



TARIFF ORDER
Petition no 39/2011
Determination of
Project Specific Tariff
of
M/S Saheli Exports Private Ltd

for
1MWp Solar Power Plant at Karaikal,
Puducherry

JOINT ELECTRICITY REGULATORY COMMISSION
For the State of Goa and Union Territories

2nd Floor, HSIIDC Office Complex, Vanijya Nikunj
Udyog Vihar, Phase-V, Gurgaon-122 016 (Haryana)
Phone: 0124-2342852 Fax: 0124-2342853
Website: www.jercuts.gov.in

2nd July 2012

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List of Abbreviations

Abbreviation		Full Form
A&G	:	Administration & General Expenses
Act	:	The Electricity Act, 2003
ARR	:	Aggregate Revenue Requirement
CAGR	:	Compounded Annual Growth Rate
Capex	:	Capital Expenditure
CEA	:	Central Electricity Authority
CERC	:	Central Electricity Regulatory Commission
CGS	:	Central Generating Stations
COD	:	Commercial Operation Date
Commission/JERC *	:	Joint Electricity Regulatory Commission for the state of Goa and union territories
DISCOM	:	Electricity Department of Puducherry
EA 2003	:	The Electricity Act, 2003
FC	:	Fixed Charges
FY	:	Financial Year
HT	:	High Tension
KVA	:	Kilo Volt Ampere
KWh	:	Kilo Watt Hour
LT	:	Low Tension
MU	:	Million Unit
MW	:	Mega Watt
NFA	:	Net Fixed Assets
NTPC	:	National Thermal Power Corporation Limited
NTP/Tariff Policy	:	National Tariff Policy
O/H	:	Overheads
O&M	:	Operation & Maintenance
PLF	:	Plant Load Factor
PX	:	Power Exchange
RoE	:	Return on Equity
RPO	:	Renewable Purchase Obligation
R&M	:	Repair & Maintenance
RE	:	Renewable Energy
SBI CAPS	:	SBI Capital Market Limited
SBI PLR	:	SBI Prime Lending Rate
T&D	:	Transmission & Distribution
VAR	:	Volt Ampere Reactive
VC	:	Variable Charges

* "Commission"

Except for the hearings and orders, the Commission denotes Secretariat of the Commission for carrying out the technical due diligence & validation of data of the petitions filed, obtaining and analyzing information/clarifications received from the Petitioner and submitting relevant issues for consideration of the Commission.

Before the

Joint Electricity Regulatory Commission

for the State of Goa and Union Territories

Gurgaon

CORAM¹
Dr. V K Garg (Chairperson)
Shri S.K. Chaturvedi(Member)

Petition No. 39/2011

In the matter of

Petition for determination of Tariff for 1.0 MW Power from Roof top PV & Small Solar Power Generation Programme (RPSSGP) for supply to the Electricity Department- Puducherry.

And in the matter of

M/s Saheli Export Pvt. Limited, Chennai. Petitioner

And

Respondents..

1. Electricity Department, Puducherry Respondent 1
2. Renewable Energy Agency Puducherry (REAP)Respondent 2

¹As per section 93 of the Electricity Act, 2003; no act or proceedings of the Appropriate Commission shall be questioned or shall be invalidated merely on the ground of existence of any vacancy or defect in the constitution of the Appropriate Commission. Shri S.K. Chaturvedi joined the Commission on 31 May 2012 and now the Chairperson and the Member constitutes Coram. The member also attended the Hearing on 7th June 2012 and the Public hearing on 19th & 20th June 2012 at Karaikal & Puducherry. The Commission attended the hearings in full strength on 7th June, 19th & 10th June 2012 in this case..

ORDER

Date: 2 July 2012

1. A CAPSULE VIEW OF THE SOLAR POWER IN INDIA

1.1. Introduction

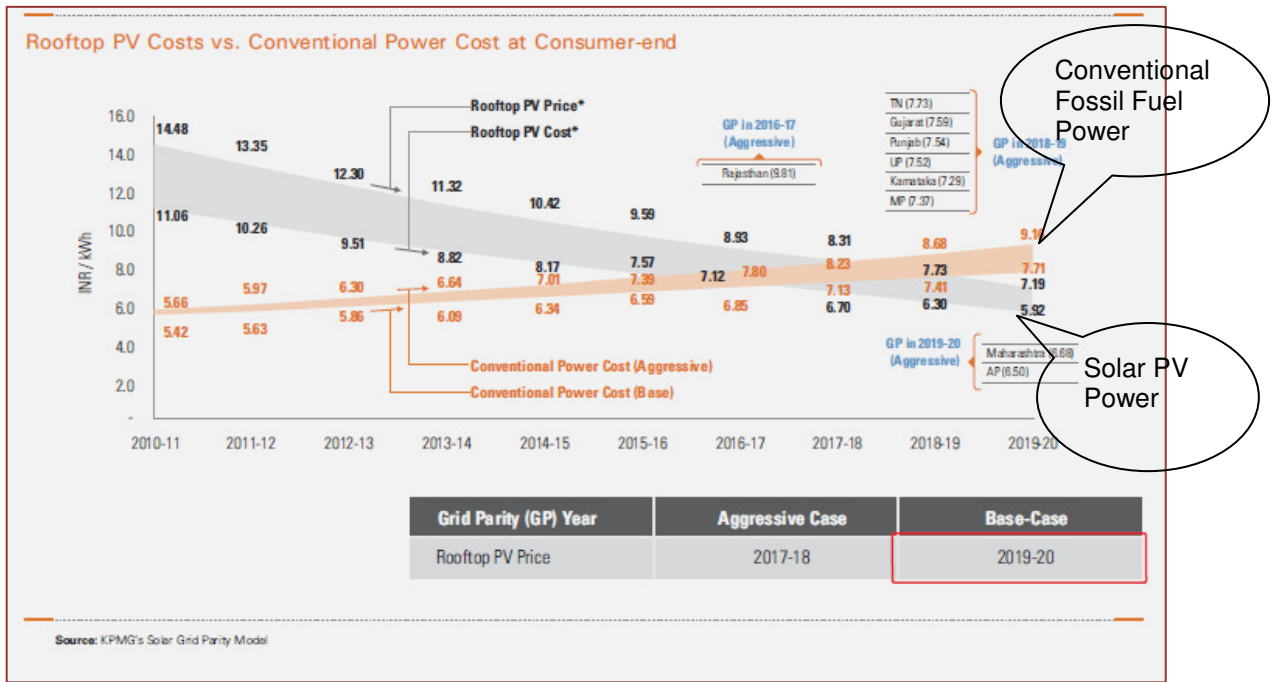
Power is a critical infrastructure input for the development and growth of the economy of a country. Since there is a limitation of producing power from conventional sources such as coal, oil etc., it is imperative that some alternative energy sources have to be discovered to meet the increasing demand of energy in the country. In this backdrop, power from renewable energy assumes importance. One of the renewable energy sources from generation of power is the **Solar Energy** which is available in abundance. India is endowed with very good solar energy resource. The average intensity of solar radiation received on India is about 300 clear, sunny days in a year. India's theoretical solar power reception, only on its land area, is about 5 Petawatt-hours per year (PWh/yr) (i.e. 5000 trillion kWh/yr or about 600 TW). The daily average solar energy incident over India varies from 4 to 7 kWh/m², with 2300 to 3200 Sunny hours, a year across the country. Even if 10% of the available area can be used, the available solar energy would be 8 million MW, which is equivalent to 5909 mtoe (million tons of oil equivalent) per year. This offers great potential for generation of power through solar energy in the state, better than most of the World except Africa and a part of Australia.

1.2. Drivers contributing to Solar Power Equipment Price Reduction

In Solar PV plant, a major part of the cost is on generating plant equipment – namely Solar Panels along with Invertors, mounting structures (for ground mounted plants) & Power Cabling and Evacuation system.

The solar module prices have been affected by the global market supply scenario. The entry of China into the solar manufacturing space has contributed significantly to lower the costs.

1. Economies of scale and global recession in 2008-09 coupled with the oversupply of modules to have resulted in the squeeze on margins across the board, triggering a sharp fall in prices and thus reduction in feed in tariffs in Europe recently.



Going forward, poly-silicon prices continue to be (an important determinant factor)- declining and projected to fall further, thus reducing the Solar tariffs, whereas the tariff from Conventional power is projected to go higher as Fuel Costs and O&M Costs are on the increase.

To promote RE, GOI has launched JNNSM a Scheme “ Roof Top Solar & Small Power Plant” which has set a target of 100 MWs under the Scheme.

To achieve the target , the act obligates the Commission to fix the RPOs . Accordingly this Commission has fixed year wise RPOs for Solar & Non Solar under its Regulation no. 14/ 2010 under Phase 1 ,as:

Solar	Non Solar	Solar	Non Solar	Solar	Non Solar
2010-11		2011-12		2012-13	
1%		2%		3%	
0.25%	0.75%	0.30%	1.70%	0.40%	2.60%

Impending on the achievements on these targets under Ph 1, the RPOs will be revised by the Commission for Phase 2 , as per regulations of the Commission.

Thus the Solar Power has come to stay as an important Energy Source today & tomorrow.

2. PROMOTING INVESTMENT IN RENEWABLE ENERGY - COMMISSION'S INITIATIVE

2.1. Land Mass Characteristics of UTs & Goa

There is relatively a limited land mass which is dry / barren patch of land suitable for Solar PV, in the Union Territories and State of Goa. In case of Puducherry, being of non-contiguous nature land with limited scalability for such projects, the Commission did not announce the generic Tariff keeping in view the reduced relevance of determining of generic tariff for Solar Power being not sensitive enough to changing market conditions. **In case there are queries showing interest in RE/Solar Power Generation in the Union Territories and State of Goa, the Commission will bring out a Generic Tariff as a base tariff and set the stage for Reverse Bidding process by the Licensees in the Territories under the jurisdiction of the Commission, to get best RE/Solar Tariff for the Consumers.**

2.2. Commission's Initiative on RPOs

The Commission on its own took **Initiative for** fixing up the Renewable Purchase Obligations (RPO) through its Regulation dated 30.11.2010 to meet the quota for meeting RPOs, giving full freedom to the Licensees in its jurisdiction, in choosing to procure the Renewable Power (Solar & Non Solar) to meet Renewable Power Obligations (RPOs) in the best interests of the Consumers by any of the following modes:

- i. Setting up a Project - The Project can be developed in the area under the jurisdiction of this commission or outside the jurisdiction and deliver Renewable Power in the area under jurisdiction of the any of its Licensees .
- ii. Open Source for Purchase of RE Power, through Tendering Route (following full transparency) – from amongst the Generators of respective RE Power -Solar from Solar Generators & non Solar from such generators who are in the Non Solar RE Power field.
- iii. Procuring RECs.

The above is in line with the EA 2003, Electricity Policy & National Renewable Energy Policy as under.

“Section 86(1) (e) of EA2003, “The State Commission shall 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, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution license”

3. INTRODUCTION OF JERC AND THE STAKE HOLDERS

3.1. JERC Formation

In exercise of the powers conferred by Section 83 of the Electricity Act, 2003 the Central Government constituted a two member (including Chairperson) Joint Electricity Regulatory Commission for all Union Territories except Delhi to be known as “Joint Electricity Regulatory Commission for Union Territories” with headquarters at Delhi as notified vide notification no. 23/52/2003 – R&R dated May 2’ 2005. Later with the joining of the state of Goa, the Commission came to be known as “Joint Electricity Regulatory Commission for the State of Goa and Union Territories” as notified on May 30’ 2008. The Joint Electricity Regulatory Commission for the State of Goa and Union Territories (Andaman & Nicobar Islands, Puducherry, Dadra and Nagar Haveli, Daman & Diu, Lakshadweep and Puducherry) started functioning with effect from August 2008. Office of the Commission is presently located at Gurgaon, Haryana.

3.2. Stake Holders

3.2.a. Saheli Exports Private Ltd – the Project Proponent

Saheli Exports has proposed setting up of 1 MW rooftop photo voltaic (PV) solar power project in the Union Territory of Puducherry at Karaikal.

3.2.b. B&G Solar Private Limited

M/s. B&G Infrastructure Company Private Limited (BGI), the B&G Group's Holding Company, has already executed 1 MWp Solar Photovoltaic Power Plant on 10th June 2011 in the state of Tamil Nadu under the same scheme namely Rooftop PV and Small Solar Generation Program (RPSSGP) under MNRE Scheme. M/S Saheli Exports is one of the group company of B&G Solar Pvt. Ltd.

3.2.c. Sangameswara Energy Private Ltd

Another associate Company in the same group, under the name of Sangameswara Energy Private Ltd, with same postal address and sharing a link on the Web address with B&G was also an applicant for the same scheme- RPSSGP.

The Stake holders at sl. 3.2a,b,c share a common web address <http://bginfra.com> as well as same office address. The Public notice was also uploaded on the same Web address, In compliance of the Commission’s order letter dated 17.04.2012.

The Petitioner (Project Proponent) also uploaded the Abridged Summary & Public Notice on this Company's web site, as at 3.2.c. on 10th June 2012.

