

No. 32/2/2014-15/GSP

भारत सरकार/ Government of India

नवीन और नवीकरणीय ऊर्जा मंत्रालय / Ministry of New & Renewable Energy  
(Solar Power Division)

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Block no. 14, CGO Complex,  
New Delhi-110 001

Dated: 04<sup>th</sup> August, 2015

To:

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

**Sub: Approval for Implementation of Scheme for setting up of 2000 MW of Grid-connected Solar PV Power projects under Batch-III of Phase-II of Jawaharlal Nehru National Solar Mission with Viability Gap Funding support from National Clean Energy Fund.**

Sir,

I am directed to convey the approval of the Government of India for Implementation of 'Scheme for setting up of 2000 MW of Grid-connected Solar PV Power projects under Batch-III of Phase-II of Jawaharlal Nehru National Solar Mission with Viability Gap Funding support from National Clean Energy Fund' through the Solar Energy Corporation of India (SECI) as per the details given below.

2 The salient provisions of the Scheme are as under:

- i. The scheme will be implemented by Solar Energy Corporation of India (SECI), New Delhi
- ii. *Viability Gap Funding* (VGF) support will be provided for setting up of Grid-connected Solar PV power projects of at least 2000 MW capacity by Solar Power Developers on Build-Own-Operate basis.
- iii. The power generated from the projects shall be purchased by SECI at a fixed levelised tariff of Rs.5.43/kWh for 25 years and shall be sold by SECI to willing State Utilities/ Discoms/ Other Bulk Consumers, at a fixed tariff of Rs.5.50/kWh for 25 years.
- iv. The projects would be selected through a process of open competitive reverse bidding on Viability Gap Fund (VGF) required by the Bidders to enable them to supply the solar power to SECI at the above mentioned levelized tariff for 25 years.
- v. The Bids will be invited in two separate categories: - (i) 250 MW with stipulation of Domestic Content Requirement (DCR) in respect of Solar PV Cells and Modules to be used in the projects and (ii) 1750 MW without any DCR restriction.
- vi. The Solar PV Projects shall be installed and commissioned within 13 months from the date of signing of their Power Purchase Agreements (PPAs) subject to provisions of the PPAs and guidelines of the scheme.

Contd. /2....

vii. The scheme will be implemented strictly within the framework of 'Detailed Guidelines' that are being issued by this Ministry.

3. The funds for provision of the VGF support, which are estimated at Rs.2100/- crore (@ Rs.1.0 Crore/MW for open category and Rs. 1.31 Crore/MW for projects in DCR category) and will get firmed up after opening of Bids to be invited by SECI, will be made available to MNRE from the National Clean Energy Fund (NCEF) operated by Ministry of Finance (Department of Expenditure) and will be disbursed to SECI based on physical and financial progress of the projects.

4. This issues with the approval of Competent Authority.

  
(B L Ram)

Director (Solar Power)

Tele Fax : 011-24368894

Encl:- One Set of Guideline of 2000 MW VGF Scheme (23 Pages).

**Copy to :**

1. The Secretary, Department of Expenditure, Ministry of Finance, North Block, New Delhi
2. The Secretary, Ministry of Power, Shram Shakti Bhawan, New Delhi
3. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi - 110 001
4. The Secretary, Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhavan, Jor Bagh Road, New Delhi - 110 003
5. The Secretary, Ministry of Petroleum and Natural Gas, Shastri Bhawan, New Delhi-110001
6. The Secretary, NITI Ayog, Yojana Bhawan, New Delhi
7. The Principal Scientific Adviser to the Govt of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi – 110011
8. The Chairman, Solar Energy Corporation of India
9. The Chairman, Central Electricity Regulatory Commission, Chandralok Bhawan, New Delhi
10. The Chairperson, Central Electricity Authority, Sewa Bhawan, New Delhi
11. The Chairman and Managing Director, NTPC
12. The Director (A), Prime Minister's office, South Block, New Delhi
13. The Director (Cabinet), Cabinet Secretariat – w.r.t. letter No.CCEA/17/2015(i) dt.15/06/2015
14. The Chairman, State Utilities concerned

**Internal distribution**

1. PS to Hon'ble Minister, NRE
2. PSO to Secretary, MNRE
3. JS&FA/JS(TK)/EA
4. All Officers of MNRE
5. The Director (NIC) – for uploading this on MNRE website

**JAWAHARLAL NEHRU NATIONAL SOLAR MISSION  
(JNNSM)**

**Phase-II**

**Guidelines for Implementation of Scheme for  
Setting up of 2000 MW Grid-connected Solar PV Power  
Projects under Batch-III**

**“State Specific VGF Scheme”**

**Government of India  
Ministry of New and Renewable Energy  
August 2015**

## **SECTION-I: BACKGROUND AND INTRODUCTION**

### **1.1. Preamble**

The Jawaharlal Nehru National Solar Mission (JNNSM) is a major initiative of the Government of India to promote ecologically sustainable growth while addressing India's energy security challenge with active participation from the States. It will also constitute a major contribution by India to the global effort to meet the challenges of climate change. The objective of the Mission is to establish India as a global leader in solar energy, by creating the policy conditions for its large scale diffusion across the country as quickly as possible. The Mission had set a target, amongst others, for deployment of grid connected solar power capacity of 20,000 MW by 2022 to be achieved in 3 phases (1000 MW in first phase up to 2012-13, 9000 MW in second phase from 2013 to 2017 and 10000 MW in the third phase from 2017 to 2022). Currently, the Government of India is considering to substantially scale up targets of solar capacity additions in the country to 100 GW by 2022.

The Government support has been provided in two modes for development of grid solar power in the country viz. mechanism of "bundling" of solar power with relatively inexpensive thermal power from the unallocated quota of the Government of India and mechanism of providing Viability Gap Funding to make available solar power at reduced price. The latter mode has been successfully implemented by Solar Energy Corporation of India (SECI) for 750 MW scheme of MNRE which is the first scheme under Phase II of the Mission.

### **1.2. Status and achievement against 1000 MW Capacity Grid-Connected Solar Power Projects under Phase-I implemented through NVVN**

JNNSM envisaged equal share of solar power through photovoltaic and solar thermal routes. Against a target of 1000 MW, a total of 970 MW capacity, besides 84 MW capacity under Migration Scheme, was allocated in two batches through a process of tariff based reverse bidding. This phase witnessed substantial reduction in solar tariff and has set a huge stage for scale up plans in the country. Specifically, tariffs during Batch-I (2010-11) for SPV projects ranged between Rs. 10.95 and Rs. 12.76 per unit, with average of Rs. 12.12 per unit and between Rs. 10.49 and Rs. 12.24 per unit, with average tariff being Rs. 11.48 per unit for Solar Thermal Projects. During Batch-II (2011-12), the tariff for Solar PV Projects ranged between Rs. 7.49 and Rs. 9.44 per unit, with an average of Rs. 8.77 per unit. The Solar Power from these plants is being sold to Distribution Utilities/ Discoms after bundling with power from the unallocated quota of power from Coal Based Stations. Installation of solar PV projects have been meeting the timelines of the schemes, however, solar thermal power projects have shown delays in construction and some of these are still to be completed. A total capacity of 718 MW has been commissioned so far under Phase-1.



