



ASSAM ELECTRICITY REGULATORY COMMISSION

FILE NO. AERC. 569/2016

PETITION NO. 12/2016 & IA No. 5/2016

ORDER SHEET

16.11.2016

Before the Assam Electricity Regulatory Commission

ASEB Campus, Dwarandhar,
G. S. Road, Sixth Mile, Guwahati – 781 022

Sharada Windpower Pvt. Ltd

----- Petitioner

Assam Power Distribution Co. Ltd. (APDCL)

----- Respondent

In the matter of

Determination of Tariff for sale of Power from 10 MW Grid Connected Solar PV Power Plant of Sharada Windpower Pvt. Ltd to APDCL to be set-up at Saraguri Vill, Chalchali Mouza, Nagaon, Assam.

ORDER

1. **Background:**

The Sharada Windpower Pvt. Ltd (hereinafter referred to as the “Petitioner”), filed a Tariff petition on 17/05/2016 before the Commission along with Detailed Project Report (DPR) for determination of Tariff for its proposed 10 MW grid connected Solar PV Power Plant to be set-up at Saraguri Vill, Chalchali Mouza, Nagaon, Assam under section 62 of Electricity Act, 2003 and the relevant regulations of AERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources), 2012. A Memorandum of Understanding (MoU) was signed with APDCL on 04/12/2015 for sale of 10 MW power to APDCL.

2. **Procedural History:**

2.1 The salient points of the Petition (12/2016) are:

- a. The Petitioner has proposed to set up 10 MW Solar PV project at Saraguri Vill, Chalchali Mouza, Nagaon, Assam, the salient features of the project are:
 - Capital cost -Rs.8.35 Cr/MW
 - Capacity Utilization Factor (CUF)-12.77%
 - PV module-Multi Crystalline type with module capacity of 250 Wp
 - Annual Energy Generation (Injection to the grid)
 - As per Petition- 11.19 MU
 - As per PVSyst Simulation report- 16.11 MU
 - Tariff Proposed-Rs 13.10/kWh.
 - The Power generated will be injected at 33kV level & will be fed to the 33/11kV Samaguri Grid substation, Nagaon.

- b. The Petitioner has mentioned that power generated from the plant will be sold to APDCL. A copy of Memorandum of Understanding (MoU), signed with APDCL on 04/12/2016 for sale of power was submitted, which was having a validity of 1 year.
- c. No proper land related documents were submitted.

2.2 After preliminary scrutiny of the Petition, vide Letter dated 20/06/2016, the following submissions were sought for:

- a. Land Lease deed/Sale deed in the name of the developer showing land cost.
- b. A detail copy of land schedule as the petitioner didn't submit any land related documents along with the petition.
- c. Land value assessment from competent Government authority.
- d. In the DPR the petitioner mentioned that evacuation will be at 132 KV, whereas in the chapter of power evacuation (in DPR), they provided the evacuation to be at 33KV. Henceforth a detail planning on power evacuation including getting right of way was asked.

2.3 On 18/08/2016, the petitioner submitted an Interlocutory petition (registered as IA 5 of 2016) along with revised DPR (levellized tariff calculation), agreement copy of the land, land Map, latest jamabandi copy, land valuation by circle officer Samaguri, list of Patta nos & dag nos. etc. The salient points of IA 5/2016 are:

- a. Project Cost of Rs 8.35 Cr/MW
- b. Capacity Utilisation Factor (CUF)- 16.80%
- c. Annual Energy Generation (Injection to the grid)
 - As per IA- 14.68MU
 - As per PVSyst Simulation report- 14.94MU
- d. Levellised Tariff of Rs 9.96/kWh
- e. The Petitioner also submitted Land Lease documents, the salient points are:
 - Total 188 Bigha 3 Katha land will be taken on lease for 30years @ Rs 1000/Bigha/month with yearly escalation of 4%.
 - The Land Lease document has also got an option of purchase within a year

2.4 In the meanwhile, vide notice dated 18/08/2016 a preliminary Hearing was schedule on 29/08/2016. Further, vide letter dated 18/08/2016, APDCL was directed to submit their views and comments on the petition filed by the Petitioner.

