INFORMATION DOCUMENT

For

Design, manufacture, supply, installation and commissioning of different capacity Roof top Solar PV Power projects under Net Metering policy in the state of Punjab.

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PEDA/NMP/EOI/2014-15/01

Promoting Clean Energy Through Solar Roof Tops

Golden opportunity for EPC companies, manufacturers, suppliers &system integrators of Solar PV Power Projects for design, manufacture, supply, installation and commissioning of different capacity Roof Top Solar Power Projects.

Punjab Government has approved Net Metering Policy under which Roof Top Solar PV Power Projects of capacities ranging from 1KW to 1000KW are to be installed on different categories of buildings i.e Homes, Institutions, Commercial/ Private / Govt. Buildings/ warehouses & Industries.

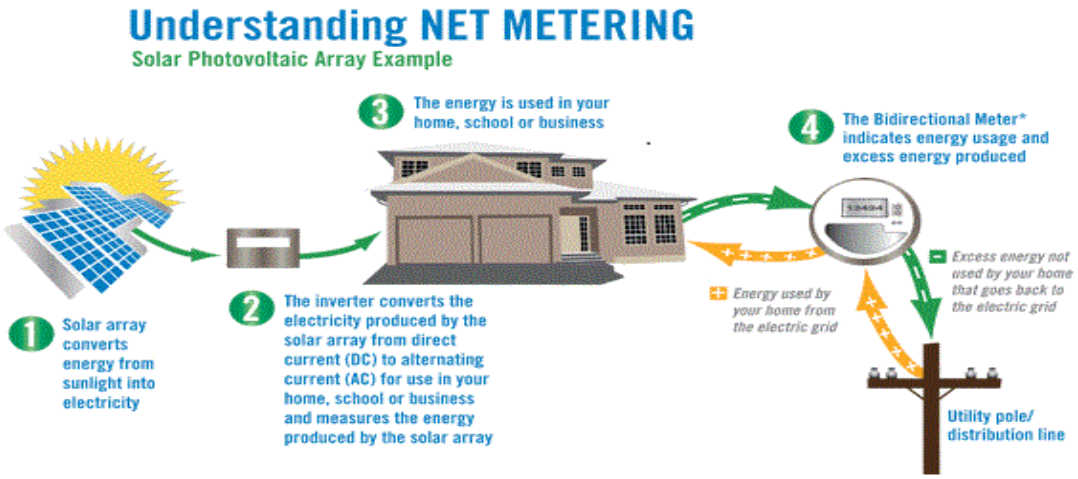
In order to facilitate the public, Punjab Energy Development Agency, the state Nodal Agency is in the process of compiling information of rates of different capacity Roof Top solar power projects which are to be displayed on the website of PEDA for the information of the Public. EPC Companies desirous of getting their information displayed may submit the technical detail of their systems/ equipments and pricing in the Performa available at **www.peda.gov.in**. before 25th November 2014. Other details and technical specifications may please be seen in the information document available on PEDA website

Chief Executive

Net Metering

- Net metering is a process through which a solar power project is installed on the roof top of the building. During day time sun rays fall on solar panels and generate electricity. The generated power is used in the building for running electrical appliances and the surplus power is fed in to the grid of PSPCL and power from the grid of PSPCL utility is consumed in the building at night or when the solar power generation is less than the requirements during day time. A bi-directional meter is installed in the supply line to register import and export of power. The reading of import and export of power is taken and sets off for net consumption of units. The bill is prepared for net consumption of units at the rates applicable under that specified electricity tariff slab.
- Net metering arrangements, thus, combine elements of captive consumption and exchange of power with the utility.
- During power cut from PSPCL, the Rooftop Solar PV System will continue to supply the power.

Energy Flow Diagram under net Metering



1. Eligibility Criteria and other terms & conditions :

1.1 This invitation open to all EPC companies, manufacturers, suppliers &system integrators of Solar PV Power Projects who have not been debarred/black listed by any Govt. organization for design, manufacture, supply, installation and commissioning of different capacity Roof Top Solar Power Projects.