### **1.3 Status of 750 MW Capacity Grid-Connected Solar Power Projects under Phase-II Batch-I implemented through SECI**

Solar Energy Corporation of India (SECI) was designated the nodal agency by MNRE for implementation of the first scheme of setting up of 750 MW of Grid Connected Solar PV Projects with VGF support from National Clean Energy Fund (NCEF). It entails purchase of power from developers at a fixed tariff of Rs. 5.45/unit (Rs. 4.75/unit in case benefit of Accelerated Depreciation is availed) and payment of VGF to the developers as per their bids, limited to a maximum of Rs. 2.5 crore/MW. Bids for the VGF sought (reverse bidding on the VGF) were invited by SECI in October, 2013 in two Categories: 375 MW Capacity under DCR (Domestic Content Requirement) and 375 MW Capacity under Open Category. Power Purchase Agreements (PPAs) with the successful bidders/ developers have since been signed in March 2014. The Projects have a Schedule of Commissioning within 13 Months from the Date of Signing of PPA i.e. up to April 2015.

### **1.4 Approach of Viability Gap Funding in Phase-II Batch-III of JNNSM**

SECI is designated as the nodal agency for implementation of MNRE schemes for developing grid connected solar power capacity through VGF mode in the country. Under the Batch-III of Phase-II JNNSM, it is envisaged to add further a total solar PV capacity of 2000 MW.

### **1.5 Scope and Objectives of the Guidelines**

1.5.1 The Scope of these Guidelines is to provide the necessary policy framework and mechanism for selection and implementation of 2000 MW Grid-connected solar PV power projects with Viability Gap Funding under Phase-II, Batch-III of JNNSM. These guidelines are independent and will have no bearing on the projects already selected under earlier schemes of NSM Phase-I & Phase-II.

1.5.2 One of the main thrusts of this batch is to further encourage competitiveness through scaling up of project sizes and introduction of efficient and transparent e-bidding and e-auctioning processes. The main objectives of the Scheme are:

- i) Scaling up of sizes of projects thereby leading to economies of scale.
- ii) Facilitating speedier implementation of the solar power projects through adoption of mechanism of solar parks to meet the Phase-II target of JNNSM.
- iii) To supplement Grid power and spread out solar power projects throughout the country thereby reducing transmission cost and losses.
- iv) Provide long-term visibility and road map for solar power development enabling creation of India as manufacturing hub in the Solar PV.
- v) To create good business model and systems for various State Governments and DISCOMs to take forward.
- vi) To facilitate energy security and fulfilment of RPO requirement of the obligated entities.

## **1.6 Phase-II, Batch-III: State Specific VGF Scheme**

The Solar Projects of 2000 MW Capacity under the State Specific VGF Scheme will be set up in the Solar Parks of various states, to be developed through coordinated efforts of Central and State Agencies. As implementation of solar parks have begun recently, it could be possible that Solar Parks in some of the States do not become available soon. For such States, Solar Projects would be allowed to be located outside solar parks with land being provided either by the State Government, or arranged by the Solar Power Developers (SPDs).

These Guidelines shall form the basis for selection of Grid Connected Solar PV projects under this scheme. Out of total capacity of 2000 MW, a capacity of 250 MW will be earmarked for bidding with Domestic Content Requirement (DCR).

MNRE shall specify the total State-wise Capacity of the Projects (both "Open Category" and "DCR Category") based on commitments from the State for off take of not less than 90% of the Capacity to be invited by SECI before issue of Request for Selection (RfS). SECI shall tie up for the remaining capacity with the other Buying Entities for which the Host State shall facilitate Inter-State transfer of power.

## **1.7 Mechanism of Viability Gap Funding (VGF) in the Scheme**

This scheme envisages providing Viability Gap Funding through SECI to the bidders selected through a transparent bidding process to procure solar power at a pre-determined fixed tariff. The salient feature of the overall mechanism would be as follows:

- a) The tariff payable to the Project developer is fixed at Rs. 5.43/ kWh for the initial year and then escalated annually by Rs. 0.05/ kWh for next 20 years, resulting in the maximum allowable tariff of Rs 6.43 / kWh at the end of 21<sup>st</sup> year. The tariff would thereafter, remain fixed at Rs. 6.43/kWh. The levelized tariff for the term of the Power Purchase Agreement thus becomes Rs. 5.79/kWh. The bidders will be free to avail fiscal incentives like Accelerated Depreciation, Concessional Customs and Excise Duties, Tax Holidays, etc. as available for such projects. The same will not have any bearing on comparison of bids for selection. As equal opportunity is being provided to all bidders at the time of tendering itself, it is up to the bidders to avail various tax and other benefits. However no developer will be allowed to claim both VGF and AD benefit. Therefor only those developers who bid zero or negative VGF can claim AD benefit. No claim shall arise on SECI for any liability if bidders are not able to avail fiscal incentives and this will not have any bearing on the applicable tariff.
- b) The Project developer will be provided a viability gap funding based on his bid. The upper limit for VGF is kept at Rs.1.0 Crore/MW for open category (Rs. 1.31 Crore/MW for projects in DCR category).
- c) The selected Project developer has to demonstrate/infuse capital in the form of Equity for an amount of at least Rs. 1.2 Crore/MW. The remaining amount can be raised as loan by the developer.

