



TELANGANA STATE ELECTRICITY REGULATORY COMMISSION
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DISCUSSION PAPER

IN THE MATTER OF DETERMINATION OF TARIFF FOR BAGASSE BASED COGENERATION POWER PROJECTS IN TELANGANA STATE

INTRODUCTION:

Electricity being an essential commodity is generated from several sources, which form part as raw material. As such generation is based on both conventional fuels and non-conventional fuels. Non-conventional fuels are based on renewable sources, which are available in abundance and can be used time and again.

2. Electricity is governed by the Electricity Act, 2003 (Act, 2003) at present and the rules and regulations are issued under the said Act, 2003 including but limited to policy framed by the government. Section 86 (1) (e) of the Act, 2003 requires the Appropriate Commission to promote renewable sources of energy and provide for connectivity with the grid and declare mandatory purchase of such energy to a minimum level of consumption in the area of the distribution licensee.

3. Towards this objective, the Government of India has been issuing policy statements from time to time exercising the power under the relevant Acts and at present Act, 2003. The latest policy announcement has been made in the National Tariff Policy of 2016.

4. The Andhra Pradesh Electricity Regulatory Commission (APERC) as it then was in the year 2000 initiated the process of determination of tariff for renewable energy and notified tariff by order dated 20.06.2001, which tariff was applicable up to 31.03.2004 for all types of renewable energy except solar. Thereafter, by another order dated 20.03.2004, the APERC had passed orders and revised tariff for the control period 2004-2009 identifying rates for specific type of fuel. Further, the then

APERC determined tariff for renewable sources by an order dated 31.03.2009 for the period from 01.04.2009 to 31.03.2014. However, the said order did not notify the fixed cost norms for the ensuing projects in the said control period.

5. After a protracted litigation as understood from the orders of the then APERC, the Hon'ble Appellate Tribunal for Electricity (ATE) had set out the normative parameters in respect of the projects commissioned for the control period 2004-2009 by order dated 22.12.2012. While doing so, the Hon'ble ATE required the then Commission to notify the final tariff for the said period taking into consideration certain parameters approved by it.

6. The generic tariff as determined erstwhile APERC is applicable to the projects which generate power based on renewable energy sources such as bio-mass, bagasse, hydel, wind etc. The APERC passed a revised tariff order dated 22.06.2013, pursuant to order dated 22.12.2012 in Appeal Numbers 150 of 2011 and batch, and by order dated 30.04.2013 in R. P. 3 / 2013 and batch as passed by Hon'ble ATE, determining the tariff for Biomass, Bagasse based co-generation and mini-hydel power plants which were existing as on 31-03-2004 and those commissioned between 01.04.2004 to 31.03.2009 except for the projects covered by negotiated PPAs based on the norms indicated in the aforesaid orders of the Hon'ble APTEL. Further, the then APERC had passed orders on 06.08.2013 determining the variable cost for the period 2009- 2014 to give effect to the order of the Hon'ble ATE. Other terms and conditions of the order dated 31.03.2009 remained unaltered. The then APERC had also determined the variable charges for the control period 2014 – 2019 by an orders dated 16.05.2014 in O. P. 32 of 2014.

7. The NTP 2016 at sub clause 2 of clause 6.4 has provided as below.

“(2) States shall endeavor to procure power from renewable energy sources through competitive bidding to keep the tariff low, except from the waste to energy plants. Procurement of power by Distribution Licensee from renewable energy sources from projects above the notified capacity, shall be done through competitive bidding process, from the date to be notified by the Central Government. However, till such notification, any such procurement of power from renewable energy sources projects, may be done under Section

62 of the Electricity Act, 2003. While determining the tariff from such sources, the Appropriate Commission shall take into account the solar radiation and wind intensity which may differ from area to area to ensure that the benefits are passed on to the consumers.”

8. One of the cogeneration plants running in the state of Telangana is M/s. NSL Krishanaveni Sugars Limited. It has filed a petition before the Commission for determination of the tariff for generation of energy from its 28.2 MW bagasse based cogeneration plant established at Ramkrishanapuram Village of erstwhile Mahaboobagar District (presently in Wanaparthy Dist). It has stated and brought to the notice of the Commission by filing a petition before it that it is a plant established in the year 2011 and has been undertaking supply of energy to the DISCOMs since then under the short term procurement in the absence of generic tariff order for the bagasse based cogeneration projects commissioned after 31.03.2009.

9. Noticing the above position and in view of the tariff policy notified by the Government of India, the Commission has now undertaken determination of the generic tariff for bagasse based cogeneration projects.

10. The operating norms (parameters) based on APTEL judgment for determination of fixed cost are given below and resulting working sheets for generic tariff are placed at Annexure A and B. The Table A and B shown below disclose the parameters relied upon by the petitioner and the parameters that are proposed by the Commission respectively.

