

**Policy on net metering & Technical Standards  
for Grid Connectivity For Roof-Top Grid  
Interactive Solar Photovoltaic Power Plants in  
the State Of Punjab**

## Table of Contents

1 Definitions and Interpretations .....	3-5
2 Scope and application .....	5
3 Eligibility .....	5-6
4 Third party owned Rooftop PV net metering model.....	6
5 Net-metering .....	6
6 Capacity Targets for distribution licensee.....	7
7 Installed Capacity.....	7
8 SPV Plant and Metering.....	7
9 Connectivity and Protection.....	7-8
10 Solar Renewable Purchase Obligation.....	8
11 Applicability of other charges.....	8
12 Eligibility to Participate under Renewable Energy Certificate Mechanism.....	8
13 Banking Mechanism and Billing.....	8-9
14 Procedure.....	9-10
15 Restriction on level of overall or local grid penetration.....	10
16 Application Fee.....	10
17 Technical and interconnection requirements.....	11
18 Operation and Maintenance.....	11-12
19 Applicability of Renewable Energy Certificates and RPO.....	12
20 Penalty or Compensation.....	12
21 Power to relax and amend.....	12
22 Subsidy.....	12
Annexures.....	13-20

**GOVERNMENT OF PUNJAB**  
**(DEPARTMENT OF NEW & RENEWABLE ENERGY)**

**O.M. No. 10/174/2014/STE(3)/-----.**

**The --th August, 2014**

Government of Punjab has already notified NRSE Policy 2012 which, inter alia, provides for encouraging solar power generation to harness vast solar potential in the State and to promote Stand Alone, Rooftop and IPP projects to achieve installed capacity of 1000 MW by the year 2022. Solar energy offers clean, climate-friendly abundant and inexhaustible energy resource to mankind. NRSE Policy has also designated PEDDA to undertake a solar rooftop programme in the State for the domestic, industrial and commercial sectors through Grid interconnectivity by deploying net metering / sale of power to PSPCL/LICENSEE. To achieve the objectives of NRSE Policy 2012 and after carefully examining the policies and schemes in this regard, the Governor of Punjab, is pleased to approve the '**Policy on net metering for Grid Interactive Roof-Top Solar Photo Voltaic Power Plants**' which shall be effective from the date of its notification.

**1. Definitions and Interpretations**

1.1 In This Policy, unless the context otherwise requires,

- a) "Act" means the Electricity Act, 2003 (36 of 2003) and subsequent amendments thereof;
- b) "Billing cycle or Billing period" means the period for which regular electricity bills as specified by the Commission, are prepared for different categories of consumers by the licensee;
- c) "Commission" means the Punjab State Electricity Regulatory Commission constituted under the Act;
- d) "Consumer" means any person who is supplied with electricity for his own use by a licensee or the Government or by any other person engaged in the business of supplying electricity to the public under the Act or any other law for the time being in force and includes any person whose premises are, for the time being, connected for the purpose of receiving electricity with the works of a distribution licensee, the Government or such other person, as the case may be;
- e) "Contract Demand" or "Sanctioned Connected Load" means the maximum demand in kW, kVA or BHP, agreed to be supplied by the licensee and indicated in the agreement (A & A Form) executed between the licensee and the consumer;
- f) "Distribution Licensee" or "Licensee" means a person granted a license under Section 14 of the Act authorizing him to operate and maintain a distribution system for supplying electricity to the consumers in his area of supply;
- g) "Electricity Supply Code" means the Electricity Supply Code specified under section 50 of the Act and subsequent amendments thereof;