1.2 The company or authorized supplier shall have minimum 2 years experience in installation of Solar power projects as on 31.03.2014.

1.3 The minimum annual turnover of the company should be Rs.50 Lac during any one financial year out of the last three financial years i.e.2011-12,2012-13&2013-14.

1.4 The company / supplier should be in profit for at least two financial years out of the last three financial years i.e. 2011-12, 2012-13&2013-14.

1.5 The offers shall be accompanied with a set of complete technical literature, operation and maintenance manual of the product in English Language.

1.6 Material shall be strictly as per laid down specifications and If there is any left out specification, in the Information Document the same shall be considered as per the latest MNRE specifications and guidelines.

1.7 The SPV modules shall be warranted for 25 years and complete SPV systems including batteries would be warranted by the manufacturer for five years, from the date of commissioning of the Project. After Installation & Commissioning Solar roof top power project shall be jointly visited by a committee of supplier, user and District Officer of PEDA.

1.8 The companies should have their secure network in Punjab and shall provide address of service centers in a separate sheet All disputes relating to this work shall be subject to the jurisdiction of the place of installation of the project.

2 Scope of Supply:

The SPV power plants should be supplied & installed by the companies as per specifications given in Annexure –I which comply to the MNRE,GOI Guidelines . Following parts for each SPV projects are mainly required to be supplied:

1. SPV Module of capacity ranging from 100Wp and above
2. Batteries of appropriate capacity
3. Power conditioning Unit (PCU) 1KW and above
4. PVC insulated Copper cables as per BIS Codes for AC & DC inter connections .
5. Junction Boxes with surge arrestors and MCB.
6. Structure for solar PV project , MS Galvanized / Aluminum.
7. O&M manual and warranty card in English Language

Any other part as per site requirement.

3. WARRANTY

i. The Solar power projects including the battery shall be warranted for five years after the date of commissioning of the project for replacement in case of any manufacturing, operation failure, non performance as per design standards.

ii. The PV module(s) shall be warranted for a minimum period of 25 years from the date of commissioning of the project. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

iii. The Warranty Card to be supplied with the system must contain the details of the system.

4. Maintenance during Warrantee period of five years:

a. Schedule visit of the supplier's engineer to the site on quarterly basis for maintenance/ assessing the maintenance requirements.

b. Visit to the site on call basis to provide maintenance services within three days of lodging of complaint.

c. Corrective & remedial maintenance services to set right the malfunction of the SPV-projects include supply and replacement of all damaged parts/ components including electronics/ charge controller, Inter connected cables/ parts and fuse etc. with new parts.

5. OPERATION & MAINTENANCE MANUAL

- An Operation, Instruction and Maintenance Manual, in English & Punjab Languages should be provided with the Solar PV projects. The following minimum details must be provided in the Manual:
- Basic principles of Photovoltaic.
- A small write-up (with a block diagram) on the Solar PV project - its components, PV module, battery, electronics and luminary and expected performance shall be provided.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics of all the component are required to be provided.
- Clear instructions on regular maintenance and trouble shooting of the Solar PV Projects.
- DO's and DONT's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the SPV Projects.

ANNEXURE-I

General Technical specifications

1. SPV Modules :

(i) Indigenously manufactured PV modules should be used.

(ii) The PV module should have crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.

(iii) The power output of the module(s) under STC should be a minimum of 100 Wp at a load voltage* of 16.4 ± 0.2 V. V_{nom} 12V.

(iv) The open circuit voltage* of the PV modules under STC should be at least 21.0 Volts.

(v) The module efficiency should not be less than 14 %.

(vi) The terminal box on the module should have provision for opening to replace the cable, if required.

(vii) PV modules must be warranted for their output peak watt capacity which should not be less than 90 % at the end of 10 years and 80% at the end of 25 years.

