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Rithwik Power Projects Ltd Biomass Plant Operating Parameters from 2014-15 to 2018-19 to determine the Normative Parameters for 2014-19

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To, **Date: 18.11.2022.**
The Dy.General Manager (Technical)
Telangana State Renewable Energy Development Corporation Limited,
Hyderabad – 500 004. Telangana

Sub: Rithwik Power Projects Ltd Biomass Plant Operating Parameters from 2014-15 to 2018-19:

Fuel Cost :

(1) Fuel Mix invariably varies on the availability of different types of biomass in the surrounding areas and also varies from season to season. Since the normative operation parameters of the power plants are determined on the basis of the CEA report, the normative fuel mix is also based the above said report. Rithwik Power Projects Limited Fuel Combination % from 2014-15 to 2018-19 for the determination of fuel cost is as follows:

RITHWIK POWER PROJECTS LIMITED Fuel Composition (2014-15 to 2018-19)						
COMPOSITION %	**YEAR WISE**					
Fuel Combination	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**Average Fuel %**
RICE HUSK	25	27	29	25	23	**26**
WOODY WASTE	30	35	32	44	42	**37**
OTHER AGRI WASTE	45	38	38	31	35	**37**
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

(2) [A] NORMATIVE PARAMETERS OF TSERC from 2014-15 to 2018-19:

S No	Year	TSERC Order (2014-15 to 2018-19)				
		Avg. Cost	Variable Cost	Specific Fuel (Kg / Kwh)	GCV (Kcal / Kg)	Station Heat Rate (SHR)
1	2014-15	2843.00	4.28	1.36	3100	4200
2	2015-16	3056.00	4.60	1.36	3100	4200

3	2016-17	2902.60	4.37	1.36	3100	4200
4	2017-18	2930.30	4.41	1.36	3100	4200
5	2018-19	3196.40	4.81	1.36	3100	4200

[B] CEA ORDER on Normative Parameters from 2014-15 to 2018-19 &

APTEL Judgement on 08.03.2022 for Biomass Plants Variable Cost Issues:

S No	Year	CEA Order (2014-15 to 2018-19) & APTEL Order 08.03.2022		
		Specific Fuel (Kg / Kwh)	GCV (Kcal / Kg)	Station Heat Rate (SHR)
1	2014-15	1.36	3300	4500
2	2015-16	1.36	3300	4500
3	2016-17	1.36	3300	4500
4	2017-18	1.36	3300	4500
5	2018-19	1.36	3300	4500

[C] Rithwik Power Projects Ltd Biomass plant Operating Parameters from 2014-15 to 2018-2019:

RITHWIK POWER PROJECTS LIMITED						
Biomass Power plant Operating Parameters from 2014-15 TO 2018-19						
S No	Year	GENERATION (IN UNITS)	EXPORT (IN UNITS)	Rithwik Power Biomass Power plant Operating Parameters		
				Specific Fuel (Kg / Kwh)	GCV (Kcal / Kg)	Station Heat Rate (SHR)
1	2014-15	49411570	42692000	1.790	2566	4600
2	2015-16	45179460	38971700	1.860	2558	4764
3	2016-17	45553350	39106900	1.770	2573	4558
4	2017-18	44388260	38073300	1.780	2638	4690
5	2018-19	45165790	38814100	1.920	2542	4888

(3) The Specific Fuel Consumption was fixed at 1.36 kg/ KWh on the as" Fired Condition" of fuel. The procured fuels will have moistures ranging from 20% to 60%. The availability of the fuels is highly seasonal. So, they will be procured and kept in the open fuel yard to allow it to get dried off before it is consumed in the boiler. During the process of drying, the fuels will lose its moisture, which shall be accounted as moisture and carpet losses in our power plant. These stock losses in a year will be around 15-20%. These stock losses

will be considered in the fuel consumption only. It will be appropriate to fix the Specific Fuel Consumption as “purchased condition” instead of as “Fired Condition”.

[A] With respect to **Rice Husk,** no conversion is necessary as the fuel "as purchased" is substantially the fuel as “Fired condition”.

[B] There is a need to consider the moisture content, levels in the "as Purchased condition" with respect to **Woody waste (Woody biomass) and Agriwaste** like Chipped bunches,.

"As purchased" condition: % Moisture content of Agri-waste like Chipped bunches 56% and Woody waste (woody biomass) 45% moisture. **Thus the Adjustment of Weight of Fuel for Fuel Cost Calculation is as follows.** Methodology for determining a **conversion factor from "as purchased" to as “fired condition”.**