- h) 'Eligible Consumer' means a consumer of electricity in the area of supply of the distribution licensee, who uses a solar system installed in the consumer premises, to offset part or all of the consumer's own electrical requirements, given that such systems can be self-owned or third party owned;
- i) "Financial Year" or "Year" means the period beginning from first of April in an English calendar year and ending with the thirty first of the March of the next year;
- j) "GOP" means the Government of Punjab in the Department of New & Renewable Energy;
- k) "Interconnection Point" means the interface of roof top solar power generation facility system with the network of distribution licensee and shall normally be the point where meter is installed to measure the energy transfer between Licensee and the solar facility developer as a consumer;
- l) "Invoice" means a Monthly Bill or a Supplementary Bill or a Monthly Invoice or a Supplementary Invoice raised by the distribution licensee to the consumer.
- m) "kWp" means kilo Watt peak;
- n) "Nodal Agency" means Punjab Energy Development Agency;
- o) "Net Metering" means an arrangement under which rooftop solar system installed at eligible consumer premises delivers surplus electricity, if any, to the Distribution Licensee for off-setting the electricity supplied by distribution licensee during the applicable or subsequent Billing Period but within the Settlement Period.
- p) "Obligated Entity" means the entity mandated under clause (e) of subsection (1) of section 86 of the Act to fulfill the renewable purchase obligation and identified under State RPO Regulations;
- q) "Premises" means rooftops or/and vacant spaces/areas on the land, building or infrastructure or part or combination thereof in respect of which a separate meter or metering arrangements have been made by the licensee for supply of electricity;
- r) "Roof top Solar Power Plant Agreement (RSPA)" means an agreement entered into by and between the Distribution licensee and the consumer in accordance with This Policy;
- s) 'Rooftop Solar System' means the solar photo voltaic power system installed on rooftops/vacant spaces/areas within the consumer premises that uses sunlight for direct conversion into electricity through photo voltaic technology;
- t) "Renewable Energy Certificate (REC)" means the certificate issued in accordance with the procedures approved by the Central Electricity Regulatory Commission;
- u) 'Settlement Period' means the period beginning from first of October in a calendar year and ending with the thirtieth of the September of the next year;

v) "Tariff Order" in respect of a licensee means the most recent order issued by the Commission for that licensee indicating the rates to be charged by the licensee from various categories of consumers for supply of electrical energy and services;

w) "Third party Owned" means in which a developer owns the Rooftop Solar system and also enters into a lease/commercial arrangement with the rooftop owner;

1.2 All other words and expressions used in This Policy although not specifically defined herein above, but defined in the Act, shall have the meaning assigned to them in the Act. The other words and expressions used herein but not specifically defined in This Policy or in the Act but defined under any law passed by the Parliament/State Legislature or Regulations notified by Appropriate Commission applicable to the electricity industry in the State shall have the meaning assigned to them in such law.

## **2. Scope and application**

2.1 This Policy shall apply to the distribution licensee and consumers of electricity of distribution licensee of the State of Punjab.

2.2 The eligible consumer may install the rooftop solar system under net metering arrangement which,

a) shall be within the permissible rated capacity as defined under This Policy.

b) shall be located in the consumer premises.

c) shall interconnect and operate safely in parallel with the distribution licensee network.

2.3 Notwithstanding the provisions of This Policy, relevant state authorities shall have the right to undertake rooftop solar projects above 1 MWp capacity through alternative mechanisms.

2.4 This Policy shall remain applicable unless repealed or substituted with new Policy.

2.5 The provisions of NRSE Policy 2012 will also apply to solar power plants under This Policy.

## **3. Eligibility**

3.1 All the consumers of the State Distribution licensee/PSPCL who intend to encourage solar energy and set up solar PV plants at available places on roof-tops of Individual households, industries, Govt./Semi-Govt./Local Body offices, commercial establishments, institutions, residential complexes etc. will be eligible with project capacity ranging from minimum 1 KWp upto 1MWp (AC side) with/without battery back-up support. Consumers may generate solar power for self

consumption and may feed excess power into the grid to be adjusted as per clause 13 of This Policy.