Table - A

Sl.No.	Particulars	Units	As per Petition
1	Installed Power Generation considered for workings	MW	1
2	Auxiliary Consumption	%	9%
3	PLF	%	55%
4	Useful life	Years	20
5	Capital Cost	Rs Lakhs / MW	460
6	Debt	%	70%
7	Equity	%	30%
8	Total Debt Amount	Rs in Lakhs / MW	322

9	Total Equity Amount	Rs in Lakhs / MW	138
10	Interest on Debt	% PA	12%
11	Return on Equity		
a	ROE for first 10 years	% PA	19%
b	ROE after 10 years	% PA	24%
C	Weighted average of ROE	%	21.50%
12	Discount Rate (Equiv to WACC)	%	14.85%
13	Depreciation		
A	Depreciation Rate 8 th year	%	7.84%
B	Depreciation Rate 9 th Year	%	7.28%
C	Depreciation Rate Balance period	%	1.82%
14	Working Capital		
A	For Fixed charges		
Aa	O & M Charges	Months	1
Ab	Maintenance spares (1 %of Capital Cost (CC))	Rs in Lakhs	4.60
Ac	Receivables for Debtors	Months	2
B	For Variable Charges		
Ba	Bagasse stock	Months	1
15	Interest on working Capital	% PA	12.00%
16	Heat rate	Kcal / KW hr	3600
17	GCV	Kcal / Kg	2250
18	O & M Expenses : 4 % of Capital Cost(CC)	Rs in Lakhs	18.40
19	O & M Escalation	%	6.69%

Table – B

Sl. No.	Particulars	Units	TSERC
1	Installed Power Generation considered for workings	MW	1
2	Auxiliary Consumption	%	9.00%
3	PLF	%	60%
4	Useful life	Years	20
5	Capital Cost	Rs Lakhs / MW	435.5
6	Debt	%	70%
7	Equity	%	30%
8	Total Debt Amount	Rs in Lakhs	304.87
9	Total Equity Amount	Rs in Lakhs	130.66
10	Interest on Debt	% PA	10.66%
11	Return on Equity		
a	ROE for first 10 years	% PA	17.56%

b	ROE after 10 years	% PA	17.56%
C	Weighted average of ROE	%	17.56%
12	Discount Rate (Equiv to WACC)	%	12.73%
13	Depreciation		
a	Depreciation Rate for 1 st 13 years	%	5.28%
b	Depreciation Rate 14 th year	%	3.05%
c	Depreciation Rate Balance period		0.00%
14	Working Capital		
a	For Fixed charges		
	O & M Charges	Months	1.00
	Maintenance spares (% of O & M expenses)	15% of O & M expenses (14.11 Laks)	3.17
	Receivables for Debtors	Months	2
b	For Variable Charges		
	Bagasse stock	Months	1
15	Interest on working Capital	% PA	11.66%
16	Heat rate	Kcal / KWhr	3600
17	GCV	Kcal/Kg	2250
18	Bagasse Price for 2018-19	Rs / MT	1743
19	O & M Expenses	Rs Lacs / MW	21.13
20	O & M Escalation		5.00%

11. Suggestions and comments are invited from all the stakeholder and public at large, so as to reach the Commission Secretary on or before 28.07.2018 by 5.00 PM. In addition to the above, the Commission desire to hear the views on the following issues also -

- i. Whether to determine Levelised tariff (fixed cost) and indicative year wise variable cost for useful life of plant.
- ii. The year wise fuel Escalation order issued by the Commission will indicate the variable cost which can be levied.

12. Based on the above material, the Commission proposes to determine the tariff for bagasse based cogeneration power plant for the control period 2018-2021.

Sd/-
COMMISSION SECRETARY (FAC)

Place: Hyderabad
Date: 09.07.2018.