3.2.d. Electricity Department of Puducherry (ED-P)

Responsible for distribution and retail supply of electricity in the Union Territory of Puducherry is the 1st Respondent for this Petition and is the buyer of the entire Solar Power Generated from the Project.

3.2.e. Renewable Energy Agency Puducherry (REAP)

The state nodal agency approved by JERC for the development of renewable energy sources in the UT of Puducherry. REAP promotes and follows a Renewable Energy Vision Document to achieve a rapid transition towards the implementation of Renewable Energy and Energy Conservation Programmes in the UT of Puducherry, is the 2nd Respondent for this Petition.

3.2.f. MNRE : Govt of India

The Ministry of New and Renewable Energy is for the developing new & Renewable Energy including Solar Power – Aimed to generate competitively priced Solar Thermal and Solar Photovoltaic Power. The Ministry is providing Subsidy for the Scheme “Rooftop & Small Solar Power Generation Programme (RPSSGP)”. The Vision of MNRE is to upscale and mainstream the use of new and renewable energy sources in furtherance of the national aim of energy security and energy independence, with attendant positive impact on local, national and global environment.

3.2.g. Indian Renewable Energy Development Agency (IREDA)

The Administrator for the Scheme, appointed by MNRE-Govt. of India for administrating the Scheme.

3.2.h. Electricity Consumers of Puducherry

All, the Consumers of Electricity ,who will have to pay for the Solar Power Tariff for next 25 Years are the Stake holders in the Project.

4. FILING OF PETITION

4.1. Chronology of Events

i. The Tariff determination process was initiated, when the Petitioner filed writ petitions before the Hon'ble High Court with judicature at Madras in Chennai, praying for interim injunction, which was granted by the Hon'ble High Court- Madras in Chennai vide order dated 7th Oct 2010 in the matter of allocation of the Projects by IREDA (Writ Petition no 16983, 16984).

The Hon'ble High Court with judicature at Madras in Chennai vide order dated 12 April 2011 in the WP no. 16984 filed by the Petitioner, directed this Commission as under :

"Petitioner is permitted to make an appropriate application as per Sections 62 and 64 of the Electricity Act, 2003 within a period of two weeks from the date of receipt of a copy of this order. If such an application is made, the Joint Electricity Regulatory Commission, the 100 respondent herein, is directed to determine the tariff in the manner as provided under 64 of the Act, after giving an opportunity of hearing to the parties concerned and pass appropriate tariff order as expeditiously as possible, since the Act contemplates the time limit for passing such an award. It is made clear that the authority concerned shall decide the petitioner's application on its own merit without being influenced by any observation made in this order"

ii. Pursuant to the directions of the Hon'ble High Court the Petition was submitted by the Petitioner on 24.05.2011 to this Commission, for determination of Solar tariff for its power project

iii. Commission's Letter dated 06.06.2011 to M/s.Saheli Pvt.Ltd. Chennai to rectify defects in the said petition.

iv. The said Petition was re-submitted on 28.06.2011 after removing the initial defects as pointed out by the secretariat of this Commission.

v. Letter to Petitioner on 20.07.2011 to proceed as per Regulation 15(vi) of JERC (Conduct of Business) Regulations 2009, by submitting requisite fee and papers as specified in JERC regulations.

vi. Petition submitted to Commission on 02.08.2011.

vii. Hearing notice issued on 05.08.2011 for hearing on 21.08.2011.

viii. Commission's Order dated 24.08.2011.

- a) Commission directed that a copy of petition be provided to respondents i.e. Electricity Department Puducherry & REAP Puducherry as it was not provided to them in line with JERC regulations.
- b) Public Notice may be issued for Public Information of the hearing.

ix. The Petitioner provided a Copy of Petition to both the respondents.

x. Hearing held on 03.10.2011. The Commission decided to further hear the matter on 25.10.2011, after the information is received from the Petitioner.

xi. Order dated 25.10.2011-On the matter of land acquisition, Petitioner prayed that by next hearing they will provide some evidence of Ownership of the land required for the project.

xii. The matter was heard by the Commission on 03-11-2011.

xiii. Counsel for the petitioner stated that they will not sign the draft agreement (PPA) with the Licensee, as approved by the Commission unless the tariff is determined first. The Commission on its side was intending to ensure that the Buyer (ED-P) & the Seller (Petitioner) are in agreement on all other terms and conditions for Electricity Sale –Purchase except the Tariff which is in the domain of the Commission as per EA 2003.

xiv. In the absence of Initialled Power Purchase Agreement (PPA) from the Petitioner, the respondent No 1 (EDP) was advised to incorporate observation of the Commission and file the initialled draft PPA with the Commission.

xv. On 2.1.2012, the Commission rejected the Petition in the absence of an Initialled draft PPA from the Petitioner.

The Petitioner, M/s Saheli Exports Pvt. Ltd appealed to the Hon'ble APTEL vide Appeal No 22 of 2012 dated 30 Jan 2012 against the JERC's Order No 39 / 2011 dated 2.1.2012. The Hon'ble APTEL in its Judgment dated 29th March 2012 directed this Commission to determine the tariff within 45 days (i.e. 14th May, 2012) as under :-

“ We, therefore, direct the Joint Commission to determine the tariff for procurement of energy by respondent no.2 from the Appellant's solar project proposed to be set up in UT of Puducherry within 45 days from the date of this judgment.”

*“ To conclude, our findings are that the signing of a valid PPA between the generator and the distribution Licensee is not a pre-condition for determination of tariff by the Joint Commission. **An MOU or Initialled draft PPA would suffice.** Accordingly, the Joint Commission is directed to determine the tariff for sale of energy from the Solar Project of the Appellant to the Respondent no.2, within 45 days from the date of this judgment”.*

4.2. Commission’s Directions Post Petition Restoration

In compliance with the Hon’ble APTEL’s judgment in the Appeal no 22./2012 dated 29th March 2012, the Petition was restored by the Commission vide its order dated 07 April 2012 & the hearing was fixed for 24.4.2012.

In compliance of APTEL Order, the Commission restored the Petition No 39/ 2011 vide Order dated 7.4.2012 and issued a notice to the petitioner for a Public Hearing on 24.4.2012. The Commission observed that a number of important portions relevant for the tariff determination were not readable and therefore directed the petitioner as per Order dated 24.4.2012, to submit the requisite information upto 26th April 2012 or before the public hearing to be held at Puducherry on 27th April 2012 and at Karaikal on 28th April 2012. The petitioner provided readable pages of the petition and replies to some of the queries. Copy of Order dated 24.4.2012 placed at **Annexure 4**.

The Commission vide its order dated 24. 04 2012 asked Petitioner to file the detailed information in respect of the documents listed here.

- i. Pages 72-77 of the Project Report Submitted along with Petition are not readable.

The petitioner was asked to provide a readable copy of the above pages which were subsequently provided by the petitioner on 27th April 2012 at the time of hearing, thus giving no time to the Commission to examine the financial numbers and their implications etc. before the public hearing.

- ii. Efficiency of panel/ degradation over the years – Not originally submitted with the Petition
- iii. Treatment of Revenue from CDM and its sharing is not indicated.

- iv. Petitioner has chosen a technology without comparing it with the other available technology and the relative operative advantages from that.
- v. Initialled PPA has not been submitted. Both the parties agreed during the hearing to submit the same before Public Hearing.
- vi. Guaranteed Power Supply (Importance).

The petitioner had not indicated the minimum guaranteed power that will be supplied based on his assumptions and calculations. In the absence of which the Units of Solar Power generated, turnover thereof and the financial implications thereof to work out & to assess its impact on the RPO obligations & the ARR petition of the Licensee for future years.

In other words what is the number of RE Power units that will not be available and the Petitioner should include in its ARR petition towards meeting RPO from this project. Say the petitioner promises 1.5 MUs but delivers only 1.2 MUs , the balance of 0.3 MUs will have to be purchased from other sources which may not be available at Rs. 5.50 / Kwh based on which the Consumer is paying. There would be an additional burden on the Consumer for the Petitioner to discharge his solar power delivery obligations.

- vii. The Petitioner was required to file the proof of land acquisition as on the date of Public Hearing to avoid non- availability of land for the project later on.

Above information was to be made available before Public Hearing at Puducherry on 27th April, 2012.

4.3. Documents Filed by the Petitioner

Documents filed by the Petitioner for this Petition are listed here under

Table 1: Documents Submitted by the Petitioner

S.No.	Date of Receipt	Subject
1.	24.04.2012	Draft duly Initialled PPA between Petitioner & the Licensee.
2.	24.04.2012	Project Report – Latest/ Updated Project Report was requisitioned by the Commission.
3.	26.04.2012	About CDM revenue Sharing, Efficiency of the Solar Panels,

S.No.	Date of Receipt	Subject
4.	10.05.2012	Sensitivity Analysis at various CUFs. (By Email) not on affidavit , The Petitioner did not work out the Sensitivity of Tariff at various CUFs, as required by the Commission, but went ahead presuming the Tariff to be fixed as proposed by the Petitioner (Rs 20.50 / Kwh)

In the Affidavit dated 26th April 2012, submitted on 27th April 2012, the Petitioner submitted

- i. Revenue from CDM is not considered.
- ii. The Petitioner submitted the draft PPA duly Initialled between the Generator & the Licensee.
- iii. A Clause on failure to Supply committed quantum of Power has not been agreed by the Petitioner with the Licensee.
- iv. Petitioner did not submit the status of the acquisition or possession of the Land and petitioner stated that it is the subject matter of IREDA, even though Cost is a major determinant of the Capital Cost for determining Tariff.

On final checking of the annexures, it came to the notice of the Commission that the Petitioner M/S Saheli Exports Pvt Ltd. had not complied with the requirements of Section 64 of EA 2003 i.e publication of the Petition in an abridged form in the newspapers and its uploading on the web site of the petitioner.

The Commission had to initiate the action of Public hearing denovo and accordingly applied for extension to Hon'ble APTEL.

4.4. Commission's Petition before the Hon'ble APTEL for Extension

The Commission moved an IA 203 of 2012 in Appeal No. 22 of 2012 on 28th May 2012, praying the Hon'ble APTEL to grant time extension by 4 weeks to the Commission for completion of the process of determination of tariff in respect of the petitioner's project on account of petitioner's non-compliance of requirements under Section 64 of EA 2003. The Hon'ble APTEL vide Order dated 31st May, 2012 permitted extension by 4 weeks up to 3rd July, 2012 as under.

“ In view of the circumstances mentioned in the application for extension in time filed by the Joint Commission, the time is extended by further four weeks. It is clear that process of determination of Tariff at any rate must be over on or before 03.07.2012. No further extension will be granted”

Post for reporting Compliance on 06.07.2012”

The Commission initiated action & process for Tariff Fixation **denovo** and fixed a hearing on 7th June 2012 and enquired from the Petitioner that whether he had complied with the requirements of Section 62 and Section 64 before the earlier Public Hearing on 27th & 28th April 2012 at Puducherry and Karaikal respectively . Petitioner replied that he had loaded on his web site only. The Petitioner did not give a categorical positive reply relating to the compliance of Section 62 & Sec 64 of EA act 2003 in his affidavit submitted on 5th June 2012 as under.

“I say that I am filling the present affidavit to place on record the clarification sought by this Hon'ble Commission in its notice of hearing dated 28th may 2012. The Hon'ble Commission has pointed out that the published abridged version of the petition is not available in the records and hence has sought the petitioner's Clarifications.

I say that Section 64(2) of the Electricity Act provides that the Applicant shall publish the application in an abridged form and manner as specified by the Appropriate Commission. I say that the purpose of the aforesaid provision is to intimate the public about the tariff which is proposed by the project proponent. In the instant case, this Hon'ble Commission had on 09.04.2012 directed the petitioner to publish the notice of public hearing which also include the specific particulars of the tariff proposed by the petitioner in the website of the petitioner. The notice of the public hearing was also published in two newspaper- “The Hindu” dated 10.04.2012 and dated 26.04.2012 by the Secretary of this Hon'ble Commission. Therefore there was due compliance of the aforesaid provision and the public was made known of the tariff proposed.

Since Regulation 77 of the Hon'ble Commission's (Conduct of Business) Regulations, 2009, provides the manner of publication of any application or petition and the Hon'ble Commission had a course to be followed the Petitioner complied with the direction of the

Hon'ble Commission to publish the notice in the petitioner's website and the publication of the notice of the public hearing by the Secretary of the Hon'ble Commission is in compliance with the aforesaid requirement. The petitioner would have complied with any further directions in this regard by this Hon'ble Commission. It is submitted that it any event such publications is in substantial compliance of the requirement under law.

The petitioner is placing the aforesaid facts on record with a request that the Hon'ble Commission may be pleased to consider that the requirement of publication of the abridged version of the petition/ notice of the petition has already been met with and proceed further with the process of tariff taxation.”

Accordingly the Commission vide order dated 07 June 2012 placed at **Annexure 2** , directed the Petitioner on the following:

“Abridged version of the Petition be published after approval of the Commission, in leading newspapers in applicable regional languages English, Tamil, Malayalam and Telugu covering all the areas of the UT of Puducherry for inviting suggestions / objections of the Stake holders”

Commission fixed the public hearing on 19th June 2012 at Karaikal and on 20th June, 2012 at Puducherry, after following the due process of giving a Public Notice in the local newspapers and uploading on the website of the Commission, of the Electricity Department Puducherry and of the project proponent.