- d) The VGF when paid by the SECI may be used to return part of the loan or developer contribution (in excess of Rs. 1.2 Crore/MW) or a combination thereof as the case may be, in case investments have already been made. SECI will issue a letter confirming sanction/ grant of VGF at the time of signing of Power Purchase Agreement (PPA), so that the Project developer is able to achieve financial closure for full amount, if required.
- e) The VGF will be released in six tranches. 50% on successful commissioning of the full capacity of the project (COD) and the balance 50% progressively over next 5 years subject to the project meeting generation requirements (CUF within specified range as per Clause 3.15.1), as under:
- End of 1st Year from COD – 10%
  - End of 2nd Year from COD – 10%
  - End of 3rd Year from COD – 10%
  - End of 4th Year from COD – 10%
  - End of 5th Year from COD – 10%
- f) If the project fails to generate any power continuously for any 1 year within 25 years or its major assets (components) are sold or the project is dismantled during this tenure, SECI will have a right to refund of VGF on pro-rata basis and if not paid by the developer then a claim on assets equal to the value of VGF released, on pro-rata basis as specified hereunder:

<b>Year of default (From COD)</b>	<b>SECI's right to refund of VGF/ claim on assets (% of VGF paid)</b>
Up to 5 years	100%
5-6 years	90%
6-7 years	80%
7-8 years	70%
8-9 years	60%
9-10 years	50%
10-11 years	40%
11-12 years	30%
12-13 years	25%
13-14 years	23%
14-15 years	21%
15-16 years	19%
16-17 years	17%
17-18 years	15%
18-19 years	13%
19-20 years	11%
20-21 years	9%
21-22 years	7%
22-23 years	5%
23-24 years	3%
24-25 years	1%

- g) If the project is transferred or sold to a third party during its tenure (after initial lock-in period of 1 year), SECI will retain full rights to operationalize the PPA with the third party, which will be under full obligation to honour all the obligations and terms & conditions of the PPA.
- h) Solar Power Developers (SPDs) and SECI shall enter into suitable VGF Securitization Agreement creating a charge over the Project assets in favour of SECI along with signing of PPA. SECI shall have a second charge over the Project assets in case of Projects being financed by lending institutions. In all other cases, SECI shall have the first charge over the Project assets to the extent of 110% of the VGF amount.
- i) In case the lending institution exercises its right to step in or take over the project, SECI will also have right to step in along with the lending institution to reclaim VGF in accordance with sub-clause (f) above or handover the project to another party for operation.
- j) The VGF bidding may also be negative. In that case, the developers will pay to SECI the agreed negative VGF in the instalments in the same pattern as designed in (e), which will go into the Payment Security Fund or there may be a provision for quoting a discount on tariff. SECI may specify one of the two options in each RFS. In case of discount on tariff option, the bidders who bids / wants to bid negative VGF will bid zero VGF and indicate discount in paisa on tariff which will be applied on tariff for all the years.

## **1.8 Total Capacity and Portfolio of Solar PV Technology Projects**

- 1.8.1 The total aggregated capacity of the grid connected solar power projects to be set up by Solar Power Developers on Build-Own-Operate (BOO) basis under Viability Gap Funding scheme in Phase-II, Batch-III of JNNSM shall be at least 2000 MW. The projects to be selected under this scheme provide for deployment of Solar PV Technology. The capacity may go higher than 2000 MW, if there is a saving in VGF amount, due to competitive bidding, so that maximum capacity can be set up within Rs. 2100 Crore budget. However, the selection of projects would be technology agnostic and crystalline silicon or thin film or CPV, with or without trackers can be installed.
- 1.8.2 Already commissioned projects cannot be considered under this scheme. Projects under construction or projects which are not yet commissioned will, however, be considered, in case these projects are not already accepted under any other Central or State Schemes. Enhancement and augmentation of existing Projects irrespective of their capacities will not be considered as eligible Project under this scheme.

## **1.9 Implementation Agency**

- 1.9.1 Solar Energy Corporation of India (SECI) will be the nodal agency for implementation of this Scheme. A fund handling charge @1% of the total VGF disbursed shall be payable to SECI out of the sanctioned VGF. SECI will develop a suitable monitoring mechanism, conduct review meetings, conduct studies to analyse the performance of the projects, carry out random checks to verify compliance of quality standards and additionally the compliance of DCR for DCR Category. No separate funding shall be provided by MNRE to SECI for these activities.



## SECTION-II: DEFINITIONS

**“Affiliate”** shall mean a Company that, directly or indirectly,

- i. controls, or
- ii. is controlled by, or
- iii. is under common control with, a Company developing a Project or a Member in a Consortium developing the Project and control means ownership by one company of at least 26% (twenty six percent) of the voting rights of the other company.

**“Bidder”** shall mean Bidding Company or a Bidding Consortium submitting the Bid. Any reference to the Bidder includes Bidding Company / Bidding Consortium/ Consortium, Member of a Bidding Consortium including its successors, executors and permitted assigns and Lead Member of the Bidding Consortium jointly and severally, as the context may require.

**“Bidding Consortium” of “Consortium”** shall refer to a group of Companies that has collectively Submitted the response in accordance with the provisions of these guidelines.

**“Company”** shall mean a body corporate incorporated in India under the Companies Act, 1956 or the Companies Act, 2013 as applicable.

**“Contracted Capacity”** shall mean the same as “Project Capacity”.

**“Control”** shall mean holding more than 51% of the paid-up share capital.

**“Equity” shall have the same meaning as given to Net worth in para 3.8 A which is as under:-**

**Equity**

= Paid up share capital

Add: Free Reserves

Subtract: Revaluation Reserves

Subtract: Intangible Assets

Subtract: Miscellaneous Expenditures to the extent not written off and carry forward losses

Paid-up Share Capital will include:

- Paid-up equity share capital;
- Fully, compulsorily and mandatorily convertible Preference shares and
- Fully, compulsorily and mandatorily convertible Debentures.

Share premium will form an integral part of Net worth provided it is realized in cash or cash equivalent. However, this condition will not apply in case of listed Companies.

**“Financial Closure or Project Financing Arrangements”** means arrangement of necessary funds by the Project Developer either by way of commitment of funds by the company from its internal resources and/or tie up of funds through a bank / financial institution by way of sanction of a loan or letter agreeing to finance.

**“Group Company”** of a Company means (i) a Company which, directly or indirectly, holds 10% (ten percent) or more of the share capital of the company or (ii) a company in which the company, directly or indirectly, holds 10% (ten percent) or more of the share capital of such company or (iii) a company in which the company, directly or indirectly, has the power to direct or cause to be directed the management and policies of such company whether through the ownership of securities or agreement or any other arrangement or otherwise or (iv) a company which, directly or indirectly, has the power to direct or cause to be directed the management and policies of the Company whether through the ownership of securities or agreement or any other arrangement or otherwise or (v) a company which is under common control with the company, and control means ownership by one company of at least 10% (ten percent) of the share capital of the other company or power to direct or cause to be directed the management and policies of such company whether through the ownership of securities or agreement or any other arrangement or otherwise.

Provided that a financial institution, scheduled bank, foreign institutional investor, non-banking financial company, and any mutual fund shall not be deemed to be Group Company, and its shareholding and the power to direct or cause to be directed the management and policies of a company shall not be considered for the purposes of this definition unless it is the Project Company or a Member of the Consortium developing the Project.

