



**ASSAM ELECTRICITY REGULATORY COMMISSION
GUWAHATI**

Petition No.(Suo-Motu)

- Coram: 1. Shri N K Das, Chairperson
2. Shri Dipak Chakravarty, Member
3. Shri Subhash Das, Member**

Date of Order: 13.11.2017

IN THE MATTER OF

Determination of levellised generic tariff for FY2017-18 to 2019-20 under Regulation 8 of the Assam Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017.

ORDER

1. The Commission has notified the Assam Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017, on 04.10.2017 (hereinafter referred to as "the RE Tariff Regulations"), which provide for terms and conditions and the procedure for determination of generic tariff of the following categories of Renewable Energy (RE) generating stations:

- (a) Small Hydro Projects;
- (b) Biomass Power Projects with Rankine Cycle technology;
- (c) Non-fossil fuel-based co-generation Plants;
- (d) Biomass Gasifier based projects;
- (e) Biogas based projects

2. As per Regulation 7 of the RE Tariff Regulations, the Commission shall only determine project specific tariff for the following RE technologies:
- (a) Solar PV and Solar Thermal;
 - (b) Wind Energy (including on-shore and off-shore);
 - (c) Biomass Gasifier based projects, if a project developer opts for project specific tariff;
 - (d) Biogas based projects, if a project developer opts for project specific tariff;
 - (e) Municipal Solid Waste and Refuse Derived Fuel based projects with Rankine cycle technology;
 - (f) Hybrid Solar Thermal power projects;
 - (g) Other hybrid projects include renewable–renewable or renewable-conventional sources, for which renewable technology is approved by MNRE;
 - (h) Any other new renewable energy technologies approved by MNRE.
3. The Commission, in due discharge of the mandate under Regulation 8(1) of the RE Tariff Regulations proposes to determine the generic tariff of the SHP projects mentioned in the Para 1 above for the control period (i.e. FY 2017-18 to 2019-20) as per the proposal enclosed as **Annexure-I**.
4. Comments / suggestions of the stakeholders on the above proposal are invited by 4th December, 2017. A public hearing on the above proposal will be held on 8th December, 2017.

Sd/-
[Mr. Subhash Das]

MEMBER

Sd/-
[Mr. Dipak Chakravarty]

MEMBER

Sd/-
[Mr. N K Das]

CHAIRPERSON

PROPOSED LEVELLISED GENERIC TARIFF FOR SMALL HYDRO POWER PROJECT FOR THE CONTROL PERIOD FY 2017-18 to 2019-20.

1. The proposed levellised generic tariffs for Small Hydro Power Projects are discussed below. For Solar PV, Solar Thermal, Wind (onshore and offshore), MSW/RDF and other emerging renewable energy technologies, the tariff will be project specific, and not generic.

USEFUL LIFE

2. Clause (cc) of sub-Regulation (1) of Regulation 2 of the RE Tariff Regulations defines 'useful life' in relation to a unit of a generating station (including evacuation system) to mean the following duration from the date of commercial operation (COD) of such generation facility:

Renewable Energy Projects	Years
Small Hydro	35

CONTROL PERIOD

3. Regulation 5 of the RE Tariff Regulations provides that the control period for determination of tariff for renewable energy projects (RE projects) shall be three years of which the first year of the control period is FY 2017-18. The proviso to the said regulation stipulates that the tariff determined for the RE projects commissioned during the control period shall continue to be applicable for the entire duration of the tariff period as proposed in Regulation 6 of the RE Tariff Regulations.

TARIFF STRUCTURE

4. Regulation 9 of the RE Tariff Regulations stipulates that the tariff for RE projects shall be single part tariff consisting of the following fixed cost components:
 - a. Return on equity;

- b. Interest on loan capital;
- c. Depreciation;
- d. Interest on working capital;
- e. Operation and maintenance expenses;

For renewable energy technologies having fuel cost component, such as biomass power projects and non-fossil fuel based cogeneration, single part tariff with two components i.e. fixed cost component and fuel cost component, is to be determined.