To be sure, the Commission ascertained before the public hearing that :

- i. the stakeholders have seen the abridged version of the petition in the news papers.
- ii. they were given a brief on Project Cost & Tariff in Vernacular language and English and
- iii. the replies to their objections / suggestions were responded to by the Project Proponent , the Electricity Department, Puducherry and REAP. (M/S Tata BP Solar the Equipment supplier to the Petitioner also responded to Queries when they were present during Public hearing on 27th & 28th April 2012).

The objections / suggestions of various stakeholders have been discussed in section 6 of this Order.

4.5. Petitioner’s Prayer

The Petitioner submitted the Petition for a Project Specific Tariff of Rs 20.50 / Kwh for a Solar PV Project based on various parameters submitted in the Petition which remained unchanged and are reproduced as under:

- i. *It is submitted that the capital cost of a solar power project is mainly dependent on all capital work including plant and machinery, civil work, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point. The Petitioner will be incurring an expenditure of approx Rs. 1,05,00,000 (One Crore and Five Lakhs Only) for purchase of land **at Devamapuram Karaikal** where the proposed project is to come up. The Petitioner intends to use Solar PV Poly Crystalline technology for the project.*
- ii. *The Petitioner will also be liable to pay the Infrastructure Development Charges (IDC)/Power Line Evacuation Charges (PLE) to the State Utility*

for establishing, operating and maintaining the sub-stations for evacuating the power generated by the Petitioner's plant. In the absence of the above, the evacuation of electricity from the project will not be possible. The IDC for 1 MW is taken for the tariff determination process and the generic norms and parameters specified in the Central Commission Regulations are applied subject to the project specific parameters.

- iii. Applying the above provisions of the Central Commission Regulations, the Petitioner is filing the present petition for project specific tariff determination of the 1 MW solar power project at Devamapuram village, Tirunallur Commune, Karaikal, Puducherry. It is respectfully submitted that in the absence of specific Regulations framed by the Hon'ble Commission, the Hon'ble Commission may apply the above as the basis for tariff determination for the Petitioner.*
- iv. Applying the above cost of the land and the IDC charges to be incurred by the Petitioner to the normative capital cost specified in the Central Commission regulations of Rs. 16.90 Crores per MW for Solar PV Crystalline technology, the total capital cost of the project works out to Rs. 18.45 Crores.*
- v. The Petitioner intends to avail long term financial assistance to the tune of Rs. 12.92 Crores for the project. At present the lending rates by Nationalised Banks for long term loans is in the region of 14% and 16 %. The Petitioner therefore requests the Commission to adopt interest rate of 14.5%. In terms of the Central Commission Regulations, the interest rate to be generally applied is 150 basis points over and above the Long Term Prime Lending Rate of the State Bank India. Even as per the above Regulations, the interest rate presently applicable would be 15.5% considering the present Long Term Prime Lending Rate of 14.5%.*
- vi. In terms of the Central Commission Regulations, the Operating and Maintenance expenses for the project are Rs.13 lacs per MW for the first year of operation with a further escalation of 5.72% for the subsequent years after 2009-10.*
- vii. As per the Central Commission Regulations, the working capital requirement for the project would include the following:
 - a. Operation and Maintenance expenses for one month;*
 - b. Maintenance spares @ 15 % of the O&M expenses,*
 - c. Receivables equivalent to 2 months of energy charges for sale of electricity;**
- viii. The Petitioner therefore requests this Hon'ble Commission to adopt a similar approach and fix the interest on working capital at the same rate of 14.5% with recent changes of Interest rate by RBI.*

- ix. *The normal life of plant and machinery in 1 MW Roof top PV Solar plant is 25years. The Central Commission Regulations has also taken 25 years as the normal life of plant and machinery and hence the Petitioner requests the Hon'ble Commission to adopt a similar approach.*
- x. *As per the Central Commission study on CUF, the average normative Capacity Utilisation Factor for India has been indicated at 19%. It is submitted that considering Puducherry climatic conditions the Capacity Utilisation factor will be around 17%. On account of the above, the annual generation of the units will reduce by 10.5% approximately. It is respectfully submitted that the Hon'ble Commission adopt the Capacity Utilisation Factor of 17% considering the climatic conditions in Puducherry.*
- xi. *It is submitted that the Hon'ble Commission may determine the tariff for the solar power project of the Petitioner based on the above norms and parameters.*

The Petitioner filed a statement indicating the tariff to be arrived at, based on the norms and parameters specified herein above.

5. PUBLIC HEARING PROCESS

The Public was informed about the hearing, by the Commission by releasing a Public Notice in the newspapers (as per the list in **Table 2**), directing the Petitioner for a similar action and directing ED-P (respondent 1) to prepare a hand out on project costs & Tariff, in vernacular language for Public information. The notice was uploaded on the JERC's web site (www.jerc.gov.in). The Petitioner was also asked to upload the abridged version of the petition as Public notice on his web site. ED-P also organized local news in the media about this Public Hearing.

5.1. Notice for Public Hearing by the Commission

The petitioner uploaded the Public Notice on the website (www.bginfra.com) of its sister Company for inviting objections and suggestions on their Project. The Saheli Exports does not have its own Web address and shares the same as indicated at para 3.2.3 of the order. The Petitioner issued a Public Notice in the News Papers giving abridged version of his Petition, inviting objections / suggestions before the date of hearing i.e 19th June 2012.

The Public Notice inviting Suggestions / Objections was also uploaded on the Web site of the Respondent 1 (ED-P).

A brief on the Project was circulated in the local language during the Public hearing also. Copy attached as an **Annexure 9** in this Tariff order. In addition, Petition is available on the Commission's web site (www.jerc.gov.in).

Table 2: Details of public notice published by Commission for the 2nd Public Hearing

S.No.	Date	Publication/ Name of Newspaper	Language	Edition
1	10.6.2012	Dinakaran	Tamil	Puducherry
2	10.6.2012	Matrabhumi	Tamil	Chennai
3	10.6.2012	The Hindu	English	Chennai
4	10.6.2012	The Hindu	English	Kochi
5	10.6.2012	New Indian Express	English	Chennai
6	10.6.2012	New Indian Express	English	Kozikode
7	10.6.2012	Vijay Bhanu	Telugu	Kakinada
8	10.6.2012	Malayala Manorma	Malalayam	Kannur
9	10.6.2012	Mathrubhumi	Malalayam	Kannur

Table 3: Details of public notice by the Petitioner giving Petitioner's abridged version for Public hearing

S.No.	Date	Publication/ Name of Newspaper	Language	Edition
1	10.6.2012	Andhra Jyothi	Telugu	Puducherry
2	10.6.2012	The Hindu	English	Chennai
3	10.6.2012	Malayala Manorama	Malalayam	Kannur
4	10.6.2012	Daily Thanti	Tamil	Puducherry

The Copies of the Notice are placed at **annexure 8** to this Tariff Order.

A brief on the Project, including Components of the Project Cost was also circulated in English and in vernacular language during the Public hearing. Copy attached at **Annexure 9**.

The Public during hearings on 19th & 20th June 2012, were adequately informed about all the aspects of the Project, Scheme, Tariff determination process. A presentation was made to the Public by the Petitioner. The Project details were circulated to the Public attending the hearing, in vernacular language and in English.

Commission received 2 written objections / suggestions on the petition for the 1st Public hearing, by the last date (25.4.2012) for filing objections/suggestion. Stakeholders who raised their concerns on the spot, were also responded to, by the officers of the utility orally on the spot.

One written paper giving suggestions / comments and queries was received from the Physically Handicapped youth Association at the Public hearing on 20th June 2012, which is a repeat of what was received in 1st Public hearing and responded accordingly.

During the public hearings, each stake holder present was offered an equal opportunity, to present his views on the petition filed by the Petitioner. All those present at the hearings, irrespective of whether they had given a written objection or not, were also given an equal opportunity to express their views. The list of Stakeholders who objected / suggested, is attached as **Annexure 10** to this order. The list includes the objectors who gave their written objections, and other stakeholders who did not give their written objection or prior intimation, but choose to express their views on the subject were also given an equal opportunity to express their views.

The issues and concerns expressed by the stakeholders have been examined by the Commission. The issues were discussed / clarified during the public hearing, & the

comments/replies of the utility and the views of the Commission thereon, have been summarized in the Table 4:Comments and Suggestions.

In the 1st Public hearing, some portion of the recording indicated disc error and therefore could not be verified. In the 2nd Hearing proceedings were recorded verbatim in English by Commission's Secretariat.

6. SUMMARY OF OBJECTIONS RAISED, RESPONSE FROM THE PETITIONER AND COMMISSION'S VIEWS

6.1. Objections/Suggestions and response at the hearings

The Hearings at both the locations Karaikal & Puducherry during 2nd hearing on 19th & 20th June 2012 respectively, had some Common General Comments & Suggestions which were verbally presented and replied to, by the Petitioner / Licensee as under :

The Following Specific Comments and Suggestions, Queries were received in writing before the 1st Public Hearing.

1. **Physically Handicapped Youth Association, Patcha Muthu Mari Amman Koil Street, Kumaragurupallam, Pondicherry - 605 011.** a Registered body working for the welfare and protecting the Interest of Physically Handicapped persons represented by Shri RP Pannerselvan

The Organization Sought to know the following general clarifications from Respondents No.1 (The Licensee) & No.2 (The Project Developer – M/s Saheli Exports , the Petitioner of this Petition 39/2011)

- i. Who will be the end users of this power generated from solar energy?
a) Hut category

b) Domestic house owners

c) Agriculturist & Schools.

d) Small, Medium or Large Scale industries

e) Commercial establishments like Star Hotels, Cinema House, Offices, Banks etc.*
- ii. If the end user falls in anyone or all categories, requests the Commission to consider the following suggestions: a) The "Hut" category of users should be given only 25 units of electricity per month free. Under the definition of "Hut" one 40 watts bulb was supposed to be used but now these "Huts" are using more than one connection thereby defeating the very purpose of the scheme. They are using gadgets like Mixie , grinder, home theatre , cable connection and paying cable connection charges of Rs 250/- per Month .Many of them are subletting a portion of their house for rent. Under these*

circumstances, it is suggested that normal charges should be collected.

The Domestic House Consumers should be split into two they are 1) Normal Users Split AIC users. The split AIC guzzles more electricity. Hence, they should be charged three times the normal charges.

Agriculturists & Schools should be given at concessional rate.

Small, Medium or Large Scale industries should be given at normal rates.

Commercial establishments like Star Hotels, offices, Banks etc. should be charged three times the normal charge.

Clarifications required from the Licensee

a) Whether fuel surcharge will be levied by Respondent no 1 – (The Licensee)

b) The cost - benefit ratio: when comparing conventional type of generating current.

The replies relevant to the subject Public hearing are covered here. Questions on other matters on Electricity other than the “ subject Hearing Matter “were also answered but are not covered here.

The Replies were given to Physically Handicapped Youth Association, by the Electricity Department and the Commission on Questions / suggestions as under:

The Generation of Solar Power is like any other Power Generation system, however it does not need any Fuel, as such no Fuel Surcharge is applicable on the Solar Power Units fed into the Grid.

The Solar Power generated will be fed into the Grid and get pooled before it reaches the consumers and Solar Power cannot be identified separately in the Grid and who gets the same cannot be ascertained. Offering this quantum of Electricity to any specific category of consumers is not possible in grid connected scheme.

The cost benefit analysis can be understood that there is only a upfront capital cost. There is no O&M cost & annual escalation on the same as well as no requirement of Fuel which is a depleting resource and is becoming costlier every day for which fuel surcharge is payable. There is no pollution in solar power generation.

Clarifications sought from Respondent no 2 (Saheli Exports)

a. “The Type of Solar Cells used: The Gallium- Arsenic- Silicon cells are not efficient at Temperature 40° and at 45° they collapse. Kindly clarify? Since the Project is under JawaharLal Nehru National Urban Renewable Mission and the Ministry of New and

Renewable Energy Agency will provide generation based incentive then the common public have a right to know the Technical details of the PV Cell used and the incentives offered by the agency. Whether these incentives will be passed on to the common public?"

- b. What is the cost of the project and how much time will it take to break even?*
- c. What is the brand of Solar Panel that is used?*
- d. What are the supply hours?*
- e. Whether they can supply throughout the year?*
- f. What is the life time of the solar panel?*
- g. Prior to putting up this project and approaching this Commission, What is the tariff calculations.*
- h. What rate was projected? Can they furnish a copy of the same? "*

Response to by the Petitioner Queries of Physically Handicapped, Youth Association, by M/S Saheli Exports

"Panels from Polycrystalline solar cells of Tata BP Solar have been considered. The Cost of the Project is Rs 18.48 Crs. The Electricity Department will pay Rs. 5.50 / KWh. Based on the Tariff decided by the Hon'ble Commission, the balance amount per Kwh will be provided as a subsidy by Govt. of India. The Tariff will be fixed for 25 Years. We have requested for Rs. 20.50 / Kwh , as such Rs 15.00 will come as subsidy , if Hon'ble commission approves the Tariff requested by us. "

2. Suggestions / Submission by Indian National Trust for Art and Cultural Heritage (INTACH), 62 rue Aurobindo Pondicherry 605 00] Present at the 1st Public Hearing in April 2012 at Puducherry.