AGRIWASTE SUCH AS CHIPPED BUNCHES	WOODY WASTE
Moisture content in Chipped bunches is 56% as in purchased condition. Therefore the combustible mass is 44% When the material is dried, the moisture content reduces to 30% Therefore the total mass left is derived in the following way. 1 kg of agri residue with 56% moisture as purchased Weight of dry combustible = 0.44 kg Weight of moisture = 0.56% X= weight of moisture in residual fuel after drying Therefore X / x+0.44) = 0.30 X = 0.30 x + 0.132 x-0.3x = 0.132 0.70 x = 0.132 X= 0.132/ 0.70 = 0.1886 hence X = 0.1886 Therefore total mass = 0.44 + 0.1886 = 0.6286 kg **Therefore the conversion factor for chipped bunches from as purchased to as fired is 0.6286**.	Woody Waste has 45% moisture in as received condition, After drying the moisture content reduces to 25% 1 Kg of woody waste with 45% moisture in as purchased condition Weight of dry combustible = 0.55 kg Weight of moisture = 0.45 kg X = Weight of moisture in the residual fuel after drying Therefore X/(x+0.55) = 0.25 X = 0.25x + 0.1375 x-0.25x = 0.1375 0.75x = 0.1375 X = 0.1375 / 0.75 = 0.1833 hence X = 0.1833 Therefore total mass=0.55+0.1833=0.7333 Kg **Therefore the conversion factor for woody waste from as purchased to as fired is 0.7333**

From the above to obtain 1**.36 kg / Kwh in the "as fired"** condition the quantity of fuel has to be purchased in the **"as purchased" condition is 1.8403 Kgs / Kwh** as shown below:

Rithwik Power Adjustment of Weight of Fuel for Fuel Cost Calculation based on Fuel combination% on Purchased basis from 2014-15 to 2018-19				
Fuel	Qty in Fuel Mix (%)	Qty as fired (kg)	Conversion Factor	Qty As Purchased (kgs)
	A	**B=1.36 X A**	**C**	**B / C**
Rice Husk	**26**	0.3536	1	**0.3536**
Woody waste	**37**	0.5032	0.7333	**0.6862**
Agri Residues	**37**	0.5032	0.6286	**0.8005**

Total	**100.0**	**1.3600**		**1.8403 Kgs**

3. From 2014-19 **t**he Fuel consumption data , the operating Normative Parameters:
Average **Specific Fuel** is ranging **from 1.77 to 1.92kgs / Kwh**.
The Gross calorific value is in between **2542 -2638 K cal / Kg only.**
Thus the **Station Heat Rate is** standing at **4558-4888**.

To arrive at the cost of fuel, the adjusted "as purchased" Specific fuel is to be considered as 1.8404 Kgs/Kwh on the basis of the fuel mix and conversion factors as submitted above.

4. The purchase cost of each fuel comprises the (a) purchase price. (b) Freight / Transport costs (where applicable if extra) and (c) unloading and other handling costs.

Freight / Transport cost varies from plant to plant and the source / nature of fuel. An average transport cost may be considered as Rs.600/- per MT applicable on the "as purchased" quantity.

Unloading and handling cost is Rs.300/- per MT for Woody waste (woody biomass) and Rs.235/- per MT for Chipped bunches (agricultural resides) applicable on the applicable on the "as purchased" quantity.

5.The fuel prices vary from power plant to power plant depending on the availability of biomass locally, the freight and transportation costs involved. The prices also vary according to the season and also on supply/demand situations. The prices of Rs.2800/- of Rice Husk, Rs.3000/- Woody waste and Rs.2100/- for agricultural resides as determined in previous order (based on the study report) are the prices in the "as purchased condition" and not in the "as fired" condition as wrongly stated These prices require to be applied to the "as purchased" quantities as submitted as above.

Fuel Cost Escalation :

6. The fuel cost escalation as determined previously was on the CERC fuel price indexation formula in terms of Clause 45 of CERC Regulation 2012 This formula considered the cost of captive coal as the reference energy component. This is clearly improper as captive coal has no relation whatsoever to biomass.

7. Clause 44 of the CERC Regulation 2012 reads as follows:

44. Fuel cost.:Biomass fuel price during first year of the control period (i.e, FY 2012-13) shall be as specified in the table below and shall be linked to Index formulae as specified under Regulation 45. Alternatively for each subsequent year of the Tariff period the normative escalation factor of 5% per annum shall be applicable at the option of the biomass project developer.

8. Thus, the developers had the option of choosing the indexing mechanism or a normative escalation factor of 5% year on year. The commission may consider allowing normative fuel price escalation at 5% year on year instead of the price indexation formula.

Thank you sir,

Yours Truly,
For **RITHWIK POWER PROJECTS LIMITED**

(**J.Dharma Rao)**

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7 attachments

1. Rithwik Power Generation, EXport, Auxilliary & Import details from 2014-15 to 2018-19.xls
66K

2. Fuel procurement & Consumption details from 2014-15 TO 2018-19.xls
36K

3. RPPL - Type of Raw material consumed and its composition month wise from April'2014 to March'2019.xls
99K

5. Rice Husk and Other Agri waste GCV reports.pdf
2379K

6.Turbine Characteristic curve.pdf
187K

7. Rithwik Power Mass and Heat Balance details from April'2014 to March'2019.xls
95K

Rithwik Power Submission Letter to TSREDCO.pdf
2317K