TARIFF DESIGN

5. Regulation 10 of the RE Tariff Regulations outlines the principles for tariff design for RE generating stations as under:

- 1) *The generic tariff shall be determined on levellised basis for the Tariff Period. Provided that for renewable energy technologies having single part tariff with two components, tariff shall be determined on levellised basis considering the year of commissioning of the project for fixed cost component while the fuel cost component shall be specified on year of operation basis.*
- 2) *For the purpose of levellised tariff computation, the discount factor equivalent to Post Tax weighted average cost of capital shall be considered.*
- 3) *Levellisation shall be carried out for the 'useful life' of the Renewable Energy project.*
- 4) *The above principles shall also apply for project specific tariff."*

LEVELLISED TARIFF

6. Levellised Tariff is calculated by carrying out levellisation for 'useful life' of each technology considering the discount factor for time value of money. Norms considered for computation of tariff are as below:

DISCOUNT FACTOR

7. In accordance with Regulation 10(2) of RE Tariff Regulations, the discount factor considered for this exercise is equal to the post tax weighted average cost of capital on the basis of normative debt: equity ratio (70:30) proposed in the Regulations. Considering the normative debt equity ratio and weighted average of the post-tax rates for debt and equity component, the discount factor is calculated. Interest Rate considered for the loan component (i.e.70 %) of capital cost is 10.00 %. For equity component (i.e. 30 %), rate of Return on Equity (ROE) is considered at post tax rate of 14 %. The discount factor derived by this method for all technologies is 9.08

CAPITAL COST

8. Regulation 12 of the RE Tariff Regulations stipulates that the norms for the capital cost as proposed in the technology specific chapter shall be inclusive of all capital works like plant and machinery, civil works, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point. The Commission has proposed the normative capital cost, applicable for the first year of control period i.e. FY 2017-18, for various RE technologies viz., Small Hydro Power, Biomass Power based on Rankine cycle, Non-Fossil Fuel based Cogeneration, Biomass Gasifier and Biogas based power projects.
9. The Capital Cost, for above mentioned RE technologies, as proposed for first year of control period will remain valid for the entire duration of the control period unless reviewed earlier by the Commission.

Technology specific capital cost of RE projects is discussed herein as under:

(A) Capital cost of Small Hydro Projects

10. Small Hydro Projects for the purpose of the RE Tariff Regulations cover those projects which are located at the sites approved by the State Nodal Agencies/State Governments using new plant and machinery and with installed power plant capacity lower than or equal to 25 MW.
11. The Commission under Regulation 28 (1) has proposed the normative capital cost for small hydro projects for first year of Control Period (FY 2017-18) as under:

Region	Projects Size	Capital Cost (Rs. Lakhs/MW)
Assam	Below 5 MW	1000
	5 MW to 25 MW	900

DEBT-EQUITY RATIO

12. Sub-Regulation (1) of Regulation 13 of the RE Tariff Regulations, as stipulated below, provides that the debt-equity ratio of 70:30 is to be considered for determination of generic tariff based on suo-motu petition.

Regulation 13 (1): For generic tariff to be determined based on suo-motu petition, the debt equity ratio shall be 70:30.

13. Based on the debt equity ratio of 70:30, the debt and equity components of the normative capital cost for determination of tariff for the RE projects have been worked out as under:

Small Hydro Projects	Debt (Rs. Lakh)	Equity (Rs. Lakh)
(a) below 5 MW	700.00	300.00
(b) 5 MW to 25 MW	630.00	270.00

RETURN ON EQUITY

14. Sub-Regulation (2) of Regulation 16 of the RE Tariff Regulations, as defined below, stipulates the normative Return on Equity (ROE) as 17.56% (after grossing up by prevailing MAT rate of 20.26%¹ (Avg. MAT rate) as on 1 April 2016) for the useful life of the project.

Regulation 16 (2): The normative Return on Equity shall be 14 %, to be grossed up by prevailing MAT as on 1st April of previous year for the entire useful life of the project.

¹ Average of MAT rate, as on 1st April 2016, for companies having profit less than Rs. 1 Cr, between Rs. 1 Cr & 10 Cr and above Rs. 10 Cr i.e. 19.055%, 20.389% and 21.342% respectively

INTEREST ON LOAN

15. Sub-Regulation (1) of Regulation 14 of the RE Tariff Regulations provides that the loan tenure of 13 years is to be considered for the purpose of determination of tariff for RE projects.