**“Host State”** shall mean the State in which the Solar Power Projects under the State Specific VGF Scheme are to be set – up.

**“Inter-connection/Delivery/Metering point”** shall mean the point at 33kV or above where the power from the solar power project is injected into the Pooling Substation at the Solar Park or CTU/STU transmission system as applicable (including the dedicated transmission line connecting the power project with the Pooling substation or CTU/STU system). Metering shall be done at this interconnection point where the power is injected into the Pooling Substation at the Solar Park or the CTU/ STU system i.e. the Delivery point. For interconnection with grid and metering, the developers shall abide by the relevant CERC Regulations, Grid Code, and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended and revised from time to time.

**“Joint Control”** shall refer to a situation where control is equally distributed among the interested parties.

**“Lead Member of the Bidding Consortium” or “Lead Member”:** There shall be only one Lead Member, having shareholding more than 51% in the Bidding Consortium, which cannot be changed till 1 year from the Commercial Operation Date (COD) of the Project.

**“Paid-up share capital”** means such aggregate amount of money credited as paid-up as is equivalent to the amount received as paid up in respect of shares issued and also includes any amount credited as paid up in respect of shares of the company, but does

not include any other amount received in respect of such shares, by whatever name called;

Paid-up share capital includes:

- Paid-up equity share capital;
- Fully, compulsorily and mandatorily convertible Preference shares and
- Fully, compulsorily and mandatorily convertible Debentures.

**“Parent”** shall mean a company, which holds at least more than 51% equity either directly or indirectly in the Project Company or a Member in a Consortium developing the Project.

**“Pooling Substation/Pooling Point”** shall mean a point where more than one solar PV project may connect to a common transmission system. (i) For projects located in the Solar Parks, the pooling point voltage and metering arrangement shall be as prescribed by the SPIA. (ii) For projects located outside the Solar Park, multiple projects can be connected to a pooling substation from where, common transmission system shall be constructed and maintained by the developer, to get connected to the STU/CTU substation. The voltage level for such common line shall be 33 kV and above. Further, the metering of the pooled power shall be done at the injection point, i.e. the STU/CTU substation. However, the voltage level of transmission system of individual projects up to the pooling substation can also be done at 11 kV and sub-meters shall be installed at the pooling substation for metering of individual projects. The losses in the common transmission system up to the injection point shall be apportioned to the individual projects for the purpose of billing.

**“Project”** is defined by separate points of injection into the grid at interconnection/ metering point at Pooling substation of the Solar Park or STU/CTU substation as the case may be, or in case of sharing of transmission lines, by separate injection at pooling point. Each project must also have a separate boundary, control systems and metering.

**“Project Capacity”** shall mean the maximum AC capacity at the delivery point on which the Power Purchase Agreement and VGF Securitization Agreement shall be signed.

**“Project Commissioning”:** the Project will be considered as commissioned if all equipment as per rated project capacity has been installed and energy has flown into grid, in line with the Commissioning procedures defined in the Guidelines/PPA.

**“Project Developer” or “Developer” or “Solar Power Developer (SPD)”** shall mean the Bidding Company or a Bidding Consortium participating in the bid and having been selected and allocated a project capacity by SECI through a competitive bidding process.

**“SECI”** shall mean Solar Energy Corporation of India.

**“Solar PV Project”** means the Solar Photo-voltaic power project that uses sunlight for direct conversion into electricity through Photo-voltaic technology.

**“Solar Park”** shall mean concentrated zone of development of solar power generation projects and provides an area that is well characterized, with proper infrastructure and

access to amenities. Solar Park will also facilitate developers by reducing the number of required approvals. Solar parks are envisaged to be developed in the following 4 modes:

- Mode 1: The State designated nodal agency undertakes the development & management of the solar park. This agency could be a State Government Public Sector Undertaking (PSU) or a Special Purpose Vehicle (SPV) of the State Government.
- Mode 2: A Joint Venture Company (JVC) is set up between State designated nodal agency and SECI for the development & management of solar park with 50% equity from SECI and 50% equity from the State Government Agency (State Government may also allow more than one agency provided total equity from State Government remains 50%).
- Mode 3: The State designates SECI as the nodal agency and SECI undertakes the development and management of solar park on behalf of State Government on mutually agreed terms.
- Mode 4: Private entrepreneurs promote solar parks without any equity participation from SECI, but may have equity participation from the State Government or its agencies.

**“Solar Park Implementing Agency” or “SPIA”** shall mean the Agencies, which will be involved in overall implementation of the Solar Park in a State. The Agencies could be SECI, State Governments and their Agencies or private sector companies as defined in MNRE scheme for Development of Solar Parks and Ultra Mega Solar Power Projects in the country.

**“STU” or “State Transmission Utility”** shall mean the Board or the Government Company notified by the respective State Government under Sub-Section I of Section 39 of the Electricity Act, 2003.

**“Trading Margin”** shall mean the margin as fixed by MNRE under this scheme on sale of solar power to State Utilities/Discoms/other Bulk Consumers.

**“Ultimate Parent”** shall mean a company, which owns not less than fifty percent (50%) equity either directly or indirectly in the Parent and Affiliates.

## **SECTION-III: GUIDELINES FOR SELECTION AND IMPLEMENTATION OF SOLAR PV PROJECTS**

### **3.1. JNNSM Phase-II Batch-III State Specific VGF Scheme for 2000 MW Solar PV Projects**

The proposed 2000 MW Solar PV Projects to be selected under Batch-III of JNNSM Phase-II, will be implemented by SECI in Solar Parks to be developed through association of Central and State Agencies / Land provided by State Governments or Land identified and arranged by Solar Power Developers in the respective States.

MNRE is facilitating development of 25 Solar Parks to accelerate the Solar Capacity Addition in various States. The bidder will approach the Solar Park Implementation Agency (SPIA) for allotment of land and connectivity. The SPIA shall provide the details of land and the timelines for availability, allotment, possession and connectivity for the projects before submission of bids. The SPIA will also provide the Cost of Land, Annual Charges, and Connectivity Charges etc. which the bidder would take into consideration in their bid.

There could be three (3) situations for locating the projects in a state, which would require different approaches of implementation, defined in the subsequent paras at appropriate places:

- A. Entire tendered quantity can be located in the Solar Park(s) in the State;
- B. Part of tendered quantity can be located in Solar Park and part outside Solar Park; and
- C. Entire tendered quantity can be located outside the Solar Park.

