost has been calculated as Rs. 4.92 Cr/MW for a biomass based power plant to be commissioned in FY 2012-13.

5.31 The Petitioner has further submitted that the cost of land has not been made a part of the benchmark capital cost as land cost cannot be generalized across the State and is site specific. As per the Detailed Project Report, cost for land and site development will be Rs. 3.20 Cr for the 23 MW biomass power plant. Including this the capital cost of the biomass power plant works out to be Rs. 5.06 Cr/MW.

5.32 The Petitioner has also submitted it has received the lowest EPC contract quote of Rs. 141 Cr for the 23 MW biomass power plant. After including other costs of the project the total cost works out to Rs. 164.03 Cr i.e. Rs 7.13 Cr/MW. However, the Petitioner has stated that it is hopeful that it will be able to negotiate with the EPC contractors and will be able to bring down the costs and has requested the Commission allow capital cost of Rs. 5.60 Cr/MW for the project.

Commission's analysis

5.33 The Commission observes that the capital cost of the projects is dependent on factors such as type of technology used, lay out of plant and its configuration, and would also vary depending on the capital costs related to type of fuel used, transportation and storage of fuel and how environment friendly the plant is designed to be. The same were taken into account while drafting the JSERC Biomass Tariff Regulations 2010.

5.34 The norm for capital cost specified in the said Regulations includes all capital works including plant and machinery, cost of land, civil work, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point. The Petitioner has misinterpreted the definition of capital cost as provided in the JSERC Biomass Tariff Regulations 2010 and has requested that cost of land be included over and above the capital cost of the project specified in the Regulations.

5.35 The capital cost considered by the Commission for biomass (combustion) projects in Jharkhand, as specified in the Clause 4.13 of the JSERC Biomass Tariff Regulations 2010, is Rs. 4.50 Cr/MW for the base year, which is equal to that prescribed by the CERC in CERC RE Tariff Regulations. The Commission notes that CERC too in its orders on tariff for biomass power plants has not allowed/included the cost of land over and above the norm for capital cost prescribed by it.

5.36 However, the Commission also observes that the CERC, in its Statement of Objects and Reasons for CERC RE Tariff Regulations 2009, has clarified that the norms prescribed by the it are for a biomass plant that utilises water cooled condenser and norms for projects employing air cooled condensers shall be dealt by it on case to case basis.

5.37 While the Petitioner has not specified clearly in its petition that it intends to utilise Rankine Cycle Technology with air cooled condenser for its proposed plant, during the course of the public hearing, and in the detailed project report (DPR) for the plant, the Petitioner has submitted that RPL shall utilise Rankine Cycle Technology with air cooled condenser rather than with water cooled condenser. As per the DPR submitted by the Petitioner, the use of air cooled technology will reduce the water requirement of the plant by up to 75% and thus reduce the pressure on the resources in the area. In view of the lower water requirements of such a plant and the risk of drought in the proposed region, such a technology would be beneficial. However, the capital cost of such a plant using air cooled condenser is higher than the cost of a plant that utilises water cooled condenser. The Petitioner in its subsequent submission to the Commission has submitted that the cost of biomass plant utilizing air cooled condenser is higher than the one utilizing water cooled condenser by Rs 0.50 Cr/MW.

5.38 Since the Petitioner has proposed to set up a plant employing air cooled condensers, the capital cost for such a project has to be considered separately. The Commission notes that RERC in its order on biomass has also considered a different capital cost for biomass plants with air cooled condensers. Also, as per IREDA the project cost considered by them is Rs 4.90 Cr/MW for air cooled biomass plants[1]. The Commission has accordingly considered the base capital cost for the biomass plant (with air cooled condenser) of the Petitioner at Rs 4.90 Cr/MW.

5.39 Since the Petitioner's plant would be coming up in FY 2012-13, the capital cost of the biomass plant shall be revised over the control period with changes in Wholesale Price Index (WPI) for steel and electrical machinery based on the following indexation formula as specified in the Clause 4.16 of the JSERC Biomass Tariff Regulations 2010:

Capital cost for n^{th} year, $CC_{(n)} = P\&M_{(n)} * (1+F_1+F_2+F_3)$

Plant & Machinery cost for nth year, $P\&M_{(n)} = P\&M_{(0)} * (1+d_{(n)})$

$d_{(n)} = [a*\{(SI_{(n-1)}/SI_{(0)})-1\}+b*\{(EI_{(n-1)}/EI_{(0)})-1\}]/(a+b)$

Where, $PM_{(0)}$ = Plant & Machinery cost for the base year

$d_{(n)}$ = Capital cost indexation factor for year (n) of Control Period

$SI_{(n-1)}$ = Average WPI Steel Index prevalent for fiscal year (n-1) of the Control Period