Sub-Regulation (2) of the said Regulation provides for computation of interest on loan as under:

(a) "The loan arrived at in the manner indicated in Regulation 13 shall be considered as gross normative loan for calculation of interest on loan. The normative loan outstanding as on April 1st of every year shall be worked out by deducting the cumulative repayment up to March 31st of previous year from the gross normative loan.

(b) For the purpose of computation of tariff, normative interest rate of two hundred (200) basis points above the average State Bank of India MCLR (Marginal Cost Lending Rate - one year tenor) prevalent during the last available six months shall be considered.

(c) Notwithstanding any moratorium period availed by the generating company, the

repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed.”

16. From the monthly data of MCLR for the last available six months from State Bank of India the average MCLR is 8.00%.
17. In terms of the above, interest rate for loan component has been determined as 10.00%.

DEPRECIATION

18. Regulation 15 of the RE Tariff Regulations provides for computation of depreciation in the following manner:

- (1) *“The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset.*
- (2) *Depreciation rate of 5.28% per annum for first 13 years and remaining depreciation to be spread during remaining useful life of the RE projects considering the salvage value of the project as 10% of project cost shall be considered.*
- (3) *Depreciation shall be chargeable from the first year of commercial operation. Provided that in case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis”.*

19. In accordance with the above, the rate of depreciation for the first 13 years has been considered as 5.28% and the rate of depreciation from the 14th year onwards has been spread over the balance useful life of the RE project as under:

Details	Small Hydro
Useful Life (in years)	35
Rate of depreciation for 13 years (%)	5.28
Rate of depreciation after first 13 years (%)	0.97

INTEREST ON WORKING CAPITAL

20. Regulation 17 of the RE Tariff Regulations provides for the working capital requirements of the RE projects as under:

- "(1) *The Working Capital requirement in respect of Small Hydro Power shall be computed in accordance with the following:*
- Small Hydro Power*
- a) *Operation & Maintenance expenses for one month;*
 - b) *Receivables equivalent to 2 (two) months of energy charges for sale of electricity calculated on the normative CUF;*
 - c) *Maintenance spare @ 15% of operation and maintenance expenses*
- (2) *Interest on Working Capital shall be computed at rate equivalent to the normative interest rate of three hundred (300) basis points above the average State Bank of India MCLR (One Year Tenor) prevalent during the last available six months for the determination of tariff".*

21. Receivables equivalent to two months of actual fixed cost have been considered. Interest rate has been computed as average of State Bank of India MCLR (One Year Tenor) prevalent during the last available six months plus 300 basis points (equivalent to interest rate of 11.00%). The interest on working capital has been worked out as specified below:

Details	Small Hydro Projects
(i) O&M expenses (month)	1
(ii) Maintenance spares (%) of O&M expenses	15
(iii) Receivables (months)	2
(C) Interest On Working Capital (%)	11.00%

CALCULATION OF CAPACITY UTILIZATION FACTOR (CUF)/PLANT LOAD FACTOR (PLF)

22. Regulation 18 of the RE Tariff Regulations, as defined below, proposes number of hours for calculation of CUF/PLF as 8766.

“Regulation 18: The number of hours for calculation of CUF/PLF (wherever applicable) for various RE technologies shall be 8766.”

OPERATION AND MAINTENANCE EXPENSES

23. Regulation 19 of the RE Tariff Regulations provides for Operation and Maintenance Expenses (O&M expenses) in respect of RE projects as under:

"Operation and Maintenance Expenses

- (1) 'Operation and Maintenance or O&M expenses' shall comprise repair and maintenance (R&M), establishment including employee expenses and administrative & general expenses.
- (2) Operation and maintenance expenses shall be determined for the Tariff Period based on normative O&M expenses proposed by the Commission subsequently in these Regulations for the first Year of Control Period.
- (3) Normative O&M expenses allowed during first year of the Control Period (i.e. FY2017-18) under these Regulations shall be escalated at the rate of 5.72% per annum over the Tariff Period"

24. The normative O&M expenses for various RE technologies proposed under the relevant provisions of the RE Tariff Regulations are as under:

(a) Small Hydro: Regulation 31 of RE Regulations provided for the normative O&M expenses for small hydro projects for the first year of the Control Period (FY 2017-18) which shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levelled tariff.