#### **4. Third party owned Rooftop PV net metering model**

4.1 In the third party owned rooftop PV net metering model, the developers or intermediaries lease out solar PV systems to interested rooftop owners. This can be a popular model for residential home owners, where turnkey installers lease rooftop systems to individual owners who, in turn, pay them a monthly lease rental. The owner of the house provides the rooftop and engages a turnkey installer to design and install the system. Alternatively, the installers can also offer an integrated service of leasing, commissioning and maintaining the systems to owners and guaranteeing standards of performance. The electricity generated from such a system is used to meet the rooftop owner's internal electricity needs while the excess generation is fed into the grid on net metering basis. This model has the following benefits:-

- Benefits to rooftop owner: The household owner avoids large upfront investment for the solar equipment and on occasion avoids assuming technology or performance risk of solar systems. Net metering allows the rooftop owner to save on power consumed from the grid to the extent of solar generation. A part of savings in energy bill of power consumption is shared with the developer by way of lease rentals.

- Benefits to developer: The leasing company generates revenues by way of lease rental from the rooftop owner under a contract. As it continues to be owner of the equipment, it also qualifies for claiming depreciation on the capital cost of the PV systems with associated direct tax benefits.

However, for all intent and purposes, PSPCL will deal with the rooftop owner/Consumer only and arrangement between rooftop owner and developer will be personal to them.

As per Open Access Regulations in force, such third party owned system may result in an open access transaction with implications of wheeling charges and surcharge relating to cross subsidy. To encourage the green energy, such roof top solar system installations set up under This Policy would be exempted from open access regulations.

#### **5. Net-metering**

5.1 The distribution licensee shall allow non-discriminatory net-metering arrangement on first-cum-first serve basis for both self-owned and third party owned rooftop PV systems as long as the total capacity (in MW) does not exceed the target capacity determined.

5.2 The distribution licensee shall accept the solar PV power for 25 years as per the useful life of the SPV system.

## **6. Capacity Targets for distribution licensee**

6.1 Maximum cumulative capacity to be installed under This Policy shall be decided by GOP on yearly basis. The shortfall in any year shall be carried forward to the next succeeding year provided that the cumulative capacity to be allowed at a particular distribution transformer shall not exceed 30% of the rated capacity of the distribution transformer; on first-cum-first serve. The applications not considered will lapse and consumer will have to apply afresh in the next financial year.

6.2 The distribution licensee shall update distribution transformer level capacity available for connecting rooftop solar systems under net metering arrangement on 1<sup>st</sup> October every year and shall provide the information on its website as well as to the Commission and PEDDA.

## **7. Installed Capacity**

7.1 The maximum capacity of the Roof Top Solar PV system, as mentioned on AC side at the output of inverter based on rated inverter capacity, shall not be more than 80% of the Sanctioned Connected Load/Contract Demand (in KVA converted to KW at normative Power Factor of 0.90) of the consumer and the minimum capacity shall not be less than 1 KW. Eligible Consumers shall assess their rooftop solar PV plant capacity based on the shadow less clear roof top area/vacant spaces, SCL/CD, actual annual energy consumption pattern and the capacity of Distribution transformer.

## **8. SPV Plant and Metering**

8.1 All the equipment associated with solar plant installation like solar PV panels, inverters; synchronizer, MPPT, batteries, transformers, cables, junction boxes etc shall be brand new and as per latest specified Indian/IEC standards. Bidirectional energy meter with CTs and PT, if required, having the feature of recording both the import and export of energy, besides other parameters shall be as per CEA metering regulations/ State Grid code as applicable and of the make & specifications as approved by PSPCL shall be installed at the cost of the SPV plant owner at the point where interconnection is made between Consumer system and PSPCL system. The Plant owner has option to install the meter & metering equipment procured by PSPCL or can procure from vendors approved by PSPCL. If metering system is procured by Plant owner, then the testing and installation of meters including CTs & PT shall be got carried out from PSPCL as per the latest departmental instructions and no meter rentals shall be charged. PSPCL shall seal the tested bidirectional energy meters as per prevailing practice of PSPCL. Details of Energy Meters is given at **Annexure-I**.