$SI_{(0)}$ = Average WPI Steel Index prevalent for calendar year (0) at the beginning of the Control Period

$EI_{(n-1)}$ = Average WPI Electrical Machinery Index prevalent for fiscal year (n-1) of the Control Period

$EI_{(0)}$ = Average WPI Electrical Machinery Index prevalent for calendar year (0) of the Control Period

a = Constant to be determined by the Commission from time to time for weightages to Steel Index, (in default it is 0.70)

b = Constant to be determined by the Commission from time to time for weightages to Electrical Machinery Index, (in default it is 0.30)

F_1 = Factor for Land and Civil work (0.10)

F_2 = Factor for Erection and Commissioning (0.09)

[1] Haryana Electricity Regulatory Commission Order dated May 27, 2011

F_3 = Factor for IDC and Financing Cost (0.14)

Table 6: Capital Cost Indexation for biomass Power Project (FY 2012-13)

	Indexation Formulation			
	CC(n) = P&M (n) * [1 + F1 + F2 + F3]			
	dn = (a * (SI(n-1)/SI(0)-1) +b* (EI(n-1)/EI(0)-1)) / (a+b)			
	P&M(n)=P&M(0)*(1+dn)			
Variable	Description	Value		
a	Weightage for Steel Index	0.70		
b	Weightage for Electrical Machinery Index	0.30		
F1	Factor for Land and Civil Work	0.10		
F2	Factor for Erection and Commissioning	0.09		
F3	Factor for IDC and Financing	0.14		
	WPI - Electrical & Machinery		WPI - Iron & Steel	
Month/Year	2011	2008	2011	2008
January	125.10	119.00	143.70	117.90
February	125.10	118.90	145.50	118.90
March	126.40	119.10	146.10	120.60
April	127.20	118.80	144.20	127.60
May	127.60	118.60	141.80	130.40
June	128.00	124.00	142.50	131.00
July	127.40	124.60	141.10	131.20
August	128.50	124.80	142.60	135.10
September		124.80		134.80
October		124.90		135.10
November		125.20		133.20
December		124.90		131.80
Average	126.91	122.30	143.44	128.97

Table 7: Approved Capital Cost

Parameters	Description	Water Cooled Plant	Air Cooled Plant
CC(0) (Cr/MW)	Capital Cost for the Base Year	4.50	4.90
P&M(0) (Cr/MW)	Plant & Machinery Cost for the Base Year	3.3835	3.6842
d(n)	Capital Cost escalation Factor	8.99%	8.99%
P&M(n) (Cr/MW)	Plant & Machinery Cost for the nth Year (FY 2012-13)	3.6875	4.0153
CC(n) (Cr/MW)	Capital Cost for the nth Year (FY 2012-13)	4.9044	5.3403

5.40 The capital cost approved by the Commission project is Rs. 4.9044 Cr/MW (Water Cooled) and Rs 5.3403 Cr/MW (Air Cooled).

Operation and Maintenance (O&M) Expenses

Petitioner's submission

5.41 The Petitioner has submitted that in line with the JSERC Biomass Tariff Regulations 2010 it has projected O&M expenses at 4.50% of the capital cost for first year escalated at the rate of 5.72% p.a.

Commission's analysis

5.42 The Commission as per Clause 4.28 of JSERC Biomass Tariff Regulations 2010 has considered O&M expenses at 4.50% of the capital cost with an escalation of 5.72% per annum on O&M expenses for biomass based power projects. The Petitioner in its petition has not asked for any change.

5.43 Therefore the Commission, while determining tariff, considers operation and maintenance expenses equivalent to 4.50% of capital cost for biomass plant with an escalation of 5.72% per annum.

Depreciation

Petitioner's submission

5.44 The Petitioner has submitted that in line with the provisions regarding depreciation, a salvage value of 10% has been considered and thus the plant has been depreciated upto 90% of the asset value. Depreciation has been considered at 7% of capital cost per annum for first ten years and 2% for the next ten years.