2.5 The Respondent 1 submitted their views and comments on 29/08/2016 on the petition.

2.6 As scheduled, preliminary Hearing was conducted on 29/08/2016 and the key directives issued are stated below:

- a. The Commission directed the Petitioner and the Respondents (APDCL and AEGCL) to have a joint meeting and to arrive at a mutually acceptable decision on the power evacuation plan. The Commission also asked both the parties to sort out all other technical matters.
- b. The Commission directed the petitioner to get the Abridged Form of the Petition approved from the Commission and thereafter publish the notice in Newspapers for Public views & comments.

The Hearing Order is enclosed as Enclosure-I.

2.7 As per the direction in the preliminary Hearing dated 29/08/2016 the Petitioner published the approved abridged notice form of the Petition in six local daily news papers on 27/09/2016, seeking comments and objections from Public within 21days time.

2.8 Thereafter, vide News Paper Notification dated 23/10/2016, Public Hearing on the Petition was scheduled on 03/11/2016. However, no comments from Public/Public representative were received.

- 2.9 As scheduled, a Public Hearing was held on 03/11/2016. During the Hearing, only Petitioner, Respondent1 (APDCL) & Respondent 2 (AEGCL) was present. No participant from the Public was there.

The salient points of submissions made by the Petitioner during the Public Hearing are:

- a. As the projects being set up by J.J PV Solar Pvt Ltd, JP Structures Pvt Ltd, Marahar Power Controls Pvt Ltd, Sharada Erectors Pvt Ltd and Sharada Windpower Pvt Ltd are in adjacent locations, to lower the evacuation cost, a common Evacuation system can be constructed and the cost may perhaps be shared equally.
- b. Further, in reply to Query on optimization of O & M Cost, the Representatives of the Petitioner submitted that sharing of O &M Cost can be worked out after Commissioning of the project.
- c. In reply to Query related to clause for purchase of land in the Land document & decision of the Petitioner, the Representative of the Petitioner submitted that the land for the project will be purchased and will not be on lease.

The Hearing Order is enclosed as Enclosure-II.

3. Legal and Regulatory framework:

- 3.1 Section 86(1) (e) of the Electricity Act 2003, mandates the State Electricity Regulatory Commissions to promote co-generation 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.
- 3.2 The Electricity Act, 2003 also requires that the State Electricity Regulatory Commissions (SERCs) shall be guided by the tariff policy in specifying the terms and conditions for determination of tariff under section 61 of the Act.
- 3.3 Section 61 of the Act also provides that State Regulatory Commissions shall be guided by the principles and methodologies specified by the Central Commission for determination of tariff applicable to generating companies and transmission licensees.
- 3.4 The terms and conditions for determination of Tariff for RE project has been specified in the AERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012 (hereinafter referred as AERC RE Tariff Regulations, 2012) notified on 07.11.2012, which was in line with CERC (Terms and Conditions for tariff determination from Renewable Energy Sources) Regulations, 2012.
- 3.5 Further, in the AERC (Co-generation and Generation of Electricity from Renewable Sources of Energy) Regulations, 2015, the Technical Parameters and other Technical Considerations such as Evacuation of power, Interface line etc were specified with regard to RE projects.

4. Computation of Provisional Tariff:

4.1 Project Cost:

4.1.1 *Summary of Petitioner's submission (As per the new DPR):*

- 4.1.1.1 PV Module Cost: The Petitioner has proposed to install 32277 tier-I multi crystalline solar PV modules having per module output of 310Wp, leading to total output of 10MW. Considering all these, the Petitioner has proposed PV Module cost of Rs 400 Lakh/MW.
- 4.1.1.2 Land cost: The Petitioner has proposed to purchase 188 Bighas 3 Katha of Land at Saraguri Vill, Chalchali Mouza, Nagaon, Assam. The Petitioner has submitted that additional expenditure is also required for development of the proposed land, thereby considering the additional cost, the Land cost of Rs 50 Lakh/MW is proposed.
- 4.1.1.3 Civil & General Works: The Petitioner has submitted that the Civil & General Works cost includes equipment foundation, control room

buildings, switchyard and site clearance, considering the additional expenditure the Petitioner has proposed Rs 85 Lakh/MW as cost towards Civil & General works.

