



# ASSAM ELECTRICITY REGULATORY COMMISSION

FILE NO. AERC. 521/2015

PETITION NO. 14/2016 IA No. 3/2016

## ORDER SHEET

17.11.2016

Before the Assam Electricity Regulatory Commission

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

Marahar Power Controls Pvt. Ltd

----- Petitioner

Assam Power Distribution Co. Ltd. (APDCL)

----- Respondent-1

Assam Electricity Grid Corporation Ltd. (AEGCL)

----- Respondent-2

### In the matter of

Determination of Tariff for sale of Power from 10 MW Grid Connected Solar PV Power Plant of Marahar Power Controls Pvt. Ltd to APDCL to be set-up at Mikirgrant, Bamuni-Mouza Chalchali Nagaon, Assam.

## ORDER

### 1. Background:

The Marahar Power Controls Pvt Ltd.(hereinafter referred to as the “Petitioner”), filed a Tariff petition on 23/11/2015 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 Mikirgrant, Bamuni-Mouza Chalchali, 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 26/06/2014 for sale of 10 MW power to APDCL.

### 2. Procedural History:

2.1 The salient points of the Petition (14/2016) are:

- a. The Petitioner has proposed to set up 10 MW Solar PV project at Mikirgrant, Bamuni-Mouza Chalchali, 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

- As per Petition- 11.19 MU
  - As per PVSyst Simulation Report- 16.11 MU
  - Tariff Proposed-Rs 13.11/kWh.
- 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 26/06/2014 for sale of power was submitted, which was having a validity of 1 year.
- 2.2** After preliminary scrutiny of the Petition, vide Letter dated 18/12/2015, the following submissions were sought for:
- a. The petitioner was asked to submit a specific project location as they have mentioned three separate project locations in the DPR and main Petition.
  - b. A detail copy of land schedule specifying mouja, locality, dag no, Patta no as the petitioner didn't submit any land related documents along with the petition.
  - c. Land value assessment from competent Government authority.
  - d. The submitted MoU for power sale has expired on 25/06/2015. The petitioner was directed to submit extended/New MoU for power sale.
- 2.3** Thereafter, the petitioner on 18/02/2016 submitted an Interlocutory petition (registered as IA 03 of 2016) in an affidavit form along with a DPR ,land detail, jamabandi copy(including list of Patta nos & dag nos. ) etc. The salient points of the IA 3/2016 are:
- a. Project Cost of Rs 8.35 Cr/MW
  - b. Capacity Utilisation Factor (CUF)- 12.77%
  - c. Annual Energy Generation (Injection to the grid) 11.19MU
  - d. In the DPR submitted along with IA, PVSyst simulation report was not submitted
  - e. Levellised Tariff of Rs 13.05 per kWh
  - f. The Petitioner did not submit any Land Lease/Purchase documents
- 2.4** After preliminary scrutiny of the Interlocutory Petition, vide Letter dated 15/03/2016 & the following submissions were sought for:
- a. The petitioner was directed to submit the new MoU, as the submitted MoU got expired on 25/06/2015.
  - b. Land Lease deed/Sale deed in the name of the developer showing land cost.
  - c. A detail copy of land schedule as the petitioner didn't submit any land related documents along with the petition.
  - d. Land valuation certificate from circle officer, Samaguri, Nagaon, as per which the Zonal value of the Land is Rs 30,000/- per Bigha.
  - e. The Petitioner was also directed for providing clarification with regard to certain submitted documents which were not related to the project
- 2.5** The petitioner vide letter dated 17/03/2016, submitted certain Land related documents such as Land Lease document, trace map, Land valuation report etc. Vide the letter dated 17/03/2016, the Petitioner also submitted a renewed MoU dated 15/03/2016, signed with APDCL, which was having a validity of 3 months.
- 2.6** However, considering the discrepancy in the submitted Land related documents in the Letter dated 17/03/2016, the Petitioner was directed for submission of the following vide AERC Letter dated 21/06/2016:
- a. Clarification with regard to submitted Land documents
  - b. Land Lease deed/Sale deed in the name of the developer showing land cost.
  - c. A detail copy of land schedule as the petitioner didn't submit any land related documents along with the petition.
  - d. Clarification with regard to Evacuation of Power
  - e. Detailed Break-up of the Project cost
- 2.7** Thereafter, vide Letter dated 22/06/2016 the Petitioner submitted the following documents