Region	Project Size	O&M expenses (Rs. lakhs/MW)
Assam	Below 5 MW	36
	5 MW to 25 MW	27

CAPACITY UTILISATION FACTOR (CUF)

25. Regulation 29 of the RE Tariff Regulations proposed the norms for Capacity Utilization Factor (CUF) of units generated in a year in respect of the Small Hydro generating stations as per the details given in the table below:

Renewable Energy Projects	CUF
Small Hydro Projects	45 %

AUXILIARY POWER CONSUMPTION

26. Regulations 30, 35, 46, 64 and 72 of the RE Tariff Regulations stipulate the auxiliary power consumption factor for different technologies as under:

Renewable Energy Projects	Auxiliary Consumption Factor
Small Hydro	1 %

Subsidy or incentive by the State Government

40. Regulation 23 of the RE Tariff Regulations provides as under:

"The Commission shall take into consideration any incentive or subsidy offered by the State Government, including accelerated depreciation benefit if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations.

41. In the light of the discussion made in the preceding paragraphs, the generic tariff for Small Hydro Projects for the control period FY2017-18 to 2019-20 have been arrived at and are proposed as under:

Generic Tariff for Small Hydro Project (SHP) Technologies

Particular	Levelling Total Tariff (Rs./kWh)
Small Hydro Power Project	
Below 5MW	4.91
5MW to 25 MW	4.14

The detailed computations for the generic tariff for Small Hydro Power project have been enclosed herewith as per the details given hereunder:

S.No	Small Hydro Power Projects	Annexure
1	<i>Projects Less than 5 MW</i>	<i>Annexure 1A</i>
2	<i>Projects between 5 MW and 25 MW</i>	<i>Annexure 1B</i>

Small Hydro Projects (less than 5MW)

A) OPERATIONAL AND FINANCIAL DATA

SL No.	Particulars	UNIT	Tariff determined by the Commission
OPERATIONAL DATA			
1	Installed Capacity	MW	1.00
2	Annual Gross Generation	MU	3.94
3	Annual Net Generation (1st Year)	MU	3.90
FINANCIAL DATA			
4	Total Project Cost including IDC	lakh	1,000.00
5	Total Project Cost	Lakh/MW	1,000.00
6	Debt (70%)	lakh	700.00
7	Equity (30%)	lakh	300.00
Total (7+8)			1,000.00
8	Discount rate	%	9.08

B) NORMS

FINANCIAL			
1	O & M Cost	Lakh/MW	36.00
2	Depreciation Rate	% (upto 13th year)	5.28%
		% (from 14th year onwards)	0.97%
3	ROE	%	17.56%
4	Interest on Term Loan	%	10.00%
5	Interest on working capital	%	11.00%
6	O & M annual Escalation Rate	%	5.72%
TECHNICAL			
7	Auxiliary Power Consumption	%	1.00%
8	CUF	%	45.00%

D)