## **9. Connectivity and Protection**

9.1 Solar Photo Voltaic rooftop systems will be allowed in house auto synchronization/de synchronization facility with distribution system of the licensee at generation voltage level. It will utilize the same service line for excess power injection into

the Grid which is currently being used by the consumer for drawl of power from utility network and will operate in synchronization with PSPCL system provided that such injection of power from the rooftop solar PV system shall not be more than 90% of the total consumption from the licensee's supply by the consumer in a Settlement Period. It will be mandatory for the solar rooftop generator to provide an appropriate protection system on their incoming side/ consumer premises with the feature of "Islanding the SPV generator", so as to achieve isolation of consumer power-system from utility power-system during grid failure including protection from voltage / lightning surges. The Power Conditioning Unit of the SPV plant shall have features to filter out harmonics and other distortions before injecting the energy into PSPCL system. The harmonics & inverter standards are given at **Annexure-II & III**.

## **10. Solar Renewable Purchase Obligation**

10.1 The quantum of electricity consumed by eligible consumer, who is not defined as obligated entity, from the rooftop solar system under net metering arrangement shall qualify towards compliance of Renewable Purchase Obligation (RPO) for the distribution licensee.

## **11. Applicability of other charges**

11.1 The rooftop solar system under net metering arrangement, whether self-owned or third party owned installed on eligible consumer premises, shall be exempted from banking & wheeling charges and losses, cross subsidy and additional surcharge etc. and MMC will be applicable as per clause 13.5.

## **12. Eligibility to Participate under Renewable Energy Certificate Mechanism**

12.1 The issuance of renewable energy certificate shall be as per the eligibility criteria specified under Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 and subsequent amendments thereof;

## **13. Banking mechanism and Billing**

13.1 On commissioning of the solar roof top system and at the end of each of the billing cycle/settlement period, PSPCL will take energy meter readings for import/drawl and export/injection of power and work out the net energy flow quantum from or to the consumer. In case the net flow is towards the PSPCL i.e. the consumer has injected/exported the net surplus energy to the PSPCL system, such quantum will be treated as energy banked by the consumer with PSPCL in the current billing cycle. In such scenario, the consumer will be issued Energy Account Statement along with the bill for charges like meter rentals, service charges etc., and banked energy will be carried forward for accounting in the next billing cycle. If the net energy flow is from the PSPCL, then the consumer will be issued the Energy Account Statement and Energy Bill for the net power drawn in the billing cycle plus other charges.



13.2 The Energy Account Statement to be issued to consumer by PSPCL for each billing cycle shall show the quantum of export/injected energy from roof-top Solar PV System, import/drawl of energy from PSPCL in the billing period, banked energy of the previous billing cycle, net billed energy for payment by the consumer for that billing period or net banked energy carried forward to the next billing period separately. The Energy Bill for import will be prepared as per the retail supply tariff as approved by the PSERC for the category to which the consumer belongs. The energy exported to PSPCL from the rooftop Solar PV system shall be set-off against the energy imported from the PSPCL grid at the PSERC approved retail supply tariff applicable to the particular consumer category.

13.3 At the end of the next and subsequent billing cycles/end of settlement period, PSPCL will take the energy meter reading and work out the net flow taking into consideration the energy banked in the previous billing cycle if any, along with the readings of import and export of power for current billing cycle and work out the net energy account bill, as the case may be. The procedure will be repeated at the end of every billing cycle. The settlement of net energy including any banked energy shall be done at the end of each settlement period based on 90% of the consumption. At the beginning of each settlement period, cumulative carried over injected energy shall be reset to zero.

13.4 All Rules and regulations including tariff will be governed by the orders of PSERC and terms and conditions prescribed in Application & Agreement (A&A) form. An additional form/ MOU shall be signed between the licensee and seller of such roof-top Solar PV sources and shall include necessary terms and conditions of meter reading, meter-rent, billing, payment, payment security arrangements, rate of delayed payment surcharge etc. and will become the part of A&A Form.

