भारतीय सौर उर्जा निगम लिमिटेड
(भारत सरकार का उपक्रम)
Solar Energy Corporation of India Ltd.
(A Government of India Enterprise)
स्वच्छ भारत – स्वच्छ उर्जा

(COVER LETTER)

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION
GURGAON (HARYANA)

PETITION NO...

IN THE MATTER OF:
Petition for approval of tariff of 1MW Grid connected Roof-top Solar PV project in Andaman and Nicobar Islands under section 62 and 83(4) of the Electricity Act, 2003 and under regulation 21, 57, 58, 59 & 60 of the JERC (Solar Power -Grid Connected Ground Mounted and Solar Rooftop and Metering) Regulations, 2015.

IN THE MATTER OF:

Solar Energy Corporation of India Limited
1st Floor, D-3, A Wing, Religare Building, District Centre, Saket, New Delhi - 110017

Petitioner

The Electricity Department
Andaman & Nicobar Administration
Vidyut Bhawan, Port Blair- 744101

Respondent

To
The Secretary
Joint Electricity Regulatory Commission
Gurgaon (HARYANA)

Sir,

The Petition filed herewith for approval of tariff of 1MW Grid connected Roof-top Solar PV project in Andaman and Nicobar Islands under section 62 and 83(4) of the Electricity Act, 2003 and under regulation 21, 57, 58, 59 & 60 of the JERC (Solar Power -Grid Connected Ground Mounted and Solar Rooftop and Metering) Regulations, 2015 may please be registered.

PETITIONER

Solar Energy Corporation of India Limited

28.06.2016

Represented by Atulya Kumar Naik
Additional General Manager (Power Systems)

Place: New Delhi
Dated: 28-06-2016

PTO

भारतीय सौर उर्जा निगम लिमिटेड
(भारत सरकार का उपक्रम)
Solar Energy Corporation of India Ltd.
(A Government of India Enterprise)

स्वच्छ भारत – स्वच्छ उर्जा

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INDEX

PETITIONER

FOR Solar Energy Corporation of India Limited

28.06.2016

Represented by Atulya Kumar Naik
Additional General Manager (Power Systems)

Solar Energy Corporation of India Ltd. New Delhi

Place: New Delhi
Dated: 28-06-2016

P.T.O

भारतीय सौर उर्जा निगम लिमिटेड
(भारत सरकार का उपक्रम)
Solar Energy Corporation of India Ltd.
(A Government of India Enterprise)
स्वच्छ भारत – स्वच्छ उर्जा

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION
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The Electricity Department
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MEMO OF PARTIES

Solar Energy Corporation of India Limited
1st Floor, D-3, A Wing, Religare Building, District Centre, Saket, New Delhi – 110017.

Petitioner

The Electricity Department
Andaman & Nicobar Administration
Vidyut Bhawan, Port Blair- 744101

Respondent

PETITIONER

For Solar Energy Corporation of India Limited

28.06.2016

Represented by Atulya Kumar Naik
Additional General Manager (Power Systems)

PLACE: NEW DELHI

DATED: 28-06-2016

P.T.O

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

e-Stamp

सत्यमेव जयते

Certificate No.	:	IN-DL268262413880990
Certificate Issued Date	:	15-Mar-2016 11:03 AM
Account Reference	:	IMPACC (IV)/ dl921303/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL92130352415442449390O
Purchased by	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Description of Document	:	Article 4 Affidavit
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Second Party	:	Not Applicable
Stamp Duty Paid By	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Stamp Duty Amount(Rs.)	:	10 (Ten only)

NOTARY REKHA Advocate DELHI Regd. No. 6/01/09 GOVT. OF INDIA 662

Please write or type below this line

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION
GURGAON (HARYANA)

PETITION NO...

IN THE MATTER OF:
Petition for approval of tariff of 1MW Grid connected Rooftop Solar PV project in Andaman and Nicobar Islands under section 62 and 63(4) of the Electricity Act, 2003 and under regulation 21, 57, 58, 59 & 60 of the JERC (Solar Power -Grid Connected Ground Mounted and Solar Rooftop and Metering) Regulations, 2015.

NOTARY REKHA Advocate DELHI

P.T.O

Solar Energy Corporation of India Limited **Petitioner**
1st Floor, D-3, A Wing, Religare Building
District Centre, Saket, New Delhi - 110017

The Electricity Department **Respondent**
Andaman & Nicobar Administration
Vidyut Bhawan
Port Blair - 744101

AFFIDAVIT VERIFYING THE PETITION

I, **Atulya Kumar Naik**, S/o Shri Khirod Chandra Naik, working as **Additional General Manager (Power Systems)** in the **Solar Energy Corporation of India Limited**, 1st Floor, D-3, A Wing, Religare Building, District Centre, Saket, New Delhi - 110017 , do hereby solemnly affirm and state as under:

1. I am the Additional General Manager (Power Systems), Solar Energy Corporation of India Ltd., the representative of the Petitioner in the above matter, and am duly authorised to swear this affidavit.
2. The statements made in the accompanying Petition herein are based on the records of the Petitioner company official record maintained in the ordinary course of business and I believe them to be true and correct.
3. The documents attached with the Petition are legible copies and duly attested by me.

NOTARY REKHA Advocate DELHI Regd. No.-7670/09 GOVT. OF INDIA

Solar Energy Corporation of India Ltd. New Delhi

(DEPONENT)

VERIFICATION

Solemnly affirmed at New Delhi on this **14th day of June 2016** that the contents of the above affidavit are true to my knowledge and belief and no part of it is false and nothing material has been concealed there from.

Solar Energy Corporation of India Ltd. New Delhi

(DEPONENT)

I, Smt. Rekha Bhabi Advocate, Saket Court, do hereby declare that the person making this affidavit is known to me through the perusal of records and I am satisfied that he is the same person alleging to be deponent himself.

NOTARY REKHA Advocate DELHI Regd. No.-7670/09 GOVT. OF INDIA

Advocate

Solemnly affirmed before me on this **14th day of June 2016** at a.m./ p.m. by the deponent who has been identified by the aforesaid Advocate.

I have satisfied myself by examining the deponent that he understood the contents of the affidavit which has been read over and explained to him. He has also been explained about section 193 of Indian Penal code that whoever intentionally gives false evidence in any proceedings of the Commission or fabricates evidence for purpose of being used in any of the proceedings shall be liable for punishment as per law.

ATTESTED

NOTARY PUBLIC DELHI

P.T.O

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Government of National Capital Territory of Delhi

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सत्यमेव जयते

Certificate No.	:	IN-DL268267089107050
Certificate Issued Date	:	15-Mar-2016 11:04 AM
Account Reference	:	IMPACC (IV)/ dl921303/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL92130352415010737219O
Purchased by	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Description of Document	:	Article 4 Affidavit
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Second Party	:	Not Applicable
Stamp Duty Paid By	:	SOLAR ENERGY CORPORATION OF INDIA LTD
Stamp Duty Amount(Rs.)	:	10 (Ten only)

NOTARY POOJA BHASIN ADVOCATE Regd. No. 10651 GOVT. OF INDIA

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NOTARY POOJA BHASIN ADVOCATE Regd. No. 10651 GOVT. OF INDIA

POWER OF ATTORNEY

AUTHORISATION TO SIGN AND FILE APPLICATION FOR TARIFF IN JERC

In exercise of powers vested with the undersigned by the Board in its 2nd Meeting held on 7th February 2012, I, Dr Ashvini Kumar, Managing Director, Solar Energy Corporation of India Limited do hereby

P.T.O

authorize Shri Atulya Kumar Naik, Additional General Manager (Power Systems), Solar Energy Corporation of India Limited to at D-3, A Wing, 1st Floor, Religare Building, District Centre, Saket, New Delhi-110017

1. File an Application for Tariff petition with Joint Electricity Regulatory Commission and amendment as per applicable provisions.

2. Sign, execute, submit, all types of statutory forms, declarations, notices, returns, statements, certificates and all other statutory compliances etc., and to do all other acts, deeds and things that may become necessary in connection with the above purposes.

3. Appear, represent and present on behalf of the company before the Joint Electricity Regulatory Commission for achieving the purpose stated herein.

I further state that the above authorization is valid, enforceable and treated as original delegation and the Solar Energy Corporation of India Limited ratify all such lawful acts, deeds and things done executed and represented by the said Atulya Kumar Naik pursuant to these presents.

27 JUN 2016

Solar Energy Corporation of India Ltd. New Delhi

(Dr Ashvini Kumar)
Managing Director

NOTARY GOVT. OF INDIA POONA BHAGIN ADVOCATE Regd. No. 10651

(Signature of Shri Atulya Kumar Naik)

Attested

ATTESTED

27 JUN 2016

NOTARY PUBLIC

(Dr Ashvini Kumar)
Managing Director

P.T.O.

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION
GURGAON (HARYANA)

PETITION NO...

IN THE MATTER OF:
Petition for approval of tariff of 1MW Grid connected Roof-top Solar PV project in Andaman and Nicobar Islands under section 62 and 83(4) of the Electricity Act, 2003 and under regulation 21, 57, 58, 59 & 60 of the JERC (Solar Power -Grid Connected Ground Mounted and Solar Rooftop and Metering) Regulations, 2015.

Solar Energy Corporation of India Limited
1st Floor, D-3, A Wing, Religare Building, District Centre, Saket, New Delhi – 110017. **Petitioner**

The Electricity Department
Andaman & Nicobar Administration **Respondent**
Vidyut Bhawan, Port Blair- 744101

Solar Energy Corporation of India Limited (hereinafter referred to as "SECI"),files petition for approval of Tariff for signing of PPA with Electricity Department ,Andaman & Nicobar Administration (hereinafter referred to as "EDA&N") as calculated by SECI with the assumptions as notified under JERC (Solar Power -Grid Connected Ground Mounted and Solar Rooftop and Metering) Regulations, 2015, for the Tariff period from COD of the entire capacity or part capacity thereof for 25 years.

The petitioner respectfully submits as under

Solar Energy Corporation of India Ltd. New Delhi

P.T.O

CHAPTER 1
BACKGROUND

This chapter gives the background of the Petitioner.

1.1. Company Profile

1.1.1. Solar Energy Corporation of India Ltd. (hereinafter referred to as SECI) is a CPSU under the administrative control of the Ministry of New and Renewable Energy (MNRE), set up on 20th Sept, 2011 to facilitate the implementation of JNNSM and achievement of targets set therein. It is the only CPSU dedicated to the solar energy sector. It was originally incorporated as a section-25 (not for-profit) company under the Companies Act, 1956.

1.1.2. However, through a Government of India decision, the company has been converted into a Section-3 company under the Companies Act, 2013 on November 09, 2015. The mandate of the company has also now been broadened to cover the entire renewable energy domain.

1.1.3. In the present outlook of the RE sector, especially solar energy, SECI has a major role to play in the sector's development. The company is responsible for implementation of a number of schemes of MNRE, major ones being the VGF schemes for large-scale grid-connected projects under JNNSM, solar park scheme and grid-connected solar rooftop scheme, along with a host of other specialized schemes such as defense scheme, canal-top scheme, Indo-Pak border scheme etc. In addition, SECI has ventured into solar project development on turnkey basis for several PSUs. The company also has a Power-Trading license and is active in this domain through trading of solar power from projects set up under the schemes being implemented by it.

1.2. Project Profile

Andaman & Nicobar Islands predominantly depends on Diesel Power. The Islands generates around 90% of the power through High Speed Diesel (HSD). The Islands are having cumulatively 104 MW Installed capacity out of which 5 MW capacity is based on Solar Power which is installed by NTPC in 2013 in Port Blair.

Apart from this, two (2) nos. of SPV plants of capacity 50 kW each is installed at Neil Island and Havelock Island by M/s BHEL, Bangalore in the year 2002 and 2004 respectively. Above SPV plants are presently not in operation and are being converted from Grid Stand Alone (GSA) system to Grid Controlled Inverter (GCI) system. The Islands are also having a Small Hydro Power Plant of capacity 5.25 MW at Kalpong.

Energy Corporation of India New Delhi

P.T.O

1.2.1. Due to this dependency on diesel power the Administration of Andaman & Nicobar Islands have outlined their plans for sustainable environmental friendly energy supply in the Islands. As a part of these strategies the administration has explored the opportunities to implement solar power systems in the Islands. *As the islands are located near the equator, their climate is tropical.* An average solar radiation is around 5kWh/m^2/day. Therefore solar power could be the best substitute of diesel power in this Island.

1.2.2. In this regard, the A&N administration vide their letter dated 25.03.2014 has expressed their willingness to Solar Energy Corporation of India (SECI) Limited which is a Govt. of India Enterprise under Ministry of New and Renewable energy GOI, through implementing Rooftop SPV Projects on the roofs of Government buildings primarily located in the Port Blair / South Andaman. SECI has also signed the MoU on dated 17th Feb,2015 with Andaman & Nicobar Administration for setting up of Solar PV based Roof Top/Ground Mounted SPV Power plants in A&N Islands. Copy of letter & MoU are placed at **Annexure-1(a)**

1.2.3. SECI's official made site visit of the Port Blair city, in May 2014 with an objective to identify the appropriate rooftops for implementing the Grid connected SPV projects. SECI's officials along with the officials of A&N administration had visited around 20 potential government sites/offices where the SPV systems could be installed. These buildings were identified in consultation with Energy Department, Port Blair, A&N Islands and had proposed setting up of an aggregate capacity of 1 MWp grid connected rooftop Solar PV systems on the various roofs of buildings.

1.2.4. Accordingly, SECI had invited competitive bids for implementation of an aggregate capacity of 1 MWp grid connected rooftop Solar PV systems to be installed on roofs of various government buildings in various parts of the south Andaman & Nicobar Islands in and around Port Blair.

1.2.5. The projects size would vary depending upon the building rooftop area, its orientation, and the energy demand of the building. The rooftop solar systems shall be in the range 1 kWp to 500 kWp (**Detailed list of the projects is placed at Annexure-1(b)).**

1.2.6. The power generated from the rooftop solar PV systems will be synchronized with the network of Distribution Licensee as per the Solar Power Grid Connected Ground Mounted and Rooftop Net Metering Regulations – 2015 dated 15/05/2015 and National Standards specified by MNRE and CEA.

1.2.7. As mentioned above, A&N Islands predominantly depend upon the diesel power which is costlier as well as not friendly with the environment. The proposed 1 MWp project will be 'first –of - its kind' in the Islands of India and success of this project will attract / inspire other investors to implement such projects in the Islands and will result in proliferation of the solar rooftop concept in achieving the Nation's Solar Mission Target.

Energy Corporation of India New Delhi

P.T.O

1.2.8. The project will be owned by the Solar Energy Corporation of India Limited. SECI had invited nationwide competitive bids and selected M/s Ujaas Energy Limited for implementation of the project at a project cost of Rs. 8.349 Cr/MWp which is lower than the project cost considered by honorable Joint Electricity Regulatory Commission vide their tariff order date 15/05/2015.

1.2.9. The project is supported by the Ministry of New and Renewable Energy (MNRE) with CFA (Central Financial Assistance) of 70% on the Project cost i.e. Rs 8.349 Cr/MWp.

1.2.10. The power generated through the project shall be purchased by Electricity department of Andaman and Nicobar Administration at the tariff approved by the Commission as proposed under this application.

1.2.11. It is pertinent to mention here that the proposed project is being monitored at PMO level as a part of "PRAGATI" .Further, "EDA&N" has also been taking rigorous follow-ups for the approval of this tariff or determination of new tariff.**(Copy of follow-up letter is placed at Annexure-2(a)).**

Energy Corporation of India Limited New Delhi

P.T.O

CHAPTER 2
TARIFF APPLICATION

2.1. The honorable Joint Electricity Regulatory Commission (for the state of Goa and Union Territories) has notified Joint Electricity Regulatory Commission for the state of Goa and Union Territories (Grid Connected Solar Power Regulations) – 2015, hereinafter referred to as 'Grid Connected Solar Power Regulations) – 2015' .

2.2. The present application has been made for the approval of tariff of sale of power from Rooftop Solar PV power plants under the provisions of the Joint Electricity Regulatory Commission for the State of Goa and Union Territories, with title Joint Electricity Regulatory Commission for the state of Goa and Union Territories (Grid Connected Solar Power Regulations) – 2015. Following provisions of the above regulations allows Solar Power Developer(SPD) to file a petition in this regard:

2.2.1. Para 21(Page no 6 of 10) provision of the PPA of the Regulations JERC-19/2015 states that:

> ***Power to Remove Difficulties***
>
> *In case of any difficulty in giving effect to any of the provisions of this Tariff Order, the Commission may by general or special order, issue appropriate directions to the SPGs, Distribution Licensee(s) etc., to take suitable action, not being inconsistent with the provisions of the Act, which appear to the Commission to be necessary or expedient for the purpose of removing the difficulty.*
>
> *The SPD or/and the Distribution Licensee may make an application to the Commission and seek suitable orders to remove any difficulties that may arise in implementation of the Tariff Order.*

2.2.2. In reference to "Chapter VIII – Miscellaneous" para 55 "Power to give directions" states that

The Commission may from time to time issue such directions and orders as considered appropriate for the implementation of these Regulations.

2.2.3. Regulation 56 – Power to relax states that The Commission may by general or Special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected may relax any of the provisions of these Regulations on its own motion or on application made before it by an interested person.