- 4.1.1.4 Mounting Structure: The Petitioner has proposed to use hot dipped galvanize MS angle of suitable size whose foundation shall be 1:2:4 PCC construction to withstand wind speed upto 180Km/hr. All fasteners shall be of stainless steel of Grid SS 304. Considering all these, the Petitioner has proposed cost of Rs70 Lakh/MW towards module Mounting Structure.
- 4.1.1.5 Power Conditioning Unit (PCU): The Petitioner has proposed Conext Sunny Central 800 CP XT/850 CP XT/900 CP XT inverter. After considering these, the Petitioner has proposed for a cost of Rs 70 Lakh/MW towards PCU.
- 4.1.1.6 Evacuation Cost upto Interconnection Point: The Petitioner has proposed an Evacuation cost of Rs 50 Lakh/MW
- 4.1.1.7 Preliminary & Pre-operative expenses including IDC & Contingency: The Petitioner proposed a cost of Rs 70 Lakh/MW under this head, which includes IDC, specific Contingencies etc.
- 4.1.1.8 Evacuation Cost beyond Interconnection Point: The Petitioner has proposed to evacuate the power through 9KM 33 kV line to 33/132/220 kV Samaguri Grid Sub-station.
- 4.1.1.9 Based on the above, the Petitioner has proposed a total project cost of Rs 835 Lakh/MW. The break-up of the proposed Project Cost is as follows:

SI No	Particular	Cost (Rs Lakh/MW)
1	PV Module	400
2	Land Cost	50
3	Civil & General Work (fencing, WBM Roads, Land filling)	85
4	Mounting Structure	70
5	Power Conditioning Unit (PCU)	70
6	Evacuation Cost Upto Interconnection Point (AC DC cables, transformers, Lightning arrestor, SCADA, HT transmission line etc.)	50
7	Preliminary & Pre-operative expenses including IDC & Contingency	70
	Project Cost upto Interconnection Point	795
8	<i>Evacuation Cost beyond Interconnection Point</i>	<i>40</i>
	Total Project Cost (Rs Lakh/MW)	835
	Total Project Cost for 10MW (Rs Lakh)	8350

4.1.2 Commission's Analysis & Decision:

- 4.1.2.1 PV Module Cost: The PV Module cost is market dependent and as per the present market scenario, the PV Module cost has gone down substantially. However, considering the further reduction in PV Module cost, the Commission has at present decided to adopt the CERC Benchmark of PV Module Cost applicable for FY 2016-17, as specified in CERC Order dated 23/03/2016, on provisional basis.