### **3.2. Mechanism of Operation**

The 2000 MW Solar PV Capacity will be set up based on the VGF model. The mechanism of operation of this model shall be as enumerated below:

- a) MNRE will fix the Lot size for each state out of the 2000 MW capacity and define the quantum of "DCR" in each Lot. Thereafter, SECI will issue Request for Selection (RfS) in one or more than one Lot as per the preparedness in the Solar Park in that State and acceptance of the State/Discom to buy the power.
- b) There will not be any project having a capacity below 10 MW under this scheme. SECI will divide the entire quantity in a state into projects of uniform size as far as possible. SECI may also divide the bid lot into different sized projects in order to match plot sizes in the solar park or to provide fair participation.
- c) The bidding will be State specific and conducted through an 'e-bidding along with e-auction' process and the interested bidders shall be required to register themselves on a web-based portal identified by SECI for e-bidding/e-auction.
- d) The bidding will be based on VGF in the form of INR/MW being sought by the bidders for each project. The bidders will submit bids quoting a VGF (INR/MW) for each project in line with Clause 1.7 (b) above. The bidders will then be committing to sell power from their plants to SECI at the tariff, according to Clause 1.7 (a) above, over the 25 year period.

- e) The selection of bids will be done based on the VGF quoted by the bidders for each project. Selection will be based on lowest quoted VGF for each project.
- f) SECI will purchase the Solar Power generated from the selected Solar PV plants at the pre-determined tariff and sell the power to willing State Utilities under 25 years Power Sale Agreements (PSAs), at the applicable tariff determined after including a Trading Margin of Rs. 0.07 per kWh.

### **3.3. Capacity of each Project**

The Capacity of the Project in MW is the maximum Power Output (AC) from the Solar Power Project, which can be scheduled at the point of Injection to the grid during any time block of the day. As mentioned above, there will not be any project having a capacity below 10 MW under this scheme. The state-wise allocation of the capacity (along with DCR component) and the maximum capacity allocation for a single Bidder may be fixed by SECI in accordance with land availability, expected competition, States' views, etc.

### **3.4. Request for Selection (RfS) for Short-listing of Projects**

Solar Energy Corporation of India (SECI) shall invite bidders to participate in the global bidding process against the Request for Selection (RfS) for development of Solar Photovoltaic Power Projects under this scheme. The bidders shall submit their bid against the RfS as per the schedule notified by SECI.

### **3.5. Processing Fees**

The Bidders shall submit non-refundable processing fee of Rs. 2 Lakhs for each Project upto 20 MW capacity, Rs. 3 Lakhs for each Project above 20 MW capacity and Rs. 10 lakh for each project of 100 MW and above capacity, along with the response to RfS.

### **3.6. Number of Applications by a Company and Capacity limit of allocation**

There will be no upper limit for the total capacity of Solar PV Projects to be allotted to a company including its Parent, Affiliate or Ultimate Parent-or any Group Company, unless fixed as provided in clause 3.3. However, bids under two separate categories can be submitted as per provisions under Clause 3.8 (E). The bidder shall submit one single application in the prescribed format detailing all projects for which the bidder is submitting the application.

### **3.7. Solar Park:**

Solar Parks are being developed under MNRE scheme for development of 25 solar parks. The Bidder will approach the Solar Park Implementation Agency (SPIA) for allotment of land and connectivity. The implementation agency will indicate the cost of land, annual charges etc. which the Bidder must take into account while bidding.



SECI will indicate the name of the park and the plot sizes as well as other details in the RfS document. If the total capacity of solar power projects in a state is higher than the capacity available in the solar park, the extra capacity can be located outside the solar park within that state. In case of projects being set up in solar parks, the lowest bidder will be given the first choice to select the plot in the Park. SECI will clearly mention in the RFS document whether projects are to come up in Solar Park or if developer is to arrange land at his level.

### **3.8. Qualification Criteria for Short-Listing of Solar PV Projects**

#### **A. Financial Criteria**

The SPD shall be required to demonstrate/infuse capital in the form of Equity for an amount of at least Rs. 1.2 Cr./MW. This infusion shall be done @20% at the time of signing of PPA, 50% at the time of Financial Closure and the balance before the disbursement of first tranche of VGF. The equity amount may also be in the form of land, if has already been acquired before the date due for equity infusion.

#### **B. Technical Criteria**

It is proposed to promote only commercially established and operational technologies to minimize the technology risk and to achieve timely and successful commissioning of the Projects. The detailed technical parameters for Solar PV Projects are at **Annexure-A**. Equivalent specifications or updated specifications may be specified by SECI in each RFS.

In order to ensure only quality systems are installed, test certificates of modules and inverters should be issued from NABL/ILAC accredited labs in India. Thereafter, a technical committee constituted by MNRE shall approve the type of modules/ inverters. In case multiple developers are sourcing from the same manufacturer whose equipment has been cleared by the committee, the process need not be repeated.

#### **C. Connectivity with the Grid**

- i. The plant should be designed for inter-connection with the transmission network of STU/CTU/Pooling substation of Solar Park or any other transmission utility at voltage level of 33 kV or above. In case the SPIA specifies the voltage level for connectivity to the pooling substation, the same would be required to be complied with by the developers. For Projects outside Solar Park, the Bidder should indicate to the transmission – licensee the location [Tehsil, Village and District, as applicable] of its proposed project.
- ii. For Projects outside Solar Park:
  - a) The Bidder shall submit a letter from the STU/CTU/Transmission Utility along with response to RfS confirming technical feasibility of connectivity of plant to the substation. The responsibility of getting connectivity with the transmission system owned by the STU/CTU or any other transmission utility, as may be required, will lie with the Bidder. The transmission of power up to the point of interconnection where the metering is done for energy accounting shall be the responsibility of the Solar Power Developer (SPD) at his own cost. The maintenance of

Transmission system upto the inter-connection point shall be the responsibility of the Project Developer.

- b) The arrangement of connectivity can be made by the SPD through a dedicated transmission line which the SPD may construct himself or get constructed by STU or any other agency. The entire cost of transmission including cost of construction of line, wheeling charges, losses etc. from the project upto the interconnection point will be borne by the Project Developer. This connectivity can also be achieved through a shared line with any agency or any existing line of STU, provided the energy accounts are bifurcated and clearly demarcated for the power generated at solar project and are issued by the STU/ SLDC concerned.
- iii. The SPD shall not be entitled to any deemed generation in case of any delay in connectivity to the Project.
- iv. The SPIA will provide inter connection facility within/close to the park at voltage level, which will be specified. The SPD will have to connect his project to that point at his cost.

#### **D. Clearances required from the State Government and other local bodies**

For projects outside solar park, the projects developers are required to obtain necessary clearances as required for setting up the Solar PV Power Projects.