2.2.4. Regulation 57 - Power to amend says that The Commission may at any time add, vary, alter, suspend, modify, amend, or repeal any of the provisions of these regulations.

2.2.5. Regulation 59 - Power to remove difficulties states that In case of any difficulty arising while giving effect to the provisions of these regulations, the Commission may either

P.T.O

suo-moto or on a petition, by an order, make such provisions not inconsistent with the provisions of the Act as may appear to be necessary after giving a reasonable opportunity to those likely to be affected by such order for removing the difficulty.

2.2.6. Regulation 60- Review of Regulations says that The Commissions, at the end of three years from the date of notification of these Regulations or even earlier if considered necessary , proper and desirable by it considering the circumstances then prevailing, shall undertake a comprehensive review of these Regulations with the objective of improvement in the principles, procedures and methodologies.

2.3. The application for approval of tariff is being submitted along with all details as per JERC regulations, 2015 .It is further submitted that the petitioner has submitted the information/details as required under these regulations to the extent, the same is available with the petitioner.

P.T.O

CHAPTER 3

PROJECT STATUS

3.1. Status of Project Approvals for Operation

The Project was approved by Board of Directors of the Company. All the required clearances shall be applied and received, once tariff is approved by the honorable commission.

3.2. Current Status of execution of the Project

The company has issued Letter of Award (LoA) to M/s Ujaas Energy Limited **(Successful bidder)** on 24th May,2016 for implementing an aggregate of 1 MWp grid connected rooftop solar PV systems on the roofs of the government buildings of A&N Islands at a project cost of Rs. 8.349 Crores(Project cost discovered through national competitive bidding). The overall project will be completed within a period of 9 months from the date of LoA. . **(Copy of LoA is placed at Annexure-2(b)).**

3.2.1. Operation and Maintenance

The operation and Maintenance shall be carried out by the petitioner who is the owner of the project. As per the provisions of Tender, the O&M for the period of first 5 years of the project life shall be carried out by **M/s Ujaas Energy limited**, the successful bidder appointed by SECI.

3.2.2. Power Evacuation System

The solar power generated from the rooftop solar PV systems will be evacuated at the distribution network of the Utility with whom SECI will sign the Power Purchase Agreement.

3.2.3 Sale of Power

It is submitted that the power generated from the project will be sold to Electricity Department of Andaman & Nicobar Administration (EDA&N) by the petitioner. SECI shall enter into Power Purchase Agreement (PPA) with the EDA&N as per the provisions stipulated under regulations JERC-19/2015 dated 8th May, 2015.

Solar Energy Corporation of India Ltd. ★ New Delhi

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CHAPTER 4
PROJECT CAPITAL COST

4.1. **Project Capital Cost**

As per the guidelines of Ministry of New and Renewable Energy dated 26/06/2014, the project is eligible for Central Financial assistance (CFA) of 70 % of MNRE benchmark cost or actual project cost, whichever is lower.

As per the MNRE order no. No. 30/11/2012-13/NSM dated 26/06/2014, the MNRE benchmark cost for A&N Islands is Rs. 90/Wp and the actual project is Rs. 83.49/Wp. Therefore the eligible subsidy for the proposed project will be Rs. 584.43 lakh and the balance 30% of the project cost i.e. Rs 250.47 Lakhs shall be invested by the petitioner (SECI) through Equity. Board of Directors in its 19th Board meeting has also approved the same **(Copy is placed at Annexure 3).**

4.2. The capital cost arrived at for the project is inclusive of all capital works, including plant and Machinery, civil works, erection, testing and commissioning, interest during construction, and other misc. expenses such as overheads, administrative cost etc. during construction, and evacuation infrastructure upto the interconnection point, in line with the norms for project cost notified by the hon'ble commission in the Grid - connected Solar Power Regulation 2015.

4.3 The EPC contractor has been awarded the project at lowest price discovered through national competitive bidding. However, scope of work of the contractor includes 5 years of O&M. The present value of 5 years of O&M cost calculated at discount rate of 15.69% works out to Rs. 47.30 Lacs. It is submitted that the same has been subtracted from awarded project cost i.e Rs 8.349 Crores to estimate EPC cost of project as Rs 7.87 Crores. However, the Preliminary and Operative expenses, Interest during Construction etc. are expected to be around Rs. 48 Lacs. Therefore, the estimated capital cost of the project is Rs. 8.349 Cr.

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CHAPTER 5

TARIFF DETERMINATION

5.1. The latest tariff order summary details for the Rooftop Solar PV technology in Andaman and Nicobar Islands is tabulated below. The latest tariff order is valid for the projects commissioned by 31st March,2016 or till revised order shall be notified by the Commission:

Annex. A Summary of Solar Tariff on PV technology for various territories under jurisdiction of JERC

Solar Tariff for Projects Commissioned during FY 2015-16											
			All Territories of JERC **except Lakshadweep and Andaman & Nicobar**				**Lakshadweep and Andaman & Nicobar**				
Sl	Rating of Plant	Capital Cost Rs Thousands / kW (without Capital Subsidy)	Tariff without Subsidy Rs./ KWh		Tariff with Subsidy Rs/ Kwh Capital Subsidy is from **MNRE or State/ UT or any other Institution**		Capital Cost Cost Rs Thousands/ kW (without Subsidy)	Tariff without Subsidy Rs./ KWh		Tariff with Subsidy Rs./ Kwh Capital Subsidy is from **MNRE or State/ UT or any other Institution**	
			Without AD*	With AD* benefit	Without AD*	With AD* benefit		Without AD*	With AD* benefit	Without AD*	With AD* benefit
Subsidy on MNRE Benchmark Price			-		**15% Subsidy**		-			**35% Subsidy**	
I.1	1 kW & Up to 500 kW Roof Top /Ground Mounted	72.0	8.51	8.06	7.32	6.95	91.0	10.39	9.82	7.62	7.22
					30% Subsidy					**70 % Subsidy**	
I.2					6.14	5.83				4.85	4.63
Subsidy on MNRE Benchmark Price			-		**15% Subsidy**		-			**35% Subsidy**	
II.1	Roof Top / Ground Mounted Above 500 kW	70.0	8.31	7.87	7.05	5.46	84.0	9.70	9.17	6.93	6.58
					30% Subsidy					**70 % Subsidy**	
II.2					5.94	5.65				4.16	3.98

5.2. For the purpose of the determination of Tariff for the proposed grid connected rooftop Solar PV power plants in Andaman & Nicobar Islands or for the year 2016-17, it is humbly submitted that **Honorable Commission may consider CUF of 15% because of the following reasons:**

5.2.1. As per the regulation the Capacity Utilization Factor has been defined as:

"CUF means the annual average capacity utilization for generation of solar power due to varying solar insolation due to weather conditions, geographical location or the maintenance of the solar panels."

The petitioner, hereby submits to the Honorable Commission that out of the total installed power capacity of A&N Islands, there is very small capacity of 5 MWp Ground Mounted Solar Power Plant has been installed so far in the Islands. The plant was installed by NTPC in March 2013 and has been operating from last 3 years. The average CUF is around 15% **(Copy of email is enclosed as Annexure 4)** with the provision of seasonal tilt. The orientation of ground mounted systems can be optimized with the best tilt in order to get the maximum yield.

Energy Corporation of India Ltd. Solar New Delhi

P.T.O

However, the solar PV systems shall be installed on the roofs of Government buildings where the orientation of the systems shall be dependent upon the type of roof. It is also observed that most of the buildings are having slanted roofs therefore the systems will be installed on the shelter Roofs at various distributed locations at various angles and directions depending on the condition of the roof. The systems will be having fixed tilt.

5.2.2. Higher rainy season period and the saline climate in the A&N Islands also contributes to the lower CUF. In A&N Islands, it has been observed that around 5-6 months of a year, heavy rainfall occurs. As can be seen from the following that from May to Oct months the average rainfall is reaching above 300 mm.

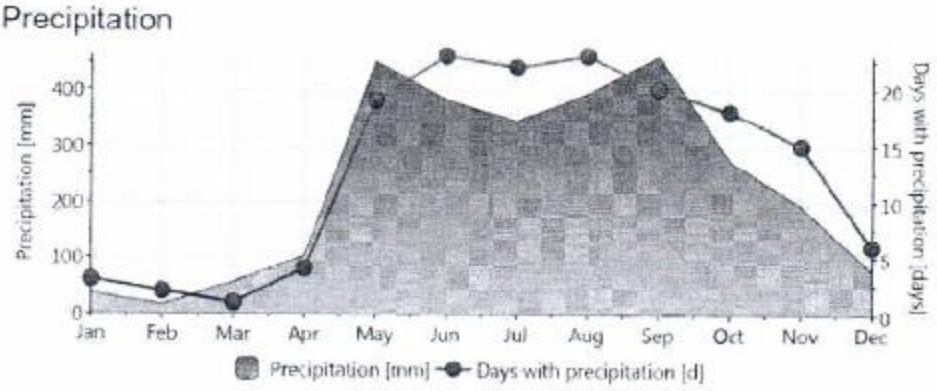

Figure Precipitation in the Port Blair City (METEONORM 07)

5.2.3. With almost 42 MWp installations in various parts of the country in the Grid connected rooftop scheme implemented by SECI, It has been observed that the average CUF that is achieved in a Rooftop solar PV power plant is not more than 15%.
Therefore, it is requested to the Hon'ble commission to consider the same in the tariff calculation.

Solar Energy Corporation of India Ltd. New Delhi

P.T.O

OTHER ASSUMPTIONS FOR DETRMINATION OF TARIFF

6. Deration Factor: It is observed that the annual deration in solar power plant generation is almost 1%. However, the petitioner has considered deration same as per JERC to arrive at the tariff for the petition.
   It is submitted that some quantum of deration may be considered in tariff order determined by the hon'ble Commission for the projects as proposed under this petition.

7. Project Cost: As mentioned above the project cost is discovered through national competitive bidding process. In case of A&N Islands because of logistic issues the project cost remains on higher side as compare to the main land, however the same is lower than the JERC benchmark cost. Therefore, it is requested to the Hon'ble commission to consider the same in the tariff calculation.

8. Central Financial Assistance (CFA): As per the MNRE order no. No. 30/11/2012-13/NSM dated 26/06/2014, the MNRE benchmark cost for A&N Islands is Rs. 90/Wp however, the actual project is Rs. 83.49/Wp. As per the guidelines of Ministry of New and Renewable Energy dated 26/06/2014 and 19/11/2015 **(Copy is placed at Annexure 5)**, the project is eligible for availing Central Financial Assistance (CFA) of 70 % of MNRE benchmark cost or actual project cost, whichever is lower. Therefore the eligible subsidy for the proposed project will be Rs. 584.43 lakh and the balance 30% of the project cost i.e. Rs 250.47 Lakhs shall be invested by the petitioner (SECI) through Equity.

   8.1. MNRE had given in principle approval for sanctioning of subsidy vide sanction no 03/73/2015-16/GCRT dated 16-12-2015 for 1MWp grid connected roof top solar power plants .However, EDA&N vide their D.O No EL/PL/1-38/2014/1457 dated 25-03-2014 has requested SECI to include in its roof top scheme .In response to which ,SECI had considered the project under Roof top Phase IV-Part-2 scheme and invited the bids on project cost basis .

   8.2. As per the MNRE guidelines and in reference to para 8.1 above, SECI has requested MNRE vide letter no SECI/PS/RTPV/A&NA/2015/2407 dated 26-02-2015 for sanctioning of CFA for 1MWp Grid connected rooftop Solar PV systems.

9. Tariff Period: 25 Years as per JERC

10. Debt to Equity Ratio: The Petitioner has considered 30% of the project cost i.e. Rs. 250.50 lakh as Equity and balance 70% is to be availed by MNRE as CFA.

11. ROE: 20% for the first 10 years and 24% for the balance 15 years as per JERC.

Solar Energy Corporation of India Ltd. New Delhi

P.T.O

12. Discount Rate: **15.69%** calculated as per JERC i.e.

    [(Cost of Capital in % x 0.70 long term loan Component) x (1 – Corporate income Tax %)]

    + (Weighted average Post Tax Return on Equity% x Equity %)

13. Depreciation ,Working Capital, Operation & Maintenance is considered as per JERC
14. Accelerated Depreciation Benefit: Not Applicable

Based on the above parameters, the levellized tariff derived for the sale of solar power from grid connected Rooftop Solar PV power systems will be around **Rs. 6.58 / kWh. (Detailed Calculation sheet is placed as Annexure 6).**

Solar Energy Corporation of India Ltd. New Delhi

P.T.O

CHAPTER 6

PRAYER

The present petition is submitted to the Hon'ble Commission for approval of the tariff as derived by SECI through national competitive bidding to arrive at the Project cost. In view of the above facts and circumstances, the petitioner prays to the Hon'ble Commission that it may be pleased to:-

a. Approve the tariff as proposed for the purpose of signing the PPA between applicant petitioner and Andaman & Nicobar Administration.

b. Pass any other order as the Hon'ble Commission may deem fit and appropriate under the circumstances of the case and in the interest of justice;

c. Condone any inadvertent omissions/errors /differences/shortcomings.

d. Allow additions/alterations/changes/modification to the petition at a future date.

PETITIONER

Solar Energy Corporation of India Limited

28.06.2016

Represented by Atulya Kumar Naik

Additional General Manager (Power Systems)

Place: New Delhi

Dated: 28-06-2016

P.T.O

Page-19

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Solar Energy Corporation of India Ltd. ★ New Delhi

28-06.2016

P.T.O

ANNEXURE- 1(a)

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

ONE HUNDRED RUPEES

रु. 100

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

062932

अंडमान और निकोबार(केंद्रशासित प्रदेश)
ANDAMAN & NICOBAR(U.T.)

MEMORANDUM OF UNDERSTANDING

—between —

Solar Energy Corporation of India
New Delhi, India
- and -
Andaman & Nicobar Administration
Port Blair, India

Memorandum of Understanding between Solar Energy Corporation of India, New Delhi and Andaman & Nicobar Administration, Port Blair for setting up of Solar PV Based Roof Top / Ground Mounted SPV Power Plants in A&N Islands

This Memorandum of Understanding hereinafter referred to as MoU is entered on this 17th day of Feb 2015 at Delhi between the following two parties:

Solar Energy Corporation of India, a company incorporated under Section 8 of the Companies Act, 2013 and having its registered office at **D-3, A-Wing, First Floor, Religare Building, District Center, Saket, New Delhi -110017**(hereinafter referred to as "SECI" which expression shall mean to include its subsidiaries, affiliates, successors and assigns)of the one part

AND

The Andaman & Nicobar Administration a Union Territory , having its Head office at Port Blair – 744 101, (hereinafter referred to as "A&NA" which expression shall, unless it be repugnant to the subject or context thereof, include its successors and permitted assigns);

(**A&NA** and **SECI** are herein referred to individually as the "Party" and collectively as "Parties" respectively).

Energy Corporation of India New Delhi

WHEREAS SECI is a company incorporated under section 8 of the Companies Act 2013, having business interest in development of Grid Connected and Off Grid Solar Power Projects; distribution and sale of solar power and promotion of Research and Development in Solar Sector in accordance with the policies and objectives laid down by the Government of India (GOI) under Jawaharlal Nehru National Solar Mission (JNNSM).

WHEREAS, Renewable energy being perceived as an alternate source of energy, is environmentally clean and not dependent on fossil fuels, the A&NA therefore, has taken a decision to reduce the Diesel Consumption in power generation by tapping Renewable sources of energy through Solar Photovoltaic (SPV) power plants (Roof Top / Ground Mounted) in a phased manner.

WHEREAS, A&N Administration have shown interest vide their letter no. EL/PL/1-38/2014/1457 dated 25.03.2014 to SECI for implementation of Roof Top / Ground mounted SPV Power Plants in A&N Islands through SECI,

WHEREAS, SECI, intents to support the initiative of the A&NA in pursuance of its mission of developing power market for optimal utilization of Renewable Energy and existing resources to the extent permissible by the SECI's internal policies, the prevailing laws, rules and regulations operating in force at the relevant time.

In response to A&NA request SECI has carried out pre-feasibility study of potential sites identified by A&NA in the month of May 2014 and has submitted the pre-feasibility report for setting-up of Grid connected Roof Top SPV Power plants on Govt. Buildings aggregating to 1000 kWp capacity in the city of Port Blair.

ACCORDINGLY, it was agreed that A&NA and SECI shall sign a MOU for implementation of Roof Top / Ground Mounted SPV Power Plants in A&N Islands.

