

Nalanda University –ON-GRID SOLAR project is recognized under the CPCU scheme, and therefore, this is being shared to understand the Technical Terms and Conditions.

RfS No. [SECI/C&P/SPD/CPSU-II/RfS/1500MW/082019](#)

Dated : 01/08/2019

For bidding guidance – please refer to Nalanda University’s Notice Inviting tender .

Main technical conditions, but not limited, are mentioned below:

Grid) Connected Solar Power Projects (Tranche-II) in India under CPSU Scheme Phase-II	<u>RfS No. SECI/C&P/SPD/CPSU-II/RfS/1500MW/082019</u>	<u>Page 1 of 95</u>	<u>Signature of Bidder</u>
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DISCLAIMER

1. Though adequate care has been taken while preparing the RfS document, the bidder(s) shall satisfy themselves that the document is complete in all respect. Intimation regarding any discrepancy shall be given by the prospective bidders to the office of SECI immediately. If no intimation is received from any bidder within **20 (Twenty) days from the date of issuance of RfS documents**, it shall be considered that the document is complete in all respect and has been received/acknowledged by the bidder(s).
2. Solar Energy Corporation of India Ltd (SECI) reserves the right to modify, amend or supplement this document.
3. This RfS document has been prepared in good faith, and on best endeavour basis. Neither SECI nor their employees or advisors make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this document, even if any loss or damage is caused by any act or omission on their part.

Place: New Delhi

Date: 01/08/2019

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SECTION - I

DEFINITIONS OF TERMS

Grid) Connected Solar Power Projects (Tranche-II) in India under CPSU Scheme Phase-II	<u>RfS No. SECI/C&P/SPD/CPSU-II/RfS/1500MW/082019</u>	<u>Page 3 of 95</u>	<u>Signature of Bidder</u>
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- 1.1 **"ACT" or "ELECTRICITY ACT, 2003"** shall mean the Electricity Act, 2003 and include any modifications, amendments and substitution from time to time;
- 1.2 **"CAPACITY UTILIZATION FACTOR (CUF)"** shall have the same meaning as provided in CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 as amended from time to time;
The CUF shall be calculated based on the annual energy injected and metered at the Delivery Point. In any Contract Year, if 'X' MWh of energy has been metered out at the Delivery Point for 'Y' MW Project capacity, $CUF = (X \text{ MWh} / (Y \text{ MW} * 8766)) * 100\%$;

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- 1.3 “**CENTRAL TRANSMISSION UTILITY (CTU)**” shall mean the Central Transmission Utility as defined in Section 38 of the Electricity Act 2003;
- 1.4 “**DAY**” shall mean calendar day;
- 1.5 “**GOVERNMENT PRODUCER**” shall mean any entity which is either directly controlled by the Central or State Government or is under the administrative control of Central or State Government or a Company in which Government is having more than 50 % shareholding.
- 1.6 “**GUIDELINES**” shall mean the “Central Public Sector Undertaking (CPSU) Scheme Phase-II (Government Producer Scheme) for setting up 12,000 MW grid (Including Mini & Micro Grid) connected Solar Photovoltaic (PV) Power Projectes by the Government Producers with Viability Gap Funding (VGF) support for self-use or use by Government/Government entities, either directly or through Distribution Companies (DISCOMS)” issued by the Ministry of New & Renewable Energy vide No. 302/4/2017-GRID SOLAR dated 05.03.2019 including subsequent amendments and clarifications thereof.
- 1.7 “**POOLING SUBSTATION/ POOLING POINT**” shall mean a point where more than one Solar PV Project may connect to a common Transmission System. Multiple

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Projects can be connected to a pooling substation from where common transmission system shall be constructed and maintained by the SPD(s) to get connected to the Delivery Point.