(viii) 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 should be inside the laminate and must be able to withstand harsh environmental conditions.)

a) Name of the Manufacturer of PV module
b) Name of the manufacturer of Solar Cells.
c) Month and year of the manufacture (separately for solar cells and module).
d) Country of origin (separately for solar cells and module).
e) I-V curve for the module.
f) Peak wattage, Im ,Vm and FF for the module.
g) Unique serial no and model no of the module.
h) Date and year of obtaining IEC PV module qualification certificate.
i) Name of test lab issuing IEC certificate
j) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

2. BATTERY

i. Tubular Lead Acid battery having minimum rating of 2 V 200Ah &12V, 150 Ah & higher capacities at C/10 discharge rate.
ii. 75% of the rated capacity of the battery should be between fully charged and load cut off conditions.
iii. Battery should conform to the latest BIS/ International standards.

3. Balance of system (BOS)

a. Cables should confirm to applicable standards i,e IEC 60189, IS 694/ IS1554, IS/IEC 69947.

b. Switches / Circuit Breakers / Connector should confirm to IS/IEC 60947 part I,II,III, EN 50521 standards.
c. Junction Boxes should confirm to IP 65 for outdoor / IP 21 for indoor use and IEC 62208 standards.
d. SPV system design should confirm to IEC 62124 standards
e. Installation of systems should confirm to IEC 60364-7-712 standards

4. Power Conditioning Unit (PCU)

The **PCU** should convert DC power produced by SPV modules, in to AC power and adjust the voltage & frequency levels to suit the local grid conditions. The inverter shall interconnect and feed power to the LT power supply of the building and also shall have the provision to power critical loads.

Common Technical Specification :

Control Type : Voltage source, microprocessor assisted , output regulation

Out put voltage : Single Phase, 230 V ac (+12.5 %, - 20 % V ac)

: 3 phase, 415 V ac (+12.5 %, - 20 % V ac)

Frequency : 50 Hz (+3 Hz, -3 Hz)

Total Harmonic Distortion : less than 3%

Operating temperature Range : 0 to 55 deg C

Inverter standards :

Inverter should comply with IEC 61683/IS 61683 for efficiency and Measurements and should comply IEC 60068-2 (1, 2, 14, 30) / Equivalent BIS Standard for environmental testing. Inverter should supervise the grid condition continuously and in the event of grid failure (or) under voltage (or) over voltage, Solar System should be disconnected by the circuit Breaker / Auto switch provided in the inverter.

Power Control : MPPT

Other important Features/Protections required in the INVERTER

- Automatic morning wake-up and nightly shutdown
- Mains (Grid) over-under voltage and frequency protection
- Fool proof protection against ISLANDING.
- Included authentic tracking of the solar array's maximum power operation voltage (MPPT).
- Array ground fault detection.

- LCD and piezoelectric keypad operator interface Menu driven
- Automatic fault conditions reset for all parameters like voltage, frequency and/or black out.
- Surge arresters on AC and DC terminals for over voltage protection from lightning-induced surges.
- INVERTER should be rated to operate at 0 –55 deg. Centigrade unless provision for air conditioning is included in INVERTER
- All parameters should be accessible through an industry standard communication link.
- Overload capacity (for 10 sec) should be 150 % of continuous rating

Harmonics Standard :

As per the standard of IEEE 519, the permissible individual harmonics level shall be less than 3% (for both voltage and current harmonics) and Total Harmonics Distortion (THD) for both voltage and current harmonics of the system shall be less than 5%.