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING ('MOU') WITNESSETH AS FOLLOWS:-

1. DEFINITIONS

In this Memorandum the following expressions shall have the following meanings:

Expression	Meaning
"A&NA"	Andaman & Nicobar Administration
"CAPEX Model"	Shall mean where the selected bidder shall be an EPC contractor and shall sign an agreement with the rooftop owner who intends to finance and own the project.
"GOI"	Government of India
"JNNSM"	Jawaharlal Nehru National Solar Mission
"JERC"	Joint Electricity Regulatory Commission
"MOU"	Memorandum of Understanding
"MNRE"	Ministry of New & Renewable Energy

Energy Corporation of India Ltd. New Delhi

"O&M"	Operation & Maintenance
"RESCO"	Renewable Energy Service Companies
"RESCO Model"	Shall mean where the selected bidders intend to take a roof top owned by some other entity on mutually agreed terms and conditions from the roof top owner(s) and enters into the PPA with rooftop owner / DISCOM / others for supply of Solar power for a period of 25 years from the date of Commissioning of project.
"RTI"	Right to information act
"SECI"	Solar Energy Corporation of India
"SPV"	Solar Photovoltaic
"Selected bidder"	Bidder selected through open tender process by SECI for implementing the project

2. INTENT OF MOU

2.01 A&NA is presently using High Speed Diesel (HSD) for power generation which is not only costly but also emits huge quantity of CO2 into the green atmosphere of these Islands where approximately 90% land mass is under forest. Thus, A&NA has taken a decision to reduce the Diesel Consumption in power generation by tapping Renewable sources of energy through SPV power plants (Roof Top / Ground Mounted) in a phased manner at identified sites by A&NA by switching over to renewable energy i.e. solar energy. As the islands are located near the equator, their climate is tropical. The A&N islands are in the moderate solar intensity zone due to long periods of rain and cloud cover. However, solar power could be a good substitute to the diesel power in these Islands.

2.02 SECI is implementing Rooftop Solar PV Projects Scheme in different States/ Cities of India as per MNRE guidelines whereas A&NA is having extensive rooftops at different sites located in the City of Port Blair (like government buildings, government housing, private housing, and prominent institutional areas etc.,) which may be effectively utilized for Grid Connected Rooftop Solar PV Projects.

2.03 SECI having expertise in the field of Solar Projects may act as Implementing Agency for carrying out different activities including Site visits, Preparation of Detailed Project Reports, Validation of Detailed Project Reports, Bid Management including preparation of tender documents, Tendering, Evaluation, Award of Work, Validation of Project Contracts & Agreements (EPC Contracts, O&M Contract, Power Purchase Agreement etc.), Quality Assurance and O&M for a period of two years, for which A&NA will provide all required administrative assistance.

Solar Energy Corporation New Delhi

3. SCOPE

The scope of SECI as an implementing agency and project management consultant for rooftop and ground mounted projects shall be as follows:-

Grid Connected Rooftop SPV Power Plants:

3.01 Implementation of a scheme for installation of grid connected rooftop SPV power plants in the city of Port Blair, Andaman & Nicobar Islands, Bid Management including preparation of tender documents,

3.02 Carry out open competitive bidding process, Techno-commercial Bid evaluation, Price Bid Evaluation,

3.03 Selection of EPC contractors / system integrators / OEMs, who will implement the projects as per the business model (CAPEX or PPA/RESCO) selected and finalized jointly by SECI and A&NA, Issue Letter of Allocations, validation of Detailed Project Reports submitted by the selected bidders, validate agreements (Power Purchase Agreement (PPA), O&M Contracts etc.),

3.04 Carry out site inspections after completion of project before issuing of commissioning certificates, release of subsidies and O&M for a period of two years

Ground Mounted SPV Power Plants:

3.05 Developing Ground Mounted Solar PV Plants (Off grid / grid connected based on the available solar resources) in association / consultation with A&NA in different islands of Andaman and Nicobar.

3.06 Carryout out site visits, Preparation of Detailed Project Reports, Bid Management including preparation of tender documents, Publishing, Techno-commercial bid evaluation, Price Bid Evaluation,

3.07 Turnkey implementation of the projects (concept to commissioning) and finalization of O&M philosophy and contracts.

4. ROLES AND RESPONSIBILITIES OF PARTIES

SECI

4.1 SECI at its discretion, in consultation with A&NA, can utilize the expertise of other agencies in implementing the projects and is free to sign any agreement / Memorandum of Understanding, with such agencies. However, any duties and liabilities arising from such agreements/understanding shall be solely the responsibility of SECI and A&NA shall not be made liable for the same, whatsoever.

4.2 SECI will provide all necessary support to A&NA in the form of technical and policy inputs to implement its programmes and any other assistance that is necessary in meeting the stated goal of the programme as per the scope of works under the clause 3.00 of this MOU.

4.3 A&NA is designated as one of the special category State's as per the clause

6.3 of the guidelines issued by the MNRE vide No 30/11/2012-13/NSM dated 26.6.14. According to that A&N Islands are eligible for availing CFA/subsidy upto 70% / 30 % of the benchmark cost or actual project cost (whichever is lower) of the grid connected rooftop power plants as applicable for Government and / or commercial establishments. SECI shall arrange the applicable subsidy(as per the latest MNRE guidelines) from MNRE and shall disburse the subsidy (subject to MNRE approval) directly to the selected bidder/s on behalf of A&NA.

A&N Administration

4.4 A&NA will provide all necessary support to SECI under its existing programmes that have been approved by the Government of India or will be approved during the time the Memorandum is in force. The support will be in the form of providing necessary authorization for specific areas of work mutually agreed to in order to implement its programmes.

4.5 SECI will charge service charges for executing the projects under the scope as defined in clause 3.05 to 3.07 of this MoU. The same shall be paid by A&NA. However the exact amount shall be mutually decided by SECI and A&NA at the time finalization of the projects.

4.6 The balance project cost shall be arranged by the selected bidder if the rooftop projects are implemented in RESCO/PPA model and the same shall be arranged by A&NA if the rooftop projects are implemented in CAPEX mode.

5. COOPERATION

5.1 SECI and A&NA will consult with each other, whenever it may be appropriate and necessary, on the matters covered by this Memorandum and will use their best endeavors to ensure that employees and other staff of both the organizations cooperate in good faith with one another.

5.2 Both Parties should apprise / keep each other informed on project related matters. If any issue or dispute arises between SECI and A&NA, they will use their best endeavors to resolve the dispute promptly and amicably.

5.3 Both Parties will provide the right of first refusal to the other to pursue jointly projects identified /developed under this MOU.

5.4 Both the Parties, within six (6) weeks from the date of signing of this MOU, shall constitute a Joint Development Team (JDT). The JDT shall have suitable representation of both the Parties. Each Party shall inform the other of its designated team members and point of communication for implementation of activities envisaged under this MOU.

6. CONFIDENTIALITY

6.1 The confidentiality will be subject to section 8(1)d and 8(1)e of the RTI act, 2005

Energy Corporation of India New Delhi

7. PROCEDURES FOR AMENDMENT

7.1 This Memorandum may be amended if at any time during its term, the work or environment of the A&NA and SECI, is so altered that the contents of the Memorandum are no longer appropriate or unworkable in the manner envisaged in this Memorandum. Such amendment, as the case may be.

7.2 This Memorandum embodies the entire understanding of the parties as to its subject matter and shall not be amended except in writing executed by both the Parties to this Understanding. Any changes are to be recorded in writing and inserted or attached to this Memorandum and this will have the effect of updating the Memorandum.

8. FUTURE PROJECTS

8.1 Pursuant to this Understanding, separate agreements will be negotiated and entered into between the Parties that identify specific proposals for implementation while taking into consideration the overall objective of SECI / A&NA.

9. CANCELLATION

9.1 Either of the two parties can, at any time during the period of the Memorandum, rescind/cancel the same after giving a notice in writing. The notice will not be less than one month prior to the actual date of rescinding/cancellation this Memorandum. However, if any act needs to be performed which though started before the rescission/cancellation and which needs to be completed, shall be finished by that party by whom it is to be performed, to the extent it is possible of performance, and it shall not be open to that party to complain that it shall not perform the incomplete acts.

10. NON EXCLUSIVITY

10.1 This Memorandum does not grant any exclusive right to any of the two Parties in the areas of cooperation that they mutually agree to respectively and shall not create any legal binding obligations upon either Party.

11. DISPUTE RESOLUTION

11.1 In case of any dispute or difference arising between the parties, the parties shall promptly and in good faith negotiate with a view to its amicable resolution and settlement. However in case of any dispute it will be resolved as per Chapter VII of Permanent Machinery of Arbitration "2. DPE/Guide line s/VII/2" as enclosed at ANNEXURE I of this MoU.

12. JURISDICTION OF COURT

12.1 In the event of any further dispute arising out of this agreement between the parties, and which remains unaddressed after best efforts the same shall be settled in the Competent Court of Law at **New Delhi.**

Energy Corporation New Delhi

13. INTELLECTUAL PROPERTY RIGHTS

13.1 The Parties hereto understand and confirm that all contents including all signage, displays which include the logo and trademark of SECI, shall be displayed only upon prior written consent from SECI.

13.2 Neither Party shall use the intellectual Property of the other party in any manner whatsoever, without the prior written consent of the other Party.

14. ASSIGNMENT

14.1 This MOU shall ensure to the benefit of the Parties hereto and to their respective successors and permitted assigns. No Party shall assign this MOU to any Third Party without the prior written consent of the other Party, and for which written consent shall not be unreasonably withheld by the other party.

15. GENERAL

15.1 This Memorandum does not constitute an offer or an agreement by SECI to provide for financing the initiative by A&NA. Such support shall be provided by SECI upon evaluating the request from A&NA from time to time, subject to its prevailing internal policies and prevailing laws, rules and regulations applicable to such initiative, from time to time.

16. COUNTERPARTS

16.1 This MOU may be executed by the Parties hereto in one or more counterparts, each of which shall be deemed to be an original, but all of which together shall constitute one and the same MOU.

17. TERM

17.1 This Memorandum will remain in force for a period of two years from the date of its execution i.e. 17/2/2015. The Memorandum can be extended for such periods or further periods by the mutual consent of both the Parties. All such extensions shall be in writing.

18. ADDRESS FOR COMMUNICATION

SECI

Party	:	Solar Energy Corporation of India
Kind Attn.	:	Shri Rajesh Kumar Jain, AGM (Solar)
Address	:	**D-3, A-Wing, First Floor, Religare Building, District Center, Saket, New Delhi -110017**
Fax No.	:	011 29563834

Energy Corporation of India New Delhi

A&NA

Party	:	Andaman & Nicobar Administration
Kind Attn.	:	Superintending Engineer, Electricity Department
Address	:	Circle Office, Vidyut Bhawan, Port Blair - 744101
Fax No.	:	03192-233365

19. SIGNATURES

IN WITNESS WHEREOF, the Parties have entered into this Memorandum, on the day, month and year as mentioned under Clause 6, above.

For and on behalf of	For and on behalf of
Solar Energy Corporation of India, New Delhi	**Andaman & Nicobar Administration, Port Blair**
Name: Shri R.K. Jain	Name: Shri B Ajit Kumar
Designation: AGM (Solar)	Designation: Executive Engineer A&N Administration
(Signature with Seal)	(Signature with Seal)
Witness:	Witness:
1.	1.
2.	2.

Solar Energy Corporation of India Ltd. New Delhi

ANNEXURE - 1(a)

अण्डमान तथा निकोबार प्रशासन
अधीक्षक अभियंता का कार्यालय
विद्युत विभाग
पोर्ट ब्लेयर – 744 101

Andaman & Nicobar Administration
Office of the Superintending Engineer
Electricity Department
Port Blair – 744 101

Website : http://electricity.and.nic.in/ E-Mail : seed@and.nic.in seelectricity@yahoo.co.in
दूरभाष / Tel : 03192 –232404, टेलीफैक्स / Telefax : 03192 – 233365

फा.स./F.No.EL/PL/I-38/2014/ 14157 पोर्ट ब्लेयर / Port Blair, दिनांक/Dated: 25/03/2014

To

Shri Rajendra Nimje, Managing Director,
Solar Energy Corporation of India,
D-3, A Wing, Ist floor,
District Center, Saket,
New Delhi – 110017.

Sub:- Installation of grid connected roof top SPV plants in A & N Islands – reg.

Sir,

This office of Electricity Department, Port Blair has received a letter No. 5/10/2013-14/RT dated 24.1.2014 on subject – Approval of Central financial assistance (CFA) to Solar energy corporation of India (SECI) for installation of Grid connected Roof top SPV plants in various states across the country under, National clean energy fund (NCEF)

As you may be aware that the power generation in A&N Islands is mainly by burning High Speed Diesel (HSD) and the average consumption of diesel in these islands is 70,000 KL annually , which raises concern both due to high cost of generation and GHG emissions.

Recently there has been a major achievement in green energy generation by installation of 5 MW Solar Power Plant, but the large open space requirements without shady patches for such capacities are in dearth in these islands which have thick tree covers. The A & N Administration is therefore extremely keen on installation of Solar PV panels on roof of Government buildings , scattered all over the islands which shall provide the grid support in disintegrated form.

Some preliminary works in this field has already been done like identifying of Government building, proposed capacity of SPV plants etc.The list of buildings identified for roof top SPV plants with details like roof area and proposed power pack is enclosed.

A&N Islands proposes to install roof top SPV plants on Government buildings on pilot basis for individual capacities above 100 KW, initially.

A G M (Sales)
• Telephonic discussion held with A&N official
• Pl share the details of our scheme with up-coming scheme
• Link qty with up-coming scheme(s)
May like to see for needful and reply.
09/4/2014

Mr. Anil

It is requested that SECI may kindly include these islands under the scheme – grid connected roof top SPV plants in the ongoing phase (PHASE –II) along with other states across the country, considering the fact that 95% of power generation in these islands is through Fossil fuels (HSD) only.

Yours faithfully

(आनन्द बिहारी – **Anand Behari**)
अधीक्षक अभियंता - Superintending Engineer

Copy to:-

1. The Secretary Power, Secretariat, A & N Administration, Port Blair, for kind information.
2. Dr Ashvini Kumar, Director (Solar), Solar Energy Corporation of India, D-3, A Wing, Ist floor, District Center, Saket, New Delhi – 110017, for kind information.
3. Dr A. K Tripathi, Director (Scientific), MNRE, Block – 14, CGO complex, Lodhi Road, New Delhi 110003, with request to kindly take up our case with SECI, Please.

अधीक्षक अभियंता - Superintending Engineer

Solar Energy Corporation of India Ltd. New Delhi

ANNEXURE-1(b)

Project Summary of Rooftop Solar PV Power Plant to be installed at Andaman and Nicobar Islands.

Sr.	Name of Site	Name of Roof	Roof Slope Direction	Slope Angle	Type of Roof	Module rating(Wp)	No. of Module	Capacity Expected (Wp)	Roof Total Capacity (Wp)
1	Stadium	Main Stadium Stand	EAST	14 Degree	Tin Shade	310	120	37200	100750
			WEST	19 Degree	Tin Shade	310	126	39060	
		Multi-purpose hall	South West	18 Degree	Tin Shade	310	0	0	
		RCC roof	Flat Roof	Zero	RCC	310	79	24490	
2	Secretariat	Main Office Building	South (Single roof)	21 Degree	Tin Shade	310	48	14880	33170
			South	20 Degree	Tin Shade	310	41	12710	
			EAST	20 Degree	Tin Shade	310	18	5580	
			WEST	20 Degree	Tin Shade	310	0	0	
3	Light House Office	Main Office Building	Flat Roof	Zero	RCC	310	56	17360	56420
		Back Office Building	Flat Roof	Zero	RCC	310	126	39060	
4	ALHW Store	Godown 3	NORTH	21 Degree	Tin Shade	310	0	0	55800
		Godown 3	South	21 Degree	Tin Shade	310	120	37200	
		Godown 2	WEST	17 Degree	Tin Shade	310	60	18600	
		Main Office 1	WEST	17 Degree	Tin Shade	310	48	14880	17980
		Main Office 2	WEST	17 Degree	Tin Shade	310	10	3100	
		Godown 1	South	17 Degree	Tin Shade	310	88	27280	31000
			NORTH	17 Degree	Tin Shade	310	0	0	
		Security Cabin	South	17 Degree	Tin Shade	310	12	3720	
		Parking (Near Canteen)	EAST	17 Degree	Tin Shade	310	36	11160	43400
			WEST	17 Degree	Tin Shade	310	0	0	
		Auditorium	EAST	17 Degree	Tin Shade	310	104	32240	
			WEST	17 Degree	Tin Shade	310	0	0	
5	Marine Hall	Hall	South West	21 Degree	Tin Shade	310	90	27900	27900
					Tin Shade	310	0	0	
6	Municipal Office	Office 1(Front)	South West	18 Degree	Tin Shade	310	36	11160	45570
			NORTH East	18 Degree	Tin Shade	310	36	11160	
		Office 2(Back1)	South East	18 Degree	Tin Shade	310	45	13950	
		Office 3(Back2)	South East	18 Degree	Tin Shade	310	30	9300	
7	Municipal Audi	Roof 1	South East	22 Degree	Tin Shade	310	72	22320	76570
		Roof 2	South West	22 Degree	Tin Shade	310	175	54250	
8	Marrine Yard	Work Shop 1	South East	21 Degree	Tin Shade	310	36	11160	55800
		Work Shop 2	South East	21 Degree	Tin Shade	310	36	11160	
		Work Shop 3	South East	21 Degree	Tin Shade	310	36	11160	
		Work Shop 4	South East	21 Degree	Tin Shade	310	36	11160	
		Work Shop 5	South East	21 Degree	Tin Shade	310	36	11160	
		Main Office				310	0	0	51460
		Iron Yard	South East	3 degree	Tin Shade	310	126	39060	
		Store Office	South East	21 Degree	Tin Shade	310	40	12400	
		Store 1	South East	18 Degree	Tin Shade	310	72	22320	48360
		Store 2	South East	30 Degree	Tin Shade	310	84	26040	
		Fitting Shop 1	South East	18 Degree	Tin Shade	310	64	19840	148800
			South West	18 Degree	Tin Shade	310	64	19840	
		Fitting Shop 2	South East	18 Degree	Tin Shade	310	46	14260	
			South West	18 Degree	Tin Shade	310	46	14260	
		Fitting Shop 3	South East	18 Degree	Tin Shade	310	84	26040	

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			South West	18 Degree	Tin Shade	310	84	26040	
		Fitting Shop 4	South East	18 Degree	Tin Shade	310	46	14260	
			South West	18 Degree	Tin Shade	310	46	14260	
		Office1	South	18 Degree	Tin Shade	310	30	9300	
		Office2	South	18 Degree	Tin Shade	310	26	8060	
		parking	South West	18 Degree	Tin Shade	310	66	20460	
9	Jungli ghat	Passenger Hall	EAST	18 Degree	Tin Shade	310	87	26970	26970
			WEST	18 Degree	Tin Shade	310	0	0	
		Transited	EAST	18 Degree	Tin Shade	310	68	21080	21080
			WEST	18 Degree	Tin Shade	310	0	0	
		Work Shop 2	South	18 Degree	Tin Shade	310	68	21080	21080
		Work Shop 1	South	18 Degree	Tin Shade	310	108	33480	33480
10	H Q Office	Office	South	21 Degree	Tin Shade	310	46	14260	14260
11	Bus Stand	Main Office	South	18 Degree	Tin Shade	310	174	53940	53940
Total							**3011**	**1001610**	**963790**

Solar Energy Corporation of India Ltd. New Delhi

PTO

ANNEXURE-2(a)

Tel: 03192 250577, Fax: 03192-250930
E-mail: eenred.andamans@yahoo.com

No.EL/NRSE/Tech/1 1(6)/16-17/572 dated 26 /04/16.