- 1.8 **“PGCIL” or “POWERGRID”** shall mean Powergrid Corporation of India Limited;
- 1.9 **“POWER PROJECT” or “SOLAR PROJECT” or “PROJECT”** shall mean the solar power generation facility having single/separate points of injection into the grid at Interconnection/ Delivery/ Metering Point, or in case of sharing of transmission lines by separate injection at Pooling Point. It is further clarified that “Grid-connected” Projects would include micro & mini grid-connected projects.
- 1.10 **“ALLOCATED CAPACITY”** shall mean the cumulative capacity allocated to the successful bidder;
- 1.11 **“PROCURER” or “END CONSUMER”** shall mean a Government entity/Government organization, which shall be the ultimate consumer of the energy produced from the Project set up under this RfS. In case the SPD sets up the project for captive or self-use, the SPD shall be deemed to be the Procurer or End Consumer as per the RfS.
- 1.12 **“PROJECT COMMISSIONING”**: The Project will be considered as commissioned based on self declaration by the SPD, if all equipment as per rated project capacity has been installed and energy has flown into the grid;
- 1.13 **“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), including the SPV formed by the selected bidder/ consortium for the purpose of setting up of Project;
- 1.14 **“RfS DOCUMENT”** shall mean the bidding document issued by SECI including all attachments, clarifications and amendments thereof vide Rfs No. **SECI/C&P/SPD/CPSU-II/RfS/1500MW/082019** dated 01/08/2019;
- 1.15 **“SECI”** shall mean Solar Energy Corporation of India Limited;
- 1.16 **“SCHEDULED COMMISSIONING DATE” or “SCD”** shall be the date as indicated in Clause 16, Section-III of the RfS;
- 1.17 **“SELECTED BIDDER” or “SUCCESSFUL BIDDER”** shall mean the Bidder selected pursuant to this RfS to set up the Project and supply electrical output of the Project;
- 1.18 **“SOLAR PV PROJECT”** shall mean the Solar Photo Voltaic Power Project that uses sunlight for direct conversion into electricity through Photo Voltaic Technology;

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- 1.19 **“STATE TRANSMISSION UTILITY” or “STU”** 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;
- 1.20 **“TOE”** shall mean Tender Opening Event.
- 1.21 **“ULTIMATE PARENT”** shall mean a Company, which owns more than 50% (Fifty Percent) voting rights and paid up share capital, either directly or indirectly in the Parent and Affiliates ;
- 1.22 **“Viability Gap Funding (VGF)”** shall mean the fund which will be disbursed by SECI to the SPD, if eligible, as per terms and conditions of this RfS document
- 1.23 **“WEEK”** shall mean calendar week;

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SECTION - II

INVITATION FOR BIDS (IFB)

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- 1.1 The Project should be designed for interconnection with the ISTS/ InSTS/STU in accordance with the prevailing CERC/SERC regulations in this regard (As applicable). For interconnection with the grid and metering, the SPD shall abide by the SPD shall abide by the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended from time to time), along with applicable Grid Code, Grid Connectivity Standards, Regulations on Communication System for transmission of electric and other regulations (as amended from time to time) issued by Appropriate Commissions and Central Electricity Authority (CEA).

- 1.2 The responsibility of getting ISTS/STU connectivity and Long Term Open Access (LTA) shall entirely be with the SPD and shall be at the cost of the SPD. The transmission of power to and at the point of Interconnection /Delivery Point where the metering is done for energy accounting, shall be the responsibility of the SPD at his own cost. In case the SPD is required to use In STS to bring solar

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2 Under the scheme, setting up of solar PV power plants for supplying auxiliary power for a power generation plant is permitted.

3 **CLEARANCES REQUIRED FROM THE STATE GOVERNMENT AND OTHER LOCAL BODIES**

3.1 The Solar Power Developers are required to obtain all necessary clearances and permits as required for setting up the Solar Power Projects, including but not limited to the following:

- a. No Objection (NOC)/Environmental clearance (if applicable) for the Project.
- b. Forest Clearance (if applicable) for the land for the Project.
- c. Approval for water from the concerned authority (if applicable) required for the Project.
- d. Any other clearances as may be legally required, in order to establish and operate the Project.