- 4.1.2.2 Land Cost: As per the submitted Land document, the Petitioner has proposed to take 188 Bighas & 3 Katha land on Lease, with an option to Purchase the land. Thereafter, during Public Hearing, the Petitioner stated that, the land will be purchased. Accordingly, it is considered that Land will be purchased by the Petitioner. However, as per Norm the maximum allowable land for 10 MW Solar PV Project is 150 Bigha, therefore, purchase of 150 Bigha of land only is allowed. Further, as per the Land Document, the Land Purchase cost is Rs 50,000 per Bigha, which is same as the zonal value as per certification from Circle Officer, Govt. of Assam. Accordingly, Rs 7.50 Lakh/MW is allowed as Land cost.
- 4.1.2.3 Civil & General Works: On study of the CERC Order on Benchmark Capital cost norm, it is observed that Civil cost includes cost pertaining to land development cost, building control room to house inverter and other BoS components, building approach roads, boundary wall, arranging water supply, lighting etc and General works includes security of solar farm, setting up of power back-up generator, yard lighting etc.
- However, considering the additional cost towards geographical locality, topographical condition & transportation of material etc from outside Assam, it is deemed fit to allow an additional 15% escalation over the CERC Benchmark cost for FY 2016-17, as specified in CERC Order dated 23/03/2016, for this head of Expenditure.
- 4.1.2.4 Mounting Structure: On scrutiny of the submissions and analysis CERC order, it is deemed fit that 15% escalation over the CERC Benchmark cost for FY 2016-17, as specified in CERC Order dated 23/03/2016, will suffice for this head of Expenditure.
- 4.1.2.5 Power Conditioning Unit (PCU): On scrutiny of the submissions and analysis CERC order, it is deemed fit that 15% escalation over the CERC Benchmark cost for FY 2016-17, as specified in CERC Order dated 23/03/2016, will suffice for this head of Expenditure.
- 4.1.2.6 Evacuation Cost upto Interconnection Point: On scrutiny of the submissions and analysis CERC order, it is deemed fit that 15% escalation over the CERC Benchmark cost for FY 2016-17, as specified in CERC Order dated 23/03/2016, will suffice for this head of Expenditure.
- 4.1.2.7 Preliminary & Pre-operative expenses including IDC & Contingency: As per the CERC Order dated 23.03.2016, this Head of Expenditure is linked to Project Cost and allowed as a percentage of total project cost. The same principle is adopted in this case.
- 4.1.2.8 Evacuation Cost beyond Interconnection Point: Regarding this head of expenditure, an estimate was received from AEGCL. Although the petitioner has proposed the cost of double pole circuit line for 10MW project single circuit line is sufficient. Based on the AEGCL estimate the cost for construction of 33 kV S/C line is Rs 20 Lakh/MW (Bay cost 31 Lakh + Transmission line- 18.89 lakh/km) (Tubular pole). Further, as per the AERC (Co-generation and Generation of Electricity from Renewable Sources of Energy) Regulations, 2015, for construction of Transmission line of more than 5km, the total cost is to be equally shared between the developer & the utility. Accordingly, 50 % of allowed cost on prorata basis for 4KM is loaded as part of the project

cost. Accordingly Rs 4.44 Lakh/MW is allowed as Evacuation Cost beyond Interconnection Point.

Further, as per Minutes of Meeting dated 29/08/2016 held between APDCL, AEGCL & Solar developers related to power evacuation, APDCL and AEGCL proposed that for 7 projects (JJ PV Solar Ltd., JP Structures Pvt. Ltd., Marahar Power Controls Ltd., Sharada Erectors Pvt. Ltd., Sharada Windpower Pvt. Ltd., NERE Infratech Pvt. Ltd. & Surjo Urja Infratech Pvt. Ltd) a single power evacuation system will be constructed and cost upto pooling will be shared by all 7 developers. Therefore, the petitioner is hereby directed to explore the proposal of APDCL and AEGCL at the time of actual implementation of the project. If the above proposal is implemented, the cost of evacuation and maintenance will be reviewed at the time of determination of final tariff

4.1.2.9 Based on the above, the provisionally Rs 538.93 Lakh/MW is approved as project cost for the Project. The break-up of the provisionally approved vis-à-vis Proposed Project Cost is as follows:

SI No	Particular	Cost (Rs Lakh/MW)	
		Proposed	Approved
1	PV module	400.00	328.39
2	Land	50.00	7.50
3	Civil & General works	85.00	40.25
4	Mounting structure	70.00	40.25
5	Power Conditioning Unit	70.00	40.25
6	Evacuation cost upto Inter-Connection Point	50.00	50.00
7	Preliminary & Pre-operative expense including IDC & contingency	70.00	27.85
	Total Project Cost upto inter-connection point (Rs Lakh/MW)	795.00	534.49
8	Evacuation cost beyond Inter-Connection Point	40.00	4.44
	Total Project Cost (Rs Lakh/MW)	835.00	538.93
	Total Project Cost for 10MW (Rs Lakh)	8,350.00	5,389.31

4.2 Technical & Financial Norm:

4.2.1 **Summary of Petitioner's submission:**

The Petitioner has proposed a Levellized Tariff of Rs 9.96/kWh, based on the following parameters:

4.2.1.1 Operation and Maintenance Cost (O & M Cost): The Petitioner has proposed O & M Cost for first year Rs 12.3 Lakh/MW with annual escalation of 5.72%.

4.2.1.2 Depreciation: The Petitioner has proposed 5.83% as Depreciation rate upto 12th year and 2.73% from 13th year onwards.

4.2.1.3 Funding Pattern: The Petitioner has proposed 30% Equity and 70% loan.

4.2.1.4 Return on Equity: The Petitioner has proposed 20% Pre Tax (1st 10 years) & 24% Pre-Tax (11th year onwards) as Return on Equity.