To
Shri Rakesh Kumar,
Director (P.S)
M/s Solar Energy Corporation India,
D-3,1st Floor, Wing A,
Religare Building,
District Centre, Saket
New Delhi 110017

Sub: Setting of Rooftop solar power plant in A&N Islands-reg.

Ref.: This office letter No. EL/NRSE/Tech/1-1(6).15-16/201 dt. 5.2.16

Sir,

Kindly refer to the above cited letter and in response to your D.O letter to Pr.Secy (Power) vide No.SEC I/DPS/1/1/2016/5608 dt. 01.01.2016 giving the agreed offer tariff of ₹ 5.50/Kwh to the Power Department, A&N Islands by availing 70% as subsidy on the total project cost under PPA of 25 years. As already discussed the tariff will be determined by JERC considering the total project cost and the subsidy offered by MNRE. Further it is to inform that LoA awarded to M/s Ujaas energy ltd., Indore vide letter No. SEC I Cont/SRI-IV-PI 74/2014 dt. 07.09.2015 had visited A&N Islands and made complete survey of the entire 13 buildings. For the past three months there is no further development seen from M/s Ujaas energy ltd. nor any communication in this matter is received. The progress of the work is being monitored not only by MNRE but also under PRAGATI. As regard to expanding the scope of solar rooftop in A&N Islands matter was discussed in detail during the recent meeting in MNRE. It is further to request your good office to kindly assure to inspect left over Govt. buildings in and around Port Blair and South Andaman for augmentation of additional proposed 5MW solar rooftop project in these island.

It is therefore, requested that kindly expedite the implementation of 1MW project in 13 Govt. buildings and provide the detail project report and PPA for its approval from competent authority at its earliest.

Yours faithfully,
sd-

(B. Ajit Kumar)
Executive Engineer (NRSE)

Copy to:-

1. The Sr.PS to Pr. Secretary(Power), A&N Admn, Port Blair for kind information to Pr.
Secretary(Power)
2. The Superintending Engineer, Electricity Department, Port Blair for kind

Energy Corporation of India New Delhi

PTO

सूर्य सदैव SUN FOR EVER

भारतीय सौर उर्जा निगम
(भारत सरकार का उपक्रम)
Solar Energy Corporation of In
(A Government of India Enterprise)

स्वच्छ भारत – स्वच्छ उर्जा

राकेश कुमार
निदेशक (पी.एस.)

No. SECI/DPS/1/I/2016/5608
Date 01.01.2016

Sub: Setting up of rooftop solar PV systems in Andaman & Nicobar Islands

Dear Sh. Arun Baroka

This is with reference to your DO No. PS/Power/2015 dated 23.12.2015 addressed to our MD on the subject matter. As discussed, action has been initiated for implementation of 1 MWp solar rooftop project for identified Government buildings in Port Blair under RESCO model.

2. As agreed, SECI will offer a tariff of Rs. 5.50*/kWh to the Department of Power, Andaman & Nicobar Islands by availing 70% subsidy from MNRE and sign a long term power purchase agreement for a period of 25 years. (* Subject to financial concurrence)

3. Keeping in view that the open competitive bids were invited under CAPEX mode only and a project cost with 5 years O&M was discovered, the tariff being offered to A&NA is derived from the project cost(so discovered) based on tariff norms of CERC/JERC. Thus, the derived tariff may require the approval of Joint Electricity Regulatory Commission, for which a petition shall be filed shortly.

4. As regard to expanding the scope of solar rooftop in A&N Islands wherein you have requested SECI to undertake additional 5 MWp solar rooftop projects on RESCO model using TERI report, SECI would bring out a tariff based open competitive bid for additional 5 MWp after taking the MNRE subsidy of 70% into account. The tariff so discovered under tariff based competitive bidding will not require the tariff determination by Appropriate Commission as is the practice with other on-going RESCO scheme(s).

We have already taken up the matter with MNRE for sanction and release of 70% subsidy against 1 MWp which works to about Rs 6.00 crores and the same is awaited. We will also be submitting a draft copy of PPA to be signed between Department of Power, A&N Administration and SECI shortly for your review and acceptance.

Warm regards

सादर

(राकेश कुमार)

सेवा में,

श्री अरुण बरोका, आइएएस
प्रिन्सिपल सचिव
डिपार्टमेंट ऑफ पावर, अंडमान & निकोबार एडमिनिसट्रेशन
सचिवलाय, पोर्ट ब्लेयर,

A.A.

प्रतिलिपि: (i) श्री तरुण कपूर, संयुक्त सचिव, एम.एन.आर.ई.
(ii) प्रबंध निदेशक, सेकी

Solar Energy Corporation of India Ltd. New Delhi

Regd. Office : D-3, 1st floor, Wing-A, Religare Building, District Center, Saket, New Delhi - 110017
Phone : (011) 71989200, Fax : (011) 71989244, Email : corporate@seci.gov.in, Website :
CIN : U40106DL

ANNEXURE-2(b)

भारतीय सौर उर्जा निगम लिमिटेड
(भारत सरकार का उपक्रम)
Solar Energy Corporation of India Ltd.
(A Government of India Enterprise)

स्वच्छ भारत - स्वच्छ उर्जा

Ref: SECI/PS/105(13)/I/2016

Date: 24th May 2016

To

'ORIGINAL'

M/s Ujaas Energy Limited,
(Formerly known as M and B Switchgears Limited),
Survey No. 211/1, Opp Sector C & Metalman,
Sanwar Road Industrial Area,
Indore-(M.P)-452001

Kind Attn: Mr. Ashu Gupta, Vice President- Corporate

Sub: "Design, Engineering, Manufacture, Supply, Storage, Civil Work, Erection, Testing and Commissioning, Obtaining No Objection Certificate (NOC) including Warranty, Operation & Maintenance for a period of 5 years of Grid Connected Rooftop Solar PV Power Plant of an aggregate capacity **1000 kWp at Andaman & Nicobar Islands for Andaman & Nicobar Administration (A&NA).**

Ref: (1) RfS no. SECI/Cont./SRT-IV-P1/74/2014 dated 27/02/2015
(2) Letter of Allocation (LoA) no. SECI/Cont./SRT-IV-P1/74/2014/4439 dated 07.09.2015

Dear Sir,

1.0 This has reference to the discussions we had with you, **M/s Solar Energy Corporation of India Limited** (herein after referred to as the "SECI ") are pleased to award on **you** (hereinafter referred to as the "EPC Contractor / Company") the Contract for the work of "Design, Engineering, Manufacture, Supply, Storage, Civil Work, Erection, Testing and Commissioning, Obtaining No Objection Certificate (NOC) from Distributed Company (DISCOM) including Warranty, Operation & Maintenance for a period of 5 years of grid connected rooftop Solar PV power plant of an aggregate capacity of 1000 kWp at" (hereinafter referred to as the "Project") at Andaman Nicobar Islands (hereinafter referred to as the "Site") as per Technical Specification & other details of RFS No. SECI/Cont./SRT-IV-P1/74/2014 dated 27.02.2015 and its subsequent amendments and clarifications issued thereon. The terms & conditions are mentioned herein below:

SECI and EPC Contractor/ Company are collectively referred to as "the Parties" and individually as "the Party" in this Contract.

2.0 SCOPE OF WORK & INSTALLATION

a. EPC Contractor's Scope of Work includes "Design, Engineering, Manufacture, Supply, Storage, Civil Work, Erection, Testing and Commissioning, Obtaining No Objection Certificate (NOC) including Warranty, Operation & Maintenance for a

Regd. Office : D-3, 1st floor, Wing-A, Religare Building, District Center, Saket, New Delhi - 110017
Phone : (011) 71989200, Email : corporate@seci.gov.in, Website : www.seci.gov.in

period of 5 years of Grid Connected Rooftop Solar PV Power Plant of an aggregate capacity 1000 kWp at Andaman & Nicobar Islands. This consists of the supply of materials to project site, project management, installation of mechanical equipment, cabling, instrumentation and electrical system and other equipment including interconnection with the electrical panel / substation as required and any other work to complete the system in all respect as per the RFS document referred above. EPC Contractor shall comply that the projects shall be implementation in accordance with the technical specifications & other details as per SECI's RfS document referred above.

b. The EPC Contractor shall take all permits, approvals and licenses, Insurance etc., provide training and such other items and services required to complete the Scope of Work at its own cost. However, SECI shall only facilitate to fulfil the above requirements.

c. The details of O&M of the grid connected rooftop Solar PV systems shall be as per Annexure I

d. The EPC Contractor shall submit the details of Monthly solar generation data in the form of Joint Meter Reading (JMR) or in any other format as per the norms of A&NA / any other Statutory body of A&N Islands, duly sealed and signed jointly by the A&NA and the EPC Contractor by 7th of every month so that SECI may raise the monthly invoices to A&NA.

3.0 TIMELINE OF THE PROJECT

As per clause 6.8.6 the above mentioned RfS document and its subsequent amendment and clarification issued thereof, M/s Ujaas Energy shall complete the design, engineering, manufacture, supply, storage, civil work, erection, testing & commissioning of the 1 MWp Grid Connected Rooftop Solar PV systems **within 9 months** from the date of issue of this Letter of Award. SECI reserves the right to provide the extension on the same, if required, as per the provisions of above referred RfS document.

4.0 CONTRACT PRICE AND TERMS OF PAYMENT FOR SUPPLY, ERECTION, TESTING & COMMISSIONING

The Contract Price for the entire scope of work covered under this letter of award and performance of all the obligations shall be **Rs. 8.349 Crore (Rupees Eight Core Thirty Four Lakh Ninety Thousand only).** The agreed price is inclusive of all applicable taxes and duties, for the entire duration of the agreement.

Details of price break-up for the proposed 1000kWp SPV power plant at Andaman & Nicobar Islands.

Solar Energy Corporation of India Ltd. New Delhi

Solar Energy Corporation of India Ltd. New Delhi

Description	Project Cost (Rs)
Supply of materials against 1000 kWp Grid connected SPV power plant as per Letter of Allocation (LoA) dated 07/09/2015 inclusive of all applicable taxes and duties. **(A)**	**7,93,15,500**
Cost against Service portion (i.e. Installation & Commissioning of the above mentioned work) inclusive of service tax **(B)**	**41,74,500.00**
Grand total (A+B)	**8,34,90,0000**

a. The payment terms shall be as follows:

Sl. No.	Schedule	%	Value in Rs.
1	Upon design, engineering, manufacture, supply, storage, civil work, erection, testing & commissioning of the 1 MWp Grid Connected Rooftop Solar PV systems after acceptance of Project by SECI	**90%**	**7,51,41,000**
2	Upon completion of 1st year of successful O&M and submission of Performance Security as per clause 4.1 below.	**5%**	**41,74,5000**
3	Upon completion of 2nd years of O&M	**5%**	**41,74,5000**
Total		**100%**	**8,34,90,000**
(In words: Rupees Eight Core Thirty Four Lakh Ninety Thousand only)			

4.1 The EPC Contractor shall submit a Performance Security equivalent to 10% of the project cost within 30 days after successful completion of first year of O&M with a validity of four years from the date of completion of first year of O&M. The Performance security shall be released after successful completion of O&M period with the compliance of entire obligations in the contract.

NB: In case the successful bidder is not able to furnish the PBG for 4 year of validity. Then PBG with initial validity period of 2 year may also be accepted by SECI provided the successful bidder shall renew/extend the BG, 30 days before the expiry of the same. If the contractor does not extend the PBG, the same shall be forfeited by SECI.

4.2 **Time of Payment:** - The SECI shall make. all endeavours to pay all amounts due within 30 (thirty) days from the date of the receipt of the invoice and other supporting documents.

Solar Energy Corporation of India Ltd. New Delhi

4.3 **Method of Payment: -** SECI shall make all payments under the Agreement by means of cheque / electronic funds transfer in immediately available funds to the account designated by the EPC Contractor from time to time. All payments made hereunder shall be subject to the applicable tax deduction at source, and inclusive of all other taxes, levy, and assessment. Duties or other charges.

5.0 COMPLIANCE OF GOVT REGULATIONS/ORDERS

In addition to the requirements mentioned in RFS as referred above, EPC Contractor shall also comply all the requirements(including compliance of technical standards) stipulated by "JERC and Statutory body of A&NA in their notified regulations and order " without any increase in project cost. Any non-compliance of above shall amount to non-compliance of contract and shall attract penalties(including forfeiture of 100% PBG).

6.0 METERING AND GRID CONNECTIVITY

Metering and grid connectivity of the roof top solar PV systems under this scheme would be the responsibility of the EPC Contractor in accordance with the prevailing guidelines of the concerned DISCOM and / or CEA (if available by the time of implementation). SECI/A&NA could facilitate connectivity; however the entire responsibility lies with development only.

7.0 INSURANCE

The EPC Contractor shall be responsible and take an Insurance Policy for transit cum storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning. The EPC Contractor shall also take appropriate insurance during O&M period.

The EPC Contractor shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of bidder.

8.0 WARRANTY

EPC Contractor warrants that PV modules used in solar power plants/ systems are warranted for their output peak watt capacity, which will not be less than 90% at the end of 10 years and 80% at the end of 25 years.

EPC Contractor warrants that the solar mounting structures are anti – corrosive and warranted for a period of 25 years.

EPC Contractor also further warrants that the goods supplied under this contract are new, unused, of the most recent or latest technology and incorporate all recent improvements in design and materials. This warrantee will also be covering the

rectification of any and all defects in the design of equipment. Materials and workmanship including spare parts for a period of 5 years from the date of commissioning. All the Guarantees/Warrantees of the different components will be transferred to SECI or its authorised agency, before handing over of the Project to SECI or its authorised agency.

9.0 SAFETY AND SECURITY

EPC Contractor shall be solely responsible for all aspects of the safety and security of the men and material deployed, while on work in A&N Islands. EPC Contractor shall be also responsible for the statutory compliance for the men deployed at work.

10.0 FORCE MAJEURE:

Notwithstanding the provisions of clauses contained in this LoA document; the EPC Contractor shall not be liable to forfeit (a) Security deposit for delay and (b termination of contract; if he is unable to ful fill his obligation under this contract due to force majeure conditions. For purpose of this clause, "Force Majeure" means an event beyond the control of the EPC Contractor and not involving the EPC Contractor's fault or negligence and not foreseeable, either in its sovereign or contractual capacity. Such events may include but are not restricted to Acts of God, wars or revolutions, fires, floods, epidemics, quarantine restrictions and fright embargoes etc. Whether a "Force majeure" situation exists or not, shall be decided by SECI and its decision shall be final and binding on the EPC Contractor and all other concerned. In the event that the EPC Contractor is not able to perform his obligations under this contract on account of force majeure, he will be relieved of his obligations during the force majeure period. In the event that such force majeure extends beyond six months, SECI has the right to terminate the contract in which case, the security deposit shall be refunded to him. If a force majeure situation arises, the EPC Contractor shall notify SECI in writing promptly, not later than 14 days from the date such situation arises. The EPC Contractor shall notify SECI not later than 3 days of cessation of force majeure conditions. After examining the cases, SECI shall decide and grant suitable additional time for the completion of the work, if required.

11.0 STANDARD OPERATION & MAINTENANCE MANUAL

The standard Operation & Maintenance Manual in 5 copies in English language, shall be provided by the EPC Contractor. The manual shall consists of operating instruction and maintenance procedure for preventive as well as breakdown maintenance of all the system/ Components of the Project and all necessary details of the Project related to proper operation and maintenance. It shall also consist of the details of electrical wiring and circuit/connection diagram of the installed system.