1	Levellized tariff (Discounted)	Rs./Kwh	4.91
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A) Technical Parameters	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1 Installed Capacity	MW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
2 Gross Generation	MU	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94		
3 Auxillary Consumption	MU	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
4 Net Generation	MU	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91		
B) Fixed Cost																																						
1 O&M Normative O & M cost	Rs. Lakh	36.00	38.06	40.24	42.54	44.97	47.54	50.26	53.14	56.18	59.39	62.79	66.38	70.18	74.19	78.43	82.92	87.66	92.68	97.98	103.58	109.51	115.77	122.39	129.39	136.80	144.62	152.89	161.64	170.88	180.66	190.99	201.92	213.47	225.68	238.59		
2 Depreciation	Rs. Lakh	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73	8.73		
3 Interest on term loan	Rs. Lakh	67.31	61.92	56.54	51.15	45.77	40.38	35.00	29.62	24.23	18.85	13.46	8.08	2.69																								
4 Interest on Working Capital	Rs. Lakh	4.74	4.73	4.73	4.73	4.74	4.76	4.78	4.81	4.84	4.89	4.94	5.00	5.07	4.47	4.66	4.86	5.08	5.30	5.54	5.79	6.06	6.34	6.63	6.95	7.28	7.63	8.00	8.39	8.81	9.24	9.71	10.20	10.71	11.26	11.84		
5 Return on Equity	Rs. Lakh	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68	52.68		
Total fixed cost	Rs. Lakh	208	205	202	199	196	193	190	188	185	183	181	180	178	140	145	149	154	159	165	171	177	184	190	198	205	214	222	231	241	251	262	274	286	298	312		
6 Nominal Fixed cost	Rs./KWH	5.33	5.25	5.16	5.09	5.01	4.94	4.87	4.81	4.75	4.69	4.64	4.60	4.56	3.59	3.70	3.82	3.95	4.08	4.22	4.37	4.53	4.70	4.88	5.06	5.26	5.47	5.69	5.93	6.17	6.44	6.71	7.00	7.31	7.64	7.99		
Fixed cost with Discount factor	Rs./KWH	5.33	4.81	4.34	3.92	3.54	3.20	2.89	2.62	2.37	2.15	1.95	1.77	1.61	1.16	1.10	1.04	0.98	0.93	0.88	0.84	0.80	0.76	0.72	0.69	0.65	0.62	0.59	0.57	0.54	0.52	0.49	0.47	0.45	0.43	0.42		
C) Levelized tariff																																						
1 O & M expn	Rs./KWH	0.92	0.97	1.03	1.09	1.15	1.22	1.29	1.36	1.44	1.52	1.61	1.70	1.80	1.90	2.01	2.12	2.24	2.37	2.51	2.65	2.80	2.96	3.13	3.31	3.50	3.70	3.92	4.14	4.38	4.63	4.89	5.17	5.47	5.78	6.11		
2 Depreciation	Rs./KWH	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22		
3 Interest on term loan	Rs./KWH	1.72	1.59	1.45	1.31	1.17	1.03	0.90	0.76	0.62	0.48	0.34	0.21	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
4 Interest on Working Capital	Rs./KWH	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.20	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.29	0.30		
5 Return on Equity	Rs./KWH	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35		
Total Cost of Generation	Rs./KWH	5.33	5.25	5.16	5.09	5.01	4.94	4.87	4.81	4.75	4.69	4.64	4.60	4.56	3.59	3.70	3.82	3.95	4.08	4.22	4.37	4.53	4.70	4.88	5.06	5.26	5.47	5.69	5.93	6.17	6.44	6.71	7.00	7.31	7.64	7.99		
Discounted Levelized tariff	Rs./KWH	4.91																																				
D) Interest on Working Capital																																						
1 O & M Expenses for one month	Rs. Lakh	3.00	3.17	3.35	3.54	3.75	3.96	4.19	4.43	4.68	4.95	5.23	5.53	5.85	6.18	6.54	6.91	7.31	7.72	8.16	8.63	9.13	9.65	10.20	10.78	11.40	12.05	12.74	13.47	14.24	15.05	15.92	16.83	17.79	18.81	19.88		
2 Receivables equivalent to 2 months of Fixed charges	Rs. Lakh	34.71	34.15	33.62	33.10	32.61	32.15	31.71	31.29	30.91	30.55	30.23	29.94	29.69	23.35	24.08	24.87	25.69	26.56	27.49	28.46	29.50	30.59	31.74	32.96	34.25	35.61	37.05	38.57	40.18	41.89	43.69	45.59	47.60	49.72	51.97		
3 Maintenance spares @ 15% of O & M expenses	Rs. Lakh	5.40	5.71	6.04	6.38	6.75	7.13	7.54	7.97	8.43	8.91	9.42	9.96	10.53	11.13	11.77	12.44	13.15	13.90	14.70	15.54	16.43	17.37	18.36	19.41	20.52	21.69	22.93	24.25	25.63	27.10	28.65	30.29	32.02	33.85	35.79		
Working Capital	Rs. Lakh	43.11	43.03	43.01	43.03	43.11	43.24	43.43	43.69	44.02	44.41	44.88	45.43	46.06	40.66	42.39	44.21	46.15	48.19	50.35	52.63	55.05	57.60	60.30	63.15	66.17	69.35	72.73	76.29	80.06	84.04	88.25	92.70	97.41	102.38	107.64		
4 Interest on Working Capital	Rs. Lakh	4.74	4.73	4.73	4.73	4.74	4.76	4.78	4.81	4.84	4.89	4.94	5.00	5.07	4.47	4.66	4.86	5.08	5.30	5.54	5.79	6.06	6.34	6.63	6.95	7.28	7.63	8.00	8.39	8.81	9.24	9.71	10.20	10.71	11.26	11.84		
Discount Factor		1.000	0.917	0.840	0.770	0.706	0.648	0.594	0.544	0.499	0.457	0.419	0.384	0.352	0.323	0.296	0.272	0.249	0.228	0.209	0.192	0.176	0.161	0.148	0.135	0.124	0.114	0.104	0.096	0.088	0.080	0.074	0.068	0.062	0.057	0.052		

