

**Arunachal Pradesh State Electricity Regulatory Commission**  
**Itanagar**

**Petition No. TP-4 of 2018 (Suo-Motu)**

**Coram: Shri R.P. Singh, Chairperson**

**Date of Order: 19<sup>th</sup> July 2018**

**IN THE MATTER OF**

Determination of levellised generic tariff for FY 2018-19 under Regulation 8 of the Arunachal Pradesh State Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2018.

**ORDER**

1. The Commission has issued the Arunachal Pradesh State Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2018, on 21.05.2018 (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;
  
2. As per Regulation 7 of the RE Tariff Regulations, the Commission shall only determine project specific tariff for the following RE technologies:
  - a) Small Hydro Project (1 MW and above and upto 25 MW);
  - b) Solar PV;
  - c) Wind Energy;
  - d) Municipal Solid Waste and Refuse Derived Fuel based projects with Rankine cycle technology;
  - e) Other hybrid projects include renewable-renewable or renewable-conventional sources, for which renewable technology is approved by MNRE;

- f) 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 2018-19 as per the proposal enclosed as **Annexure-I.**

Itanagar

Date: 19<sup>th</sup> July 2018



[R. P. Singh]

CHAIRPERSON





**Annexure –I****PROPOSED LEVELLISED GENERIC TARIFF for SMALL HYDRO POWER PROJECT FOR THE CONTROL PERIOD FY 2018-19.**

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

**USEFUL LIFE**

2. Clause (w) 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:

S. No.	R. E. Projects	Useful Life (Years)
1	Small Hydro Plant	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 2018-19. The Provision 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 specified 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:
- Return on equity;
  - Interest on loan capital;
  - Depreciation;

- d) Interest on working capital;
- c) 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 regulation, 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) specified 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 10.08 %. 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 9.20 % ((10.08 % x 0.70 x (1 – 29.12%)) + (14.0% x 0.30)) (Income tax rate @ 29.12% (25% IT rate+ 12% surcharge +4% Education cess).

**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 2018-19, for RE technologies viz., Small Hydro Power.
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:**

**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 25 has proposed the normative capital cost for small hydro projects for first year of Control Period (FY 2018-19) as under:

Region	Project Size	Capital Cost (Rs. Lakh/ MW)
Arunachal Pradesh	Below 500 kW	1400
	500 kW- Below 1 MW	1200

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### **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)
Below 500 kW	980	420
500 kW- Below 1 MW	840	360

### **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 % <sup>1</sup> (Avg. MAT rate) as on 1 April 2017) 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.*

<sup>1</sup> Average of MAT rate, as on 1<sup>st</sup> April 2017, 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 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 of calculation for interest on loan. The normative loan outstanding as on April 1<sup>st</sup> 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. The monthly data of MCLR for the last available six months from State Bank of India and the average MCLR is shown below.

Month	1 Year Tenor MCLR Rates (Source: SBI Monthly Press Releases)
December 2017	7.95 %
January 2018	7.95 %
February 2018	8.15 %
March 2018	8.15 %
April 2018	8.15 %
May 2018	8.15 %
<b>Avg. for last Available 6 months</b>	<b>8.08 %</b>

17. Considering the Average MCLR and in accordance to Sub-Regulation 2, interest rate for loan component has been determined as **10.08 %**.

## 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.*



Secretary

State Electricity Regulatory Commission  
Arunachal Pradesh

- 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 14<sup>th</sup> 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:
  - 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
O&M expenses (month)	1
Maintenance spares (%) of O&M expenses	15
Receivables (months)	2
Interest On Working Capital (%)	11.08

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

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

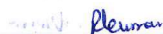
*Regulation 18: The number of hours for calculation of CUF/PLF (wherever applicable) for various RE technologies shall be 8766.*

### **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:

Small Hydro: *Regulation 29 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 levellised tariff.*