12.0 ARBITRATION

20.1 All disputes or differences between Parties in respect of or concerning or connected with the interpretation or implementation of this Agreement or arising out of or in connection with this Agreement ("**Disputes**"), shall at the first instance be resolved

through mutual discussions between the officials of each of the Parties, which shall begin within 45 days after a Party has delivered to the other Party a written request for such consultation.

20.2 If the Parties are unable to resolve the Dispute in question within forty five (45) days of the commencement of mutual discussions in terms of Section 20.1 then the dispute shall be referred by either party by giving notice to the other party in writing of its intention to refer to arbitration as hereafter provided regarding matter under dispute. No arbitration proceedings will commence unless such notice is given. Any dispute in respect of which a notice of intention to commence arbitration has been given in accordance with Sub Clause 20.2, shall be finally settled by arbitration.

20.3 In all other cases, any dispute submitted by a party to arbitration shall be heard by an arbitration panel composed of three arbitrators, in accordance with the provisions set forth below.

The SECI and the EPC Contractor shall each appoint one arbitrator, and these two arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel.

If the two arbitrators do not succeed in appointing a third arbitrator within Thirty (30) days after the latter of the two arbitrators has been appointed, the third arbitrator shall, at the request of either party, be appointed by the Appointing Authority for third arbitrator which shall be the President, Institution of Engineers.

If one party fails to appoint its arbitrator within thirty (30) days after the other party has named its arbitrator, the party which has named an arbitrator may request the Appointing Authority to appoint the second arbitrator.

If for any reason an arbitrator is unable to perform its function, the mandate of the Arbitrator shall terminate in accordance with the provisions of applicable laws as mentioned in Clause 22 (Applicable Law) and a substitute shall be appointed in the same manner as the original arbitrator. Arbitration proceedings shall be conducted with The Arbitration and Conciliation Act, 1996.

The decision of a majority of the arbitrators (or of the third arbitrator chairing the arbitration panel, if there is no such majority) shall be final and binding and shall be enforceable in any court of competent jurisdiction as decree of the court. The parties thereby waive any objections to or claims of immunity from such enforcement. The arbitrator(s) shall give reasoned award.

20.3 All arbitration proceedings shall be conducted in the English language and the place of arbitration shall be New Delhi, India.

20.4 This Section 20 is severable from the rest of this Agreement and shall remain in effect even if this Agreement is terminated for any reason.

21.0 JURISDICTION

This agreement and the terms and conditions thereon shall be governed by the laws of India and subject to the exclusive jurisdiction of the courts of Law in Delhi.

22.0 GOVERNING LAW

This Agreement shall be governed in accordance with the laws applicable in India.

23.0 NOTICES

23.1 Notice Addresses

Unless otherwise provided in the Agreement, all notices and communications concerning the Agreement shall be in writing and addressed to the Parties at the addresses set forth below:

In case of notice to the EPC Contractor:

Attention : Sri Ashu Gupta

Address : **M/s Ujaas Energy Limited,**
(Formerly known as M and B Switchgears Limited),
Survey No. 211/1, Opp Sector C & Metalman,
Sanwar Road Industrial Area,
Indore-(M.P)-452001

Telephone : [+91 8225004250]
E-mail : [ashu.g@ujaas.com]

If case of notice to the SECI:

Attention : Mr. R. K. Jain
Addl. General Manager (Solar
Address : Solar Energy Corporation of India
D-3, A - Wing, First Floor, District Center,
Saket, New Delhi-110017
Telephone : 011-71989 211
Facsimile : 011 – 71989 244
E-mail : agmsolar@seci.gov.in

23.2 Service of Notices

Unless otherwise provided herein, any notice provided for in the Agreement shall be hand delivered, sent by registered post, or by courier delivery, or transmitted by facsimile or email and shall be deemed delivered to the addressee or its office when received at the address for notice specified above when hand delivered or sent by courier delivery, upon posting if sent by registered post and upon confirmation of sending when sent by facsimile/email (if sent during normal business hours or the next business day if sent at any other time).

23.1 Independent Service Provider

This Agreement is on a principal to principal basis between the Parties hereto. Nothing contained in this Agreement shall be construed or deemed to create any association, partnership or joint venture or employer-employee relationship or principal-agent relationship in any manner whatsoever between the Parties.

This Letter of Award is being issued to you in duplicate. We request you to return its duplicate copy duly signed and stamped on each page including all the enclosures by the authorized signatory of your company as a proof of your acknowledgement of this award within 15 days from the date of this LoA.

Thanking you,

Yours faithfully,

(R.K. Jain)
Addl. General Manager (Solar)

आर.के. जैन / R.K. Jain
अपर महाप्रबन्धक (सौर) / Addl. General Manager (Solar)
भारतीय सौर ऊर्जा निगम लि. / Solar Energy Corp. of India Ltd.
(भारत सरकार का उद्यम) / (A Govt. of India Enterprise)
डी-3, प्रथम तल, 'ए' विंग, डिस्ट्रिक्ट सेन्टर, साकेत, नई दिल्ली-17
D-3, 1st Floor, 'A' Wing, District Centre, Saket, New Delhi-110017

Acknowledgement:

Signature of Authorized Signatory: .....

Name:....., Designation: .....

Date of Acknowledgement:
.....

Seal: .....

Solar Energy Corporation of India Ltd. ★ New Delhi

Operation and Maintenance Guidelines of Grid Connected PV Plants

For the optimal operation of a PV plant, maintenance must be carried out on a regular basis.
All the components should be kept clean. It should be ensured that all the components are fastened well at their due place.
Maintenance guidelines for various components viz. solar panels, inverter, wiring etc. are discussed below:

1. SOLAR PANELS

Although the cleaning frequency for the panels will vary from site to site depending on soiling, it is recommended that

- ✓ The panels are cleaned at least once every fifteen days.
- ✓ Any bird droppings or spots should be cleaned immediately.
- ✓ Use water and a soft sponge or cloth for cleaning.
- ✓ Do not use detergent or any abrasive material for panel cleaning.
- ✓ Iso-propyl alcohol may be used to remove oil or grease stains.
- ✓ Do not spray water on the panel if the panel glass is cracked or the back side is perforated.
- ✓ Wipe water from module as soon as possible.
- ✓ Use proper safety belts while cleaning modules at inclined roofs etc.
- ✓ The modules should not be cleaned when they are excessively hot. Early morning is particularly good time for module cleaning.
- ✓ Check if there are any shade problems due to vegetation or new building. If there are, make arrangements for removing the vegetation or moving the panels to a shade-free place.
- ✓ Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.
- ✓ Never use panels for any unintended use, e. g. drying clothes, chips etc.
- ✓ Ensure that monkeys or other animals do not damage the panels.

2. CABLES AND CONNECTION BOXES

- ✓ Check the connections for corrosion and tightness.
- ✓ Check the connection box to make sure that the wires are tight, and the water seals are not damaged.
- ✓ There should be no vermin inside the box.
- ✓ Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged, replace the wire.
- ✓ If the wire is outside the building, use wire with weather-resistant insulation.
- ✓ Make sure that the wire is clamped properly and that it should not rub against any sharp edges or corners.
- ✓ If some wire needs to be changed, make sure it is of proper rating and type.

3. INVERTER

- ✓ The inverter should be installed in a clean, dry, and ventilated area which is separated from, and not directly above, the battery bank.

Energy Corporation of India New Delhi

- ✓ Remove any excess dust in heat sinks and ventilations. This should only be done with a dry cloth or brush.
- ✓ Check that vermin have not infested the inverter. Typical signs of this include spider webs on ventilation grills or wasps' nests in heat sinks.
- ✓ Check functionality, e.g. automatic disconnection upon loss of grid power supply, at least once a month.
- ✓ Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

4. SHUTTING DOWN THE SYSTEM

- ✓ Disconnect system from all power sources in accordance with instructions for all other components used in the system.
- ✓ Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.
- ✓ To the extent possible, system shutdown will not be done during day time or peak generation.

INSPECTION AND MAINTENANCE SCHEDULE

Component	Activity	Description	Interval	By
PV Module	Cleaning	Clean any bird droppings/ dark spots on module	Immediately	User/Technician
	Cleaning	Clean PV modules with plain water or mild dishwashing detergent. Do not use brushes, any types of solvents, abrasives, or harsh detergents.	Fortnightly or as per the site conditions	User/Technician
	Inspection (for plants > 100 kW_p)	Use infrared camera to inspect for hot spots; bypass diode failure	Annual	Technician
PV Array	Inspection	Check the PV modules and rack for any damage. Note down location and serial number of damaged modules.	Annual	User/Technician
	Inspection	Determine if any new objects, such as vegetation growth, are causing shading of the array and move them if possible.	Annual	User/Technician
	Vermin Removal	Remove bird nests or vermin from array and rack area.	Annual	User/Technician
Junction Boxes	Inspection	Inspect electrical boxes for corrosion or	Annual	Electrician

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Component	Activity	Description	Interval	By
Plant	Monitoring	Daily Operation and Performance Monitoring	Daily	Site in charge
Spare Parts	Management	Manage inventory of spare parts.	As needed	Site in charge
Log Book	Documentation	Document all O&M activities in a workbook available to all service personnel	Continuous	Site in charge

Solar Energy Corporation of India Ltd. New Delhi

Monthly O & M Report

Month and year:
Name of the bidder:
RFS ref no.:
Project Capacity:
Address of the site:

Part A

Component	Activity	Description	Date	Name / Signature	*Remarks
PV Module	Cleaning	Immediately clean any bird droppings/ dark spots on module.			
	Cleaning	Clean PV modules with plain water or mild dishwashing detergent.			
	Inspection (for plants > 100 kW_p)	Infrared camera inspection for hot spots, bypass diode failure.			
PV Array	Inspection	Check the PV modules and rack for any damage.			
	Inspection	If any new objects, such as vegetation growth etc., are causing shading of the array. Remove if any.			
	Vermin Removal	Remove bird nests or vermin from array and rack area.			
Junction Boxes	Inspection	• Inspect electrical boxes for corrosion, intrusion of water or vermin. • Check position of switches and breakers. • Check status of all protection devices.			
Wiring	Inspection	Inspect cabling for signs of cracks, defects, lose connections, corrosion, overheating, arcing, short or open circuits, and ground faults.			
Inverter	Inspection	• Observe instantaneous operational indicators on the faceplate.			

Solar Energy Corporation of India Ltd. New Delhi

Component	Activity	Description	Interval	By
		intrusion of water or insects. Seal boxes if required. Check position of switches and breakers. Check operation of all protection devices.		
Wiring	Inspection	Inspect cabling for signs of cracks, defects, lose connections, overheating, arcing, short or open circuits, and ground faults.	Annual	Electrician
Inverter	Inspection	Observe instantaneous operational indicators on the faceplate of the inverter to ensure that the amount of power being generated is typical of the conditions. Inspect Inverter housing or shelter for physical maintenance, if required.	Monthly	Electrician
Inverter	Service	Clean or replace any air filters.	As needed	Electrician
Instruments	Validation	Spot-check monitoring instruments (pyranometer etc.) with standard instruments to ensure that they are operational and within specifications.	Annual	PV Specialist
Transformer	Inspection	Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc.	Annual	Electrician
Tracker (if present)	Inspection	Inspect gears, gear boxes, bearings as required.	Annual	Technician
	Service	Lubricate tracker mounting bearings, gearbox as required.	Bi-annual	Technician

Component	Activity	Description	Date	Name / Signature	*Remarks
		• Inspect Inverter housing or shelter for any physical maintenance. • Check for connection tightness.			
Inverter	Service	Clean or replace any air filters.			
Instruments	Validation	Verify monitoring instruments (pyranometer etc.) with standard instruments to verify their operation within tolerance limits.			
Transformer	Inspection	Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc.			
Plant	Monitoring	Daily Operation and Performance Monitoring.			
Spare Parts	Management	Manage inventory of spare parts.			
Log Book	Documentation	Maintain daily log records.			
Tracker (if any)	Inspection	Inspect gears, gear boxes, bearings, motors.			
	Service	Lubricate bearings, gear as required.			

*Provide details of any replacement of systems/components, damages, plant/inverter shut down (planned/forced), breakdown, etc under remarks.
*Daily register is to be maintained by the bidder at each location. The same may be inspected by SEC or its authorised representative at any time 5 years of O&M period. The Register will have the information about the daily generation, Inverter downtime if any, Grid outages.

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Part B

Date	Generation kWh	Grid outage (hh:mm)	Inverter down period (hh:mm)	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Total generation for the month in kWh:
Cumulative generation since commissioning in kWh:
CUF for month in %:
Cumulative CUF since commissioning in %:

Date:

Signature of the
Authorised signatory of the Bidder

Solar Energy Corporation of India Ltd. New Delhi

ANNEXURE-3

Page-49

EXTRACT OF THE MINUTES OF THE 19TH BOARD MEETING PERTAINING TO PS DIVISION

AGENDA NO. 19/18

INVESTMENTAPPROVAL FOR IMPLEMENTATION OF 1 MWp GRID-CONNECTED ROOFTOP SPV SYTEMS IN ANDAMAN & NICOBAR ISLANDS IN RESCO MODE BY SECI.

With the permission of the Chair, the agenda item was tabled and circulated to all the members of the Board for consideration and approval for Investment Proposal of 1MW of Grid-Connected Rooftop SPV Systems in Andaman & Nicobar Islands in RESCO Mode.

Due to high importance of the project, it was felt that the SECI should take up the project and put all dedicated efforts for early execution of the project.

After deliberations by the Board, the investment proposal was approved with the following:-

1) 70% subsidy from MNRE, as Central Financial Assistance (CFA) on the discovered project cost.
2) SECI's equity investment of Rs. 250.50 lakhs equivalent to 30% of the Project cost.
3) Filing a petition before JERC for determination of Tariff based on competitively discovered project cost of Rs. 8.35 Cr.

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P.T.O

ANNEXURE-4

Page-50

Avnish

From: anitaag@seci.gov.in on behalf of Anita Agrawal <anitaag@seci.gov.in>
Sent: 25 April 2016 18:03
To: 'Avnish Parashar'
Cc: 'rajesh jain'; 'Atulya Kumar Naik Additional Gen. Mgr.'
Subject: FW: Annual generation data and CUF achieved for 5 MWp ground based solar PV plant installed at Port Blair, Andaman & Nicobar Islands.

FYI

From: rahularora@seci.gov.in [mailto:rahularora@seci.gov.in]
Sent: 06 January 2016 17:49
To: agmsolar@seci.gov.in
Cc: rakesh.k@seci.gov.in; anitaag@seci.gov.in
Subject: FW: Annual generation data and CUF achieved for 5 MWp ground based solar PV plant installed at Port Blair, Andaman & Nicobar Islands.

FYI

From: Subhash Thakur [mailto:subhashthakur@ntpc.co.in]
Sent: 06 January 2016 17:43
To: rahularora@seci.gov.in
Cc: 'Kiran Kumar' <kirannitjsr@gmail.com>; HOD(Elect) <dinkardevate@ntpc.co.in>; dkchaturvedi@ntpc.co.in
Subject: RE: Annual generation data and CUF achieved for 5 MWp ground based solar PV plant installed at Port Blair, Andaman & Nicobar Islands.

Dear Sir,

Solar PV generation is given below:

FY 2013-14 (6624747 Kwh, CUF 15.12%)
FY 2014-15(7144873 Kwh, CUF 16.31%)

Regards

Subhash Thakur

From: rahularora@seci.gov.in [mailto:rahularora@seci.gov.in]
Sent: 04 January 2016 13:10
To: subhashthakur@ntpc.co.in
Cc: agmsolar@seci.gov.in; anitaag@seci.gov.in
Subject: Annual generation data and CUF achieved for 5 MWp ground based solar PV plant installed at Port Blair, Andaman & Nicobar Islands.

Sir,

Please recall the telephonic discussion with our Director (PS), Sh. Rakesh Kumar.

You are requested to please arrange to provide us the annual generation data and CUF achieved for 5 MWp ground based solar PV plant installed at Port Blair, Andaman & Nicobar Islands.

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An early action is highly solicited please.

Thanks & Regards,

(Rahul Arora)
PA to Director (PS)
Solar Energy Corporation of India
D-3, A-Wing, First Floor,
Religare Building, District Centre,
Saket, New Delhi – 110017
Ph. 011-71989219
Fax 011-71989243

Solar Energy Corporation of India Ltd. New Delhi

ANNEXURE-5

No. 30/11/2012-13/NSM
Government of India
Ministry of New and Renewable Energy

Block No. 14, CGO Complex,
Lodhi Road, New Delhi-110003
Dated: 26th June, 2014

To
The Pay and Accounts Officer,
Ministry of New and Renewable Energy,
New Delhi.

Subject: Continuation of "Off-Grid & Decentralized Solar Applications" Scheme in the 2nd Phase of the Jawaharlal Nehru National Solar Mission during 12th Plan Period including 2014-15: Guidelines "Grid-Connected Rooftop and Small Solar Power Plants Programme"

Sir,

In continuation to the Administrative Approval for continuation of "**Off-Grid & Decentralized Solar Applications" Scheme in the 2nd Phase of the Jawaharlal Nehru National Solar Mission during 12th Plan Period** issued vide No. 30/11/2012-13/NSM dated 26th May, 2014, I am directed to issue the Guidelines for implementation of the "**Grid Connected Rooftop and Small Solar Power Plants Programme**" of the Ministry **(Annexure).**

2. This issues in exercise of powers delegated to this Ministry and with the concurrence of IFD dated 01.06.2014 vide their Dy. No. IFD/435/14-15 dated 09.06.2014 and with the approval of competent authority.