#### **E. Domestic Content Requirement**

MNRE shall intimate the DCR capacity to SECI before announcement of State Specific Bid. Under DCR, the solar cells and modules used in the solar PV power plants must both be made in India. In case of crystalline Silicon technology, all process steps and quality control measures involved in the manufacture of the Solar Cells and Modules from P-type (or N-type) wafers till final assembly of the Solar Cells into Modules shall be performed at the works of PV manufacturers in India. The requisite P-type (or N-type) wafers and other raw materials can be imported. In case of Thin-film technologies, the entire Modules assembly comprising of Thin -film Solar Cells shall be manufactured in India. The starting substrate (without any semiconductor junction) and other requisite raw materials can be imported. The Bidders at the time of bidding may opt for either “DCR Category” or “Open Category” or both the categories. They will submit separate Bids under both the categories.

### **3.9. Selection of Projects under the VGF scheme**

- a. The selection of Projects shall be done through two-stage e-bidding and e-auction, as detailed in the RfS document to be issued by SECI. The procedure for conducting e-bidding and e-auctioning shall be framed by SECI.
- b. Based on the RfS notification issued by SECI, separate Technical and Financial bids will be submitted by the developer in his Application, separately for the “DCR” and “Open” categories, as per his choice. The financial bid will clearly indicate per MW VGF required from SECI in Indian Rupees against each project for which the bid is submitted.
- c. **Technical Evaluation:** Technical evaluation for each bidder will be valid for all bids under Batch-III for 2000 MW capacity. This would imply that if a

bidder is evaluated in 1<sup>st</sup> bid, same evaluation will be used, if he bids in the 2<sup>nd</sup> or 5<sup>th</sup> or any bid in this batch. However, new bidders can come in 2<sup>nd</sup> and subsequent bids and they will be evaluated in that bid for all subsequent bids.

### **3.10 Power Purchase Agreement**

- 3.10.1 A copy of Standard Power Purchase Agreement to be executed between SECI and the Project Developer shall be provided by SECI along with Invitation for Submission of response to RfS. Within one month of the date of issue of Letter of Intent (LoI), the Power Purchase Agreement between SECI and the Project Developer for Purchase of Power from the project will be executed. The PPA shall be for a period of 25 years from the date of CoD.
- 3.10.2 The developers will be free to reconfigure and repower their plants from time to time during the PPA duration. However, SECI will be obliged to buy power only within the Capacity Utilization Factor (CUF) range laid down in Power Purchase Agreement (PPA) as per guidelines. Excess power generated will be purchased at a notional Support Price of Rs.3 per kWh only. The developers are free to operate their plants after expiry of the 25 years' PPA period if other conditions like land lease etc., permits. However, any extension of the PPA period beyond 25 years shall be through agreements between the Solar Power Developer, SECI and the Buying Utilities.
- 3.10.3 SECI will execute a Power Sale Agreement (PSA) with the State Utilities/ Discoms/Bulk Consumers of the buying States for sale of power to them valid for 25 years. Further, State Utilities/Discoms will have to maintain LC and Escrow Arrangement as may be defined in the PSA.

### **3.11 Bank Guarantees**

- 3.11.1 The Bidder shall provide the following Bank Guarantees to SECI in a phased manner as follows:
- Earnest Money Deposit (EMD) of Rs. 10 Lakh/MW in the form of Bank Guarantee along with RfS.
  - Performance Bank Guarantee (PBG) of Rs. 30 Lakh/MW at the time of signing of PPA.
- 3.11.2 At the time of signing of PPA, the Bank Guarantees against EMD shall be returned to the respective SPDs after PBGs are submitted by the SPDs and verified by SECI.
- 3.11.3 The Project Developers are required to sign PPA with SECI in line with the Timeline given in the guidelines. In case, the Project Developer refuses to execute the PPA within the stipulated time period, the Bank Guarantees towards EMD shall be en-cashed by SECI as penalty. In case the Project is not selected, SECI shall release the Bank Guarantees within 15 days of the issue of LoI to selected Projects. The Performance Bank Guarantees shall be valid for a period of 21 months from the date of signing of PPA for the Projects. The PBGs will be returned to the developers immediately after successful commissioning of their projects, after taking into account any penalties due to delays in commissioning as per provisions stipulated in Clause 3.14.2.

### **3.12 Minimum Paid up Share Capital to be held by Project Promoter**

- 3.12.1 The Company developing the project shall provide complete information in their bid against RfS about the Promoters and their shareholding in the company indicating the controlling shareholding before signing of PPA with SECI.
- 3.12.2 No change in the shareholding in the Company developing the Project shall be permitted from the date of submitting the response to RfS till the execution of the PPA. However, this condition will not be applicable if a listed company is developing the Project.
- 3.12.3 After execution of PPA, the controlling shareholding (controlling shareholding shall mean more than 51% of the voting rights and paid-up share capital) in the Company/Consortium developing the project shall be maintained for a period of (1) one year after commencement of supply of power. Thereafter, any change can be undertaken under intimation to SECI. Transfer of controlling the shareholding with in the same group of companies will however be allowed even before one year period after commencement of supply gets over with the permission of SECI, subject to the condition that, the management control remains within the same group of companies.
- 3.12.4 In the event of Change in Shareholding/Substitution of Promoters triggered by the Financial Institutions leading to signing of fresh PPA with a New Entity, an amount of Rs. 10 Lakh per Project per Transaction as Facilitation Fee (non-refundable) shall be deposited by the developer to SECI. This amount will go to payment security fund.

### **3.13 Financial Closure/ Project Financing Arrangements**

- 3.13.1 For projects located in Solar Parks: The Project Developer shall report tie-up of Financing Arrangements for the projects within 7 months from the date of signing Power Purchase Agreement. At this stage, the Project Developer would furnish within the aforesaid period the necessary documents to establish that the required land for project development is in clear possession of the Project Developer (minimum 1.5 ha per MW) and the requisite technical criterion have been fulfilled. The Project Developer would also need to specify their plan for meeting the requirement for domestic content.
- 3.13.2 For projects located outside Solar Parks: In addition to the requirements mentioned at Clause 3.13.1, the SPD shall be required to submit the transmission/connectivity agreement with the STU/CTU/Discom.
- 3.13.3 In case of delay in achieving above condition as may be applicable, SECI shall en-cash Performance Bank Guarantees and shall remove the project from the list of the selected projects, unless the delay is on account of delay in allotment of land in Solar Park or by Government or delay in transmission line or Force Majeure. An extension can however be considered, on the sole request of SPD on payment of Rs. 10,000/- per day per MW. This amount will go into the Payment Security Fund. This extension will not have any impact on the Scheduled Commissioning Date.