Region	Project Size	O&M Expense (Rs. Lakh/ MW)
Arunachal Pradesh	Below 5 MW	38.06
	5 MW – 25 MW	28.54

#### CAPACITY UTILISATION FACTOR (CUF)

25. Regulation 27 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 28 of the RE Tariff Regulations stipulate the auxiliary power consumption factor as under:

Renewable Energy Projects	Auxiliary Consumption Factor
Small Hydro Projects	1%

#### SUBSIDY OR INCENTIVE BY THE CENTRAL / STATE GOVERNMENT

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

*"The Commission shall take into consideration any incentive or subsidy offered by the Central or 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.*



*Provided that the following principles shall be considered for ascertaining income tax benefit on account of accelerated depreciation, if availed, for the purpose of tariff determination:*

- 1) Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.*
- 2) Capitalization of RE projects during second half of the fiscal year. Per unit benefit shall be derived on levellised basis at discount factor equivalent to Post Tax weighted average cost of capital".*

28. In terms of the above regulation, for the projects availing the benefit of accelerated depreciation, an applicable Income tax rate of 29.12%<sup>2</sup> (25% IT rate+ 12% surcharge +4% Education cess) has been considered. For the purpose of determining net depreciation benefits, depreciation @ 5.28% as per straight line method (Book depreciation as per Companies Act, 1956) has been compared with depreciation as per Income Tax Act i.e. 40% of the written down value method. Moreover, additional 20% depreciation in the initial year is proposed to be extended to new assets acquired by power generation companies vide amendment in the section 32, sub-section (1) clause (ii) of the Income Tax Act.

<sup>2</sup>25% Corporate Tax Rate announced in Budget 2018-19 for companies having turnover of up to Rs. 250 crores, Education Cess announced as 4%.

29. Depreciation for the first year has been calculated at the rate of 50% of accelerated depreciation (40%) and 50% of additional depreciation (20%) (as project is capitalized during the second half of the financial year as per proviso to Regulation
30. Income tax benefits of accelerated depreciation and additional depreciation, has been worked out as per normal tax rate on the net depreciation benefit. Per unit levellised accelerated depreciation benefit has been computed considering the post tax weighted average cost of capital as discount factor. Accelerated depreciation benefit has been computed as per existing provisions of Income Tax Act.
31. In the light of the discussion made in the preceding paragraphs, the generic tariffs of Small Hydro Projects for the financial year 2018-19 have been arrived at and specified as under:



**GENERIC TARIFF FOR SMALL HYDRO PROJECT (SHP) TECHNOLOGIES**

<b>Particular</b>	<b>Levelling Total Tariff (Rs./kWh)</b>
Below 500 kW	<b>6.31</b>
500 kW- Below 1 MW	<b>5.68</b>

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

<b>S.No</b>	<b>Small Hydro Power Projects</b>	<b>Annexure</b>
<b>1</b>	Below 500 kW	<b>Annexure 1A</b>
<b>2</b>	500 kW- Below 1 MW	<b>Annexure 1B</b>



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Secretary

State Electricity Regulatory Commission  
Arunachal Pradesh

Small Hydro Projects					Annexure 1A
Small Hydro: Assumptions Parameters					
S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Arunachal Pradesh upto 1 MW
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Capacity Utilization Factor	%	45%
			Auxiliary Consumption	%	1%
			Useful Life	Years	35
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	1400.00
3	Period		Tariff Period	Years	35
4	Sources of Fund	<u>Debt: Equity</u>	Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lacs	980.000
			Total Equity Amount	Rs Lacs	420.000
		<u>Debt Component</u>	Loan Amount	Rs Lacs	980.00
			Moratorium Period	years	0
			Repayment Period(include Moratorium)	years	13
			Interest Rate	%	10.08%
		<u>Equity Component</u>	Equity amount	Rs Lacs	420.00
			Return on Equity for first Project Life	% p.a	17.56%
			Discount Rate		9.20%
		5	Financial Assumptions		Income Tax
<u>Depreciation</u>					
Allowed Depreciation	%			90%	
Depreciation Rate for first 13 years	%			5.28%	
			Depreciation Rate 14th year onwards	%	1.425%
6	Working Capital	<u>For Fixed Charges</u>			
		O&M Charges		Months	1
		Maintenance Spare	(% of O&M expenses)		15%
		Receivables for Debtors		Months	2
		Interest On Working Capital		%	11.08%
7	Operation & Maintenance	O&M Expenses (2018-19)		Rs Lacs	38.06
		<u>Total O &amp; M Expenses Escalation</u>		%	5.72%
8	<b>Generation and Sale Of Energy</b>				
		Total No. of Hours		Irs	8766