Yours faithfully,

(Dr. Arun K Tripathi)
Director /Scientist 'F'
Tele Fax -011-24363035
E-mail : aktripathi@nic.in
Website: www.mnre.gov.in

Solar Energy Corporation of India Ltd. New Delhi

Copy for information and appropriate action to:-

1. All Central Ministries and Departments;
2. Department of Public Enterprises (DPE), Block 14, CGO Complex, New Delhi
3. Principal Director of Audit, Scientific Audit-II, DGACR Building, I.P. Estate, Delhi-110002
4. Principal Secretaries/Secretaries (Energy Departments) all States /UTs
5. All State/UT Nodal Agencies (by name)
6. All Municipal Commissioners
7. CMD, IREDA, 1st floor, East Court, Indian Habitat Centre , Lodhi Road, New Delhi
8. Director General, Bureau of Indian Standards, Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi
9. D.G., National Institute of Solar Energy, Gwal Pahari, Gurgaon, Haryana
10. MD, Solar Energy Corporation of India, D-3, A Wing,1st Floor, Religare Building , District Centre , Saket, New Delhi-110017
11. National Housing Bank and all nationalized Banks.

Copy to:

1. PS to Hon'ble Minister of State for Power, Coal and New and Renewable Energy, Shram Shakti Bhawan, New Delhi.
2. PSO to Secretary, MNRE
3. PS to AS&FA, MNRE
4. JS(AS)/JS(TK)
5. All Advisers & Group Heads
6. All Under Secretaries in MNRE
7. Director (NIC) to upload this on the Ministry's website
8. CA , MNRE/Cash Section
9. Hindi section for Hindi version
10. Sanction folder

(Dr. Arun K Tripathi)
Director /Scientist 'F'

Solar Energy Corporation of India Ltd. New Delhi

No. 30/11/2012-13/NSM
Government of India
Ministry of New & Renewable Energy
Dated: 26th June, 2014

Annexure

Off-Grid and Decentralized Solar Application Scheme: Operational Guidelines for Grid Connected Rooftop and Small Solar Power Plants Programme

I. Background:

The Government had launched Jawaharlal Nehru National Solar Mission during 2010-11, which is a major initiative of the Government of India and State Governments to promote ecologically sustainable growth while addressing India's energy security challenge. It will also constitute a major contribution by India to the global effort to meet the challenges of climate change.

The immediate aim of the Mission is to focus on setting up an enabling environment for solar technology penetration in the country both at a centralized and decentralized level. The first phase (up to 31st March 2013) focused on promoting off-grid systems including hybrid systems to meet / supplement power, heating and cooling energy requirements. Based on the experience gained during the 1st phase of the Mission, the programme is being expanded with a focus on energy access and replacement of fossil fuels with renewable energy. These systems still require interventions to bring down costs but the key challenge is to provide an enabling framework and support for entrepreneurs to develop markets. The scheme is completely demand driven.

Solar energy including thermal and PV is second largest renewable energy source after wind energy. Around 60 million households worldwide use solar hot water collectors. Total Worldwide installed capacity is 235 GWth (335 million sqm.). India was ranked 4th in the world in terms of new capacity addition during the year 2011. Installed capacity for India stands at 7.281million sq m^2equivalent to 5082 MWth till 30th October 2013. Worldwide these achievements were possible with interventions in the form of capital subsidy/incentive in Electricity bill/ mandatory provision through heat laws.

In India Fossil fuels are being used for process heating, drying, distillation/ desalination, water heating, space heating, refrigeration and power/electricity generation. Nearly 25 million households are using electric geysers, consuming~7500 GW-hr of electricity (assuming minimum annual consumption of~600 kWh/ year/ geyser) and 15 million tons/year of petroleum fuels are used in industries in thermal form at temperatures below 300°C. It is assumed that 30% of

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energy consumed in industry is used for heating water, which shows that there is a huge potential.

There is a large potential available for generating solar power using unutilized space on rooftops and wastelands around buildings. Small quantities of power generated by each individual household, industrial building, commercial building or any other type of building can be used to partly fulfill the requirement of the building occupants and surplus, if any, can be fed into the grid. The roof-top SPV systems on building's roof space can be installed to replace DG gensets for operation during load shedding.

The price of power generated from solar plants installed today is at par with or lower than the commercial tariff for consumers. The cost of solar power is on the decline trend while the cost of fossil fuel based electricity is increasing day by day.

The cost of generating solar power at present is a little higher than the tariff charged from consumers by Distribution Licensees/DISCOMS in most cases (other than commercial). With the capital subsidy (upto30%) or so, it may be possible to generate power between Rs.5.0 -6.50 per unit for the next 20 years, which is cheaper than the diesel gen-set based electricity and this could also be cheaper than the cost at which most Distribution Licensees/DISCOMS would make power available to the same consumer. It is therefore important to popularize the use of solar energy so that people gain confidence and then its use can increase on its own.

II. Scheme

Grid Connected Rooftop and Small Solar Power Plants Programme

1.0 Grid connected Rooftop Solar Power Plant

1.1 In grid connected rooftop or small SPV system, the DC power generated from SPV panel is converted to AC power using power conditioning unit and is fed to the grid either of 33 kV/11 kV three phase lines or of 440/220 Volt three/single phase line depending on the capacity of the system installed at institution/commercial establishment or residential complex and the regulatory framework specified for respective States. They generate power during the day time which is utilized fully by powering captive loads and feed excess power to the grid as long as grid is available. In case, where solar power is not sufficient due to cloud cover etc., the captive loads are served by drawing power from the grid. The grid-interactive rooftop system can work on net metering basis wherein the beneficiary pays to the utility on net meter reading basis only. Alternatively two meters can also be installed to major the export and import of power separately. The mechanism based on gross metering at mutually agreed tariff can also be adopted. Many such power plants can be installed at the roofs of residential and

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commercial complex, housing societies, community centers, government organizations, private institutions etc.

1.2 Ideally, grid interactive systems do not require battery back-up as grid acts as the back-up for feeding excess solar power and vice-versa. However, to enhance the performance reliability of the overall systems, a minimum battery back-up of one hour of load capacity is recommended. In grid interactive systems, it has, however to be ensured that in case the grid fails, the solar power has to be fully utilized or stopped immediately feeding to the grid (if any in excess) so as to safe-guard any grid person/technician from getting shock (electrocuted) while working on the grid for maintenance etc. This feature is termed as 'Islanding Protection'.

1.3 The grid connected rooftop solar photovoltaic power generation plants, generates electricity at the consumption center and hence contributes to reducing the network losses of the distribution licensee. The electricity generation shall also contribute to meeting the demand and supply gap and shall also enable the obligated entities for complying with their solar purchase obligation targets as specified by appropriate Electricity Regulatory Commissions'. India has a huge potential for deployment of grid connected rooftop solar photovoltaic power generation plants and the MNRE envisages harnessing this potential.

2.0 Objective of the Programme

- To promote the grid connected SPV rooftop and small SPV power generating plants among the residential, community, institutional, industrial and commercial establishments.
- To mitigate the dependence on fossil fuel based electricity generation and encourage environment friendly Solar electricity generation.
- To create enabling environment for investment in solar energy sector by private sector, state government and the individuals.
- To create enabling environment for supply of solar power from rooftop and small plants to the grid.
- To encourage innovation in addressing market needs and promoting sustainable business models and ensure employment opportunities.
- To provide support to channel partners and potential beneficiaries, within the framework of boundary conditions and in a flexible demand driven mode.
- To create a paradigm shift needed for commoditization of grid connected SPV rooftop applications.
- To support consultancy services, seminars, symposia, capacity building, awareness campaigns, human resource development, etc.
- To encourage replacement of diesel, wherever possible.

3.0 Scope of the Programme:

3.1 The programme would be applicable in all parts of India and would, to begin with, be co-terminus with the Jawaharlal Nehru National Solar Mission and will, Inter alia, focus on promoting grid connected solar rooftops and small power plants to

meet/ supplement electricity/power requirements. The Project Appraisal Committee could also examine other feasible hybrid technologies for inclusion in the Programme.

3.2 The grid connected rooftop solar photovoltaic power generation plants up to a maximum capacity of **500 kWp** per project/system to generate electricity/power would be eligible under the Programme. The minimum capacity of **1.0 kW** would be eligible under this programme. The programme may be implemented in Urban and Rural Areas as well. The programme encourages installation of rooftop solar photovoltaic power generation plant for self-consumption as well as supply/sale of electricity to the grid.

3.3 The programme will also cover some R&D work related to suitable meters, grid connectivity, online monitoring, software development, establishment of testing facilities, state specific studies on potential assessment, system package development, policy development, engagement of consultants, seminars/workshops, capacity building & trainings, awareness campaigns preparation of literature/guidelines, innovative projects, IT enabled monitoring mechanisms, evaluation and other studies etc.

4.0 Implementation Arrangements:

4.1 The programme would be implemented through multiple agencies for rapid up-scaling in an inclusive mode. These agencies would be State Nodal Agencies/Deptts. Implementing the renewable energy programmes, Solar Energy Corporation of India and other Govt. organizations i.e. PSUs/Institutions/State Departments/Local Governments/Municipal Corporations/NHB/IREDA/DMRC, Metro Rail Corporations of other States etc. The Distribution Licensees/DISCOMs will also be eligible for direct implementation of the programme. Channel partners may also be considered for some cases.

4.2 The implementation will be carried out in both programme/project modes. The projects upto 50 kWp can be implemented in programme mode while projects above 50 kWp will be done on project mode. Following categories of implementing agencies will be utilised:-

(i) State Nodal Agencies(SNAs)

State Nodal Agencies/Deptts. for implementing various renewable energy programmes have been established under the control of respective State Governments. The projects up to 50 kWp can be implemented in programme mode. Beyond 50 kWp the implementation will be in project mode. The yearly target will be allocated to the States/SNAs depending upon their interest, demand and the capability in the beginning of the Financial Year (FY) or even in February for the preceding year. About 10% of eligible CFA can be released in advance at the time of target allocation. The SNAs will keep/maintain all applications and records with them and will submit the requisite brief about the beneficiaries/projects duly

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certified by them. These records will be made available for the audit purpose or to the inspecting team/MNRE officials etc.

(ii) Solar Energy Corporation of India (SECI)

The **Solar Energy Corporation of India** is a section 8 company established under the JNNSM as a company not for profit under the administrative control of MNRE. The SECI will submit the plan for implementation, as and when necessary and depending upon the feasibility and availability of funds the MNRE after taking into account the feasibility shall consider the plan or may suitably modify the plan before approval. SECI shall set up the allotted capacity/projects following the competitive bidding route.

(iii) Channel Partners

These channel partners would help the individuals and small groups of clients to access the provisions/benefits available under the programme. The Channel Partners enable significant reduction in the administrative/transaction cost and help in timely implementation of the projects. The Channel Partners which would be used for implementation could include the following:-

a) Renewable Energy Service Providing Companies (RESCOs)
b) System Integrators
c) Manufactures of any component of the Solar Plants
d) Project developers
e) Vendors/ suppliers of solar equipment
f) Reputed and relevant NGOs of National level

All Channel Partners will need to submit the proposals in the prescribed format. The online mechanism will be developed /preferred. They will follow all terms and conditions, of scheme and technical specifications as specified by MNRE time to time and will ensure the quality work.

Channel Partners will be empanelled by MNRE based on certificate from a rating agency in the country for technical and financial strength. The rating agencies would check the net worth/ turnover of the participating entity, its technical capability of supplying, installing and providing after sales service, track record and tie-ups with the equipment suppliers. Reputed Govt. technical Institutions could be exempted from the accreditation by rating agency on submission of their application with MNRE based on criteria defined for this purpose.

A transparent methodology for accrediting these entities by MNRE will be put in place. The empanelment would be done initially for 2 years which may be extended further on merit. Those channel partners who are already empanelled by MNRE under 'Off-grid and Decentralized Solar Applications' Scheme would also be considered based on their performance for the grid connected rooftop plants also. The channel partners already selected may also be notified under the programme.

Detailed Guidelines for accrediting/empanelling channel partners will be separately put in place by MNRE, or by SNAs, if the later is so directed by MNRE to empanel Channel Partners.

(iv) Financial Institutions/Financial Integrators

The financial Institutions and financial Integrators i.e., NABARD, National Housing Banks, other Banks, IREDA, SECI etc. will also be eligible for implementing the programme. They may source funds from MNRE, their own resources or any other sources i.e., carbon credits, National Clean Energy Fund, funds from States, beneficiary contribution, CSR sources etc..

(v) Other Govt. Departments/Agencies

The other Govt. Departments/Agencies i.e., Railways, Defence/Para Military Forces, Local Government Bodies including Municipal Corporations/Municipalities, PSUs, Institutions, Development Authorities, DMRC, State Departments interested in directly implementing the programme will also be encouraged. They may directly implement their own projects for meeting their large scale demands or other projects.

5.0 Project Cost, Benchmark Cost and Central Financial Assistance

5.1 The project cost of a grid connected rooftop PV system will include the hardware i.e., PV modules, inverters, meters, support structures, charge controllers, cables and minimum battery required to ensure smooth operation. It will also include cost of transportation, installation, connectivity, civil works and operation and maintenance for five years along with warranty of the system.

5.2 The benchmark cost may be fixed by MNRE on yearly/half yearly basis. The Central Financial Assistance (CFA) would be 30 % / 70% of the benchmark cost or the actual project cost as applicable, whichever is lower. The level of CFA may be revised by MNRE from time to time.

6.0 Funding Pattern.

6.1 Funding under the scheme would be in Project mode for systems larger than 50 kWp or equivalent, i.e. there must be a project report which would, inter alia, include client details, technical & financial details, O&M and monitoring arrangements. For lower capacity systems, i.e., below 50 kWp this would be operated in programme mode. Project proposals shall be submitted to the MNRE in the prescribed formats for small capacity systems. For the proposals upto 5 kWp the exact address of the beneficiary, project details with project cost etc. will be submitted by the implementing agencies in the list mode duly certified by them that their individual applications, beneficiary's identification, photo and the system photographs have been kept and maintained in their office for any audit and inspection purpose. For the projects from 5 kWp to 50 kWp the proposals shall be submitted in the prescribed format. For the projects above 50 kWp the proposal

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along with detail project report will be submitted. The total project cost shall be funded through CFA, and the users/beneficiary contribution. The beneficiary could also obtain loan from the Bank at commercial interest for meeting a cost of the power plant. Techno-economic specifications for a minimum cut-off level for the requirement of the project mode would be specified by MNRE.

6.2 MNRE would provide financial support in accordance with the benchmark cost and subsidy levels fixed by MNRE every year or on half yearly basis. The present CFA would be 30% of the benchmark cost of the grid connected rooftop and small solar power plants. However, it can be revised by MNRE time to time. The benchmark cost of a PV system will include the hardware cost up to the site including PV modules, inverters, minimum storage battery, cost of meters, local connectivity cost, cost of civil works, foundations, installation, operation and maintenance for a period of five years, comprehensive maintenance for a period of 5 years, warranty for the complete systems, etc.

6.3 In Special Category states viz. North Eastern States, Sikkim, Jammu & Kashmir, Himachal Pradesh and Uttarakhand, Lakshadweep, A&N Islands etc. the CFA upto 70% may be provided. This subsidy pattern can be accessed ONLY by Central and State Government Ministries, Departments and their organizations, State Nodal Agencies, SECI and Local bodies. This will be applicable for the projects at Central and State Government Ministries and their organizations (excluding PSU/Corporate buildings); Government Educational Institutions, Hospitals, community centers, Anganwadis, Panchayat Ghars, State/Central Government Buildings, Municipal Corporation Buildings, , Police Stations, Police Posts, vocational training centers, Government hostels etc. depending on requirement.

6.4 Upto 3.0 % of CFA would be admissible as service charges to State Nodal Agencies, SECI/NHB/IREDA/DMRC or other govt. agencies etc. This would be provided by MNRE, in addition to the CFA. The amount of CFA to be given to the State Nodal Agencies/ SECI etc. as service charges would be determined as follows:-

(a) Efforts made in preparing innovative cases by deploying staff in the field preparing DPRs etc. and having dedicated units at Head Office for such purpose.
(b) Providing technical assistance / help in implementation of the schemes.
(c) Having an IT based real time monitoring mechanism in place to reflect not only the progress during implementation but also performance after installation.
(d) MNRE may retain appropriate amount out of this 3% and provide to SECI or some other organization to give technical support to such Nodal Agencies which may be weak or not having enough technical staff. Experts or qualified professionals may also be placed with SNAs.
(e) Detailed guidelines on this will be issued in a month's time from the date of approval.

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6.5 Some R&D work related to suitable meters, grid connectivity, online monitoring, software development, establishment of testing facilities etc. will also be supported under this programme on merit. The state specific studies on media publicity/ potential assessment, system package development, policy development engagement of consultants etc. will be supported under the programme. Upto 1% of the total budget would be earmarked for this purpose.