Technical and interconnection requirements

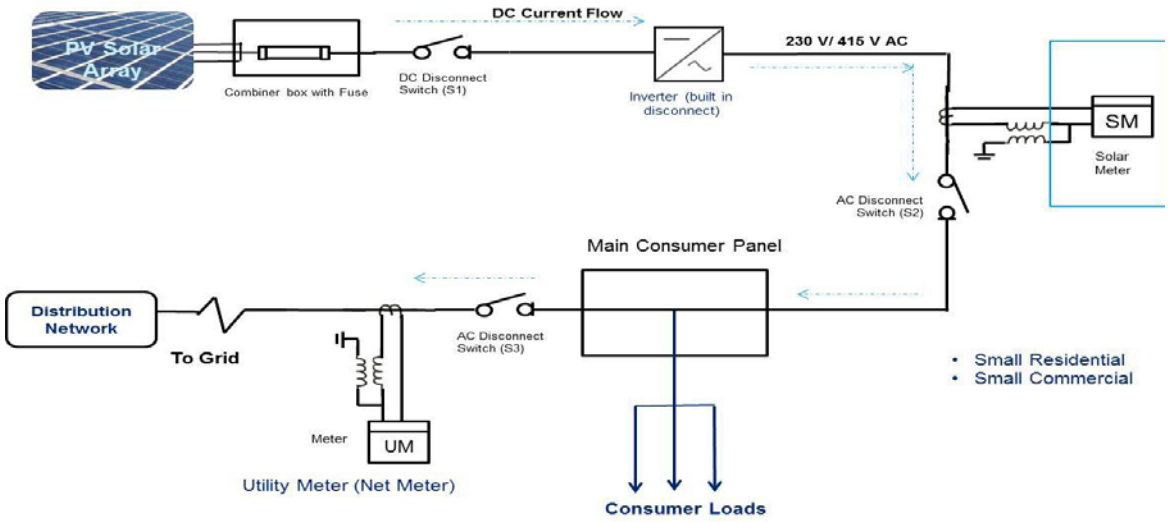
Overall conditions of service	State Distribution/Supply Code	State Distribution/Supply Code
Overall Grid Standards	Central Electricity Authority (Grid Standard) Regulations 2010	Central Electricity Authority (Grid Standard) Regulations 2010
Equipment	BIS / IEC / IEEE	BIS / IEC / IEEE
Meters	Central Electricity authority (Installation & operation of meters) Regulation 2006 as amended time to time	Central Electricity authority (Installation & operation of meters) Regulation 2006 as amended time to time
Safety and supply	Central Electricity Authority(measures of safety and electricity supply) Regulations, 2010	Central Electricity Authority(measures of safety and electricity supply) Regulations, 2010
Harmonic Requirements Harmonic Current	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013

Synchronization	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Photovoltaic system must be equipped with a grid frequency synchronization device. Every time the generating station is synchronized to the electricity system. It shall not cause voltage fluctuation greater than +/- 5% at point of connection.
Voltage	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage. Beyond a clearing time of 2 second, the photovoltaic system must isolate itself from the grid.
Flicker	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Operation of Photovoltaic system should not cause
Frequency	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	When the Distribution system frequency deviates outside the specified conditions (50.5 Hz on upper side and 47.5 Hz on lower side), There should be over and under frequency trip functions with a clearing time of 0.2 seconds.
DC injection	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Photovoltaic system should not inject DC power more than 0.5% of full rated output at the interconnection point or 1% of rated inverter output current into distribution system under any operating conditions.

Power Factor	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9 should operate.
Islanding and Disconnection	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The photovoltaic system in the event of fault, voltage or frequency variations must island/disconnect itself within IEC standard on stipulated period.
Overload and Overheat	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored.
Paralleling Device	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Paralleling device of photovoltaic system shall be capable of withstanding 220% of the normal voltage at the interconnection point.