### 3.14 Commissioning

#### 3.14.1 Part Commissioning:

Part commissioning of the Project shall be accepted by SECI subject to the condition that the minimum capacity for acceptance of part commissioning shall be 50% of the Project Capacity subject to balance Project Capacity thereafter. Part Commissioning shall not be applicable for Projects having a size of 10 MW. The PPA will remain in force for a period of 25 years from the date of acceptance of the first part commissioning of the project.

#### 3.14.2 Commissioning Schedule and Penalty for Delay in Commissioning:

The selected projects shall be commissioned within 13 months of the date of signing of PPA. In this regard, a duly constituted Committee will physically inspect and certify successful commissioning of the project. In case of failure to achieve this milestone, SECI shall en-cash the Performance Bank Guarantee (BG) in the following manner:

- a. Delay up to one month - 20% of the total Performance BG on per day basis and proportionate to the Capacity not commissioned in lots of 10 MW each.
- b. Delay of more than one month and up to three months – SECI will encash remaining Performance BG on per day basis and proportionate to the Capacity not commissioned in lots of 10 MW each.
- c. In case the commissioning of the project is delayed 3 months, the first year tariff of Rs. 5.43/kWh shall be reduced at the rate of 0.50 paise/kWh per day of delay for the delay in such remaining capacity which is not commissioned. The maximum time period allowed for commissioning of the full Project Capacity with encashment of Performance Bank Guarantee and reduction in the fixed tariff shall be limited to 25 months from the date of signing of PPA. In case, the Commissioning of the Project is delayed beyond 25 months from the date of signing of PPA, the PPA capacity shall stand reduced / amended to the Project Capacity Commissioned and the PPA for the balance Capacity will stand terminated and shall be reduced from the selected Project Capacity. The funds generated from the encashment of the Bank Guarantees shall be deposited in a separate fund under payment security mechanism to be maintained by SECI under the guidance of MNRE.
- d. For projects located in Solar Parks, Committee handling the Payment Security Mechanism (PSM), may consider giving 10% of the Performance bank guarantee encashed to the STU/CTU, as the case may be, if the project is delayed beyond the date as provided for in PPA, even though the Transmission/ evacuation system is ready thereby resulting in system lying idle. SPDs shall enter into an Implementation Support Agreement with SPIA / State Agency for Land & associated infrastructure for development of the Project inside the Solar Park, Connectivity with the STU / CTU System and all clearances related thereto shall be the responsibility of the SPIA/State Agency / SPD.

3.14.3 In case of Solar parks, if there are delays in land allotment or connectivity by the SPIA, SECI can extend the time for financial closure and commissioning date by up to 3 months, without any financial implications to the SPD. For any extension beyond the period of 3 months, SECI will approach MNRE, who will be authorized to decide on further extension with the approval of Secretary, MNRE.

3.14.4 If the solar park is delayed due to reasons solely attributable to the SPIA, a penalty of Rs 100/day/MW will be paid by SPIA. This fund will go to the payment security fund.

### **3.15 Electricity Generation from Solar PV Power Projects**

#### **3.15.1 Criteria for generation**

The developers will declare the CUF of their plant at the time of commissioning and will be allowed to revise the same once within 1 year of commissioning. The declared CUF shall in no case be less than 17% over a year. They shall maintain generation so as to achieve CUF\* within -15% and +10% of their declared value till the end of 10 years from COD subject to the CUF remaining over minimum of 15% and within - 20% and +10% thereafter till the end of the PPA duration of 25 years. The lower limit will, however, be relaxable by SECI to the extent of grid non-availability for evacuation which is beyond the control of the developer. The CUF will be calculated every year from 1st April of the year to 31st March next year. However, for the purpose of release of VGF, CUF will be calculated every year from the date of commissioning up to completion of 1 year from the date of commissioning. The upper limit will not be applicable for the purpose of payment of VGF.

*\* For example, if the declared CUF is 20%, variation allowed will be in the range of 17% to 22% only.*

#### **3.15.2 Shortfall in minimum generation**

If for any Contract Year, it is found that the developer has not been able to generate minimum energy corresponding to the value of CUF below the lower limit of CUF declared by the developer, such shortfall in performance shall make developer liable to pay the compensation provided in the PSA as payable to buying utilities/Discoms and shall duly pay such compensation to SECI to enable SECI to remit the amount to the buying utilities/Discoms. This will, however be relaxable by SECI to the extent of grid non-availability for evacuation, which is beyond the control of the developer. This compensation shall be applied to the amount of shortfall in generation during the Contract Year. The amount of compensation shall be equal to the compensation payable (including RECs) by the buying utilities/Discoms towards non - meeting of RPOs, if such compensation is ordered by the State Commission. However, this compensation shall not be applicable in events of Force Majeure identified under PPA with SECI affecting supply of solar power by SPD.

#### **3.15.3 Excess generation**

Any excess generation over and above 10% of declared CUF will be purchased by SECI at a tariff of Rs. 3/kWh, provided SECI is able to get any buyer for sale of such excess generation. While the developer would be free to install DC solar field as per his design of required output, including his requirement of auxiliary consumption, he will not be allowed to sell any excess power to any other entity other than SECI (unless refused by SECI). In case at any point of time, the peak of capacity reached is higher than the rated capacity and causes disturbance in the system at the point where power is injected, the developer will have to forego the excess generation and reduce the output to the rated capacity.



### 3.16 Commercial Operation Date (CoD):

The Commercial Operation Date (CoD) shall be considered as the date 30 days subsequent to the actual date of commissioning of the project as declared by the SNA/Commissioning Committee. The 25 year tenure of PPA shall commence from Commercial Operation Date. Upon declaration of CoD, the developer shall pay to SECI, a Performance Guarantee Deposit (PGD) @Rs. 10 lakhs/MW/Project. It shall stay with SECI for 25 years. The PGD shall be refunded to SPD without interest within three months after expiry of the 25 Year term of PPA subject to satisfactory performance of the project. In case the developer winds up his project or terminates the PPA prior to the completion of the 25 Year term of PPA, the PGD shall be forfeited. Interest earned on Performance Guarantee Deposit may also be used in Payment Security Fund.

The following three milestone dates for commissioning may therefore be observed and may fall on separate dates:

- (i) **Inter connection with Grid:** This may be provided by the STU/CTU /Discom on the request of the project developer, even if the project is only partially ready to facilitate testing and allow flow of power generated into the grid to avoid wastage of Power.
- (ii) **Commissioning of Project:** This will be on a date, when the project meets the criteria defined for project commissioning. SECI may authorise any individual or committee or organisation to declare the project commissioned on site.
- (iii) CoD after which energy accounting under PPA will start.