Commission's analysis

5.45 In order to facilitate loan repayment by the developers within a period of 10 years (including 1 year moratorium), the Commission proposed depreciation rate of 7% for the first 10 years and 2% for the remaining 10 years of the total plant life considered as 20 years as per Clause 4.32 of JSERC Biomass Tariff Regulations 2010.

5.46 The Petitioner in its petition has not suggested any change. So the above defined norms are retained by the Commission in this Order.

Interest on Loan

Petitioner's submission

5.47 The Petitioner has submitted that it has calculated the interest on long term debt by considering:

(a) Debt: Equity ratio of 70:30 and accordingly long term debt as 70% of the Capital Cost.

(b) Interest rate of 150 basis points above long term Prime Lending Rate of State Bank of India.

5.48 The Petitioner has considered the existing prime lending rate of SBI of 14.25% for working out interest rate of 15.75% for interest on long term loan.

5.49 A moratorium period of 1 year has been considered in the repayment of loan and the repayment period has been considered as 10 years (including 1 year of moratorium) with equal instalments in line with the Regulations.

Commission's analysis

5.50 The Commission has considered a normative debt equity ratio of 70:30 to determine the tariff for biomass as specified under Clause 4.12 of the JSERC Biomass Tariff Regulations 2010.

5.51 An interest rate which is 150 basis points (1.50%) above the long-term prime lending rate of State Bank of India during the previous year is considered as the interest rate on debt for determination of tariff for biomass project as specified in Clause 4.30 of JSERC Tariff Biomass Regulations 2010.

5.52 The Commission observes that the weighted average interest rate during FY 2011-12 (up to September 2011) comes to 14.04%. Therefore, rate of interest on debt is approved at 15.54% (14.04%+1.50%).

Interest on Working Capital

Petitioner's submission

5.53 The Petitioner has computed the interest on working capital by considering:

(a) 4 months of fuel stock;

(b) 1 month of O&M cost;

(c) 2 months of receivables;

(d) Maintenance spare equivalent to 15% of O&M expenses;

5.54 The Petitioner has considered the rate of interest on working capital as 100 basis points (1%) above long term Prime Lending Rate of State Bank of India. The existing prime lending rate of SBI of 14.25% for working out interest rate of 15.25% for interest on working capital.

Commission's analysis

5.55 The Commission observes that the majority of biomass power projects will be based on crop residue in the state, which are thus seasonal in nature and would require good storage facility to store fuel for longer duration. In view of seasonal variation in availability of fuel, the Commission has considered a higher working capital for fuel stock. The following norms for working capital are considered by the Commission as per Clause 4.29 of JSERC Biomass Tariff Regulations 2010:

(a) 4 months of fuel stock ,

(b) 1 month of O& M cost and

(c) 2 months of receivables.

(d) Maintenance spares equivalent to 15% of O&M expenses

5.56 An interest rate which is 100 basis points (1%) above the short-term prime lending rate of State Bank of India during the previous year is considered for calculation of interest on working capital for determination of tariff as specified in Clause 4.30 of JSERC Biomass Tariff Regulations 2010.

5.57 The Commission observes that the weighted average interest rate during FY 2011-12 (up to September 2011) comes around 14.04%. Therefore, rate of interest on working capital is approved at 15.04% (14.04%+1%).

Return on Equity (RoE)

Petitioner's submission

5.58 The Petitioner has submitted that in line with JSERC biomass Tariff Regulations 2010, equity has been considered at 30% of capital cost of the project.

5.59 Further, the pre-tax return on equity has been considered at 19% of capital cost per annum for first ten years and 24% for the next ten years.

Commission's analysis

5.60 The Commission has considered a normative debt equity ratio of 70:30 to determine the tariff for biomass and non-fossil fuel based co-generation projects as specified under Clause 4.12 of the JSERC Biomass Tariff Regulations 2010.

5.61 The Commission considers Return on Equity of 19% for the first 10 years and 24% for the remaining 10 years of the total plant life considered as 20 years as per JSERC Biomass Tariff Regulations 2010.