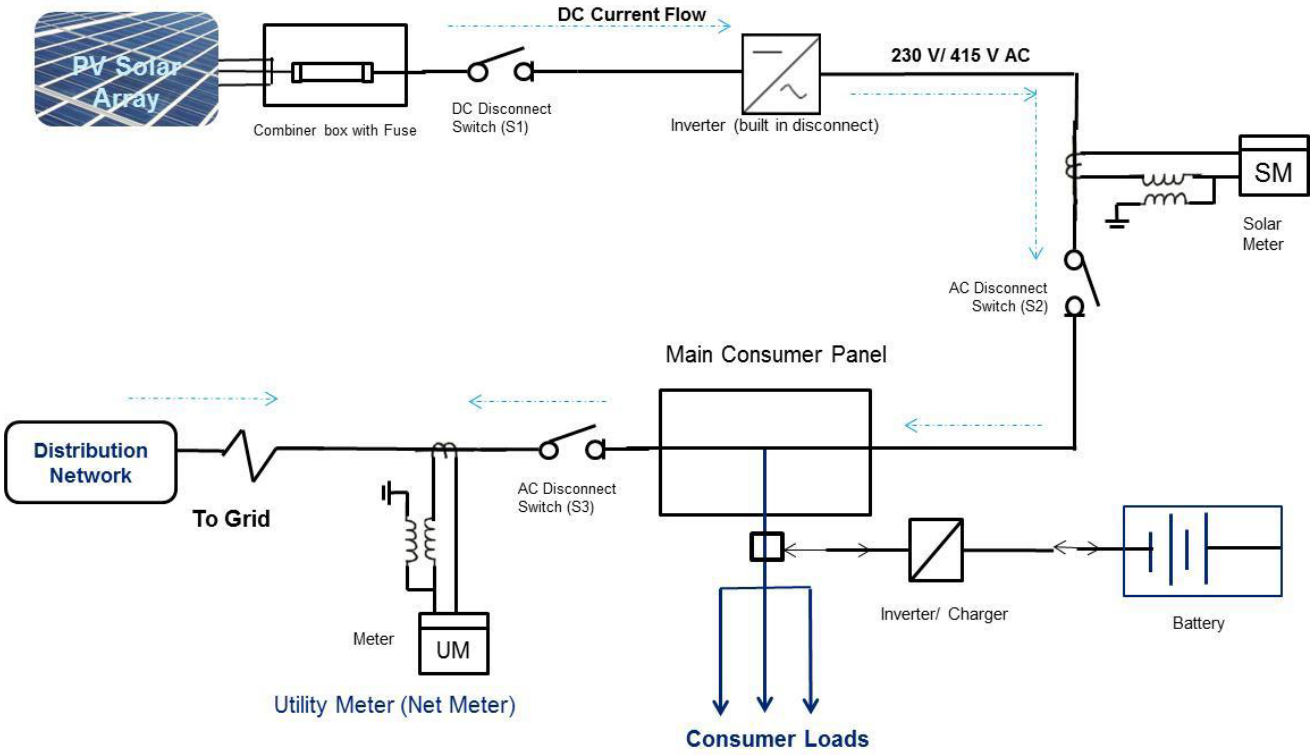
Meter Configuration options

The metering system for rooftop solar system, under net-metering arrangement, shall be as elaborated below which should be applicable till such time the Central Electricity Authority notifies the standards in this matter. **a) Two Meter Configuration without Storage** The metering protocol for 'Grid connected rooftop solar PV system without storage' and location of solar meter and consumer meter shall be in accordance with the schematic below:-


PV Solar Array
Combiner box with Fuse
DC Current Flow
DC Disconnect Switch (S1)
Inverter (built in disconnect)
230 V/ 415 V AC
SM
Solar Meter
AC Disconnect Switch (S2)
Main Consumer Panel
Distribution Network
To Grid
AC Disconnect Switch (S3)
Meter
UM
Utility Meter (Net Meter)
Consumer Loads
• Small Residential
• Small Commercial

The utility meter (Net-meter) has to be bi-directional meter to register both import grid electricity amount as well as export solar electricity amount.

Two Meter Configuration with Storage The metering protocol for 'Grid connected rooftop solar PV system with storage' and location of Solar Meter (SM) and Utility Meter (UM) shall be in accordance with the schematic below:-



The utility meter (Net-meter) has to be bi-directional meter to register both import grid electricity amount as well as export solar electricity amount.