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RE Tariff (SHP)																																							
Units Generation	Unit	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		
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		
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	3.94	
Auxiliary 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	0.04	0.04	
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	
Fixed Cost	Unit	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		
OM/Expenses	Rs Lakh	38.06	40.24	42.54	44.37	47.54	50.26	53.14	56.18	59.39	62.79	66.38	70.18	74.19	78.44	82.92	87.66	92.68	97.98	103.59	109.51	115.77	122.40	129.40	136.80	144.62	152.90	161.64	170.84	180.58	191.00	201.92	213.47	225.68	238.59	252.24			
Depreciation	Rs Lakh	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	66.53	
Interest on term loan	Rs Lakh	58.02	37.41	79.81	72.21	64.61	57.01	49.41	41.81	34.21	26.60	19.00	11.40	3.80																									
Interest on working capital	Rs Lakh	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	6.15	
Return on Equity	Rs Lakh	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	73.75	
Total Fixed Cost	Rs Lakh	279.50	274.03	268.70	263.49	258.44	253.54	248.80	244.23	239.84	235.65	231.68	227.88	224.33	175.42	180.11	185.06	190.30	195.84	201.70	207.90	214.44	221.36	228.68	236.42	244.66	253.28	262.38	271.96	282.06	292.66	304.48	316.55	329.31	342.81	357.07			
Per Unit Cost of Generation	Unit	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		
OM/Expn	Rs/kWh	0.97	1.02	1.09	1.15	1.22	1.29	1.36	1.44	1.52	1.61	1.70	1.80	1.90	2.00	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	6.46			
Depreciation	Rs/kWh	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70		
Int. on term loan	Rs/kWh	2.43	2.24	2.04	1.85	1.65	1.46	1.27	1.07	0.88	0.68	0.49	0.29	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Int. on working capital	Rs/kWh	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		
R/E	Rs/kWh	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88		
Total COG	Rs/kWh	7.16	7.02	6.85	6.75	6.62	6.49	6.37	6.25	6.14	6.03	5.93	5.84	5.74	4.49	4.81	4.74	4.67	4.61	4.55	4.50	4.45	4.40	4.35	4.30	4.25	4.20	4.15	4.10	4.05	4.00	3.95	3.90	3.85	3.80	3.75	3.70		
Discount Factor		1.000	3.839	0.768	0.773	0.644	0.500	0.540	0.494	0.463	0.415	0.380	0.348	0.318	0.292	0.267	0.244	0.224	0.205	0.188	0.172	0.157	0.144	0.132	0.121	0.111	0.101	0.093	0.085	0.078	0.071	0.065	0.060	0.055	0.050	0.046	0.042		
Discounted Tariff	Rs/Unit	7.157	5.884	5.283	4.744	4.261	3.828	3.440	3.092	2.781	2.502	2.252	2.029	1.829	1.310	1.231	1.159	1.091	1.028	0.970	0.915	0.864	0.817	0.773	0.732	0.693	0.657	0.624	0.592	0.563	0.535	0.508	0.482	0.456	0.431	0.406	0.382		
Levelised Tariff	Rs/Unit	6.31																																					
Depreciation amount	90%																																						
Book Depreciation rate	5.28%																																						
Tax Depreciation rate	40%																																						
Additional depreciation	20.00%																																						
Income Tax (Normal Rates)	23.12%																																						
Capital Cost	1400.0																																						
Years	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			
Book Depreciation	%	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%		
Book Depreciation	Rs Lakh	36.96	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	73.92	
Accelerated Depreciation	%	100.00%	40.00%	24.00%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Allowed during the year	%	60.00%	16.00%	9.60%	5.76%	3.46%	2.07%	1.24%	0.73%	0.45%	0.27%	0.16%	0.10%	0.06%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Chasing	%	40.00%	24.00%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Accelerated Deprn.	Rs Lakh	840.00	224.00	134.40	80.34	48.39	29.03	17.42	10.45	6.27	3.76	2.26	1.35	0.81	0.46	0.29	0.18	0.11	0.06	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Net Depreciation Benefit	Rs Lakh	803.04	150.08	60.48	6.72	-25.54	-44.69	-66.50	-83.47	-																													