6.6 CFA for organizing seminars/workshops, trainings, awareness campaigns preparation of literature/guidelines, innovative projects or other miscellaneous work etc. can be provided depending on merit. A total fund of upto 2% would be earmarked and about 100 such activities are proposed during the 12th Plan across the country.

6.7 In order to manage the all activities in MNRE, a project management cell, engagement of consultancy organization may be done. A total fund of upto 0.50 % may be utilized for the Project Management Cell/engagement of consultancy organization etc.

6.8 The CFA from MNRE would not preclude the channel partners from availing other fiscal and financial benefits being provided by State, Central Governments and any other agency so long as the same is clearly disclosed in the project report. They could also try to access a combination of capital subsidy and allow cost interest for the end consumer, provided they can tie up with lending institutions. These lending institutions could then enter into an agreement for refinance/ interest subvention with IREDA/other suitable institutions.

6.9 The present benchmark price for photovoltaic systems without battery back-up support is considered as Rs.100/-per Wp for the systems upto 100 kWp and Rs. 90/- per kWp for the systems 100-500 kWp. This may be revised from time to time.

6.10 MNRE may work out a mechanism of disbursing subsidy through SECI/IREDA/any suitable government institution in a phased manner.

7.0 Business models for grid connected rooftop and small solar power plants

For the successful smooth operation of rooftop and small solar power plants, various situations and conditions based models may be worked out to make it a workable business model. The business models must be in accordance with the prevailing legal framework. There can be many possible business models, some of which can be considered are as follows:

(a) Solar installations owned by consumer

i) Solar Rooftop facility owned, operated and maintained by the consumer(s).

Energy Corporation of India New Delhi

ii) Solar Rooftop facility owned by consumer but operated and maintained by the 3rd party.

(b) Solar installations owned, operated and maintained by 3rd Party

If the 3rd party implements the solar facility and provides services to the consumers, the surplus electricity may be injected to the electricity grid. The combinations could be:

i) Arrangement as a captive generating plant for the roof owners

The 3rd party implements the facility at the roof or within the premise of the consumers; the consumer may or may not invest as equity in the facility as mutually agreed between them. The 3rd party may also make arrangement of undertaking operation and of maintenance of the facility. The power is then sold to the roof owner.

ii) Solar Lease Model, Sale to Grid

The 3rd party implementing the solar facility shall enter into a lease agreement with the consumer for medium to long term basis on rent. The facility is entirely owned by the 3rd party and consumer is not required to make any investment in facility. The power generated is fed into the grid and the roof top owner gets a rent.

(c) Solar Installations Owned by the Utility

I) Solar Installations owned operated and maintained by the DISCOM

The DISCOM may own, operate and maintain the solar facility and also may opt to sub contract the operation and maintenance activity. The DISCOM may recover the cost in the form of suitable tariff. The electricity generation may also be utilized by DISCOM for fulfilling the solar renewable purchase obligation.

ii) Distribution licensee provides appropriate viability gap funds

The DISCOM may appoint a 3rd party to implement the solar facilities on its behalf and provide appropriate funds or viability gap funds for implementing such facility. It may also enter into an agreement with the 3rd party undertaking the operation and maintenance of the solar facilities.

There can be many such business models which may be developed/adopted depending upon the market conditions, user's interest, and initiatives by the ESCOs.

8.0 Requirements for grid connected rooftop and small solar plants

The following points may be considered:

i) Connectivity Regulations

Central Electricity Authority (CEA) has notified **"CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013".** This standard provides necessary guidance to Distribution Licensee/DISCOMs and also the transparency in the process and encourages consumers for installing such grid connected rooftop solar plants.

ii) Tariff determination

The projects can be installed on Net Metering or Feed-in-Tariff (FIT) basis. This will be decided by Regulators/DISCOMs/Distributed Licensee in consultation with the implementing agencies. In case of the feed-in-tariff, the provisions should be in such a manner that it provide a safeguard to all stakeholders including DISCOMs. The tariff may be such that it is attractive for the roof owner and does not put too much burden on the DISCOMs. Therefore, regulators need to come up with feed in tariff for roof tops with and without MNRE subsidy.

iii) Availability of Electricity Grid

The availability of electricity grid near the solar installation is an essential component which needs to be provided by the concerned agencies.

iv) Signing of MOU/Agreements

If required, an MoU will need to be entered into among the beneficiaries / DISCOMs / Distribution Licensees and the other involved parties.

9.0 Classification of Projects based on Grid Connectivity:

The Projects under these guidelines fall within two broad categories i.e.(a) the projects connected to HT voltage at distribution network (i.e. below 33 kV) (b) the projects connected to LT voltage i.e. 400/415/440 volts (3-phase) as the case may be or 230 volts (1-phase). Accordingly, the projects may be under the following two categories.

10.1. Category 1: Projects connected at HT level (below33kV) of distribution network

The Projects with proposed installed capacity of minimum 50 kW and upto 500 kW and connected at below 33kV shall fall with in this category. The projects will have to follow appropriate technical connectivity standards in this regard.

10.2. Category 2: Projects connected at LT level (400 Volts-3 phase or 230 Volts-1 phase)

The Projects with proposed installed capacity of less than100kW and connected of the grid at LT level (400/ 415/ 440 volts for 3-phase or 230V for1-phase) shall fall within this category.

11.0 Modus Operandi and submission of Proposals

11.1 The project site/rooftops at office buildings, commercial buildings, residential complexes etc. can be selected on the basis of total energy requirement of the premise and the area available for installation of roof top Solar PV system.

11.2 Solar PV system on the roof top of selected buildings can be installed for meeting the requirement of the building as much as possible in agreement with the local DISCOMs/Distribution Licensee.

11.3 Though rooftop systems shall be generally connected on LV supply, large solar PV system may be connected to 11kV system. Following criteria is suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers however, the connectivity level may be decided depending upon the site conditions and policies:

- Up to 10 kW solar PV systems the connectivity may be at Low Voltage single phase supply point.
- Between 10-100 kW solar PV systems, the connectivity may be at three phases low voltage supply
- Above 100 kWp upto 500 kWp capacity, system connection can be made at 11 kV/33 kV level.

11.4 Export Import meters/two way/bi-directional meters need to be installed with the facility of net metering. Two way meters can also be used as they are cheaper and give better idea about power exported. The meter may also be finalized in consultation with the Distribution Licensee/DISCOM. The CEA regulations on metering arrangements may also be followed.

11.5 The billing of buildings by DISCOM can be done on the basis of net energy drawn from the grid during the month on the tariff prescribed by the Regulatory Commission for commercial consumers or as finalized with the DISCOM.

11.6 A Power Purchase Agreement (PPA) needs to be signed between the owner of buildings, 3rd party and the DISCOMs as applicable. If the State has already

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announced a policy on the grid connected roof top and small solar plants, the relevant notification may be mentioned along with the proposals.

11.7 An agreement between DISCOM and the owner of building/premise/SPV plant needs to be signed for the net metering and billing on the monthly/bi-monthly basis as applicable. Suitable payment security mechanism may need to be provided by the DISCOM/ Distribution Licensee/ State Nodal Agency/ Utility etc..

11.8 The proposal can be submitted in the format as prescribed by MNRE with details of grid connectivity & metering arrangements, agreement signed with DISCOM etc. to this Ministry as per the Programme. For the small category residential users up to 5.0 kWp the bulk proposals can be submitted by SNAs along with the list of beneficiaries duly certified by them (ref para 6.1) in the format as prescribed by MNRE.

The above options/procedure is a suggestive in nature and it needs to be left on the wisdom of the implementing agency, user, DISCOMs/Distribution Licensee and states to suitably modify depending upon the prevailing conditions. There is also need to formulate a separate policy on grid connected rooftop and small solar plants by States. The policy may adopt net-metering or gross metering/feed-in Tariff or any other mechanism as deemed appropriate.

12.0 Release of Funds:

12.1 For setting up of the projects the release of funds for various Implementing Agencies would be as follows:

Sl. No.	Implementing Agency	Pattern for Release of Funds
1.	State Nodal Agencies and State Nodal Departments	Upto 30% of the eligible CFA and services charges at the time of sanction of the proposal in the project/programme mode. However, 10% advance may be given at the time of allocation of targets on programme mode. Balance 70% after successful commissioning of the projects after sample verification on submission of requisite claims.
2.	Solar Energy Corporation of India (SECI)	Upto 30 % after submission of detailed proposal on the costs firmed up on tender basis. However, 10% advance may be given on allocation of targets/sanction of the preliminary proposal on programme mode.

Energy Corporation of India New Delhi

		Balance 70% on completion/ commissioning, performance report for about one month and due verification/third party inspection thereof on submission of requisite claims.
3.	Channel Partners	On reimbursement basis on completion/ commissioning, performance report for about one month and due verification/third party inspection thereof on submission of requisite claims. 50% of the eligible CFA may be released at the stage of claims submitted after completion/commissioning and balance 50% after verification/3rd party inspection.
4.	Financial Institutions/ Financial Instigators	Upto 30% of the eligible CFA and services charges at the time of sanction of the proposal in the project/programme mode. Balance 70% after successful commissioning of the projects after sample verification on submission of requisite claims.
5	Other Government Agencies for the Govt. Projects	Upto 30% of the eligible CFA and services charges at the time of sanction of the proposal in the project/ programme mode. Balance 70 % after successful commissioning of the projects after sample verification on submission of requisite claims.

12.2 The subsidy will be disbursed directly by MNRE to the channel partners unless decided – otherwise i.e. through SNAs. MNRE may specify an accounting system, monitoring mechanism and transparent computer based web enabled data bank with beneficiaries and system details. MNRE may also use SECI / SNAs for subsidy disbursement to channel partners. For Implementing Agencies like State Nodal Agencies/PSUs (involved in manufacturing of PV modules), the release of funds could on milestone basis on the progress of the project. The advance on milestone basis to SNAs/Deptts./Govt. Deptts. is applicable only to Govt. Supported projects.

12.3 The balance of CFA would be released as second and final tranche of the sanctioned CFA after receipt of Utilisation Certificate, of not less than 50% of the first tranche released. While releasing the second tranche, MNRE would take into consideration, revision in initial annual estimate (if any) for appropriate funding. An audited statement of accounts will be submitted by the proponents for the release of the second/final tranche.

13.0 Approval Mechanism

13.1 At the beginning of each year MNRE will estimate broadly the capacity available under the scheme in that year. Not more than 50% of the capacity shall be available for execution through the channel partner route. At the beginning of each Quarter, MNRE shall earmark/release an indicative target for that period. All the Channel Partners shall submit, within a 15 day period to be prescribed by MNRE, proposals/ targets in the prescribed formats along with a commitment for meeting the balance cost of the project other than the CFA to MNRE. Targets will be approved and communicated and the channel partners can start implementation at their own risk and investment. They will be responsible for following the scheme guidelines and MNRE specifications. Project will be sanctioned within 45 days of receiving of the project report from the project proponent. The proposals of the Channel Partners will be sanctioned on the appraisal and recommendations of the Project Appraisal Committee (PAC) constituted by MNRE.

In case capacity applied for by the Channel Partners exceeds the available capacity in that period, MNRE will device a transparent mechanism to decide on the allocation of capacity to the various Channel Partners. However, in no case shall the total capacity allocated through Channel Partners exceed 50% of the total capacity allocation in any particular quarter.

13.2 Proposals of State Nodal Agencies, SECI and other Govt. Agencies, NHB, PSUs and IREDA will not require PAC approval and will be directly processed/ sanctioned by the division.

13.3 The entire process of receiving proposals, processing them and giving approvals would be preferably IT enabled. The mechanism for online monitoring of each project will be developed and efforts will focus towards real time monitoring. The PAC would also frame rules and prescribe formats etc., for project approval, with in the overall framework of this scheme, so as to make the process transparent.

13.4 The In-principle approval of the targets/ proposals may be granted by the Ministry in-advance to the States Departments/SNAs/Channel Partners and other implementing agencies to enable them for planning their strategies identify the beneficiaries, formulate the specific proposals etc..

13.5 MNRE reserves the right to decentralise the whole process of administering the Channel Partners to SNAs.

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14.0 Project Management Consultant (PMC)

The government may engage a reputed agency as a Project Management Consultant (PMC) to handle all the processes such as assistance for formulation, appraisal and screening of proposals preceding the formal approval which would be a function of MNRE. It would also assist the Ministry in formulating the detailed implementation guidelines/formats, if any. A Project Management Cell is also proposed to be created in MNRE. The PMC will also device a suitable Monitoring System.

15.0 Monitoring and Evaluation:

15.1 Monitoring and evaluation studies of the Scheme and its implementation will be carried out during the period of implementation of the Scheme as is given below:

i. At the primary level of monitoring, channel partners would be responsible for monitoring parameters such as end-use verification and KYC compliance and also compilation of statistical information.
ii. National monitors, Consultants, Institutions, Reputed Civil Society Groups, eminent persons, Corporate Houses (as an activity under Corporate Social Responsibility) with relevant experience, SNAs, other govt. organizations and MNRE officials would be involved, for ground verification/performance evaluation on random sample basis.
iii. The electricity generation data should be available at the beneficiary level. However, for projects above 5 kW, the system providers would also make available generation data to MNRE at intervals specified.
iv. For the projects 50 kWp and above 100% field inspection would be required and the claim will contain the inspection report.

However, primarily responsibility of monitoring and reporting will be with the implementing agencies.

15.2 Information and Communication Technology must be used for ensuring fool proof monitoring. Since the scheme envisages IT enabled monitoring and verification protocols, the cost of monitoring may be included in the total project cost which should be used by various channels partners/agencies/organisations for compliance.

15.3 It is envisaged that certified energy auditors, scheme monitors and others would be empanelled for certifying the outputs of the system correspond to the parameters laid down in the programme.

16.0 Technical Requirements

16.1 The scheme requires the project proponents to adhere to the national/ international standards specified by the Ministry from time to time.

Energy Corporation of India New Delhi

16.2 Only indigenously manufactured PV modules should be used in Solar PV systems power plants. However, other imported components can be used, subject to adequate disclosure and compliance to specified quality norms and standards.

16.3 Grid interactive SPV power plants and/ systems, inverters, meters, cables, mounting structures and other balance of systems etc. should have the minimal technical requirements and Quality Standards as specified by MNRE from time to time.

17.0 Supporting Innovation

In very special and rare cases, the Ministry could consider higher CFA for undertaking pilot and demonstration projects either for demonstrating new and innovative applications or for demonstrating new technologies. Ministry may also consider sanctioning to SECI or other government institutions demonstrative projects with higher CFA with a provision for recovery of the CFA on savings in fuel usage. Detailed guidelines for such schemes would be separately drawn up, if required.

18.0 Natural Calamities and Disasters

18.1 Ministry could consider providing 100% funding in case of natural calamity for installation of grid connected rooftop and small solar plants on humanitarian ground.

19.0 Interpretation of the Guidelines

In case of any ambiguity in interpretation of any of the provisions of these guidelines, the decision of the Ministry shall be final.

20.0 Review

20.1 The scheme would be reviewed by an Internal Review Committee at 6 month/yearly interval and modifications therein as and when recommended would be incorporated by the Ministry in the programme time to time. In addition, a platform for experts to discuss best practices, debate over issues to overcome bottlenecks and provide effective policy suggestions for ensuring wide spread grid connected solar solutions deployment would also be established at the national level.

20.2 MNRE may frame specific guidelines for various products and various categories based on this scheme to bring in more clarity and easy applicability. In these guidelines MNRE may exclude certain provisions if they are not required for that product category or if it is felt that lesser support is required.

III. Fixing of CFA and Benchmark cost

All CFA values will be based on bench mark cost and **would be fixed in absolute value i.e. in Rs/Watt.** There could also be other parameters like efficiency of system. For fixing CFA and bench mark cost, MNRE will set up a

Energy Corporation of India New Delhi

committee which will take inputs from rates received in various tenders by SECI and other agencies including Nodal agencies, component market rates, global rate trends etc. The CFA may be fixed annually or biannually. In case of channel partners a correction factor will apply on the bench mark price to determine the CFA.

Following procedure will be used to determine the benchmark cost under Solar Off Grid Scheme for the Grid Connected Rooftop and Small Solar Power Plants:-

1. Benchmark cost will be determined separately for the Grid Connected Rooftop Photovoltaic (PV) plants including the cost of components as mentioned in para 5 above.

2. Separate committee would be constituted in MNRE for the grid connected categories.

3. The benchmark cost would be fixed based on the following two main criteria:

a) Price determined through tenders done by SECI, State Nodal Agencies and other Government Departments/ organizations in 12 months preceding the date when the committee starts working for determining the benchmark cost for next year.
b) Component wise cost breakup to arrive at an estimated price of each of the products for which benchmark cost is determined. The committee will collect data about all the tenders floated with MNRE subsidy. These would then be clubbed into different categories depending on the product, technology etc. Thereafter the committee may develop criteria for arriving at a rate out the price or by calculating median. The benchmark so determined through tendered price will then be compared with values arrived at through costing by clubbing the price of various components. In case of wide difference, the committee may go into the reasons and if need be, apply correction factor.

4. The committee may take into account all relevant factors and also co-opt experts if necessary to adopt a benchmark price as close to the actual price as possible. The committee may also relook the benchmark cost after 6 months in case it is felt that there is a major change in the market.