13.5 All the instructions, rules and regulations applicable to the consumers of the PSPCL for the applicable class/category including but not limited to the Tariff rates, Payment Schedule, Late payment surcharge, connected load/ contract demand, Load Surcharge, peak load restrictions, Advance Consumption Deposit etc., shall also be applicable to the Roof Top Solar plant owner as a consumer of PSPCL. Electricity duty shall be levied as per GOP instructions amended from time to time and at present ED is applicable on the net power drawn by the Consumer from PSPCL.

As long as the consumer having set-up the solar power plant consumes power from PSPCL and/or generated from solar plant or banked solar energy up to or more than the MMC level in any billing period, Monthly Minimum Charges (MMC) will not be leviable.

#### **14. Procedure**

14.1 The consumer intending to set up the Roof top PV system can download the solar net-metering rooftop Application-cum-Agreement form from the website of the

PSPCL and shall submit the same to designated officer of PSPCL for grant of permission to set-up the plant. After checking the feasibility, the applicant shall be issued Letter of Approval by PSPCL within 30 days of receipt of application. The consumer shall set up the plant and submit the work completion report along with Single Line Diagram of the synchronizing and protection arrangement issued by the plant supplier/EPC contractor that the plant has been installed as per approved standards and specifications within 180 days. After site verification, PSPCL shall install and seal the Bi-directional energy meter(s) within 10 days of the submission of report and plant will be treated as commissioned for net-metering commercial operations from that date. In case of delay the consumer shall have to get further extension from PSPCL. Such extension will be granted for a maximum period of 2-months only and the approval granted will lapse automatically if the project is not set-up even in the extended 2-months period. However, he will be eligible to apply in the next financial year but his application will be kept at the bottom of the list of applicants and he will be permitted to set-up the plant only if all the applicants above him are selected and there is still capacity available for allotment.

## **15. Restrictions on level of overall or local grid penetration**

15.1 Net-metering based rooftop solar systems are small capacity systems and can be expected to proliferate fast when the policy and procedures are conducive. The impact and level of proliferation of net-metering based rooftop would have an impact on the local grid which has to address technical, safety and grid security issues arising out of possible reverse flow of electricity in the local grids. The distribution licensee shall provide net metering arrangement to all eligible consumers as long as the cumulative capacity to be allowed for a particular distribution transformer shall not exceed 30% of the rated capacity of the distribution transformer.

The distribution utility to which the - consumer is connected can be given the benefit of deemed RPO for self-consumption of electricity by consumers who are not defined as obligated entities under the RPO framework as long as such consumers do not opt for REC framework for self consumption as eligible entity. This will encourage utilities to facilitate implementation of small capacity net-metering based rooftop solar projects.

The quantum of electricity consumed by an eligible consumer, who is not defined as an obligated entity from the rooftop solar system under net-metering arrangement shall qualify as deemed Renewable Purchase Obligation (RPO) for the distribution licensee.

## **16. Application Fee**

16.1 The applicant shall pay application fee of Rs. 50/KVA alongwith the application to PSPCL. No parallel operation charges shall be leviable on these projects as per NRSE Policy 2012.

## **17. Technical and interconnection requirements**

17.1 Given at Annexure-IV.

## **18. Operation and Maintenance**

18.1 The solar plant shall comply with the relevant standards specified by the MNRE /BIS and CEA. The responsibility of operation and maintenance of the solar photo voltaic (SPV) generator including all accessories and apparatus lies with the consumer. The design and installation of the rooftop SPV should be equipped with appropriately rated protective devices to sense any abnormality in the system and carry out automatic isolation of the SPV from the grid. The inverters used should meet the necessary quality requirements and should be certified for their quality by appropriate authority; the protection logics should be tested before commissioning of the plant.

18.2 The automatic isolation or islanding protection of SPV should be ensured for, no grid supply and low or over voltage conditions and within the required response time. Adequate rated fuses and fast acting circuit breakers on input and output side of the inverters and disconnect/isolating switches to isolate DC and AC system for maintenance shall be provided. The consumer should provide for all internal safety and protective mechanism for earthing, surge, DC ground fault, transients etc.