- f. Latest jamabandi copy of the land.
  - g. The Petitioner also submitted Land Lease documents, the salient points are:
    - Total 149 Bigha 3 Katha 12 Lesha land will be taken on lease for 30years @ Rs 833/Bigha/month with yearly escalation of 4%.
    - The Land Lease document has also got an option of purchase within a year at a cost of Rs 30,000/- per Bigha
  - h. Land trace map specifying the dag no., patta nos etc.of the site.
- 2.8** The Commission vide Letter dated 27/07/2016 certain additional queries & submission were sought. The salient points are:
- a. Detailed break up of Project cost
  - b. PVSyst Simulation report showing loss diagram etc.
  - c. Concurrence from AEGCL with regard to Evacuation of Power
- 2.9** Thereafter, vide submission dated 11/08/2016, the Petitioner submitted revised DPR and Tariff computation sheet. The salient submission of the Petitioner are:
- a. Project cost of Rs 8.35 Cr/MW
  - b. Energy Generation (injection to the grid)
    - As per Calculation sheet-14.68 MU
    - As per PVSyst Simulation report- 14.93 MU
  - c. CUF of 16.80%
  - d. Levellised Tariff of Rs 9.96 per kWh
- 2.10** In the meanwhile, a letter dated 06/08/2016 was also received on 11/08/2016. In the letter, the Petitioner submitted a break-up of Project cost comparing with CERC Benchmark Project Cost. It may be noted that, as per this submission, the total project is shown as Rs 835 Lakh/MW. However, the summation of heads gives a total Project Cost of Rs. 785 Lakh/MW.
- 2.11** Vide notice dated 18/08/2016 a preliminary Hearing was scheduled on 29/08/2016 and on the same day a letter to APDCL was sent seeking their views and comments on the petition.
- 2.12** APDCL submitted their views and comments on 29/08/2016 on the petition filed by Marahar Power Controls Pvt. Ltd.
- 2.13** 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 News-papers for Public views & comments.
- The Hearing Order is enclosed as Enclosure-I.
- 2.14** As per the direction in the preliminary Hearing dated 29/8/2016 the Petitioner published the approved abridged notice form of the Petition in six local daily news papers on 28/09/2016, seeking comments and objections from stakeholders within 21days time.
- 2.15** Thereafter, vide News Paper Notification dated 23/10/2016, a Public Hearing on the Petition was scheduled on 03/11/2016. However, no comments from Public/Public representative were received.

- 2.16** 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 submission dated 06/08/2016):***

- 4.1.1.1 PV Module Cost: The Petitioner has proposed to install 40008 tier-I multi crystalline solar PV modules having per module output of 250Wp, 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 149 Bighas 3 Katha and 12 Lessa of Land at Mikirgrant, Bamuni-Mouza Chalchali 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 35 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 50 Lakh/MW as cost towards Civil & General works.
- 4.1.1.4 Mounting Structure: The Petitioner has proposed to use 80 micron hot dipped galvanized structure. 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 1000 CP XT inverter. After considering these, the Petitioner has proposed for a cost of Rs 65 Lakh/MW towards PCU.
- 4.1.1.6 Evacuation Cost upto Interconnection Point: The Petitioner has proposed an Evacuation cost of Rs 55 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 set up a 9KM steel lattice structure which connects to the existing Grid substation. The Petitioner proposed a cost of Rs 40 Lakh/MW under this head.
- 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:

<b>SI No</b>	<b>Particular</b>	<b>Cost (Rs Lakh/MW)</b>
1	PV Module	400
2	Land Cost	35
3	Civil & General Work	50
4	Mounting Structure	70
5	Power Conditioning Unit (PCU)	65
6	Evacuation Cost Upto Interconnection Point (AC DC cables, transformers, Lightning arrestor, SCADA, HT transmission line etc.)	55
7	Preliminary & Pre-operative expenses including IDC & Contingency	70
	<b>Project Cost</b>	<b>745</b>
8	Evacuation Cost beyond Interconnection Point	<b>40</b>
	<b>Total Project Cost (Rs Lakh/MW)</b>	<b>785</b>
	<b>Total Project Cost for 10MW (Rs Lakh)</b>	<b>7850</b>

#### **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.

4.1.1.1 Land Cost: As per the submitted Land document, the Petitioner has proposed to take 149 Bighas 3 Katha and 12 Lessa 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.

Further, as per the Land Document, the Land Purchase cost is Rs 30,000 per Bigha, which is same as the zonal value as per certification from Circle Officer, Govt. of Assam. Accordingly, Rs 4.49 Lakh/MW is allowed as Land cost.

The Petitioner has further proposed additional cost towards Land development. However, the Land development cost is part of Civil & General works. Therefore no separate cost is allowed towards Land development cost.

4.1.2.2 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.

4.1.2.3 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.

4.1.2.4 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.

4.1.2.5 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.

4.1.2.6 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.

4.1.2.7 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.

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.

4.1.2.8 Based on the above, the provisionally Rs 536.39Lakh/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	4.49
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	27.71
	Total Project Cost upto inter-connection point (Rs Lakh/MW)	<b>795.00</b>	<b>531.95</b>
8	Evacuation cost beyond Inter-Connection Point	40.00	4.44
	<b>Total Project Cost (Rs Lakh/MW)</b>	<b>835.00</b>	<b>536.39</b>
	<b>Total Project Cost for 10MW (Rs Lakh)</b>	<b>8,350.00</b>	<b>5,363.90</b>

## 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 of Rs 12.3 Lakh/MW with annual escalation of 5.72%.

4.2.1.2 Land Cost: The Petitioner has proposed a land cost of Rs 35 Lakh/MW.

- 4.2.1.3 Depreciation: The Petitioner has proposed 5.83% as Depreciation rate upto 12<sup>th</sup> year and 2.73% 13<sup>th</sup> year onwards.
- 4.2.1.4 Funding Pattern: The Petitioner has proposed 30% Equity and 70% loan.
- 4.2.1.5 Return on Equity: The Petitioner has proposed 20% Pre Tax (1<sup>st</sup> 10 years) & 24% Pre-Tax (11<sup>th</sup> year onwards) as Return on Equity.
- 4.2.1.6 Interest on Loan: The Petitioner has proposed Interest rate of 12.76%, with a repayment period of 12 years.
- 4.2.1.7 Interest on Working Capital: The Petitioner has proposed 13.26% Interest on Working Capital.
- 4.2.1.8 Auxiliary Power Consumption: The Petitioner has proposed 0.25% Auxiliary Power Consumption.
- 4.2.1.9 Capacity Utilization Factor (CUF): The Petitioner proposed CUF of 16.8%.
- 4.2.1.10 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 1<sup>st</sup> 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 1<sup>st</sup> 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 12.70% 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.

4.2.1.1 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 14.931 MU. Based on the Energy Injection of 14.931 MU, the CUF of 17.04% is arrived at. Thereby, CUF of 17.04% is approved.

4.2.2.8 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 14.93 MU approved.

4.2.2.9 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.