5. It is hoped that price of the system will come closer and closer to benchmark cost as time progresses and after few years the price coming through tenders would not be very different from benchmark cost. Benchmark cost will also get rationalized as technologies improve.

IV. Tatkal Scheme

There would be provision for reserving quantities of various solar systems at lower subsidy levels along with the facility of disbursal on priority basis in a definite time period. This would, however, be done within the upper subsidy cap as laid down in the scheme for the particular component. A committee will be set up to decide the scheme separately.

V. Hybrid systems

There would be a provision to promote hybrids like Wind-solar etc. within the defined CFA and subsidy limits for that particular component in this scheme.

VI. Specification and standards

Ministry will set the technical specification and quality standards from time to time and rationalize them as may be required. Technical specification and standard for each part of the schome is specified in **Annexure-1** as currently applicable.

VII. Monitoring and System life

Online monitoring will be compulsory for all systems more than 10 kWp capacity for PV and equivalent of 10 kW capacity for thermal systems. Real time monitoring may be specified by MNRE for large systems and online monitoring would be eventually extended to 1 kWp systems as well.

Life of systems and products will be specified from time to time and efforts will be made to ensure that no systems or products are discarded before fill life usage.

VIII. Guidelines for Channel Partners

The Channel Partners are an important implementing agency. It is essential to ensure that guidelines for selection, rating and appraisal of channel partners are transparent and simple. It shall also be ensured that there are no restrictions on the number of channel partners and all otherwise eligible agencies are empanelled subject to their rating and appraisal. In case of overcapacity of applications, the projects shall be allocated among channel partners in a transparent manner. MNRE shall issue detailed guidelines within 30 days from the date of approval for channel partners covering all these aspects.

Energy Corporation of India New Delhi

IX. Redundancy and interpretation

In case of a particular application being eligible for CFA under more than one of the sub-schemes outlined above, the same shall be considered for sanction under that sub-scheme which involves lesser minimum CFA.

In case of any ambiguity regarding interpretation of the guidelines, the decision of MNRE shall be final.

Solar Energy Corporation of India Ltd. New Delhi

No. 30/11/2012-13/NSM
Government of India
Ministry of New & Renewable Energy
Dated: 26th June, 2014

Annexure- 1

[A] BOUNDARY CONDITIONS FOR SUPPORT TO GRID Connected SOLAR PV APPLICATIONS

S.NO.	Category of beneficiaries	Size
1	All Categories including Individuals, Industrial/Commercial/ Non Commercial entities	1 kWp to 500 kWp

[B] Minimal Technical Requirements /Standards for SPV Systems / Plants to be deployed under the Programmes of Ministry of New and Renewable Energy

1. PV MODULES:

1.1 The PV modules must conform to the latest edition of any of the following IEC /equivalent BIS Standards for PV module design qualification and type approval: Crystalline Silicon Terrestrial PV Modules IEC 61215 / IS14286, Thin Film Terrestrial PV Modules IEC 61646 / Equivalent IS (Under Dev.), Concentrator PV Modules & Assemblies IEC 62108.

1.2 In addition, the modules must conform to IEC61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification or Equivalent IS (Under Dev.)

1.3 PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.

1.4 **IDENTIFICATION AND TRACEABILITY**

Each PV module must use a RF identification tag (RFID),which must contain the following information:

(i) Name of the manufacturer of PV Module
(ii) Name of the Manufacturer of Solar cells
(iii) Month and year of the manufacture (separately for solar cells and module)
(iv) Country of origin (separately for solar cells and module)
(v) I-V curve for the module
(vi) Peak Wattage, Im, Vm and FF for the module

Energy Corporation of India Ltd. New Delhi

(vii) Unique Serial No and Model No of the module
(viii)Date and year of obtaining IEC PV module qualification certificate
(Ix) Name of the test lab issuing IEC certificate
(x) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

Until March 2013, the RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions.

1.5 ***VALIDITY :***

The validity of the existing Certificates/Reports in the old format/procedure shall be valid till March 2013 only. Manufactures are advised to get their samples tested as per the new format/procedure before 31st March 2013, whose validity shall be for five years.

1.6 **AUTHORIZED TESTING LABORATORIES/ CENTERS**

PV modules must qualify (enclose test reports/ certificate from IEC/NABL accredited laboratory) as per relevant IEC standard. Additionally the performance of PV modules at STC conditions must be tested and approved by one of the IEC / NABL Accredited Testing Laboratories including Solar Energy Centre of MNRE. For small capacity PV modules upto 50 Wp capacity STC performance as above will be sufficient. However, qualification certificate from IEC/NABL accredited laboratory as per relevant standard for any of the higher wattage regular module should be accompanied with the STC report/ certificate.

1.6.1 Details of Test Labs shall be given separately.

(Any other Test Lab that has set – up for testing and wants to get included may contact Director, MNRE)

1.6.2 While applying for Testing, the Manufacturer has to give the following details:
- A copy of registration of the company particularly for the relevant product/ component/ PV system to be tested
- An adequate proof from the manufacturer, actually showing that they are manufacturing product by way production, testing and other facilities
- Certification as per JNNSM standards for other bought out items used in the system
Without above proof test centers are advised not to accept the samples.

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1.7 WARRANTY

PV modules used in solar power plants /systems must be warranted for their out put peak watt capacity, which should not be less than 90% at the end of 12years and 80% at the end of 25 years.

2. BALANCE OF SYSTEM (BOS) ITEMS/ COMPONENTS:

2.1 The BOS items /components of the SPV power plants /systems deployed under the Mission must conform to the latest edition of IEC/ e quivalent BIS Standards / MNRE specifications / as specified below:

BOS Item / System	Applicable BIS /Equivalent IEC Standard Or MNRE Specifications	
	Standard Description	Standard Number
Power Conditioners/ Inverters**including MPPT and Protections (more than 100 Wp and up to 20 KWp Capacity only) :	Efficiency Measurements Environmental Testing	IEC 61683 / IS 61683 IEC 60068-2 (1, 2, 14, 30) / Equivalent BIS Std.
Charge Controller/MPPT units	Environmental Testing	IEC 60068-2 (1,2,14,30) /Equivalent BIS Std.
Storage Batteries	General Requirements & Methods of Testing Tubular Lead Acid / VRLA / GEL Capacity Test Charge/Discharge Efficiency Self-Discharge	As per relevant BIS Std.

Energy Corporation of India New Delhi

Cables	General Test and Measuring Method PVC insulated cables for working voltage up to and including 1100 V and UV resistant for outdoor installation	IEC 60227 / IS 694 IEC 60502 / IS 1554 (Pt. I & II)
Switches/Circuit Breakers /Connectors	General Requirements Connectors –safety A.C./D.C.	IEC 60947 part I,II, III / IS 60947 Part I,II,III **EN 50521**
Junction Boxes /Enclosures for Inverters/Charge Controllers/Luminaries	General Requirements	IP 54(for outdoor)/ IP 21(for Indoor) as per IEC 529
Meters	As per CEA Guidelines issued from time to time	
Grid Connectivity	As prevalent in the State	

**In case if the Charge controller is in-built in the inverter, no separate IEC 62093 test is required and must additionally conform to the relevant national/international Electrical Safety Standards wherever applicable

2.2 AUTHORIZED TESTING LABORATORIES/ CENTERS

Test certificates / reports for the BoS items/components can be from any of the NABL/ IEC Accredited Testing Laboratories or MNRE approved test centers. The list of MNRE approved test centers will be reviewed and updated from time to time.

2.3 WARRANTY

The mechanical structures, electrical works including power conditioners/inverters/charge controllers/maximum power point tracker units/distribution boards/digital meters/switch gear/storage batteries, etc. and over all workmanship of the SPV power plants/ systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 5 years.

Solar Energy Corporation of India Ltd. New Delhi

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ANNEXURE-5

ANNEXURE-5

No. 5/34/2013-14/RT
Government of India
Ministry of New and Renewable Energy
(Solar Energy Group)
****

Block 14, CGO Complex,
Lodhi Road, New Delhi
Dated: 19th November, 2015

NOTIFICATION

Subject: Installation of Grid Connected Solar Rooftop Power Plants – Central Financial Assistance (CFA) of MNRE - regarding.

The Ministry is implementing a 'Grid Connected Rooftop and Small Solar Power Plants Programme' (vide no. 30/11/2012-13/NSM dated 26th June, 2014) in which the solar rooftop plants from 1.0 kWp to 500 kWp capacities are set up. The Ministry has set a target for installation of 100 GW solar power of which 40 GW is to come from grid connected solar rooftop plants.

2. A CFA of the 15% of the benchmark cost was announced vide notification no. 5/34/2013-14/RT dated 03.08.2015 for various categories i.e. residential, institutional, Government and social sector. Now, CFA pattern on the grid connected solar rooftop systems is proposed to be retained as per existing ongoing scheme under implementation vide no 30/11/2012-13/NSM dated 26th June 2014 with following modifications:

(i) No CFA will be provided for commercial and industrial establishments in the private sector as they are eligible for other benefits such as accelerated depreciation, custom duty concessions, excise duty exemptions and tax holiday. Industrial and commercial electricity tariff for them is usually high and hence these sectors do not need any Government CFA to make solar attractive. Further, whenever they go to the State Regulators for project specific tariff, the tariff depends on whether CFA is availed or not, and the tariff is decided accordingly. Hence, CFA will give no net benefit to the commercial and industrial establishments in the private sector.

(ii) For all other sectors, the CFA pattern will remain same that is, 30% of benchmark cost for general category States/UTs and 70% of benchmark cost for special category States i.e., North Eastern States including Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir and Lakshadweep, Andaman & Nicobar Islands.

3. The Domestic Content Requirement (for modules made in India) will be applicable only for those installations where CFA will be provided. No Domestic Content Requirement will be applicable to the commercial and industrial establishments in the private sector where CFA is not applicable.

4. The following benefits are also available for installation of Grid Connected Rooftop and Small Solar Power Plants in the country besides, CFA of MNRE:

- Accelerated depreciation benefits for industrial and commercial buildings
- Custom Duty Concessions and Excise Duty Exemptions
- 10 years tax holiday
- Provision of bank loans as a part of home loan/ home improvement loan

Energy Corporation of India New Delhi

- Loans for system aggregators from Indian Renewable Energy Development Agency at concessional interest rate (9.9% to 10.75%)
- Loans available upto Rs. 15 crore for renewable energy projects and upto Rs. 10 lakhs for individual loans under Priority Sector Lending.

5. The CFA will be provided through State Nodal Agencies, State Departments, Solar Energy Corporation of India (SECI), Indian Renewable Energy Development Agency (IREDA), Empanelled Government Agencies/DISCOMs, PSUs of Central and State Government etc. and participating Banks.

6. This will supersede the earlier issued Notification No. 5/34/2013-14/RT dated 03.08.2015.

[Dr. Arun K Tripathi]
Sr. Director
Telefax: 011-24363035

To:

1. All Central Ministries and Departments
2. Department of Public Enterprises (DPE), Block 14, CGO Complex, New Delhi
3. Principal Director of Audit, Scientific Audit-II, DGACR Building, I.P. Estate, Delhi
4. Principal Secretaries/Secretaries (Energy Departments) all States /UTs
5. All State/UT Nodal Agencies (by name)
6. All Municipal Commissioners
7. CMD, IREDA, 1st floor, East Court, Indian Habitat Centre , Lodhi Road, New Delhi
8. Director General, Bureau of Indian Standards, Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi
9. D.G., National Institute of Solar Energy, Gwal Pahari, Gurgaon, Haryana
10. MD, Solar Energy Corporation of India, D-3, A Wing,1st Floor, Religare Building, District Centre , Saket, New Delhi-110017
11. National Housing Bank and all nationalized Banks
12. To be published on website of MNRE, SECI, IREDA, NISE and all SNAs.

Copy to:

1. PS to Hon'ble Minister of State for Power, Coal & New and Renewable Energy, Shram Shakti Bhawan, New Delhi
2. PSO to Secretary, MNRE
3. PS to AS&FA, MNRE
4. JS(AS)/JS(TK)
5. All Advisers & Group Heads
6. All Under Secretaries in MNRE
7. Director (NIC) to upload this on the Ministry's website
8. CA , MNRE/Cash Section
9. Hindi section for Hindi version
10. Sanction folder

Energy Corporation of India Limited New Delhi

(Dr. Arun K Tripathi)
Sr. Director

ANNEXURE-6

Assumpion for Solar PV Power Projects Parameters					For A&N	
S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Asumptions	JERC Assumptions as on 15/05/2015
1	Power Generation					
		Capacity				
			Installed Power Generation Capacity	MW	1	1
			Capacity Utilization Factor	%	15.0%	18.0%
			Deration factor	%	0.00%	0.00%
			Auxiliary Consumption	%	0.00%	0.00%
			Useful Life	Years	25	25
2	Project Cost					
		Project cost		Rs Lacs/MW	834.9	910
		VGF/Subsidy		Rs Lacs/MW	584.43	0
		Capital Cost/MW	Power Plant Cost	Rs Lacs/MW	250.47	910
3	Financial Assumptions					
			Tariff Period	Years	25	25
		Debt: Equity				
			Debt	%	0%	70%
			Equity	%	100%	30%
			Total Debt Amount	Rs Lacs	0.00	637.00
			Total Equity Amout	Rs Lacs	250.47	273.00
		Debt Component				
			Loan Amount	Rs Lacs	0.00	637.00
			Moratorium Period	years	0	0
			Repayment Period(incld Moratorium)	years	12	12
			Interest Rate	%	12.71%	12.71%
		Equity Component				
			Equity amount	Rs Lacs	250.47	273.00
			Return on Equity for first 10 years	% p.a	20.00%	20.00%
			RoE Period	Year	10	10
			Return on Equity 11th year onwards	% p.a	24.00%	24.00%
			Weighted average of ROE		22.40%	22.40%
			Discount Rate		15.69%	10.67%
4	Financial Assumptions					
		Economic Assumptions				
		Fiscal Assumptions				
			Income Tax	%	34.610%	33.990%
			MAT Rate (for first 10 years)	%	20.960%	20.960%
			80 IA benefits	Yes/No	NA	Yes
		Depreciation				
			Depreciation Rate for first 12 years	%	5.83%	5.83%
			Depreciation Rate 13th year onwards	%	1.54%	1.54%
			Years for 5.83% rate		12	12
5	Working Capital					
		For Fixed Charges				
		O&M Charges		Months	1	1
		Maintenance Spare	(% of O&M expenses)	%	15%	15%
		Receivables for Debtors		Months	2	2
		For Variable Charges				
		Interest On Working Capital		%	13.21%	13.21%
6	Operation & Maintenance					
		power plant		Rs. Lacs	13.00	13.00
		Total O & M Expenses Escalation		%	5.72%	5.72%

levelised tariff (Rs/kWh)
6.58

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P.T.O

ation of Tariff for Solar PV

Factor			1	0.864	0.747	0.646	0.558	0.482	0.417	0.360	0.312	0.269	0.233	0.201	0.174	0.150	0.130	0.112	0.097	0.084	0.073	0.063	0.054	0.047	0.040	0.035	0.030
neration	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
eration	MU		1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
enses	Rs Lakh		13.00	13.74	14.53	15.36	16.24	17.17	18.15	19.19	20.29	21.45	22.67	23.97	25.34	26.79	28.32	29.94	31.66	33.47	35.38	37.40	39.54	41.81	44.20	46.73	49.40
on	Rs Lakh		14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	14.60	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86	3.86
term loan	Rs Lakh		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
working Capit	Rs Lakh		2.16	2.20	2.24	2.29	2.33	2.38	2.44	2.49	2.55	2.62	2.91	2.98	2.81	2.89	2.97	3.06	3.15	3.25	3.35	3.46	3.58	3.70	3.83	3.96	4.11
Equity	Rs Lakh		50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09	50.09	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11	60.11
d Cost	Rs Lakh		79.86	80.64	81.47	82.34	83.27	84.25	85.28	86.38	87.54	88.76	100.30	101.66	92.12	93.65	95.27	96.98	98.78	100.69	102.71	104.84	107.10	109.48	112.00	114.66	117.48
COG																											
Cost of Generat	Unit	Levellised	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Rs/kWh	1.43	0.99	1.05	1.11	1.17	1.24	1.31	1.38	1.46	1.54	1.63	1.73	1.82	1.93	2.04	2.16	2.28	2.41	2.55	2.69	2.85	3.01	3.18	3.36	3.56	3.76
on	Rs/kWh	0.99	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
n loan	Rs/kWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
rking capital	Rs/kWh	0.29	0.16	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.20	0.22	0.23	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31
	Rs/kWh	3.97	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.81	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57
	Rs/kWh		6.38	6.14	6.20	6.27	6.31	6.41	6.49	6.57	6.66	6.75	7.63	7.74	7.01	7.13	7.25	7.38	7.52	7.66	7.82	7.98	8.15	8.33	8.52	8.73	8.94
Factor			1	0.864	0.747	0.646	0.558	0.482	0.417	0.360	0.312	0.269	0.233	0.201	0.174	0.150	0.130	0.112	0.097	0.084	0.073	0.063	0.054	0.047	0.040	0.035	0.030

6.58

Tariff	6.581	Rs/Unit

Solar Energy Corporation of India Ltd. New Delhi

ANNEXURE-6

PAGE-80