The above clearances, as applicable for the Project, shall be required to be submitted to SECI prior to commissioning of the Project. In case of any of the clearances as indicated above being not applicable for the said Project, the SPD shall submit an undertaking in this regard, and it shall be deemed that the SPD has obtain all the necessary clearances for establishing and operating the Project. Any consequences contrary to the above shall be the responsibility of the SPD.

Annexure - A

**TECHNICAL PARAMETER OF PV MODULE AND
VARIOUS OTHER COMPONENTS FOR USE IN GRID
(INCLUDING MINI & MICRO GRID) CONNECTED
SOLAR POWER PLANTS**

All components of the PV plant shall be in accordance with technical specifications given in relevant IS/ IEC Standards. The design and commissioning also shall be as per latest IS/ IEC standards. The following are some of the technical measures required to ensure quality of the major components used in Grid (including Mini & Micro Grid) Connected solar power Projects.

Under this RfS, use of both Solar Photo voltaic (SPV) cells and Modules manufactured domestically as per specifications and testing requirement fixed by MNRE are mandatory for installation of awarded Solar PV power Plant.

1. PV MODULE QUALIFICATION

The PV modules used in the Grid (including Mini & Micro Grid) Connected solar power Projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent Indian standards.

Standard	Description
IEC 61215-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements
IEC 61215-1-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
IEC 61215-1-2 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
IEC 61215-1-3 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules
IEC 61215-1-4 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-4: Special requirements for testing of thin-film Cu(In,Ga)(S,Se) based photovoltaic (PV) modules
IEC 62108 Ed. 2.0	Concentrator photovoltaic (CPV) modules and assemblies - Design qualification and type approval
IEC 61730-1 Ed. 2.0	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction

IEC 61730-2 Ed.2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
IEC 61701 Ed.2	Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment)
IEC 62716 Ed.1	Photovoltaic (PV) modules - Ammonia corrosion testing (Applicable for wet atmospheres having high concentration of dissolved ammonia)
IEC TS 62804-1 Ed.1	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon

2. POWER CONDITIONERS/ INVERTERS

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

Standard	Description
IEC 61683 Ed. 1	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IEC 62109-1 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62109-2 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IEC 61000-6-2 Ed. 2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
IEC 61000-6-4 Ed. 2.1	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 62116 Ed. 2/ IEEE 1547:2003 with 2014 Amendment 1/UL 1741	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures/ IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems / Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
IEC 60068-2-1:2007	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2:2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14:2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature

IEC 60068-2-30:2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
LVRT Compliance	As per the latest CERC Guidelines / Order/ Regulations
Grid Connectivity	Relevant CERC Regulations (including LVRT Compliance) and Grid Code as amended and revised from time to time.

As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, PV Modules and Inverters used in the Grid (including Mini & Micro Grid) Connected solar power Projects shall conform to the Standards Specified as per below and bear the Standard Mark as notified by the Bureau of Indian Standards:

Sl. No. (1)	Product (2)	Indian Standard Number (3)	Title of Indian Standard (4)
1.	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules (Si wafer based)	IS 14286	Crystalline Silicon Terrestrial Photovoltaic (PV) modules - Design Qualification And Type Approval
2.	Thin-Film Terrestrial Photovoltaic (PV) Modules (a-Si, CIGS and CdTe)	IS 16077	Thin-Film Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
3.	PV Module (Si wafer and Thin film)	IS/IEC 61730 (Part 1) IS/IEC 61730 (Part 2)	Photovoltaic (PV) Module Safety Qualification Part 1 Requirements for Construction Photovoltaic (PV) Module Safety Qualification Part 2 Requirements for Testing