- 4.2.1.5 Interest on Loan: The Petitioner has proposed Interest rate of 12.76%, with a repayment period of 12 years.
- 4.2.1.6 Interest on Working Capital: The Petitioner has proposed 13.26% Interest on Working Capital.
- 4.2.1.7 Auxiliary Power Consumption: The Petitioner has proposed 0.25% Auxiliary Power Consumption.
- 4.2.1.8 Capacity Utilization Factor (CUF): The Petitioner has proposed a CUF of 16.8%.
- 4.2.1.9 Energy Generation (MU): The Petitioner has proposed Yearly net Energy Generation of 14.68 MU.

4.2.2 Commission's Analysis & Decision:

- 4.2.2.1 Operation and Maintenance Cost (O & M Cost): As per the AERC RE Tariff Regulations, 2012, the O & M cost allowable for 1st year of operation is Rs 11 Lakh/MW. At that point of time the norm was in line with the then CERC norm for O & M cost. However, as per the CERC Generic Tariff Order for FY 2016-17, the O & M Cost for first year of operation is Rs 7 Lakh/MW with an annual escalation of 5.72%. This implies that at the national level and in general the O & M cost for Solar PV project has gone down.

Therefore, considering the change in scenario, the Commission deems it fit to reduce the O & M norm by using the provisions under Regulation 85 of the AERC RE Tariff Regulations, 2012. However, considering the additional cost requirement for the state of Assam, the Commission deems it fit to allow additional 15% cost over and above the CERC Benchmark. Accordingly, Rs 8.05 Lakh/MW is considered to be O & M cost for the 1st year of operation (Rs 7 Lakh/MW + 15% of Rs 7 Lakh/MW)

- 4.2.2.2 Depreciation: The Depreciation is allowed as per the provisions of the AERC RE Tariff Regulations, 2012.
- 4.2.2.3 Funding Pattern: The Petitioner's proposal is in line with the AERC RE Tariff Regulations, 2012 and hence considered the proposed Funding Pattern on the approved Project Cost.
- 4.2.2.4 Return on Equity: The Petitioner's proposal is in line with the AERC RE Tariff Regulations, 2012 and hence considered the proposed rate of Return on Equity.
- 4.2.2.5 Interest on Loan: As per AERC RE Tariff Regulations, 2012, the normative interest rate shall be considered as average SBI base rate prevalent during first six months of previous year plus 300 basis point. Further the repayment period of 12 years proposed by the Petitioner is 12.76% which is as per the norm and hence allowed the same.
- 4.2.2.6 Interest on Working Capital: The Interest on Working Capital being a normative component, the same is allowed as per the AERC RE Tariff Regulations, 2012.
- 4.2.2.7 Auxiliary Power Consumption: The Petitioner's proposal is 0.25% which is above the norm and hence Auxiliary Power Consumption of 0% is considered as per AERC RE Tariff Regulations, 2012.
- 4.2.2.8 Capacity Utilisation Factor (CUF): The Energy Output of a Solar PV System is dependent on various factors such as Solar Irradiation at the project site, PV Module & Panel Efficiency, PCU Efficiency, Transformation Efficiency etc. As such, the net energy output is dependent on the losses at the various stages/parts. In the DPR, the

Petitioner has submitted a Simulation report of PVSyst software (a software used for generating Simulation report of energy generation from Solar PV Plant) showing the losses at various stages and finally the Energy Injected into the grid.

Considering the fact that for estimation of power generation from Solar PV power plants, PVSyst, HOMER & RETScreen are the most widely used software, the Commission deems it fit to accept the PVSyst Simulation report submitted by the Petitioner and accordingly considers the Energy Injected into the grid as 14.937 MU. Based on the Energy Injection of 14.937 MU, the CUF of 17.05% is arrived at. Thereby, CUF of 17.05% is approved.

4.2.2.9 Energy Generation (MU): The Petitioner has proposed Yearly net Energy Generation of 14.68 MU. However, as discussed in previous clause, the Energy Injection to the grid as reflected in the PVSyst Simulation report is considered and accordingly Net Energy Generation per year of 14.94 MU approved.