Table 8: Summary of Cost Parameters

Parameters	Submitted by RPL	Approved by the Commission
Capital cost (Rs Cr/MW) for FY 2012-13	5.60	4.9044 (water cooled) 5.3403 (air cooled)
PLF	70%	70%
Auxiliary consumption	10%	10%
Heat rate (kCal/kWh)	4200	3800
Calorific value (kCal/kg)	2873	3467
Fuel cost (Rs/ MT) for FY 2012-13	2800	2080.25
Fuel price escalation p.a.	5%	5%
O&M as % of capital cost	4.50%	4.50%
O&M escalation per year	5.72%	5.72%
D-E ratio	70:30	70:30
Interest on debt	15.75%	15.54%
Interest on Working Capital	15.25%	15.04%
Depreciation	1 to 10 yrs - 7% 11 to 20 yrs – 2%	1 to 10 yrs - 7% 11 to 20 yrs – 2%
Return on equity (pre-tax)	19% - 1st 10 yrs, 24% - 11 to 20 yrs	19% - 1st 10 yrs, 24% - 11 to 20 yrs

Approved Generation Tariff

5.62 Based on the approved values of the various operational and financial parameters, gross and net generation as discussed above, the Commission has calculated the fixed cost and variable cost for the licensee for the 13 years period starting from FY 2012-13.

5.63 The Petitioner has not specified clearly in its tariff petition that intends to utilise Rankine Cycle Technology with air cooled condenser for its proposed plant. However, during the course of the public hearing, and in the detailed project report (DPR) for the plant submitted subsequently, the Petitioner has submitted that RPL shall utilise air cooled condenser rather than water cooled condenser. Given the uncertainty in the matter and the fact that work on the plant is yet to be started, the Commission on its part has approved capital cost for the proposed plant considering the use of both water cooled condensers and air cooled condensers. Accordingly, it has also calculated the generation tariff for the biomass power plant with water cooled condensers and also air cooled condensers.

5.64 The Petitioner is directed to submit to the Commission a petition for review of the tariff three months prior to the commissioning of the plant and again before the end of the Control Period as defined in the JSERC biomass Tariff Regulations 2010. The Commission may review the generation tariff to be charged by the Petitioner considering the latest available information regarding rates of interest, inflation rates, other prevalent market conditions and policies etc. Therefore, the tariff determined by the Commission in this Order is provisional.

5.65 The Petitioner may enter into a PPA with the beneficiary subject to the tariff approved by the Commission.

Table 9: Tariff for Biomass Plant (Water Cooled)*

Year	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Variable Cost													
Capacity (MW)	23	23	23	23	23	23	23	23	23	23	23	23	23
PLF (%)	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Gross Generation (MU)	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04
Auxiliary Consumption (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Auxiliary Consumption (MU)	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
Net Generation (MU)	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93
Station Heat Rate (kCal/kWh)	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
Gross Calorific Value (kCal/kg)	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467
Rate of Fuel (Rs./MT)	2080.25	2184.26	2293.48	2408.15	2528.56	2654.99	2787.74	2927.12	3073.48	3227.15	3388.51	3557.94	3735.83
Fuel Cost (Rs. Lacs)	3215.70	3376.49	3545.31	3722.58	3908.71	4104.14	4309.35	4524.81	4751.06	4988.61	5238.04	5499.94	5774.94
Variable Cost (Rs/kWh)	2.533	2.660	2.793	2.933	3.079	3.233	3.395	3.565	3.743	3.930	4.127	4.333	4.550
Fixed Cost													
O&M Expenses (Rs. Lacs)	507.60	536.64	567.33	599.78	634.09	670.36	708.71	749.24	792.10	837.41	885.31	935.95	989.48
Depreciation (Rs. Lacs)	789.60	789.60	789.60	789.60	789.60	789.60	789.60	789.60	789.60	789.60	225.60	225.60	225.60
Interest on term loan (Rs. Lacs)	1227.14	1158.96	1022.61	886.27	749.92	613.57	477.22	340.87	204.52	68.17	0.00	0.00	0.00
Interest on working Capital (Rs. Lacs)	347.77	360.22	371.63	383.80	396.77	410.57	425.26	440.88	457.47	475.09	485.38	508.71	533.22
Return on Equity (Rs. Lacs)	642.96	642.96	642.96	642.96	642.96	642.96	642.96	642.96	642.96	642.96	812.16	812.16	812.16
Fixed Cost (Rs. Lacs)	3515.08	3488.38	3394.14	3302.41	3213.34	3127.07	3043.76	2963.56	2886.66	2813.23	2408.45	2482.42	2560.47
Fixed Cost (Rs./kWh)	2.769	2.748	2.674	2.602	2.532	2.464	2.398	2.335	2.274	2.216	1.897	1.956	2.017
Generation Tariff (Rs/kWh)	**5.302**	**5.408**	**5.467**	**5.535**	**5.611**	**5.697**	**5.793**	**5.900**	**6.017**	**6.146**	**6.024**	**6.289**	**6.567**