- i. Solar PV including rooftop solar PV. should be promoted as it is one of the energy sources that can make a major contribution to achieving renewable energy targets. Rooftop solar has the advantage that the use of valuable (agricultural) land can be avoided. Puducherry with its large number of row houses with (flat) roofs has a huge opportunity for rooftop solar, serving the dual purpose of generating electricity for local consumption and for protecting the roof from the direct sun.*
- ii. To create conditions that are conducive for investments in (rooftop) solar PV long term.*
- iii. Clear and transparent policies are needed so that project funding can be attracted.*
- iv. Feed-in tariffs for the gross solar PV energy produced are an essential component of (rooftop) solar PV policies.*
- v. The purpose of feed-in tariff orders is to make it known to the public at large and the investors and banks in particular what the revenue per kWh or energy produced will be for projects that are commissioned during a certain project commissioning period so that they can decide whether to invest or not.*

- vi. It is submitted that feed-in tariffs for (rooftop) solar PV are fixed annually in the month of September for projects to be commissioned during the financial year that commences in April of the following year. (E.g. the feed-in tariff for projects to be commissioned during the financial year 2013-14 would be announced in September 2012). This prior feed-in tariff announcement is needed so that prospective investors, rooftop owners, and developers can prepare a project plan and negotiate equipment cost, rooftop rental (if applicable) and project finance loans on the basis of the announced feed-in tariff.
- vii. While fixing (rooftop) solar PV feed-in tariffs for the gross production of electrical energy produced, the following parameters may be taken into account to ensure that projects are, and remain, viable so that renewable energy penetration targets set by the Government of India can be achieved:
- viii. Capital cost; Rooftop rental (if applicable); Debt-equity ratio; - Return on equity; Interest on debt; Depreciation; Interest on working capital; Maintenance expenses;
- ix. Expected life of inverter(s); Replacement cost of grid inverter(s); Grid availability; Capacity utilisation factor; Solar PV panels performance reduction Useful plant life / economic life.

For the specific case of Solar Project by M/s Saheli Exports, INTACH recommended as follows:

- (a) The feed-in tariff order is passed within a time frame (e.g. within a month).
- (b) The Power Purchase Agreement between Saheli Exports and the Electricity Department of Puducherry is signed within a month from the date of the feed-in tariff announcement, if Saheli Exports decides to proceed with the project after the tariff order is passed.
- (c) The feed-in tariff of the project of Saheli Exports may be fixed on the basis a levelised cost of energy calculation that is computed with the following assumptions:
 - I. Capital cost: Rs 11 crore per MW
 - II. Rooftop rental: 20% of feed-in tariff revenue *or* land cost (if not included in capital cost of equipment);
 - III. Debt-equity ratio: Debt 70%, Equity 30%
 - IV. Return on equity: 20% for the first 10 years, 25% thereafter
 - V. Interest on debt: 12.50%
 - VI. Depreciation: 5%
 - VII. Interest on working capital: 14.00%
 - VIII. Maintenance expenses: INR 12 lakh per MW for 2012-13 with an annual increase of 8%

- IX. Expected life of inverter(s): 7 years
- X. Replacement cost of grid inverter(s): Rs. 2.0 crore per MW (2012-2013 prices);
- XI. Grid availability (Puducherry): 90%
- XII. Capacity utilisation factor: 18%
- XIII. Solar PV panels performance reduction: 1 % per annum;
- XIV. Useful plant life / economic life: 22 years.

Commission’s view : (it was during 1st Public Hearing)

The Market data on Project cost and all the parameters that are relevant on this date and applicable to Puducherry will be considered while deciding tariff and will be decided as soon as possible. The use of Agricultural Land / scarce land is the prerogative of the Project Developer and Govt. is not acquiring the land from any farmer for this Project. It is a commercial deal between the two parties – the land buyer and the land seller.

Solar Roof Top is always a better proposition in land scarce geographical area. However, the Commission is not putting any restriction for the same.

Table 4: Comments and Suggestions

These queries were verbally asked in the 1st Public Hearing, and some of these were repeated in the 2nd hearing also. The questions not related to the subject matter though answered, are not covered here.

Sl.	Gist of Queries	Response of ED-P/ REAP/ Saheli	Commission’s analysis & Views as explained to the Public / Objector
1.	High Tariff and its impact on each consumer’s bill By : S/Sh K Ukkirapandayan, Perumal, Parthasarthy	The Quantum of such power is small , as such impact will be nominal	The Commission removed their apprehensions that there will only be a marginal impact on the Tariff. The Public was explained about the RPOs and the compulsions to promote Renewable Power. The use of RECs was also explained.
2.	High Cost by Private Sector and Govt. should take on such projects rather than private sector. By S/Sh Mohd Bilal, Illangovan, Perumal	It is a Scheme of GoI where Private Players are required to participate & set up the Project	Role of MNRE / IREDA & the Commission was explained to the Public
3.	Non use of Agricultural Land By S/ Shri Illangovan, Rajendran, Bala Subramanium, Rajsehar	Saheli informed that it is a non Productive Land.	The use of Agricultural Land / scarce land is the prerogative of the Project Developer and govt. is not acquiring the land from any farmer. It is a commercial deal between the two parties – the land buyer and the land seller.

Sl.	Gist of Queries	Response of ED-P/ REAP/ Saheli	Commission's analysis & Views as explained to the Public / Objector
4.	<p>Is the Project Cost and Tariff is pre-decided ? By : S/Sh Bala Subramaniam, Damodaran</p>	<p>The Project Cost and Tariff has been submitted by Saheli for its approval / decision by the Commission</p>	<p>No, it will be decided as soon as possible. The Commission will go through and analyse the data on various parameters submitted by the Petitioner with reference to relevant regulations, Policy and other parameters available in the Public domain for their reasonability and justification before fixing the Tariff for the Project.</p>
5.	<p>High Cost of the Project & how does it compare with Gujarat. Rate of return on Investment seems to have been kept high by the Project Developer. By : Sh. Srinivasan, and also by REAP, & ED-P</p>	<p>Saheli Stated that Land in Karaikal- Puducherry is costly. Saheli also stated that the Cost of Solar Panels has gone up due to Rupee weakening since the Scheme was announced when USD was @ Rs 44.50 About Import Content , Saheli was not sure whether he can get it from the Supplier, but he said he will try.</p>	<p>The Market data of various states on Project cost and all the parameters that are relevant on this date and applicable to Puducherry will be considered while deciding tariff.</p> <p>The Commission gave an opportunity to the Petitioner for submitting the documentary evidence of Land Cost in the area around the Project site as under:</p> <ul style="list-style-type: none"> i. Average Cost of Land in last 3 years ii. If not available: then, Average Cost of Land in last 1 year iii. If not available: then, the proof of last similar land sale in the vicinity of the Project Location <p>The Commission asked the Petitioner to indicate the import content in the Project Cost .</p> <p>These details of Cost of Land & Import Content in Solar Panel were required to be submitted by 22nd June 2012 *</p> <p>These details were not provided till 2nd July 2012</p>

6.	High Tariff By S/ Shri , Samy, Rajasekhar, Bala,	REAP, ED-P	As above
7.	If Puducherry is surplus in Power , why have the Costlier Power – Shri Rajasekhar		To meet RPO requirements.
8.	We do not oppose solar Power , but please execute the Project at Lowest Cost- Shri Rajasekhar		Commission will analyse each and every parameter.
9.	User of the Solar Power : whether Industry, Domestic or any other Group		The Power will be fed to the Grid, Pooled and used by all consumers.

During the 2nd Public hearing, The Petitioner was directed to make a presentation on Company's proposed Solar Power Project so that Public is better aware of what is being discussed and what does this Project Tariff means to the Stake Holders.

The Presentation made by the Petitioner included certain points which are not compatible to the present market environment and are dealt point wise as here under:

Petitioner's Presentation:

1. *Tariff of Rs 20.50 / Kwh as 5 MW Plant will be economical on per MW basis and made a mention of CERC basis for Tariff Determination.*

Commission's Views

When making a reference of CERC Solar Tariff, reference of Power Plant of 5 MW size by Petitioner was not relevant as Hon'ble CERC does not mention 5 MW size of Solar Power Plant in its Tariff Calculations. CERC Tariff of Rs 10.39 / Kwh is based on 1 MW vide its Tariff Order dated 27 March 2012. This Tariff is without accounting for any upfront benefit to be taken by the Project Developer.

Petitioner's Presentation:

2. *Cost of Land in Puducherry is 5 to 6 Times the Land Cost at other Places.*

Commission's Views

The petitioner though had asked for the determination of the Project Specific Tariff, but never justified the Project Specific parameters including Cost of Land., even though an

opportunity was given to him during public hearing. The Commission also gave time to the Petitioner for submitting the documentary evidence of Land Cost in the area around the Project site as under:

- i. Average Cost of Land in last 3 years
- ii. If not available: then, Average Cost of Land in last 1 year
- iii. If not available: then, last land sale transaction in the vicinity of the Project site.

These details were required to be submitted by 22nd June 2012 (not even up to 2nd July 2012), so that commission's Secretariat is able to analyze the same. The Commission has on its own checked up the Prices in Karaikal & around Karaikal from the commercial information available on the internet.

Commission's Decision:

A Fair price of a non / less productive agricultural land or waste land (suitable for Solar PV Project) may be around Rs. 24 Lacs for 5 Acres required for the Solar Project of 1 MWp and is approved by the Commission, against all India average of Rs 3.2 Lacs per acre or Rs 16 Lacs for 5 Acres considered by Hon'ble CERC.

Petitioner's Presentation:

3. *20% PLF considered by EDP in their Tariff calculations.*

Commission's Views

The applicable term with reference to Solar PV Project is "CUF" and not "PLF" and a professional company in Solar Space is not expected to use the term of "PLF" in Solar PV project. The Petitioner has indicated 19% CUF which is supported by the data available in Public domain

Petitioner's Presentation:

4. *Module degradation over Plant life may be considered while calculating the Financial Parameters.*

Commission's Views

Hon'ble CERC has considered this and made a mention of Degradation, but has built it within the Project Cost of Rs. 10 Crs/ MW & the levellised Tariff of Rs 10.39 / Kwh.

Petitioner's Presentation:

5. *CERC price is in the scale for 5 MW and above, whereas this scheme has a limitation for 1-2 MW where we cannot get the lower price as in that case.*

Commission's Views

It is not a correct statement of the Petitioner that Hon'ble CERC's Tariff is in the scale of 5 MW. Hon'ble CERC's order dated 27th March 2012 on petition no. 35/2012 is for 1 MW solar PV as at Annex 5A of the CERC's order.

Petitioner's Presentation:

6. *Interest rate cannot be 12% as now the prime lending rate of all banks is 13.75%*

Commission's Views

The Rate of Interest of 12% is not considered by Hon'ble CERC. It is 12.75%/ Annum on Debt and 12.8 % per annum on Working Capital.

Petitioner's Presentation:

7. *O&M cost of 9 Lakhs - against to 10 Lakhs and escalation cannot be flat 5% all the time, and should increase over time.*

Commission's Views

The Hon'ble CERC has fixed the O&M Cost after inviting Public Views & comments and commission will approve the same after considering various factors after this hearing

Commission's Decision.

Petitioner's Presentation:

8. *Escalation on O&M varies 5% for first 5 years thereafter 7.5% every year, plus there is the additional maintenance on painting and coating for the galvanized materials.*

Commission's Views

It is only a suggestion from the Petitioner; The Commissioner will consider every aspect on its own merits

Petitioner's Presentation:

9. *The \$ to Re. is currently around Rs.56.00 per US \$, which was about Rs.44.50 per US \$ at the time of announcement of the Policy for the guidelines.*

Commission's Views

The Import Content built in the Project Cost was asked from the Petitioner and time was given up to 22nd June 2012 to substantiate. The Petitioner was not sure if he will be able to get it from the Supplier as the Supplier might not like to reveal. The Petitioner did not

submit even a rough estimate of the details till the date 22nd June 2012 as specified (not even up to 2nd July 2012).

The Commission has seen the fall in the Solar Cells and Solar panels prices. The variations almost balanced and neutralized the impact of Cost / Exchange rate variation post Oct-Nov 2011 ; the date indicated by the Hon'ble CERC's in their consultation paper of 06th Feb 2012.

Petitioner's Presentation:

10. *Reverse biddings happened across India in last 2 years have seen an erratic pricings and those projects are not able to get proper financial closures and seen difficulties in completing the projects. The recent trends in the reverse bidding have shown some maturity. For example latest 400MW bidding, developers have got the project at Rs. 12 + for bigger projects like 50 MW+ sizes. Similarly Reliance has announced a 300 MW project with an estimated project cost of 6000 Crores. Out of which for 40 MW PV plant already debt raised from US exim bank and ADB for about 700 crores @ an average price of 17.5 crores / MW.*

Commission's Views

The Results of Reverse Bidding are getting reconfirmed every time and are showing falling Tariff Trends.(NVVN 2011 1st Batch, 2nd Batch), Bangalore (April 2012), MP (May 2012), Odisha (Feb 2012). The Cost of Solar Power Project has been indicated as Rs 10 Crs/ MW in Odisha. (Ref : Annexure 15)

The Petitioner has been projecting higher Tariff examples in his business interests, without taking care of Customer interests / or drain on Public Exchequer by way of higher subsidy.