4.	Power converters for use in photovoltaic power system	IS 16221 (Part 1) IS 16221 (Part 2)	Safety of Power Converters for use in Photovoltaic Power Systems Part 1- General Requirements Safety of Power Converters for Use in Photovoltaic Power Systems Part 2- Particular Requirements for Inverters
5.	Utility –Interconnected Photovoltaic inverters	IS 16169	Test Procedure of Islanding Prevention Measures for Utility-Interconnected Photovoltaic Inverters
6.	Storage battery	IS 16270	Secondary Cells and Batteries for Solar Photovoltaic Application General Requirements and Methods of Test

3. CABLES AND CONNECTORS

All cables and connectors to be used for installation of solar field must be of solar grade which can withstand harsh environment conditions for 25 years and voltages as per latest IEC standards. It is recommended that the Cables of 600-1800 Volts DC for outdoor installations should comply with the BS/ EN EN50618/ TUV 2pfg 1169/08/07 for service life expectancy of 25 years.

4. 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.

5. 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/ equipment for which such Test facilities may not exist in India at present, test certificates from reputed ILAC Member body accredited Labs abroad will be acceptable.

6. WARRANTY (read with the University’s NIT – In case common/conflict, the stringent criteria will be preferred which should be beneficial for the University)

- PV modules used in Grid (including Mini & Micro Grid) Connected solar power plants must be warranted for peak output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- The modules shall be warranted for at least 10 years for failures due to material defects and workmanship.
- The mechanical structures, electrical works and overall workmanship of the grid solar power plants must be warranted for a minimum of 5 years.
- The Inverters/ PCUs installed in the solar power plant must have a warranty for 5 years.

7. 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/m², AM 1.5, 25°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.

8. PERFORMANCE MONITORING

As part of the performance monitoring, the following shall be carried out:

- a. The SPD shall maintain the list of Module IDs along with performance characteristic data for each module. This data shall be submitted to SECI/ MNRE.
- b. The SPDs must install necessary equipment to continuously measure solar radiation on module plane, 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

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MNRE on line and/ or through a report on regular basis every month for the entire lifetime of the Project.

- c.
- d. The SPDs shall provide access to SECI/ MNRE or their authorized representatives for installing any additional monitoring equipment to facilitate on-line transfer of data.
- e. All data shall be made available as mentioned above for the entire lifespan of the project.
- f. The plant SCADA should be Open Platform Communications (OPC) compliant with standard DNP3 and modbus control interfaces over TCP/ IP having the provision to add protocol converters to implement custom and secure communications protocol standard for providing real time online data (including but not limited to irradiance, plant generation (instantaneous/ daily/ monthly/ yearly), Daily Peak Generation, temperature, wind speed etc.) to SECI/ MNRE.
- g. Fibre Optic Ethernet Ring network (Managed type Ethernet switches in each Control Room) should be provided between MCR & Inverter Control Rooms.
- h. Web-based monitoring should be available, which should not be machine dependent. The web-based monitoring should provide the same screens as available in the plant. Also, it should be possible to download reports from a remote web-client in PDF or Excel format

9. SAFE DISPOSAL OF SOLAR PV MODULES

The SPD 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 in accordance with the "e-waste (Management and Handling) Rules, 2011" notified by the Government and as revised and amended from time to time.

10. CAPACITY OF SOLAR PV PROJECTS

- i) The rated capacity to be installed shall be considered as minimum DC Arrays Capacity and maximum AC Capacity at the delivery point as described below:

Sr. No.	Solar PV Project Capacity Bid	Minimum DC Arrays Capacity to be installed	Minimum Rated Inverter Capacity	Maximum AC Capacity Limit at Delivery point
1	10 MW	10 MW	10 MW	10 MW

- ii) Higher DC capacity arrays so as to achieve AC capacity limit is allowed.
- iii) For commissioning of the Project, capacity of DC arrays installed shall be considered in multiple of 1 MW per unit. For example, In case of part commissioning of 5 MW



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Project, each unit shall be required to have minimum 1 MW DC Arrays Capacity be installed.

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