Small Hydro Projects					Annexure 1B	
Small Hydro: Assumptions Parameters						
S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Arunachal Pradesh upto 1 MW	
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1	
			Capacity Utilization Factor	%	45%	
			Auxiliary Consumption	%	1%	
			Useful Life	Years	35	
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	1200.00	
3	Period		Tariff Period	Years	35	
4	Sources of Fund	Debt: Equity	Debt	%	70%	
			Equity	%	30%	
			Total Debt Amount	Rs Lacs	840.000	
			Total Equity Amount	Rs Lacs	360.000	
		Debt Component	Loan Amount	Rs Lacs	840.00	
			Moratorium Period	years	0	
			Repayment Period(include Moratorium)	years	13	
			Interest Rate	%	10.08%	
		Equity Component	Equity amount	Rs Lacs	360.00	
			Return on Equity for first Project Life	% p.a	17.56%	
Discount Rate			9.20%			
5	Financial Assumptions		Income Tax	%	29.120%	
		Depreciation				
			Allowed Depreciation	%	90%	
			Depreciation Rate for first 13 years	%	5.28%	
			Depreciation Rate 14th year onwards	%	1.425%	
6	Working Capital	For Fixed Charges				
		O&M Charges		Months	1	
		Maintenance Spare	(% of O&M expenses)			15%
		Receivables for Debtors		Months		2
		Interest On Working Capital		%		11.08%
7	Operation & Maintenance	O&M Expenses (2018-19)		Rs Lacs	38.06	
		Total O & M Expenses Escalation		%		5.72%
8	Generation and Sale Of Energy					
		Total No. of Hours		Hrs	8766	