Annexure- 1B

Small Hydro Projects (between 5MW and 25MW)

A) OPERATIONAL AND FINANCIAL DATA				
SL No.	Particulars	UNIT	Tariff determined by the Commission	
OPERATIONAL DATA				
1	Installed Capacity	MW	1.00	
2	Annual Gross Generation	MU	3.94	
3	Annual Net Generation (1st Year)	MU	3.90	
FINANCIAL DATA				
4	Total Project Cost including IDC	lakh	900.00	
5	Total Project Cost	Lakh/MW	900.00	
6	Debt (70%)	lakh	630.00	
7	Equity (30%)	lakh	270.00	
Total (7+8)			900.00	
8	Discount rate	%	9.08	
B) NORMS				
FINANCIAL				
1	O & M Cost	Lakh/MW	27.00	
2	Depreciation Rate	% (upto 13th year)	5.28%	
		% (from 14th year onwards)	0.97%	
3	ROE	%	17.56%	
4	Interest on Term Loan	%	10.00%	
5	Interest on working capital	%	11.00%	
6	O & M annual Escalation Rate	%	5.72%	
TECHNICAL				
7	Auxiliary Power Consumption	%	1.00%	
8	CUF	%	45.00%	
D)				
1	Levellized tariff (Discounted)	Rs./Kwh	4.14	