4.2.2.10 Module Degradation: In the submitted PVSyst report, the Petitioner has accounted for Module quality loss thereby the degradation is already factored in. Further, in the CERC Generic Tariff Order for FY 2016-17, the net Energy Generation is kept same for all the 25 years of operation, without considering Degradation factor. Therefore, the Commission deems it fit not to consider separate Module Degradation.

4.2.2.11 Based on the above, the Technical & Financial Norms approved vis-à-vis proposed is shown in the table below:

SL No.	Particulars	UNIT	Proposed	Approved
OPERATIONAL DATA				
1	Installed Capacity	MW	10.00	10.00
2	Annual Gross Generation	MU	14.72	14.94
3	Annual module Degradation	%	0.70%	0.00%
4	Annual Net Generation	MU	14.68	14.94
FINANCIAL DATA				
5	Total Project Cost including IDC	<u>lakh</u>	8350.00	5389.31
6	Project Cost	Lakh/MW	835.00	538.93
7	Debt (70%)	<u>lakh</u>	5845.00	3772.52
8	Equity (30%)	<u>lakh</u>	2505.00	1616.79
	Total (7+8)	-	8350.00	5389.31
9	Discount rate	%	10.70	10.64
Financial Norm				
1	O & M cost	Lakh/MW	12.30	8.05
2	Depreciation Rate	upto 12th year	5.83%	5.83%
		13th year onwards	2.73%	Remaining Depreciation spread for the rest of life
3	ROE	%	20% Pre Tax(1st 10 years) & 24% Pre Tax (from 11th	20% Pre Tax(1st 10 years) & 24% Pre Tax (from 11th

SL No.	Particulars	UNIT	Proposed	Approved
			year)	year)
4	Interest on Term Loan	%	12.76%	12.76%
5	Interest on working capital	%	13.26%	13.26%
6	O & M annual Escalation Rate	%	5.72%	5.72%
Technical Norm				
7	Auxiliary Power Consumption	%	0.25%	0.00%
8	CUF	%	16.80%	17.05%

4.3 **Levelling Tariff:**

Based on the above, the Commission has determined and approved a provisional levellised tariff of Rs. 6.41/kWh for a period of 25 years from the date of commercial operation.

Details of tariff computation are furnished in Annexure-I enclosed.

5. **Other applicable conditions:**

5.1 **Statutory and other clearances:**

All statutory clearances and necessary approvals shall be obtained by the developer for setting up of the project. The developer is also responsible for their compliance and their renewals as may be required from time to time.

5.2 **Sharing of CDM benefit:**

The sharing of Clean Development Mechanism (CDM) benefits shall be as per the provision of AERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012 (Regulation 22) which is as under:

The proceeds of carbon credit from approved CDM project shall be shared between generating company and concerned beneficiaries in the following manner, namely

- a) 100% of the gross proceeds on account of CDM benefit to be retained by the project developer in the first year after the date of commercial operation of the generating station ;
- b) In the second year, the share of the beneficiaries shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, where after the proceeds shall be shared in equal proportion, by the generating company and the beneficiaries.

5.3 **Scheduling:**

The 10 MW solar PV plant of the petitioner shall be subjected to the scheduling and dispatched code specified under AERC Grid Code, as amended from time to time under Regulation 12.3 of the AERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources), 2012.

5.4 Taxes and duties:

The tariff determined under this order shall be exclusive of taxes and duties as may be levied by the state/central Govt. and the same shall be passed through on actual incurred basis as specified under Regulation 24 of the AERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources), 2012.

5.5 Evacuation of power:

Interconnection facilities and communication links are to be installed and maintained by the licensee at the interconnection points to enable evacuation of power from the project.

5.6 Determination of final tariff:

The Commission has determined the provisional tariff for the 10 MW Solar PV plant of the Petitioner. The Commission directs the petitioner to file fresh petition for determination of final tariff, immediately after Commercial Operation of the project, based on actual capital expenditure of the project incurred upto the date of commercial operation duly certified by the statutory auditors based on annual audited accounts.