Petitioner's Presentation:

11. *Additional capacity on the DC side is not allowed in this Scheme like those of NTPC-NVNVN and other reverse bidding projects, where proper planning can be done in utilizing the full infrastructure. In this case, we will be under utilizing the infrastructure.*

Commission's Views

The Petitioner can go ahead with additional plant Capacity outside the Scheme under which Project is proposed. The Commission is not aware of any restriction placed by any agency for expansion, if the expansion is undertaken beyond the Scheme.

The Commission also observes that the Petitioner made a presentation comparing the Tariff proposed by ED-P and REAP about a year back. Both these respondents now have proposed CERC determined Tariff of Rs. 10.39 / Kwh. Confirmation from ED-P placed at Annexure 20 attached.

During the Presentation by the Petitioner, the Stake holders asked common questions/ Clarifications and were addressed as under:

Public Hearing Comments : by Specific Stakeholders

Sl.	Queries Gist	Response of ED-P/ REAP/ Saheli	Commission's analysis & Views as explained to the Public / Objector
1.	Private Party undertaking the Project	<p>Issue raised by By : S/Sh K Ukkirapandayan, Perumal, Parthasarthy</p> <p>It is a scheme of GoI for Private Players.</p>	<p>In this GoI scheme, Tariff is to be decided by the respective commissions.</p>
2.	CUF of 19%	<p>The Petitioner intervened in respect of CUF and indicated it to be 17.25% (against 19% as per the Petition) and said that it can be proved by data from a Solar Project 30 Kms away from Proposed site.</p> <p>REAP said 19% is OK</p>	<p>The Commission informed the Petitioner, that the Commission can look into the CUF data (if submitted) of any Project on East Coast based Solar Project , and Commission can get it verified from the Third Party for an independent check. The data should be received by 22nd June 2012 at the Commission's Office.</p>
3.	High Power Tariff	<p>ED -P said that "because of the falling trend of Solar Tariff, ED-P suggests the CERC Generic Tariff of Rs 10.39/ KWh or as to be approved by the Hon'ble Commission". The ED-P was asked for the Tariff, ED-P intend to propose.</p> <p>ED-P also said that ED-P was aware of the recent reverse bidding tariff range of successful bidders</p> <p>REAP said The land prices indicated by the Petitioner are very high and should not go beyond the land in the adjacent areas in the Tamil Nadu". The CERC Solar Tariff & Tariff principles may be considered by allowing any adjustment for the Tariff of smaller size of the Plant.</p>	<p>Commission made the apprehensions of the Objectors at rest by indicating that Cost of Power purchase by ED-P will be Rs 5.50 / Kwh with 3% escalation / year. The Power Units generated from 1 MW Plant are of the order of 1.664 Mn units a year which will have a very small impact on the Avg. Cost of Power because of high quantum of Power Purchase for Puducherry. Commission also informed that the Scheme is on PPP basis as such Private Companies have to take a step forward.</p>

4.	Imported Solar Panels are cheaper	Saheli informed that Crystalline PV Panels are not allowed under the Scheme	No Comments
5.	Private Party	Issue raised by : By : S/Sh K Ukkirapandayan, Perumal, Parthasarthy It is a scheme of Gol for Private Players.	In this the Gol scheme , Tariff is to be decided by the respective commissions.

The data to be submitted by the Petitioner regarding Land Cost & CUF of East Coast projects asked by the Commission during 2nd Public Hearing, has not been received by the date specified by the Commission.

On Specific Queries by the Commission from the Public, at the end of the Public Hearings on 19th & 20th June 2012; the response was same at both the hearings as under:

- i. Need for the Project : **The People Okayed the Project.**
- ii. Justification of the Tariff : **The People said Rs. 20.50/ Kwh is high, needs Hon'ble Commission's approval.**

7. COMMISSION'S APPROACH AND DESIGN FOR TARIFF DETERMINATION

Following the Public Hearings, Commission went through the gist of various comments, suggestions received at the Public Hearings, analyzed and proceeded with the Process of Tariff Determination.

7.1. Tariff Determination Approach

The Commission has not framed regulation of its own for the determination of tariff of RE / Solar PV Project. JERC's Regulation No. 10 of 2009 dated 8.2.2010 provides that the Commission will follow the approach and methodology as specified by CERC for determination of Tariff.

JERC Regulation 10-2009 CHAPTER-II

GENERAL GUIDING FACTORS FOR DETERMINATION OF TARIFF

(1) The Commission, while determining the tariff shall be guided by the principles Contained in Section 61 of the Act, namely

- (a) The principles and methodologies specified by the Central Commission for the Determination of the tariff applicable to generating companies and Transmission Licensees;*
- (b) The generation, transmission, distribution and supply of electricity are conducted on commercial principles;*
- (c) The factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;*
- (d) Safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner*
-*
- (h) The promotion of co-generation and generation of electricity from renewable sources of energy;*
- (i) The National Electricity Policy and tariff policy"*

The Commission, in its approach for determination of Tariff in this Order has also relied on (a) above and other relevant references for a detailed and a proper analysis and determination of Project Specific Tariff from the various documents of Hon'ble CERC. However, wherever a change is required specific to the Petition the same has been done. These Changes are made in the interest of the Consumers, GBI cost to the Govt. and promoting investments in RE in the subject territory.

In Tariff fixation for this Petition, the Commission inter-alia is also guided by Section 61.

(Tariff regulations) of the Electricity Act 2003:

The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-

- (a) The principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission Licensees;
- (b) The generation, transmission, distribution and supply of electricity are conducted on commercial principles;
- (c) The factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;
- (d) Safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner;
- (e) The principles rewarding efficiency in performance;
- (f) Multiyear tariff principles;
- (g) That the tariff progressively reflects the cost of supply of electricity and also, reduces cross-subsidies in the manner specified by the Appropriate Commission;
- (h) The promotion of co-generation and generation of electricity from renewable sources of energy;
- (i) The National Electricity Policy and Tariff policy
- (j) RPO regulation of JERC -14/2010 of 30 Nov 2010.

The Commission is also guided by the Tariff Policy :

“ 5.12.1 Non-conventional sources of energy being the most environment friendly there is an urgent need to promote generation of electricity based on such sources of energy. For this purpose, efforts need to be made to reduce the capital cost of projects based on non-conventional and renewable sources of energy. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies and a sustained growth of these sources. “

Hon'ble CERC deliberated various Tariff parameters that go into its Fixation for Renewable Energy, including Solar Power Generation based on Photovoltaic (PV) Technology. These were discussed and deliberated in Public hearing in detail as under.

- a. Explanatory Memorandum-Renewable Energy Tariff Regulations (EM) dated Nov 2011 was placed on CERC's Web site for getting comments of various stake holders.
- b. Hon'ble CER Commission vide its Public notice no. (Petition No. 35/2012 (*suo-motu*) dated 29th February, 2012 invited comments from the various stakeholders based on a document dated 6th Feb 2012 titled "Statement and Objects for Renewable Energy

Tariff" issued by Hon'ble CERC. In response to the same written comments/suggestions received from 31 stakeholders including MNRE.

- c. Subsequently, a public hearing was held by Hon'ble CERC on 15th March, 2012. Ten stakeholders expressed their views/suggestions/comments in person during the hearing.
- d. Hon'ble CERC also instituted a study (Nov 2011) on Capacity Utilization factor, effect of Solar Panel Tilt angle and the geographical location of Solar Power Plant.

7.2. Solar Tariff Requested by the Petitioner V/s Market Discovered Tariffs

- i. Petitioner demanded: Rs20.50 / Kwh for a project cost of Rs 18.4883 Crs as per the Project Report & 18.45 Crs the Capital Cost as per the Petition.
- ii. REAP initially recommended a tariff of Rs.20.50 / Kwh at a cost of Rs20 Crs. and then revised the recommendations during Public Hearing to CERC tariff of Rs 10.39 Kwh (levelised tariff for 25 Years without accelerated depreciation) during the hearing at Puducherry on 20th June 2012.
- iii. Electricity Department had recommended a tariff of Rs. 13.83/ Kwh without reference to the project cost, which was revised by them during the Public Hearing to CERC tariff of Rs 10.39 Kwh (levelised tariff for 25 Years without accelerated depreciation) during the hearings at Karaikal & Puducherry on 19th & 20th June 2012.
- iv. Tariff by authorities as per para 7.3 (Table 5)

7.3. Recent Tariff Comparison of PV Technology Based Plants

Table 5: Solar Tariff –Trend

Solar PV Schemes in various states	Order Dated	Tariff Years	Tariff with normal depreciation rate Rs / Kwh	Tariff if accelerated depreciation is taken up front Rs. / KWh
CERC	27 Mar 2012	25	10.39	9.35
NVVN Ph 1 Reverse Bidding		25	Average 12.25 Range 10.95 to 12.76	
NVVN Reverse Bidding Ph 2 Batch2	Aug 2011	25	Average 8.77 Range 7.49 to 9.41	
Gujarat	31 Aug 2010	25	10.37	9.28
Odisha	27 Feb 2012		7.00-8.98	
Karnataka Reverse Bidding	16 Apr 2012	25	7.94 -8.50	
Madhya Pradesh	13 May 2012	25	7.90-9.59	

Above results reveal that under the reverse bidding mechanism; projects are allocated to developers offering the lowest effective generation Tariff & also the tariffs set by the various authorities, shows a declining trend.

The Tariff components have been appropriately examined and analyzed as per “Tariff Determinants-Components in fixation of tariff:”

The Commission examined the petition, its various parameters, and assumptions along with the following.

- i. Trend in Capital Equipment cost for Small Solar PV Plants of 1 MW. The data has been examined that is available up to May 2012 has been examined
- ii. Various parameters affecting CUF on India’s East Coastal areas
- iii. Commission has also considered:
 - a. Small Scale of the Project
 - b. Cost of Funds
 - c. Credit Rating
 - d. Equipment / Technology Performance

7.4. Determination of Tariff

The Petitioner has demanded a Tariff of Rs. 20.50 per unit, based on various components and parameters of costs.

Table 6: Parameters for Tariff as per the Petitioner

There were variations in the data given in the Petition & in Project Report.

Petition being a latest document (after Project Report), the same has been accepted as the data source for various parameters for determination of Tariff.

Sl.	Parameters	Petitioner
1.	Tariff	Rs. 20.50 / Kwh
2.	Project (Capital Cost)/ MW Rs Crs.	18.4883
3.	CUF	17 % as part of the Prayer but 17.13% (Eq to 1.50 Mn for 1 MW) as per the Project report. 19% as per the Abridged Petition for Public Hearing
4.	Power Generation in Million Units	1.50
5.	Plant Life Years	25
6.	Solar Panel Degradation/ yr.	1%
7.	O&M + Escalation / Year	Rs. 13 Lacs for 1st Year + 5.72 % / Yr. Escalation
8.	Int. on Loan	14.5 % (13% in the Project Report)

Sl.	Parameters	Petitioner
9.	Int. on WC	14.5% (13% in the Project Report)
10.	Depreciation	Not mentioned under prayer, 7% & 1.33 % as per CERC norms indicated only in the Project Report.
11.	CDM Benefits	Revenue sharing Not considered by the Petitioner in the Petition
12.	Power Transmission line for Evacuation	Rs 50.00 Lacs (75 Lacs in the Project Report)
13.	Tariff	Rs 20.50 / Kwh
14.	Project (Capital Cost) / MW Rs Crs.	18.4883
15.	CUF	17 % as part of the Prayer but 17.13% (Eq to 1.50 Mn for 1 MW) as per the Project report. 19% as per the Abridged Petition for Public Hearing
16.	Power Generation in Million Units	1.50
17.	Plant Life Years	25
18.	Solar Panel Degradation/ yr	1%

The Commission exercising its prudence and obligations to promote the Renewable Energy decided not to reject the Petition due to these aberrations. The Petition being the final document has been mainly relied upon by the Commission for Tariff fixation. The Commission proceeded for determination of Tariff pragmatically and proactively.

7.5. Components in fixation of tariff:

The Commission has considered the Cost data submitted by the Petitioner, Market Data on the Cost of Solar PV Projects and the Results of Competitive Bidding on Solar PV Projects etc. have been examined. An analysis & treatment of each Tariff Component is provided under the para 7.6 heading "Tariff Determinants".