4.2.2.10 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
<b>OPERATIONAL DATA</b>				
1	Installed Capacity	MW	10.00	10.00
2	Annual Gross Generation	MU	14.72	14.93
3	Annual module Degradation	%	0.70%	0.00%
4	Annual Net Generation	MU	14.68	14.93
<b>FINANCIAL DATA</b>				
5	Total Project Cost including IDC	<u>lakh</u>	<b>8350.00</b>	<b>5363.90</b>
6	Project Cost	Lakh/MW	835.00	536.39
7	Debt (70%)	<u>lakh</u>	5845.00	3754.73
8	Equity (30%)	<u>lakh</u>	2505.00	1609.17
	<b>Total (7+8)</b>	-	<b>8350.00</b>	<b>5363.90</b>
9	Discount rate	%	10.70	10.64
<b>Financial Norm</b>				

SL No.	Particulars	UNIT	Proposed	Approved
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 year )	20% Pre Tax(1st 10 years) & 24% Pre Tax (from 11th 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%
<b>Technical Norm</b>				
7	Auxiliary Power Consumption	%	0.25%	0.00%
8	CUF	%	16.80%	17.04%

#### 4.3 **Levelling Tariff:**

Based on the above, the Commission has determined and approved a provisional levellised tariff of Rs. 6.39/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. 14/2016 & IA No.3/2016) stands disposed of with fixation of the Provisional Levellised Tariff of Rs 6.39 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-I

### Determination of project specific Tariff for 10 MW Grid connected Solar PV Power Plant of Marahar Power Controls 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	
<b>1. Installed Capacity</b>	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	
<b>2. Gross Generation</b>	MU		15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	
<b>3. Annual module degradation</b>	MU																										
<b>4. Auxillary Consumption @ 0%</b>			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>4. Net Generation</b>	MU		14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	14.93	
<b>Fixed Cost</b>			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		279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279
Interest on term loan	Rs. Lakh		459	419	379	339	299	260	220	180	140	100	60	20													
IWC	Rs. Lakh		28	28	27	26	26	25	25	24	24	23	24	24	20	20	21	21	22	22	23	24	25	25	26	27	28
Return on Equity	Rs. Lakh		322	322	322	322	322	322	322	322	322	322	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386
<b>Total fixed cost</b>	Rs. Lakh		1,169	1,133	1,097	1,062	1,027	992	958	924	890	857	890	857	673	683	693	704	715	727	739	752	766	781	797	813	831
Nominal Fixed cost	Rs. /KWH		7.83	7.59	7.35	7.11	6.88	6.64	6.41	6.19	5.96	5.74	5.96	5.74	4.51	4.57	4.64	4.71	4.79	4.87	4.95	5.04	5.13	5.23	5.34	5.45	5.56
Discounted Fixed cost	Rs. /KWH		7.83	6.86	6.00	5.25	4.59	4.01	3.50	3.05	2.65	2.31	2.17	1.89	1.34	1.23	1.13	1.03	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
Land Lease	Rs. /KWH		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	Rs. /KWH		1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Interest on term loan	Rs. /KWH		3.08	2.81	2.54	2.27	2.01	1.74	1.47	1.20	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	0.15	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	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
<b>Total COG</b>	Rs. /KWH		7.83	7.59	7.35	7.11	6.88	6.64	6.41	6.19	5.96	5.74	5.96	5.74	4.51	4.57	4.64	4.71	4.79	4.87	4.95	5.04	5.13	5.23	5.34	5.45	5.56

#### Discounted Levellized tariff

Discounted Levellized tariff	Rs. /KWH		6.39
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#### 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		195	189	183	177	171	165	160	154	148	143	148	143	112	114	115	117	119	121	123	125	128	130	133	136	138
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
<b>Working Capital</b>	Rs. Lakh		214	209	204	199	195	190	186	182	178	174	181	178	149	153	156	161	165	169	174	179	185	191	197	203	210
Interest on Working Capital	Rs. Lakh		28	28	27	26	26	25	25	24	24	23	24	24	20	20	21	21	22	22	23	24	25	25	26	27	28

#### Discount Factor (Based on Discount rate @ 10.64%)

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
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