*Signature*

RE Tariff (SHP)																																					
Units Generated	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	
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	
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
Auxiliary 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	
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	
Fixed Cost	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	
OGM Expenses	Rs Lakh	38.06	40.24	42.54	44.97	47.54	50.26	53.14	56.18	59.39	62.79	66.36	70.18	74.19	78.44	82.92	87.66	92.36	97.98	103.59	109.51	115.77	122.40	129.40	136.60	144.02	151.59	159.39	167.69	176.69	186.66	197.00	207.92	213.47	225.68	238.59	252.24
Depreciation	Rs Lakh	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	57.02	
Interest on term loan	Rs Lakh	81.44	74.83	68.41	61.90	55.38	48.87	42.35	35.83	29.32	22.80	16.29	9.77	3.26																							
Interest on working capital	Rs Lakh	5.51	5.46	5.47	5.46	5.45	5.45	5.46	5.47	5.50	5.53	5.57	5.52	5.68	5.72	5.74	5.67	5.91	6.15	6.43	6.71	7.01	7.32	7.66	8.01	8.39	8.78	9.20	9.64	10.11	10.60	11.12	11.67	12.26	12.87		
Return on Equity	Rs Lakh	63.22	33.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	63.22	
Total Fixed Cost	Rs Lakh	245.26	240.69	236.65	232.57	228.62	224.82	221.19	217.73	214.45	211.36	208.48	205.81	203.36	162.07	168.76	171.71	176.96	182.50	188.35	194.55	201.09	208.02	215.33	223.07	231.25	239.89	249.03	258.70	268.91	279.71	291.13	303.20	315.97	329.46	343.72	
Per Unit Cost of Generation	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	
OGM expn	Rs/kWh	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	6.46	
Depreciation	Rs/kWh	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46		
Int. on term loan	Rs/kWh	2.09	1.92	1.75	1.58	1.42	1.25	1.08	0.92	0.75	0.58	0.42	0.25	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Int. on working capital	Rs/kWh	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
RfE	Rs/kWh	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	
Total COG	Rs/kWh	6.28	6.17	6.05	5.95	5.85	5.76	5.66	5.56	5.49	5.41	5.34	5.27	5.21	4.15	4.27	4.40	4.53	4.67	4.82	4.98	5.15	5.33	5.51	5.71	5.92	6.14	6.38	6.62	6.89	7.18	7.48	7.79	8.09	8.44	8.80	
Discount Factor		1.000	0.983	0.968	0.953	0.938	0.923	0.908	0.893	0.878	0.863	0.848	0.833	0.818	0.803	0.788	0.773	0.758	0.743	0.728	0.713	0.698	0.683	0.668	0.653	0.638	0.623	0.608	0.593	0.578	0.563	0.548	0.533	0.518	0.503	0.488	
Discounted Tariff		6.280	5.173	4.653	4.198	3.770	3.365	3.058	2.757	2.466	2.244	2.027	1.832	1.659	1.508	1.375	1.258	1.154	1.061	0.978	0.905	0.841	0.786	0.738	0.696	0.659	0.626	0.597	0.572	0.550	0.530	0.511	0.494	0.479	0.464	0.450	
Levelised Tariff	Rs/Unit	5.66																																			
Depreciation amount	90%																																				
Book Depreciation rate	5.26%																																				
Tax Depreciation rate	40%																																				
Additional depreciation	20.00%																																				
Income Tax (Normal Rates)	28.12%																																				
Capital Cost	1200.0																																				
Years of Depreciation	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	
Book Depreciation	%	2.64%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	5.26%	
Book Depreciation	Rs Lakh	31.68	63.33	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36	63.36
Accelerated Depreciation	%	100.00%	40.00%	24.00%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Opening	%	60.0%	45.00%	36.00%	27.75%	20.76%	15.57%	11.67%	8.42%	6.04%	4.35%	3.11%	2.24%	1.65%	1.21%	0.88%	0.64%	0.47%	0.34%	0.25%	0.18%	0.13%	0.09%	0.06%	0.04%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Allow ed during the year	%	40.00%	24.00%	14.40%	8.64%	5.18%	3.11%	1.87%	1.12%	0.67%	0.40%	0.24%	0.15%	0.09%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Closing	%	20.00%	21.00%	21.60%	22.11%	22.57%	22.99%	23.37%	23.71%	24.00%	24.25%	24.46%	24.63%	24.76%	24.85%	24.90%	24.93%	24.94%	24.94%	24.94%	24.93%	24.91%	24.88%	24.83%	24.77%	24.69%	24.59%	24.47%	24.33%	24.17%	24.00%	23.81%	23.61%	23.39%	23.15%	22.89%	
Accelerated Deprn.	Rs Lakh	720.00	92.80	115.20	69.12	41.47	24.88	14.83	8.96	5.37	3.22	1.93	1.16	0.70	0.42	0.25	0.15	0.09	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Net Depreciation Benefit	Rs Lakh	688.32	28.64	51.84	5.16	-21.89	-36.48	-48.43	-58.40	-67.99	-76.14	-83.43	-89.20	-93.66																							