18.3 To prevent back feeding and possible accidents when maintenance works are carried out by DISCOM personnel, Double pole/Triple pole with neutral isolating disconnect switches which can be locked by DISCOM personnel should be provided. This is in addition to automatic sensing and isolating on grid supply failure etc and in addition to internal disconnect switches. In the event of DISCOM LT/HT supply failure, the consumer has to ensure that there will not be any solar power being fed to the LT/HT grid of DISCOM. The consumer is solely responsible for any accident to human beings/animals whatsoever (fatal/non fatal/departmental/non departmental) that may occur due to back feeding from the SPV plant when the grid supply is off. DISCOM reserves the right to disconnect the installation at any time in the event of damage to its grid, meter, etc. or to prevent accident or damage.

18.4 The consumer shall abide by all the codes and regulations issued by the Commission to the extent applicable and in force from time to time. The consumer shall comply with PSERC/DISCOM/CEA requirements with respect to safe, secure and reliable function of the SPV plant and the grid. The power injected into the grid shall be of the required quality in respect of wave shape, frequency, absence of DC components etc.

18.5 The consumer shall restrict the harmonic generation within the limit specified in the agreement or specified by the Central Electricity Authority as and when such regulation is issued.

18.6 The SPG (individual homes/commercial establishments) may establish LT grid interactive solar power plant in the roof top or elevated surface with the following options:

1. Grid interactive solar PV system without battery.
2. Grid interactive solar PV system with battery backup.

However, in both the options, features as per section 18.2 & 18.3 above shall be available so as to ensure islanding of the SPV system & prevent back feeding to Grid system of PSPCL.18.7 The inverter standard shall be such that it should not allow solar power/battery power to extend to DISCOM's LT grid on failure of DISCOM's grid supply, irrespective of the LT connectivity options. The required inverter standard for three phase and single phase solar power are furnished in Annexure-III. 18.8 The inverter should be a sine wave inverter. Harmonic standards shall be as per IEEE 519.

### **19. Applicability of Renewable Energy Certificates and RPO**

19.1 Net-metering injection is not eligible for REC. The quantum of electricity consumed by an eligible consumer, who is not defined as an obligated entity from the rooftop solar system under net-metering arrangement shall qualify as deemed Renewable Purchase Obligation (RPO) for the distribution licensee.

### **20. Penalty or Compensation**

20.1 In case of failure of net metering system, the provisions of penalty or compensation shall be as per the provisions of the standard of performance regulations for distribution licensee.

### **21. Power to interpret, relax and amend**

22.1 The Secretary, New and Renewable Energy shall be final authority to interpret any of the provisions and may by general or special order, relax any of the provisions of This Policy and from time to time add, vary, alter, suspend, modify, amend or repeal any provisions of This Policy.

### **22. Subsidy**

22.1 The consumers interested in setting up of solar rooftop PV project can approach PEDDA for grant of applicable MNRE, Govt. of India grant as per the prevailing instructions/Policy.

22.2 The solar power plant will be eligible for the fiscal and other incentives as per NRSE Policy 2012.

**Sd/-  
Secretary,  
Department of New and Renewable Energy  
Govt. Of Punjab**

**ANNEXURE-I**

**Energy Meter(s) Detail**

<b>S.No.</b>	<b>Meter Description</b>	<b>Accuracy</b>	<b>Load of Consumer</b>	<b>Voltage Level</b>
1	Single Phase 10-60 A, whole current	Class-I	upto 7 KW	Single Phase LT 230 V
2	3 Phase 10-60 A, whole current	Class-I	More than 7KW & up to 25 KW	Three Phase LT 400 V
3	LT AC 3-Phase 4-Wires CT operated static DLMC compliant energy meter	Class- 0.5s or better	More than 25 KW & up to 100 KW	Three Phase LT 400 V
4	HT TPT Meter, DLMS Compliant & AMR Compatible	Class- 0.5s or better	More than 100 KW	Three Phase HT (11 KV)