Analysis of Various COMPONENTS OF TARIFF as under, based on the Market Parameters on Solar PV Project Parameters vis a vis data submitted by the Petitioner:

7.6. Tariff Determinants

- a. Project Cost (Capital Cost)
- b. Capacity utilization factor
- c. De-rating
- d. Debt-equity ratio
- e. Term of loan
- f. Rate of interest
- g. Interest on Working Capital
- h. Return on equity
- i. Life of plant and machinery

- j. Rate of depreciation
- k. Operation and maintenance expenditure
- l. Auxiliary Consumption
- m. Accelerated Depreciation Benefit Impact, (if availed) on Tariff

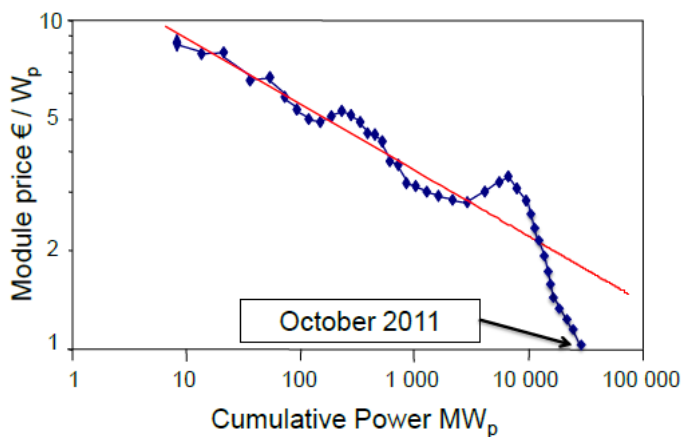
7.7. Project Cost

Recent falling trend in the cost and tariff of PV solar projects are analyzed herein:

Due to advances made in materials that continue to increase the efficiency and extend the life time of solar photovoltaic (PV) modules, there has been a remarkable decline in the cost of solar energy in the recent times. As seen from the trends in Indian Market, Project Developers' learning from Projects undertaken so far have optimized Panel layouts in the Field, Lesser losses in cable, higher generation (Capacity Utilization Factor) by appropriating the Panel tilt etc. led to better Tariffs (beyond the reduction in Capital Costs alone) reflected by Competitive bidding and proactive involvement of CERC, SERCs, MNRE, IREDA, NVVN etc. These reports were studied and data analyzed and referred to by the Commission for a realistic assessment.

Price experience (learning) curve

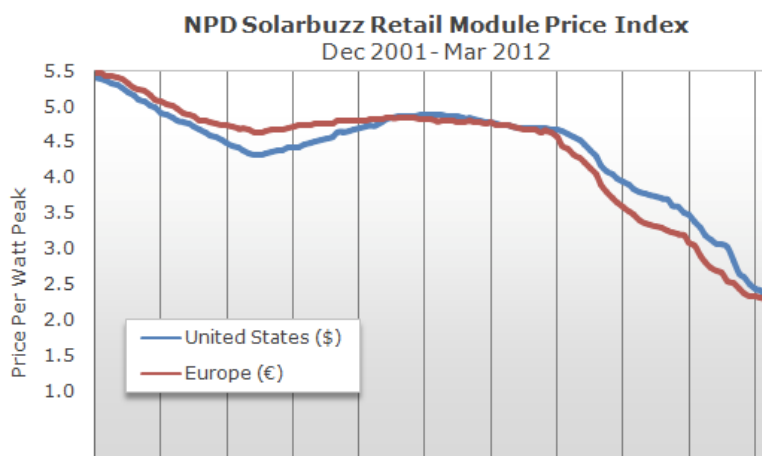
Silicon-wafer based modules



Source: Solar Generation, IEA-PVPS 2006; Deutsche Bank, SERIS 2011

Source of Curve of Price Experience: Solar Energy Research Institute of Singapore (SERIS) ANNUAL REPORT

Reduction in Capital Cost from Jan 2010 (earlier CERC Tariff date) onwards, at Rs. 1690 Lac/MW for F Y 2010-11 as per CERC to Rs.1000 Lacs / MW by Hon'ble CERC in 2012. The prices are further falling, leading to Falling Tariffs from 2010 till date.



Source: <http://www.solarbuzz.com/facts-and-figures/retail-price-environment/module-prices>

The decrease in tariff is on the following counts:

Improvement in technology is leading to higher efficiency resulting in lower capital cost / MW. Declining capital cost due to decline in the prices of solar panels etc. and related balance of factors along with factors like improved layouts, lesser losses in cables, optimized Panel Tilt angle etc.

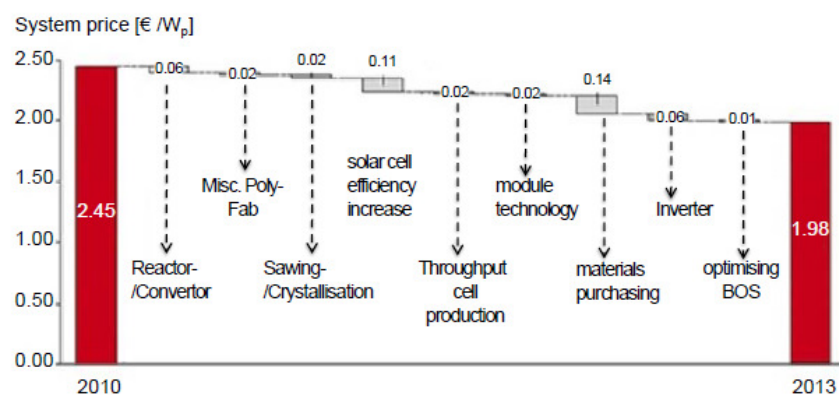
Technology selection by the Petitioner has been made on the basis of old established technology. The technologies which require larger land area are not considered as per the submission made by the Petitioner.

The Commission has considered the above data, analyzed the same, after conducting a prudence check, and considering the Tariffs received through bidding mechanism, knowing fully well Non-availability of capital cost figures in case of reverse biddings, (including innovative financial engineering if any, being done by large companies with relatively larger investable funds), leveraging benefits etc. has also been kept in view. The impact of each of the Tariff components on the tariff is discussed in the following paragraphs.

Table 7: Exchange Rate Effect on Solar Panel Costs

Sl.	Date		High	Low	Average	Rs/ USD
1	Nov 11		15	1	1.135	49.0
2		In Rupees @ Exchange Rate indicated at SI 1	73.5	49	55.62	
3	26 June 2012		1.25	0.65	0.812	56.6
4		In Rupees @ Exchange Rate indicated at SI 3	70.75	36.79	45.96	
<p>The Average Prices in Indian Rupees have fallen in spite of Weaker Indian Rupee. The Imports are allowed for PV Cells only and not the Panels.</p> <p>These Prices have fallen gradually.</p> <p>Source of Prices : PVinsights.com</p>						

Reduction in PV system prices, Including processing of materials, cells, modules; +BOS + margins



Source: P. Fath, Centrotherm; SEMI PV Fab Manager Forum, 2011

Pre-assembled components realized through the standardization and resulting economies, offer cost savings in the installation phase. High volume manufacturing has the further potential to significantly reduce component costs, as it has in the module production industry. Significant cost savings opportunities remain, as the BOS component manufacturers are typically small (with small market share), and utilize materials that are not specifically design for use in the solar industry. (Source: Renewable Energy Technology Cost Review – Melbourne Energy Institute, March 2011) Each component of above referred non-module cost of Solar PV based power plant is estimated as under for the determination of capital cost of Solar PV projects for FY2012-13.

The single largest of the BOS components is the inverter. According to Investment Panel on Climate Control (IPCC) Report-2011, the overall BOS experience curve has been between 78 and 81%, or a 19 to 22% learning rate. Quite similar to the module rates, the learning rates for inverters were just in the range of 10%. The Hon'ble CER Commission, while determining the benchmark has considered the Inverter cost as 0.98 crs / MW during Nov 2011 (USD @ Rs 49.00)

Hon'ble CERC Considered Installation expenditure includes EPC cost towards DC cabling between Solar PV panels & Inverters including junction boxes, AC cabling between Inverter & sub-station, Earthing arrangements and Transformer. The transformer cost includes the EPC cost of a step up outdoor type transformer, auxiliary transformers, HV Circuit breaker, Current Transformers, Potential Transformers, Isolators, LAs, protection relay and TOD meter. It also includes electrical accessories like , MCCBs, MCBs, fuses, lugs, glands etc, plant and control room lighting system with supports, fixtures, SCADA system, battery set, earthing system.

The Hon'ble CERC, while determining the benchmark capital cost for Solar PV projects considered the cost of cables and transformers and other associated equipment as 1.00 Crore/MW for FY 2012-13.

Balance of System – Price Trend

The cost reduction potential is being exploited by the Balance of Systems (BOS) industry as it is developing, and adopting similar principles to those followed in the module industry. An increased level of component standardization can decrease cost and labour. This standardization of components is helping drive economies of scale, and lead to high volume manufacturing.

7.8. Solar Tariff in the Market as at Present

There is a declining market of all Solar PV systems are leading to a falling Tariff Trend.

CERC's Tariff Order dated 27th March 2012 (Petition 35/2012) Levelised for 25 Years at Rs. 10.39 per Kwh. If accelerating depreciation is availed by the Project developer, the applicable Tariff will be Rs. 9.35/ KWh (10.39-1.04= 9.35). Rs 1.04 / Kwh is towards claiming accelerated depreciation.

The CERC fixed tariffs have declined over the years and so are the Tariffs in the results of reverse bidding tenders by various organizations in India. Analyzing the Results of the reverse bidding process by NVVN in Phase II, lowering the Solar Tariffs further down, the Hon'ble CERC has accordingly reduced the Floor Price and Forbearance Price of Renewable Energy Certificates (RECs) as under.

Falling Tariffs in Indian Solar Power are moving towards Grid Parity. Higher Tariffs will distort the Market and effect the zeal for Efficiencies.

Table 8: Renewable Energy Certificates (RECs) – Floor / Forbearance Price

FY	Price for Solar RECs : Rs /MWh		Remarks
	Floor Price	Forbearance Price	
2010-11	12,000	17,000	-
2011-12	12,000	17,000	Reduction due to Reduced Solar Tariffs and Project Capital Costs. .
2012-13	9,880	13,690	

7.9. Hon'ble CERC's Tariff Order dated 27th March 2012

On a Suo Motu Petition 35/2012 : Rs.10 Crs / MW with Rs.7 crs Debt and Rs.3 Crs Equity funding.

The Commission while examining and analysing the capital cost of the petition, had a look at information in para 7.3, 7.7 & Table 7 above , whereby Hon'ble CERC having heard the industry demanding capital cost ranging from Rs. 10 Crs to Rs. 14 crs / MW for Solar PV projects.

The CERC has specified the normative capital cost for the Solar PV power projects as Rs. 1000 Lakh/MW for the FY 2012-13.

Thin film module prices per watt were in the range of \$0.8 to \$1.20 and crystalline module prices were in the range of \$1.0 to \$1.5. These prices are normally designated in USD even in India, even though import of Crystalline Panels is not allowed under this scheme. Now that the prices of crystalline and thin film module available in India are in the range of 0.7 to 1.0 US\$/Watt and are on the decline further as of now.

Commission's Analysis: Based on above analysis the Commission has analysed various components of Cost and decides as under

Table 9: Decision on Petition's Capital Cost breakup- Summary

Parameters of Cost	As per the Petition	Capital Cost- Solar PV Rs Lakhs/ MW – CERC March '12 Norms	Commission (JERC) Rationalization of Cost Components Rs Lacs	Remarks of the Commission
PV Modules	Not Separately indicated	494	494	-
Land Cost	100	16	24	<p>The Price of 5 Acres of land is the information in the Public domain as per the Annexure 17 on Land Prices in Karaikal. Cost of undeveloped barren land has been considered by the Commission.</p> <p>The Commission gave an opportunity to the Petitioner for submitting the documentary evidence of Land Cost in the area around the Project site as under:</p> <p>i. Average Cost of Land in last 3 years ii.If not available: then, Average Cost of Land in last 1 year iii. If not available: then, the proof of similar land sale in the vicinity of the Project Location</p> <p>The Petitioner did not submit any information till 02nd July 2012.</p>
Civil & General Works	120	90	90	CERC norms are adequate
Power Conditioning Unit	Not separately Indicated	98	98	-
Cables , Transformers & other Misc.	Not separately Indicated	100	100	CERC norms are adequate. Project Developers are now achieving better gains from improvements in the power electronics, wiring, and mounting systems required.
Preliminary & Pre – Operative, Including IDC & Contingency	183.83	80	80	CERC norms adequate. The Faster Construction of Projects have reduced IDC, Preliminary & Preoperative expenses are less for a company having got experience thru' sister company Project.
Capital Cost	1848.83	978		
Misc. Cost		22	22	
Approved Capital Cost		1000	1008	

Commission’s Decision on Project Cost:

After Considering the above changes, the Commission approves the cost of Rs. 10.08 crore per MW as the Project Specific Cost .

7.10. Capacity Utilization Factor

” CUF” contributes to Optimal Generation of Solar Power by fixing an appropriate Tilt angle as per the Study arranged by CERC”.

In the absence of data for various locations, CERC considered the suggestions of the various stake holders who demanded a CUF from 17 per cent to 19 per cent with adjustments for auxiliary power consumption etc. Some stake holders demanded auxiliary consumption of almost 5.5 per cent. Some stake holders demanded that the auxiliary power consumption should be based zone-wise etc.