*Provisional

Table 10: Tariff for Biomass Plant (Air Cooled)*

Year	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Variable Cost													
Capacity (MW)	23	23	23	23	23	23	23	23	23	23	23	23	23
PUF (%)	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Gross Generation (MU)	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04	141.04
Auxiliary Consumption (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Auxiliary Consumption (MU)	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
Net Generation (MU)	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93	126.93
Station Heat Rate (kCal/kWh)	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
Gross Calorific Value (kCal/kg)	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467	3467
Rate of Fuel (Rs./MT)	2080.25	2184.26	2293.48	2408.15	2528.56	2654.99	2787.74	2927.12	3073.48	3227.15	3388.51	3557.94	3735.83
Fuel Cost (Rs. Lacs)	3215.70	3376.49	3545.31	3722.58	3908.71	4104.14	4309.35	4524.81	4751.06	4988.61	5238.04	5499.94	5774.94
Variable Cost (Rs/kWh)	2.533	2.660	2.793	2.933	3.079	3.233	3.395	3.565	3.743	3.930	4.127	4.333	4.550
Fixed Cost													
O&M Expenses (Rs. Lacs)	552.72	584.34	617.76	653.10	690.45	729.95	771.70	815.84	862.51	911.84	964.00	1019.14	1077.44
Depreciation (Rs. Lacs)	859.79	859.79	859.79	859.79	859.79	859.79	859.79	859.79	859.79	859.79	245.65	245.65	245.65
Interest on term loan (Rs. Lacs)	1336.22	1261.98	1113.51	965.05	816.58	668.11	519.64	371.17	222.70	74.23	0.00	0.00	0.00
Interest on working Capital (Rs. Lacs)	356.64	369.08	380.35	392.39	405.23	418.93	433.52	449.04	465.56	483.11	492.61	516.21	541.02
Return on Equity (Rs. Lacs)	700.11	700.11	700.11	700.11	700.11	700.11	700.11	700.11	700.11	700.11	884.35	884.35	884.35
Fixed Cost (Rs. Lacs)	3805.48	3775.31	3671.53	3570.43	3472.17	3376.89	3284.76	3195.96	3110.68	3029.09	2586.62	2665.37	2748.47
Fixed Cost (Rs./kWh)	2.998	2.974	2.893	2.813	2.735	2.660	2.588	2.518	2.451	2.386	2.038	2.100	2.165
Generation Tariff (Rs/kWh)	**5.531**	**5.634**	**5.686**	**5.746**	**5.814**	**5.893**	**5.983**	**6.083**	**6.194**	**6.316**	**6.165**	**6.433**	**6.715**

*Provisional

This Order is signed and issued by the Jharkhand State Electricity Regulatory Commission on this the 20th of October, 2011.

Date: 20th of October, 2011
Place: Ranchi

Sd/-	Sd/-
(T.MUNIKRISHNAIAH)	(MUKHTIAR SINGH)
MEMBER (E)	CHAIRPERSON

A6: ANNEXURES

List of participating members of public in the public hearing

Table 11: List of participating members of public in the public hearing

Sl. No.	Name	Address / Organization if any
1.	Priya Kumari	F.O. Tariff Cell Comm. Deptt. DVC, Kolkata
2.	Sunil Lal	Dy G.M. Rake Power Pvt. Ltd.
3.	Chandershekhar Iyer	Executive Director, Consultant, RPL.
4.	Vijay Prakash Singh	JUSCO, Jamshedpur
5.	K.C. Jha	JUSCO, Jamshedpur
6.	N.K. Patodia	Usha Martin
7.	B.K. Singh	Usha Martin
8.	Lokesh Vaidya	Sanmarg Press
9.	Ashish Samual	Aaj Press
10.	Kedar Nath Lal Das	Jharkhand Technology Pvt. Ltd., Solar Industries, PCB
11.	Ashok Kumar	Director, JREDA
12.	Uday Kr. Singh	JREDA
13.	R. Pandey	Ex DGM(E) SAIL, Bokaro
14.	P.K. Mishra	DGM(E), SAIL, Bokaro
15.	Karun	Dainik Jagran
16.	Munna	Dainik Jagran
17.	Hardeep Singh	The Telegraph