**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%.

**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.

**Technical and interconnection requirements**

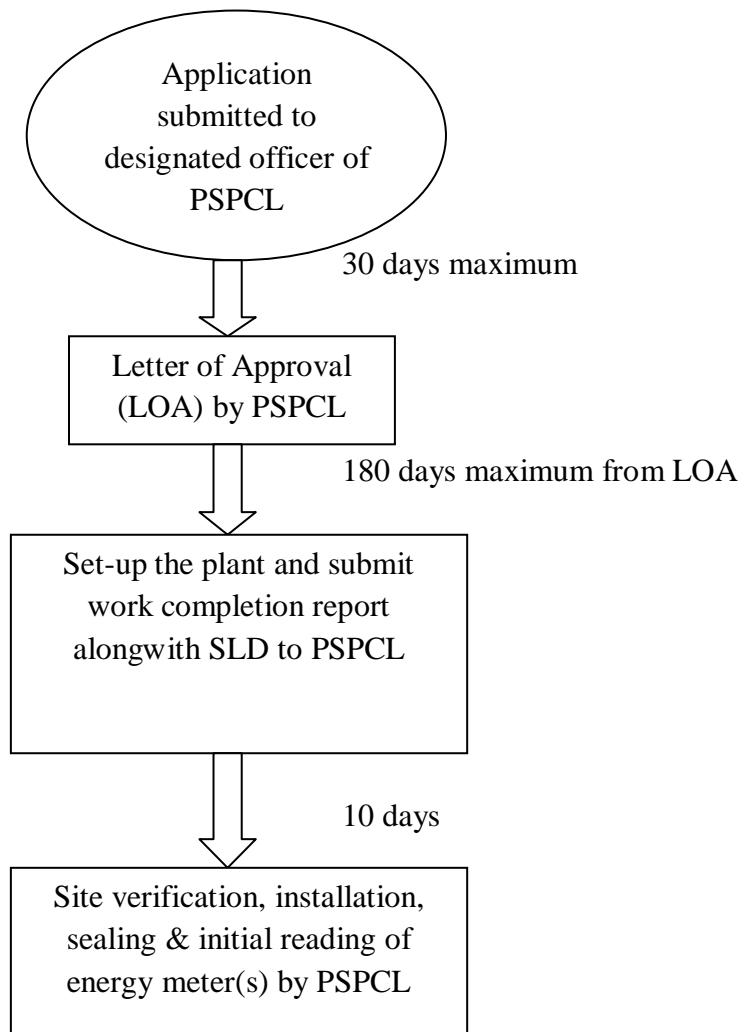
<b>Parameter</b>	<b>Reference</b>	<b>Requirement</b>
<b>Overall conditions of service</b>	State Distribution/Supply Code	State Distribution/Supply Code
<b>Overall Grid Standards</b>	Central Electricity Authority (Grid Standard) Regulations 2010	Central Electricity Authority (Grid Standard) Regulations 2010
<b>Equipment</b>	BIS / IEC / IEEE	BIS / IEC / IEEE
<b>Meters</b>	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
<b>Safety and supply</b>	Central Electricity Authority(measures of safety and electricity supply) Regulations, 2010	Central Electricity Authority(measures of safety and electricity supply) Regulations, 2010
<b><u>Harmonic Requirements</u></b>		
<b>Harmonic Current</b>	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
<b>Synchronization</b>	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.
<b>Voltage</b>	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.
<b>Flicker</b>	IEEE 519 CEA (Technical Standards for	Operation of Photovoltaic system should not cause



	Connectivity of the Distributed Generation Resources) Regulations 2013	voltage flicker in excess of the limits stated in IEC 61000 standards or other equivalent Indian standards, if any.
<b>Frequency</b>	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.
<b>DC injection</b>	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.
<b>Power Factor</b>	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.
<b>Islanding and Disconnection</b>	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.
<b>Overload and Overheat</b>	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.
<b>Paralleling Device</b>	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.

**Note:** The standards/specifications shall be subject to amendments/revisions from time to time as duly notified by PEDDA on its website.