A) Technical Parameters	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
1 Installed Capacity	MW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2 Gross Generation	MU	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	
3 Auxillary Consumption		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
4 Net Generation	MU	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91
B) Fixed Cost																																						
1 O&M Normative O & M cost	Rs. Lakh	27.00	28.54	30.18	31.90	33.73	35.66	37.70	39.85	42.13	44.54	47.09	49.78	52.63	55.64	58.83	62.19	65.75	69.51	73.48	77.69	82.13	86.83	91.80	97.05	102.60	108.47	114.67	121.23	128.16	135.49	143.24	151.44	160.10	169.26	178.94		
2 Depreciation	Rs. Lakh	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	
3 Interest on term loan	Rs. Lakh	60.58	55.73	50.88	46.04	41.19	36.35	31.50	26.65	21.81	16.96	12.12	7.27	2.42																								
4 Interest on Working Capital	Rs. Lakh	4.03	4.00	3.99	3.97	3.97	3.96	3.96	3.97	3.98	4.00	4.02	4.05	4.09	3.53	3.67	3.82	3.98	4.15	4.33	4.51	4.71	4.92	5.15	5.38	5.63	5.89	6.17	6.47	6.78	7.11	7.45	7.82	8.21	8.62	9.05		
5 Return on Equity	Rs. Lakh	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	47.41	
Total fixed cost	Rs. Lakh	182	178	175	172	169	166	163	161	158	156	153	151	149	114	118	121	125	129	133	137	142	147	152	158	163	170	176	183	190	198	206	215	224	233	243		
6 Nominal Fixed cost	Rs. /KWH	4.65	4.57	4.49	4.41	4.33	4.25	4.18	4.11	4.05	3.99	3.93	3.87	3.82	2.93	3.02	3.11	3.20	3.30	3.41	3.52	3.64	3.76	3.90	4.04	4.19	4.34	4.51	4.69	4.87	5.07	5.27	5.49	5.73	5.97	6.23		
Fixed cost with Discount factor	Rs. /KWH	4.65	4.19	3.77	3.40	3.06	2.75	2.48	2.24	2.02	1.82	1.65	1.49	1.35	0.95	0.89	0.84	0.80	0.75	0.71	0.68	0.64	0.61	0.58	0.55	0.52	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.34	0.32		
C) Levelized tariff																																						
1 O & M expn	Rs. /KWH	0.69	0.73	0.77	0.82	0.86	0.91	0.97	1.02	1.08	1.14	1.21	1.27	1.35	1.42	1.51	1.59	1.68	1.78	1.88	1.99	2.10	2.22	2.35	2.49	2.63	2.78	2.94	3.10	3.28	3.47	3.67	3.88	4.10	4.33	4.58		
2 Depreciation	Rs. /KWH	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20		
3 Interest on term loan	Rs. /KWH	1.55	1.43	1.30	1.18	1.05	0.93	0.81	0.68	0.56	0.43	0.31	0.19	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4 Interest on Working Capital	Rs. /KWH	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.23		
5 Return on Equity	Rs. /KWH	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	
Total Cost of Generation	Rs. /KWH	4.65	4.57	4.49	4.41	4.33	4.25	4.18	4.11	4.05	3.99	3.93	3.87	3.82	2.93	3.02	3.11	3.20	3.30	3.41	3.52	3.64	3.76	3.90	4.04	4.19	4.34	4.51	4.69	4.87	5.07	5.27	5.49	5.73	5.97	6.23		
Discounted Levelized tariff	Rs. /KWH	4.14																																				
D) Interest on Working Capital																																						
1 O & M Expenses for one month	Rs. Lakh	2.25	2.38	2.51	2.66	2.81	2.97	3.14	3.32	3.51	3.71	3.92	4.15	4.39	4.64	4.90	5.18	5.48	5.79	6.12	6.47	6.84	7.24	7.65	8.09	8.55	9.04	9.56	10.10	10.68	11.29	11.94	12.62	13.34	14.10	14.91		
2 Receivables equivalent to 2 months of Fixed charges	Rs. Lakh	30.30	29.74	29.20	28.68	28.18	27.69	27.22	26.78	26.35	25.95	25.57	25.21	24.89	19.07	19.63	20.21	20.83	21.49	22.18	22.91	23.69	24.50	25.37	26.28	27.25	28.27	29.35	30.49	31.70	32.98	34.33	35.75	37.26	38.86	40.54		
3 Maintenance spares @ 15% of O & M expenses	Rs. Lakh	4.05	4.28	4.53	4.79	5.06	5.35	5.65	5.98	6.32	6.68	7.06	7.47	7.89	8.35	8.82	9.33	9.86	10.43	11.02	11.65	12.32	13.02	13.77	14.56	15.39	16.27	17.20	18.18	19.22	20.32	21.49	22.72	24.02	25.39	26.84		
Working Capital	Rs. Lakh	36.60	36.40	36.25	36.13	36.05	36.01	36.02	36.07	36.18	36.34	36.56	36.83	37.17	32.06	33.35	34.72	36.17	37.71	39.33	41.04	42.85	44.76	46.79	48.93	51.19	53.58	56.11	58.78	61.61	64.59	67.75	71.09	74.62	78.35	82.30		
4 Interest on Working Capital	Rs. Lakh	4.03	4.00	3.99	3.97	3.97	3.96	3.96	3.97	3.98	4.00	4.02	4.05	4.09	3.53	3.67	3.82	3.98	4.15	4.33	4.51	4.71	4.92	5.15	5.38	5.63	5.89	6.17	6.47	6.78	7.11	7.45	7.82	8.21	8.62	9.05		
Discount Factor		1.000	0.917	0.840	0.770	0.706	0.648	0.594	0.544	0.499	0.457	0.419	0.384	0.352	0.323	0.296	0.272	0.249	0.228	0.209	0.192	0.176	0.161	0.148	0.135	0.124	0.114	0.104	0.096	0.088	0.080	0.074	0.068	0.062	0.057	0.052		