The Commission looked at the study of performance of Solar Plants in India which reveals that the average CUF at more than 80 per cent of locations works out to be more than 19 per cent for solar PV based on thin film technology. Similarly average CUF at more than 50 per cent locations works out to be more than 19 per cent for PV plants based on crystal line technology.

Table 10: Commission’s analysis of CUF & Power Generation data of Petitioner

Sl.	Ref to Project Report submitted as a part of the Petition and the Abridged Petition in the Public Notice	Page Ref. Project Report	Data by the Petitioner	Considered by the Commission after Analysis & Decision thereon
1.	Executive Summary page 6 & Para 2.2 Page 7 & Abridged Petition for Public Hearing in the Public notice	2,6,7	Annual Energy 1.50 Mn Units at Annual CUF= 19%	<p>The CUF in the abridged version of the Petition by the Petitioner in the News Paper notice on 10th June 2012 is 19% .</p> <p>At 19% CUF for 1 MW = 1.664 Mn Units are Generated.</p> <p>The CUF of 19% is after accounting for the Rainy days, Rain fall Cloud Coverage, Sun shine hours etc.</p>
2.	Sub para 3 Page 7 “ 1 MWp SPV systems.....is estimated to afford 1.50 MUs. operate at a Capacity Utilization of 19%	7	1MWp at 19% CUF will generate 1.664 Mn Units 1MWx8760 hrs/year x 19% CUF / 10 ⁶ = 1.664 Mn Units	
3.	Para 2.4 Projected Energy Generation	9	1.52 MU/ Annum	
4.	“ Rainy Days & Cloud Coverage “ Estimated Power Generation	19	1.5 MU	
5.	“Radiation Maps “ This leads to generate1.50 MU approx	19	1.50 MU approx	

Sl.	Ref to Project Report submitted as a part of the Petition and the Abridged Petition in the Public Notice	Page Ref. Project Report	Data by the Petitioner	Considered by the Commission after Analysis & Decision thereon
6.	Para 3.5 "Rain fall & Cloud Coverage"	19	Estimated theoretical yield 1.52 MUs	

The Project Report indicates an Inclination angle of 20 Deg on Page 47 under para Support Structure/ Description of the Plant as per Project report of the Petitioner.

No scientific approach has been presented by the Petitioner in fixing a CUF of 17% or 19% (indicated differently in different documents).

The Commission allows a free option to the Petitioner to choose the Technology that fits the best on the Techno Economic parameters and bring in the efficiency of the system, lower costs to the consumers, in line with the Electricity Act and National Policy.

7.11. Power Generation units / MW based on CUF

The Calculations of Solar Power Tariff based on the Units generated has been considered by the Commission as 1 MWp in line with the Petition, and not 902 Kwp as mentioned in the project report.

Table 11: Power Generation Data by Petitioner & Commission's Decision

Sl.	Ref to Project Report submitted as a part of the Petition and the Abridged Petition in the Public Notice	Page Ref. Project Report	Data by the Petitioner	Considered by the Commission after Analysis & Decision thereon
1.	Modules BP4175/ BP4180/BP3225/BP/3230	42	1000 KWp	The Plant Size has been indicated as 1 MW , capital Cost norms (Rs 10.08 Crs. / MW) and Power Generation norms (1.664 MUs/ MW) . Petitioner to ensure that Plant is sized at 1 MWp
2.	"Para 4 & Table for System Configuration" As such each section will have 309 Modules Producing 902 Kw of peak Power	43	902 KWp in the Table on Pg 43 of Project Report	

Based on the CUF bench mark of 19 per cent for solar PV works out to 1.664 MU/ year (1MW*8760 hrs / year *19%)/ 10⁶ = 1.664 Mn Units / MW as against 1.50 Mn units / Year indicated by the petitioner.

CUF and Power generation Tariff

There is a direct relationship between the CUF, number of units generated and rate per unit and the resultant cash out flow on account of generation based incentive. For example, if project cost is Rs 10.08 crores / MW

CUF 19 per cent, generation is shown as 1.664 MU per year, That gives a Tariff of Rs 10.58 / Unit as per the Parameters decided by the Commission.

GBI = Tariff Rs. 10.58 per unit cost minus Rs.5.50 / Unit= Rs 5.08 / unit for the 1st Year, as Rs 5.50/ KWh (Licensees Share) will increase@ 3% per Year.

Commission's Decision

1. CUF of 19%
2. The Power Generation at 19% = 1.664 Mn Units per year

Commission having accepted a CUF of 19% as indicated by the Petitioner in its abridged version circulated to the Public during Public Hearing on 19th June 2012 & 20th June 2012 , approves the generation output of 1.664 Mn Units generation / Year from the Proposed Plant and is also as per the Study of HON'BLE CERC (1MW*8760 hrs/ year * 19* Cuf / 10⁶ for Mn Units / Year). 19% CUF is decided for the purpose of fixing Power Units Generated for Tariff fixation. The actual Power Generation might be higher or lower than 1.664 Mn/Year depending on the Panel selected, layout of Panels, Tilt angle etc.

7.12. Life of the Solar Panels (Useful Life of the Plant)

The Petitioner has considered a life of 25 Years which is in line with the Hon'ble CERC's Tariff Order dated 27th March 2012 (Petition 35/2012)i.e. 25 Years

Commission's Analysis : Regarding Useful Life of Solar Power project, manufacturers offer warranties cover for solar modules for 25 years and more, and so the life is usually expected for 25 years.

Commission's Decision:

Considering the above, the Commission approves the life of the Project as 25 Years for determination of the Tariff of this Project .

7.13. Performance Degradation of Solar Panels

HON'BLE CERC's Tariff Order dated 27th March 2012 (Suo- Motu Petition no 35/2012) does indicate a life degradation, but indicates that the same has been built in the the additional cost towards degradation in the module cost while arriving at total module cost.

Commission's Analysis:

Some of the SERCs make a provision for this separately. In HON'BLE CERC's "Statement Of Reasons" (SOR) paper, it has been considered included in the Project Cost.

Commission's Decision

The Commission decides to provide “no separate consideration toward this factor” as it is already built in the cost of the modules, as in HON'BLE CERC order on Petition 35/ 2012 also.

7.14. O&M Costs & yearly escalation

HON'BLE CERC's Tariff Order dated 27th March 2012 (on Suo Motu Petition 35/2012) : Rs 11 Lacs for 1st Year + escalation @5.72 % per annum from 2nd Year

The Petitioner has taken Rs. 13 Lacs for the 1st year (as the capital cost considered by the Petitioner is higher). The annual increase has been considered as 5.72 %

The Hon'ble CER Commission has also considered the offers provided by the EPC contractors for Operation & Maintenance Support services for a MW scale projects at Rs 11 lakh/year/MW with the escalation of 5-6 % per annum which includes maintaining the plant, replacement services & manually Cleaning of Modules for 10 years along with manpower support of engineers, technicians, workmen and security guard, for the year 2012-13 to be at @ Rs. 11 lakh/MW/ annum escalated at 5.72% / annum for determination of levelised tariff over the tariff period of 25 Years.

Commission's Decision:

Commission approves the O&M expenses as under fixed on 12 calendar Months basis/ Year, or on pro rata basis as under:

1st Year O&M @ Rs. 11 Lacs for 1MW, Escalation on Rs 11 Lacs @5.72% / year thereafter (from 13th Month).

7.15. Interest on Loan / Debt:

The Petitioner's Petition seeks interest rate of 14.5 % , while the Project Report on page 71 indicates it to be 13%.

HON'BLE CERC has considered a debt equity ratio of 70 : 30 i.e. 70 per cent of the total project cost as Debt component as proposed by the Petitioner in line with HON'BLE CERC, which means Rs.7.00 crores for this project. The rate of interest decided by Hon'ble CERC is 12.3 per cent for a repayment period of 12 years including moratorium. This rate was fixed by Hon'ble CERC on 27th March 2012. This rate was based on the SOR dated 06th Feb 2012 on which the Public hearing was held by the Hon'ble CERC.

Most of investors/borrowers are falling under Grade II/ III/IV category of IREDA. This means that Interest rate even in most competitive lender IREDA for most of the

players is in the range of 12.5% to 13.0%. Accordingly a rate of interest on debt component has been decided as **12.75%** for Solar PV project considered under this petition.

A Group Company of the Petitioner has already made a Solar PV Power plant of similar size operationalized; the Financial Institutions will have a better confidence in the Petitioner's Capability in execution of such projects and will offer attractive rates of Interest for Debt Component.

Table 12: Interest Rate on Debt

Rate of Interest in % on Debt				
	Grade I	Grade II	Grade III	Grade IV
Schedule A, AAA, Rated PSU	11.00			
State Sector	11.00	11.25	11.50	11.75
Wind, Cogen, Hydro	11.75	12.00	12.25	12.50
Solar PV	12.25	12.50	12.75	13.00
Solar Thermal	12.50	12.75	13.00	13.25
Other Sectors	13.50			

Interest during Construction has been taken for 1 year Period by the Petitioner.

Commission's Decision:

Commission accepts 70% debt towards the Project cost (Equity being 30%) and keeping in view the small size company with not a big balance sheet, the interest on the Loan @ 12.75% for a repayment period of 12 Years (with moratorium if any) and reduce IDC by cutting down the Construction time as per Present practices of various developers Ref. Annex 19 " Projects Commissioned in less than one year".

7.16. Interest on the Working Capital

Hon'ble CERC based on their base paper of 06 Feb 2012 heard various stake holders, who demanded working capital ranging from 14.5 per cent to 17 per cent. Hon'ble CERC has allowed working capital at 12.8 per cent

The petitioner has demanded 13 per cent interest as per the Project Report page 71, (14.5% as per the Petition) on working capital equivalent to 2 months receivables whereas Hon'ble CERC considered and fixed 12.8 per cent per annum a reasonable rate.

Commission's Decision:

The Commission approves the rate of interest as 12.8 % as fixed by Hon'ble CERC for the purpose of Tariff determination by the Commission.

7.17. Working Capital - Amount

Quantum of Working Capital for working out the interest burden has been asked by the Petitioner as under

- a) Cost towards Spares @ 15% of the O&M Cost
- b) 1 Month Cost towards O&M
- c) 2 Months Receivables.

HON'BLE CERC after Public hearing stipulated the Working Capital amount requirements for Solar PV project to be computed in accordance with the following:

- i. Cost towards Spares @ 15% of the O&M Cost
- ii. 1 Month Cost towards O&M
- iii. 2 Months Receivables.

Commission Decision:

The Commission approves to allow the Working Capital Requirements as under, which is in line with HON'BLE CERC.

The Quantum of Working Capital for working out the Rate of Interest is:

- i. Cost towards Spares @ 15% of the O&M Cost.
- ii. 1 Month Cost towards O&M Cost for Salaries & wages towards O&M
- iii. 2 Months Receivables.

Operation and Maintenance or O&M expenses' shall comprise Repair and Maintenance (R&M), Establishment, including employee expenses and the Expenses for administrative & general expenses.

7.18. The Depreciation Rate

To make explanation on this factor self-explanatory, the Commission gives a numerical example

For the purpose of depreciation the value is taken as 10 per cent which means depreciation has to be provided at Rs. 10.08 Crs minus Rs. 1.008 Cr = Rs 9.072 crores over a period of 25 years. Depreciation has been provided at a rate of 5.83 per cent for the **first 12 years (70%/ 12 Years)** and 1.54 per cent per year thereafter up to 25 Years (so that total depreciation reaches 90%), following a straight line method. The two added together will be 90 per cent of the total asset value.

Hon'ble CERC's Tariff Order dated 27th March 2012 (Petition 35/2012) 5.83% for 1st Year to 12th year and the balance@1.54% from 13th year onwards.

If accelerated depreciation is provided, the rate of depreciation as permissible under the Income Tax Act and the balance will be spread out, in the balance part of the Project life following Straight line method.

For example (Change if the Tariff Changes)

if the above depreciation rate is followed, the levelised tariff comes to Rs. 10.58 per unit for 25 years. In case the accelerated depreciation benefit is availed of, the tariff will get reduced by Rs. 1.04 paisa per unit for 25 years:

1. Tariff with normal depreciation Rs. 10.58 levelised
2. Tariff with accelerated depreciation Rs. 10.58 - 1.04 = Rs.9.54 per unit for 25 years levelised.

For Accelerated Depreciation, if availed the following shall apply:

- i) Assessment of benefit shall be based on capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.
- ii) Capitalization of RE projects during second half of the fiscal year. Per unit benefit shall be derived on levelised basis at discount factor equivalent to post tax weighted average cost of Capital (WACC)."

The Commission has two extremes open before it, before deciding on the Depreciation.

One is the tariff arrived at following the bench mark set up by HON'BLE CERC in the month of March based on their document dated 6 February 2012 which was based on the data of around October/November 2011 or earlier. Accordingly, the levelised tariff comes to Rs. 10.58/ unit with normal depreciation and Rs. 9.54/ unit with the benefit of accelerated depreciation.

The second extreme is the tariff received by NVVN in its tender for the purchase of solar power based on PV solar technology which is in the range of Rs. 7.49 to Rs. 9.41 / Unit. This is a market discovered rate through open tender, and is not a straight line because the Karnataka utility in April 2012 received rates of Rs. 7.94 to Rs. 8.50 / Unit.