PROFORMA-I

Format for forwarding letter
(To be submitted by Companies on the official letter head of the company)

No. Dated:-

To

The Director
Punjab Energy Development Agency
Plot No 1 &2, Sector 33D, Chandigarh

Subject:- **Design, manufacture, supply, installation and commissioning of different capacity Roof top Solar PV projects under Net Metering policy in the state of Punjab.**

Sir,

We here by submit our offer in compliance with terms and conditions of the Net metering document PEDA/NMP/EOI/2014-15/01. As specified, the offer has been submitted

a) That we are submitting this offer under the above mentioned notice after having fully read and understood the nature of the work and having carefully noted all the specifications, terms and conditions laid down in the Net metering document.
b) That we have never been debarred from executing similar type of work by any central/state/public sector undertaking/department.
c) That we shall execute the work as per specifications, terms and conditions of the net metering document.
d) That our offer shall remain valid for placement of purchase order/ orders for one year after finalization rates.
e) We are not involved in any major litigation that may have an impact on the delivery installation & commissioning of the project under this document
f) I have read and accepted all the terms and conditions of this document.

Yours faithfully,
Proprietor
(…….)
Name, Seal &Signature

(Authorized Signatory)

PROFORMA-II

(To be submitted on Stamp Paper of Rs.100/-)

MANUFACTURERS' AUTHORIZATION FOR SUPPLIER

No. _____ dated

To

Net metering document. PEDA/ NMP/EOI/2014-15/01

Dear Sir:

We _____ who are established and reputable manufacturers of _____ *(name & descriptions of goods offered)* having factories at (*address of factory)* do hereby authorize M/s _____ *(Name and address of authorized supplier)* to submit the offer for the goods manufactured by us against the above document.

We hereby extend our full guarantee and warrantee of 5 years for the goods and services offered for supply by the M/s _____ against this Project in the state of Punjab.

Yours faithfully,

(Name)
(Name of manufacturer)

Note: This letter of authority should be on the Stamp paper and should be signed by a person competent and having the power of attorney to legally bind the manufacturer.

PROFORMA-III

TURNOVER RECORD FORM

To be certified by Chartered Accountant

Name of Company:-

Annual turnover data for past three years				
Sr. No.	Year	Turnover (Rs. In Lacs)	Profit	Loss
1	2	3	4	5
1.	2011-12			
2.	2012-13			
3.	2013-14			

Signature with seal of the company

Signature with seal of the Chartered Accountant

PROFORMA-IV

Performa for submission of rates of different capacity roof top Solar PV Power Projects under Net Metering Policy of Punjab.

Name of company :-																	
Description	Make	Capacity (in KWp) →	1	2	3	5	10	15	20	30	50	80	100	200	300	400	500
Rooftop solar PV power project		price (In Rs.) →															

Signature & Stamp of
Rep. of company

PROFORMA- V

Performa for submission of rates of different components of roof top Solar PV Power Projects under Net Metering Policy of Punjab.

Sr. No	**Name of company :-**												
	Description of Devices	Make	Capacity & Rate										
1.	Solar Panels		Capacity (Wp)	100	150	200	250	300					
			Rate (Rs.)										
2.	PCU		Capacity (KVA)	1 Single phase	2 Single phase	3 Single phase	5 Single phase	10 Three phase	15 Three phase	20 Three phase	30 Three phase	50 Three phase	80 Three phase	100 Three phase
			Rate (Rs.)											
3.	Battery (Tubular Lead Acid)		Capacity (Ah)	12V 150 Ah	12V 180 Ah	12V 200 Ah	12V 250 Ah	2V 200 Ah	2V 500 Ah	2V 800 Ah	2V 1000 Ah	2V 1500 Ah	2V 2000 Ah	2V 2500 Ah
			Rate (Rs.)											

Signature & Stamp of
Rep. of company