With the above observations and decisions, the Tariff Petition (No. 12/2016 & IA No.5/2016) stands disposed of with fixation of the Provisional Levellised Tariff of Rs 6.41 per kWh for a period of 25 years.

Sd/-
(S. C. Das)
Member, AERC

Sd/-
(D. Chakravarty)
Member, AERC

Sd/-
(N.K. Das)
Chairperson, AERC

ANNEXURE-

Determination of project specific Tariff for 10 MW Grid connected Solar PV Plant of SharadaWindpower Pvt Ltd

		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
1. Installed Capacity	MW	10.00	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2. Gross Generation	MU		14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94
3. Annual module degradation	MU																										
4. Auxillary Consumption																											
4. Net Generation	MU		14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94	14.94
Fixed Cost			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
O & M cost	Rs. Lakh		81	85	90	95	101	106	112	119	126	133	140	148	157	166	175	185	196	207	219	232	245	259	274	289	306
Depreciation	Rs. Lakh		280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
Interest on term loan	Rs. Lakh		461	421	381	341	301	261	221	181	140	100	60	20													
IWC	Rs. Lakh		28	28	27	27	26	25	25	24	24	23	24	24	20	20	21	21	22	23	23	24	25	25	26	27	28
Return on Equity	Rs. Lakh		323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323	323
Total fixed cost	Rs. Lakh		1,174	1,138	1,102	1,066	1,031	996	962	927	893	860	827	793	760	727	693	660	627	593	560	527	493	460	427	393	360
Nominal Fixed cost	Rs. /KWH		7.86	7.62	7.38	7.14	6.90	6.67	6.44	6.21	5.98	5.76	5.53	5.30	5.07	4.84	4.61	4.38	4.15	3.92	3.69	3.46	3.23	3.00	2.77	2.54	2.31
Discounted Fixed cost	Rs. /KWH		7.86	6.89	6.03	5.27	4.61	4.02	3.51	3.06	2.66	2.32	2.18	1.89	1.34	1.23	1.13	1.04	0.95	0.87	0.80	0.74	0.68	0.63	0.58	0.53	0.49
Levellised tariff corresponding to useful life																											
O & M expn	Rs. /KWH		0.54	0.57	0.60	0.64	0.67	0.71	0.75	0.80	0.84	0.89	0.94	0.99	1.05	1.11	1.17	1.24	1.31	1.39	1.47	1.55	1.64	1.73	1.83	1.94	2.05
Depreciation	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
Interest on term loan	Rs. /KWH		3.09	2.82	2.55	2.28	2.01	1.75	1.48	1.21	0.94	0.67	0.40	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-
IWC	Rs. /KWH		0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.15	0.16	0.16	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.19
ROE	Rs. /KWH		2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Total COG	Rs. /KWH		7.86	7.62	7.38	7.14	6.90	6.67	6.44	6.21	5.98	5.76	5.53	5.30	5.07	4.84	4.61	4.38	4.15	3.92	3.69	3.46	3.23	3.00	2.77	2.54	2.31
Levellized tariff	Rs. /KWH		6.41																								
IWC																											
a) O & M Expenses for 1 month	Rs. Lakh		7	7	7	8	8	9	9	10	10	11	12	12	13	14	15	15	16	17	18	19	20	22	23	24	25
b) Receivables equivalent to 2 months of Fixed charges	Rs. Lakh		196	190	184	178	172	166	160	155	149	143	149	143	113	114	116	118	120	121	124	126	128	131	133	136	139
c) Maintenance spares @ 15% of O & M expenses	Rs. Lakh		12	13	13	14	15	16	17	18	19	20	21	22	24	25	26	28	29	31	33	35	37	39	41	43	46
Working Capital	Rs. Lakh		214	210	205	200	195	191	186	182	178	174	182	178	149	153	157	161	165	170	175	180	185	191	197	203	210
Interest on Working Capital	Rs. Lakh		28	28	27	27	26	25	25	24	24	23	24	24	20	20	21	21	22	23	23	24	25	25	26	27	28
Discount Factor (Based on Discount rate @ 10.64%)			1.00	0.90	0.82	0.74	0.67	0.60	0.55	0.49	0.45	0.40	0.36	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.11	0.10	0.09