Commission's Decision

Looking at both the extremes- the trend in pricing, the value of dollar which was taken to be Rs. 49.00 in the HON'BLE CERC bench mark, the Commission takes into account the exchange rate variation, cost reduction in Solar Panel and balance of systems (BOS) and approves the tariff as indicated under para 8 " Commission's Order " . The Petitioner has not been able to provide any Foreign Exchange Component built in the Project Cost. Tariff is accordingly approved by the Commission as at Para 8 with normal

depreciation and alternatively accelerated depreciation with all the RPO to be accruing to the Licensee and no RECs to be claimed by the Petitioner.

7.19. Carbon Credit – Benefit Sharing

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

- 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.”

Commission’s Decision:

The Commission directs that the sharing of CDM benefits, if claimed by the Petitioner.

7.20. Subsidies

Subsidy or incentive by the Central / Union Territory Administration (State Government):

This Tariff is based on the Petitioner not claiming any Subsidy towards the cost of the project, either from the Union Territory Administration or the Central Govt. as per the Petition which is submitted for the Project under RSSPGP scheme which does not provide for any subsidy.

Commission has taken note of the above while approving the Tariff.

7.21. Auxiliary Power Consumption

Auxiliary power if required for air-conditioning in inverter and control rooms, cleaning water softening and pumping system, security, night lighting and general office lights and fans.

Commission’s Decision:

Commission has considered the auxiliary power consumption on different counts as above included in the O&M expense and approves that no separate allowance is allowable.

7.22. Power Evacuation & Metering

The Power Evacuation including any Transformer , Transmission line and metering on the Petitioner’s side is included in the Capital Cost and also Installation expenditure includes EPC cost towards DC cabling between Solar PV panels & Inverters including junction boxes, AC cabling between Inverter & sub-station, Earthing arrangements. The transformer cost

includes the EPC cost of a step up outdoor type transformer, auxiliary transformers, HV Circuit breaker, Current Transformers, Potential Transformers, Isolators, LAs, protection relay and TOD meter. It also includes electrical accessories like , MCCBs, MCBs, fuses, lugs, glands etc. plant and control room lighting system with supports, fixtures, SCADA system, battery set, earthing system.

Commission's Decision:

The Commission decides that all the above cost are included in the Capital Cost approved and no separate provisions are applicable towards Power Evacuation & metering

7.23. Fiscal Parameters

Before Preceding for Tariff fixation the issues of discounting factor Pre or Post tax is also considered here:

For the purpose of levellised tariff computation, the discount factor equivalent to Post Tax Weighted Average Cost of Capital (WACC) has been considered as in the detailed calculations and in line with Hon'ble CERC's approach.

While taking the investment decisions, the developer considers post tax WACC as the discount rate to post tax incremental cash flows to arrive at NPV @ 10.83% on the project revenues, has been considered as in the detailed calculations as per

$WACC = (16\% \text{ ROE in this case} * \text{Equity } \%, 30\% \text{ in this case}) + ((\text{Rate of Interest on debt} * \text{Debt } \%, 70\% \text{ in this case}) * (1 - \text{Income tax } , 32.45\% , \text{in this case}))$

$\text{Discount Rate} = 1 / (1 + WACC)^t$ where, t is the year number.

For this Tariff Order, the Commission has also decided to retain the provisions made by Hon'ble CERC.

The returns for renewable energy generation projects have been specified by CERC in pre-tax terms alone and prevalent tax regime including recent revision in terms of MAT rate and corporate tax rate has been factored in while specifying Pre-Tax Return on Equity. Accordingly, pre-tax return on equity has been stipulated at 20% per annum (pre-tax) for initial 10 years and at 24% per annum (pre-tax) for subsequent period at present tax rates.

Any gains or losses on account of any change in tax rate, MAT or Corporate Tax, as the case may be, shall be to the account of the RE project developer since the returns have been regulated in pre-tax terms.

As regards providing additional return on equity to RE projects, the Commission decides that a pre- tax return on equity (ROE) of 24% for 1-10 Years & 11-25 pretax ROE of 24 % that works out is adequate for attracting investment considering the maturity of technology and lower gestation period. This is in line with the Tariff Approach of Hon'ble CERC.

Table 13: Analysis Summary of Tariff Parameters and Commission's Decision.

Sl	Tariff Parameter	Ref Para of this order	Claimed by the Petitioner in the Petition	CERC vide Order on Petition no 35/2012	Rationale of the Commission	Commission's Decision
1.	Project Cost (Capital Cost) / MW in Rs Crs.	7.7	18.4883 (Project Report)	10.00	Falling Solar Panel Prices are leading to Falling Tariff trend.	Rs. 10.08 Crs
2.	Capacity utilization factor (CUF) %	7.10	19% in the Public Notice, 17% in the Petition	19	Commission has gone by the Public Notice & the CERC Study. Other figures used by Petitioner in Project report & presentation have been ignored.	19
3.	Solar Panel De-rating % / Year	7.13	1%	No extra allowance	CERC has accounted for the same in the Total cost and no extra provision for De-rating	Factored in the Capital Cost
4.	Debt-equity ratio	7.15	70:30	70:30	As per CERC	70:30
5.	Moratorium + Repayment Year + Year Term of loan	7.15	1+10	0+12	As per CERC	0+12
6.	Rate of interest-Debt Component %	7.15	13%	12.30	As per CERC & analysis of the Commission based on IREDA rate.	12.75

Sl	Tariff Parameter	Ref Para of this order	Claimed by the Petitioner in the Petition	CERC vide Order on Petition no 35/2012	Rationale of the Commission	Commission's Decision
7.	Working Capital Quantum	7.17	1	1	As per CERC	1
8.	O&M Fixed Month	7.17	1	1	As per CERC	1
9.	Spares % of O&M cost	7.17	15	15	As per CERC	15
10.	Receivables Months	7.17	2	2	As per CERC	2
11.	Rate of Interest on Working Capital %	7.16	14.5 %	12.80	As per CERC	12.80
12.	Return on equity (ROE)	7.23				
	1-10 Year %		6.53%	20 % Pre Tax	As per CERC	20% Pre Tax
	11-25 Years %		14.93%	24 Pre Tax	As per CERC	24 %Pre tax
	Weighted Avg - 25 Years % Pre Tax		No Mention	22.4 %	As per CERC	22.4%
13.	Discount Rate % NPV (post tax) Based on Rate of Interest on debt	7.23	No mention	10.62 Post Tax	As per CERC	10.83 Post tax
14.	Life of Solar in Years	7.12	25	25	As per CERC	25
15.	Rate of depreciation %	7.18	The Total depreciation will be up to 90% of the equipment cost , considering balance 10% as salvage value.			
15.(a)	1-12 Year		7.00 %	5.83 %	As per HON'BLE CERC	5.83%
15.(b)	13-25 Year		1.33%	1.54 %	As per HON'BLE CERC	1.54 %
16.	Operation and maintenance (O&M) expenditure Rs Lacs / Year(1st Year)	7.14	13 Lacs	11	As per HON'BLE CERC, included	11

Sl	Tariff Parameter	Ref Para of this order	Claimed by the Petitioner in the Petition	CERC vide Order on Petition no 35/2012	Rationale of the Commission	Commission's Decision
17.	O&M Escalation / Year %	7.14	5.72	5.72	As per HON'BLE CERC	5.72
18.	Power Evacuation Lacs	7.22	75	Incl. in Project Cost	As per HON'BLE CERC incl. in Sl no 1	Incl. in Project Cost
19.	Auxiliary Power Consumption %	7.21	No Specific Request	incl.in O&M expense	As per HON'BLE CERC	incl.in O&M expense
20.	Accelerated Depreciation Benefit Yes / No	7.18	No Request	Allowed as per IT Act	Allowed as per IT Act	Allowed as per the IT Act
21.	CDM Sharing Yes/ No	7.19	No	Sharing , if claimed	Sharing , if claimed	Sharing , if claimed

Table 14: Changes made to HON'BLE CERC Parameters for Project Specific Tariff

Sl	Cost Parameter	HON'BLE CERC (Petition of 35/ 2012)	As Per this order	Remarks
1	Land Cost Rs Lacs	16	24	Cost of Waste Land in Karaikal is a bit higher than a average in other Places as taken by HON'BLE CERC.
1.	Project Cost Rs. Lacs	1000	1008	Cost increase due to 1 above.
2.	Rate of Interest on Debt	12.3%	12.75%	The Petitioner being a small entrepreneur(as per IREDA rates)

These Changes have resulted in Higher Tariff (Levelised for 25 Years) in Rs. / KWh				
1	Without Accelerated Depreciation benefit availed by the Project Developer (Petitioner)	10.39	10.58	
2	With Accelerated Depreciation benefit availed by the Project Developer upfront (Petitioner)	9.35	9.54	

8. COMMISSION'S ORDER

The Commission studied, analyzed the tariff discovered by the market through open tenders and reverse bidding done by utilities, and the tariff of the various utilities on the identical terrain and climate on the east coast/ near east coast, so as to have a reasonable assessment of various parameters of the Project including CUF of 19% , to arrive at a tariff which is most reasonable and objective.

The Tariff Order takes care of the Cost of Land in Karaikal and exchange rate variation since the date of Project Report, Capacity Utilization Factor (CUF) in the Coastal Region.

Due care has been taken about the Company (Group) regarding interest rates, that are likely to be available to this size of Companies. No foreign funding or soft loan is available to a such a small Company and as such innovative financial engineering may not be feasible / available to the Petitioner due to its small size and certain restrictions under the Scheme.

Table 15: Commission's Decision on Tariff

Sl	Depreciation Treatment	For 1 Mwp Installed Capacity
		Tariff in Rs/ Kwh , Levelised for 25 Years
1	Without any benefit of availing Depreciation upfront by Project Developer	10.58
2	When Project Developer avails Depreciation upfront as per IT Act	9.54
<p>The following shall be applicable:</p> <ul style="list-style-type: none"> i. The Licensee will pay only Rs.5.50 per unit plus escalation @3% per year for 25 years as levelised tariff and the total Tariff will remain the same as indicated above. ii. This is One Part tariff and there is no separate variable part. iii. The Solar Power Generated by this Petitioner and payment made by the Licensee will be considered as RPO to the extent of Solar Power Units purchased by the Licensee. iv. The Generator is not allowed to sell to third party or claim any RECs for any quantum of Solar Power Generated from this Project, except under force majeure conditions faced by EDP. v. Detailed Year Wise Calculations are as per the Annexure 18 titled " Solar Power Tariff Calculation" 		

The difference in Tariff with & without accelerated depreciation remains the same in this Project specific Tariff order as compared to Hon'ble CERC's order on Petition no. 35/2012 because certain variations neutralized each other.

Variations if any in the above determined project specific tariff for the project may be allowed due to changes in the provisions of the MNRE scheme' Roof Top PV & Small Solar Power Generation Programme (RPSSGP) " guidelines for which were announced by MNRE on 16.06.2010. The Licensee will notify the variation factor, if any, as determined by MNRE Government of India from time to time under the scheme and put it on their website for information of the consumers.

9. DIRECTIVES

REAP & the Licensee are directed to monitor the claim of CDM benefits by the Petitioner. CDM benefits are not considered by the Petitioner and also by the Commission in arriving at the Tariff of the Project.

Commission has taken a pragmatic view that CDM benefits may or may not be available during the entire / part duration of the Life of the Project for which Levelised tariff has been fixed, and therefore has not considered the revenue from CDM benefits.

In case the CDM benefits are available individually for the project or pooling with another project, the Petitioner must claim the same and pass on the benefit by sharing the same between the Petitioner and the Licensee as per sharing formula specified under para “Carbon Credit – Benefit Sharing “ of this Tariff order.

REAP while certifying the claim should inform the Licensee ED-P, & the Commission about the CDM revenue and the same benefits be shared accordingly.

The above benefits of CDM will be passed on to the Consumers through the trueing up process of ARR in the years following the receipt of the benefit.

The Petitioner will:

1. Ensure that Plant is sized at 1MWp Capacity.
2. Inform the Start date of the Project with estimated scheduled date of Commissioning
3. Completion date of the project (Commissioning)
4. Quarterly Reports in between the above two reports at S No. 2& 3 above.
5. Units Generated on half yearly basis

10.CONCLUSION

This Tariff Order is in compliance of the Order of the Hon'ble High Court of judicature at Madras on WP 19943 / 2010 dated 12.04.2012 for Tariff determination as per Section 64 of EA 2003 after the Petitioner submitted the petition as per section. 62 & 64 of EA 2003.

The Tariff Order also complies with the directions of the Hon'ble APTEL as per IA 203 of 2012 in Appeal No. 22 of 2012 dated 31 May 2012 for the determination of Project Specific Tariff.

This Tariff Order determines the Project Specific Tariff of the Project for the Petitioner.

Sd/-
(S.K. Chaturvedi)
Member

Sd/-
(Dr. V. K. Garg)
Chairperson

Date : 2nd July 2012

Place : Gurgaon

Annexures (placed in a separate file)