Any energy produced and flowing into the grid before CoD shall not be at the cost of SECI under this scheme and developers will be free to make short-term sale to any organisation or individual. SECI may agree to buy this power as a trader if they find it viable outside this scheme.

## **SECTION-IV: OTHER PROVISIONS**

### **4.1 Role of State Nodal Agencies**

It is envisaged that the State Government shall appoint any Agency as a State Level Agency, which will provide necessary support to facilitate the required approvals and sanctions in a time bound manner so as to achieve commissioning of the Projects within the scheduled Timeline. This may include facilitation in the following areas:

- Coordination among various State and Central agencies for speedy implementation of projects
- Support during commissioning of projects and issue of commissioning certificates.

### **4.2 Role of State Transmission Utility**

It is envisaged that the State Transmission Utility will provide transmission system to facilitate the evacuation of power from the Projects which may include the following:

- (i) Provide connectivity to the Solar Projects with the grid
- (ii) Support during commissioning of projects
- (iii) Coordination among various State and Central agencies for evacuation of power

### **4.3 Role of Solar Park Implementation Agency (SPIA)**

The SPIA shall undertake the following activities to achieve the objectives of speedy establishment and implementation of Solar Park in the Host State

- (i) Develop, plan, execute, implement, finance, operate and maintain the Solar Park.
- (ii) Obtain statutory & non statutory clearances and to make area development plan within Solar Park.
- (iii) Frame out transparent plot allotment policy and specify procedures pursuant to the relevant State policies and their amendments thereof.
- (iv) Enter into Lease agreement and give possession before Financial Closure to SPD for the entire period of the Project.
- (v) Work out charges to be paid by the developers for land, connectivity and use of various facilities in the Solar Park.
- (vi) Enter into an Implementation Support Agreement with SPDs for Land & associated infrastructure for development of the Project inside the Solar Park, Connectivity with the STU / CTU System.

While it will be the endeavour of the State Agencies /Central Agencies as described above to facilitate support in their respective area of working but nevertheless, SPD shall be overall responsible to complete all the activities related to Project Development at its own risk and cost.

#### **4.4 Power to Remove Difficulties**

If any difficulty arises in giving effect to any provision of these guidelines or interpretation of the guidelines or there is a requirement to modify the guidelines for better implementation, the matter will be referred to a Committee constituted by MNRE for this purpose. Thereafter, clarifications/modifications/rectification of anomalies, may be issued with approval of Secretary, MNRE.

#### **4.5 Payment Security Mechanism**

SECI shall set up a payment security mechanism in order to ensure timely payment to the developers. This fund will have a corpus to cover 3 months payment. The money received from encashment of BGs, interest earned on this fund, incentives for early payment and the grants from Government/ NCEF will be used to build this fund. The Ministry of New and Renewable Energy will frame Rules to operate this fund. Any charges incurred by SECI on account of litigation related to implementation of the Scheme shall be charged to this account. The expenses on account of short term open access charges, UI charges, fund requirements for furnishing security deposits in the form of Bank Guarantee/ LCs to STUs in accordance with BPTA or associated charges etc. may be utilised from PSM

#### **4.6 Solar Park Scheme:**

The provisions of Solar Park Scheme notified by the Ministry of New & Renewable Energy vide No.30/26/2014-15/NSM dated 12th December, 2014 would be applicable for the solar projects to be set up in the Solar Park.

## **Technical Requirements for Grid Solar PV Power Plants**

The following are some of the technical measures required to ensure quality of equipment used in grid-connected solar photovoltaic power projects:

### **1. SPV Modules**

1.1 The SPV modules used in the grid solar power projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent BIS standards.

- Crystalline Silicon Solar Cell Modules IEC 61215
- Thin Film Modules IEC 61646
- Concentrator PV modules IEC 62108

1.2 In addition, SPV modules must qualify to IEC 61730 for safety qualification testing at 1000V DC or higher. The modules to be used in a highly corrosive atmosphere throughout their lifetime must qualify to IEC 61701.

### **2. Power Conditioners/ Inverters**

The Power Conditioners/Inverters of the SPV power plants conform to the latest edition of IEC/ equivalent BIS Standards as specified below:

Efficiency Measurements	IEC 61683
Environmental Testing	IEC 60068 -2/ IEC 62093
Electromagnetic Compatibility (EMC)	IEC 61000-6-2, IEC 61000-6-4 & other relevant parts of IEC 61000
Electrical Safety	IEC 62103/IEC 62109-1&2
Protection against Islanding of Grid	IEEE1547/IEC 62116/UL 1741/ equivalent BIS Standard

### **3. Other Sub-systems/ Components:**

Other subsystems/components used in the SPV power plants (Cables, Connectors, Junction Boxes, Surge Protection Devices, etc.) must also conform to the relevant international/ national Standards for Electrical Safety besides that for Quality required for ensuring Expected Service Life and Weather Resistance. (IEC Standard for DC cables for PV systems is under development. It is recommended that in the interim, the Cables of 600-1800 Volts DC for outdoor installations should comply with the draft EN50618/TUV 2pfg 1169/08/07 for service life expectancy of 25 years).

### **4. Authorized Test Centres**

The PV modules / Power Conditioners deployed in the power plants must have valid test certificates for their qualification as per above specified IEC/ BIS Standards by one of the NABL Accredited Test Centres in India. In case of module types like Thin Film and CPV / equipment for which such Test facilities may not exist in India at present, test certificates from reputed ILAC Member Labs abroad will be acceptable.

## 5. **Warranty**

PV modules used in grid solar power plants must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

## 6. **Identification and Traceability**

Each PV module used in any solar power project must use a RF identification tag. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions.)

- 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 at Standard Test Condition (1000 W/m<sup>2</sup>, AM1.5, 25<sup>o</sup> C)
- vi) Wattage, Im, Vm and FF for the module
- 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

Site owners would be required to maintain accessibility to the list of Module IDs along with the above parametric data for each module.

## 7. **Performance Monitoring:**

All grid solar PV power plants must install necessary equipment to continuously measure solar radiation, ambient temperature, wind speed and other weather parameters and simultaneously measure the generation of DC power as well as AC power generated from the plant. They will be required to submit this data to SECI and MNRE or any other designated agency on line and/or through a report on regular basis every month for the entire duration of PPA. In this regard they shall mandatorily also grant access to SECI and MNRE or any other designated agency to the remote monitoring portal of the power plants on a 24X7 basis.

## 8. **Safe Disposal of Solar PV Modules:**

The developers will ensure that all Solar PV modules from their plant after their 'end of life' (when they become defective/ non-operational/ non-repairable) are disposed of in accordance with the "e-waste (Management and Handling) Rules, 2011" notified by the Government and as revised and amended from time to time.

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