Annexure A

Determination of Tariff for non-fossil fuel based co-generation Projects		2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
Units Generation	Units	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Installed capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross Generation	MU		4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82
Auxiliary Consumption	MU		0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Net Generation	MU		4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38
Fixed cost																						
O&M Expenses	Rs in lakhs		18.40	19.63	20.94	22.35	23.84	25.44	27.14	28.95	30.88	32.96	35.16	37.51	40.02	42.70	45.56	48.60	51.86	55.32	59.03	62.98
Depreciation	Rs in lakhs		36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06	36.06
Opening loan	Rs in lakhs		322.00	285.94	249.87	213.81	177.74	141.68	105.62	69.55	33.49	0.00	0.00									
Closing loan	Rs in lakhs		285.94	249.87	213.81	177.74	141.68	105.62	69.55	33.49	0.00											
Average loan	Rs in lakhs		303.97	267.90	231.84	195.78	159.71	123.65	87.58	51.52	15.24	0.00										
Interest on term loan	Rs in lakhs		36.48	32.15	27.82	23.49	19.17	14.84	10.51	6.18	1.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O&M Expenses/Month	Rs in lakhs		1.533	1.636	1.745	1.862	1.987	2.120	2.261	2.413	2.574	2.746	2.930	3.126	3.335	3.558	3.796	4.050	4.321	4.610	4.919	5.248
Maintenance spares	Rs in lakhs		4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600	4.600
Bagasse cost - 1 month	Rs in lakhs		6.41	6.73	7.06	7.42	7.96	10.71	10.18	10.27	10.36	11.87	12.58	13.34	14.14	14.98	15.88	16.84	17.85	18.92	20.05	21.26
Relevables - 2 months	Rs in lakhs		33.26	33.39	33.58	33.81	0.00	39.66	38.11	37.87	38.59	36.10	39.12	41.08	43.16	45.37	47.71	50.20	52.84	55.64	58.62	61.78
Interest on working capital loan	Rs in lakhs		5.50	5.55	5.64	5.72	3.99	6.85	6.62	6.62	6.80	6.64	7.11	7.46	7.83	8.22	8.64	9.08	9.55	10.05	10.58	11.15
Return on Equity	Rs in lakhs		26.22	26.22	26.22	26.22	26.22	26.22	26.22	26.22	26.22	33.12	33.12	33.12	33.12	33.12	33.12	33.12	33.12	33.12	33.12	33.12
Total Fixed cost	Rs in lakhs		122.66	119.63	116.69	113.85	107.28	104.41	106.55	104.04	99.43	74.18	83.75	86.45	89.33	92.40	95.68	99.17	102.89	106.86	111.09	115.60
Per unit cost of Generation																						
O&M expenses	Rs/KWhr		0.42	0.45	0.48	0.51	0.54	0.58	0.62	0.66	0.75	0.80	0.85	0.91	0.97	1.04	1.11	1.18	1.26	1.35	1.44	
Depreciation	Rs/KWhr		0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Interest on term loan	Rs/KWhr		0.83	0.73	0.63	0.54	0.44	0.34	0.24	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Interest on working capital loan	Rs/KWhr		0.13	0.13	0.13	0.13	0.05	0.15	0.15	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	
ROE	Rs/KWhr		0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	
Total Fixed	Rs/KWhr		2.80	2.73	2.66	2.60	2.45	2.50	2.43	2.37	2.27	1.69	1.91	1.97	2.04	2.11	2.18	2.26	2.35	2.44	2.53	2.64
Total CGG	%/KV/hr		4.55	4.57	4.60	4.67	5.17	5.41	5.22	5.18	5.33	4.94	5.35	5.62	5.91	6.21	6.53	6.87	7.23	7.61	8.02	8.45
Discount Factor (WACC)		0.1485																				
Discount Factor			1	0.8707	0.76	0.66	0.57	0.50	0.44	0.38	0.33	0.29	0.25	0.22	0.19	0.17	0.14	0.13	0.11	0.10	0.08	0.07
Levelised Tariff (Fixed)	Rs/KWhr		2.47																			
Fuel cost for Working Capital computation																						
Bagasse cost for WC calculations @ 5% escalation up to 13-14 & thereafter as per VC order dated 18.05.2014 up to 2018-19 & thereafter 6% indicative escalation as per APERC orders	Rs/MT		998	1047	1100	1155	1211	1268	1324	1381	1438	1495	1552	1609	1666	1723	1780	1837	1894	1951	2008	2065
Bagasse consumption	MT		7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8	7708.8
Variable cost with Fuel Escalation up to 2018-19 as per Orders of APERC/TSERC, thereafter indicative 6% Escalation as per APERC order dated 18.05.2014	Rs/KWhr		1.75	1.84	1.93	2.03	2.13	2.23	2.33	2.43	2.53	2.63	2.73	2.83	2.93	3.03	3.13	3.23	3.33	3.43	3.53	3.63

Bagasse cost for WC calculations @ 5% escalation up to 13-14 & Thereafter as per VC order dated 16.05.2014 up to 2018-19 &	Rs/MT		998	1047	1100	1155	1551	1668	1584	1598	1743	1848	1958	2076	2200	2333	2472	2621	2778	2945	3121	3309
Bagasse consumption	MT		8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8410	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6	8409.6
Variable cost with Fuel Escalation up to 2018-19 as per Orders of APERC/TSE RC , thereafter in indicative 6 % Escalation as per APERC order dated 16.05.2014	Rs/KW hr		1.75	1.84	1.93	2.03	2.73	2.93	2.79	2.81	3.06	3.25	3.44	3.65	3.87	4.10	4.35	4.61	4.88	5.18	5.49	5.82
Total COG with VC as per APERC/TSE RC orders			3.94	4.03	4.12	4.22	4.92	5.12	4.97	5.00	5.25	5.44	5.63	5.84	6.06	6.29	6.54	6.80	7.07	7.37	7.68	8.01