**Timelines to set-up Grid Interactive Roof-Top Solar Photovoltaic Power Plants**



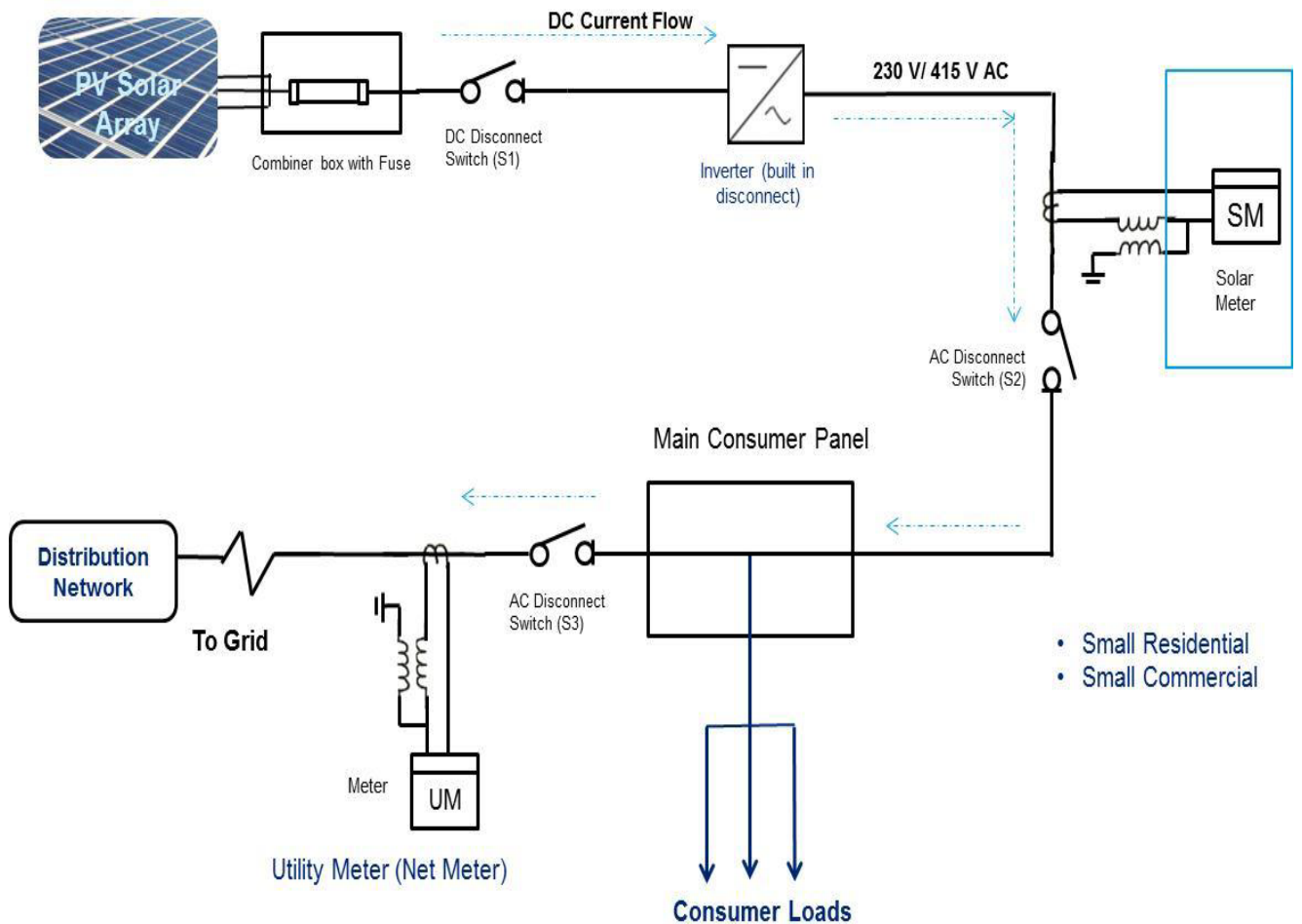
## **ANNEXURE-VI**

### **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**

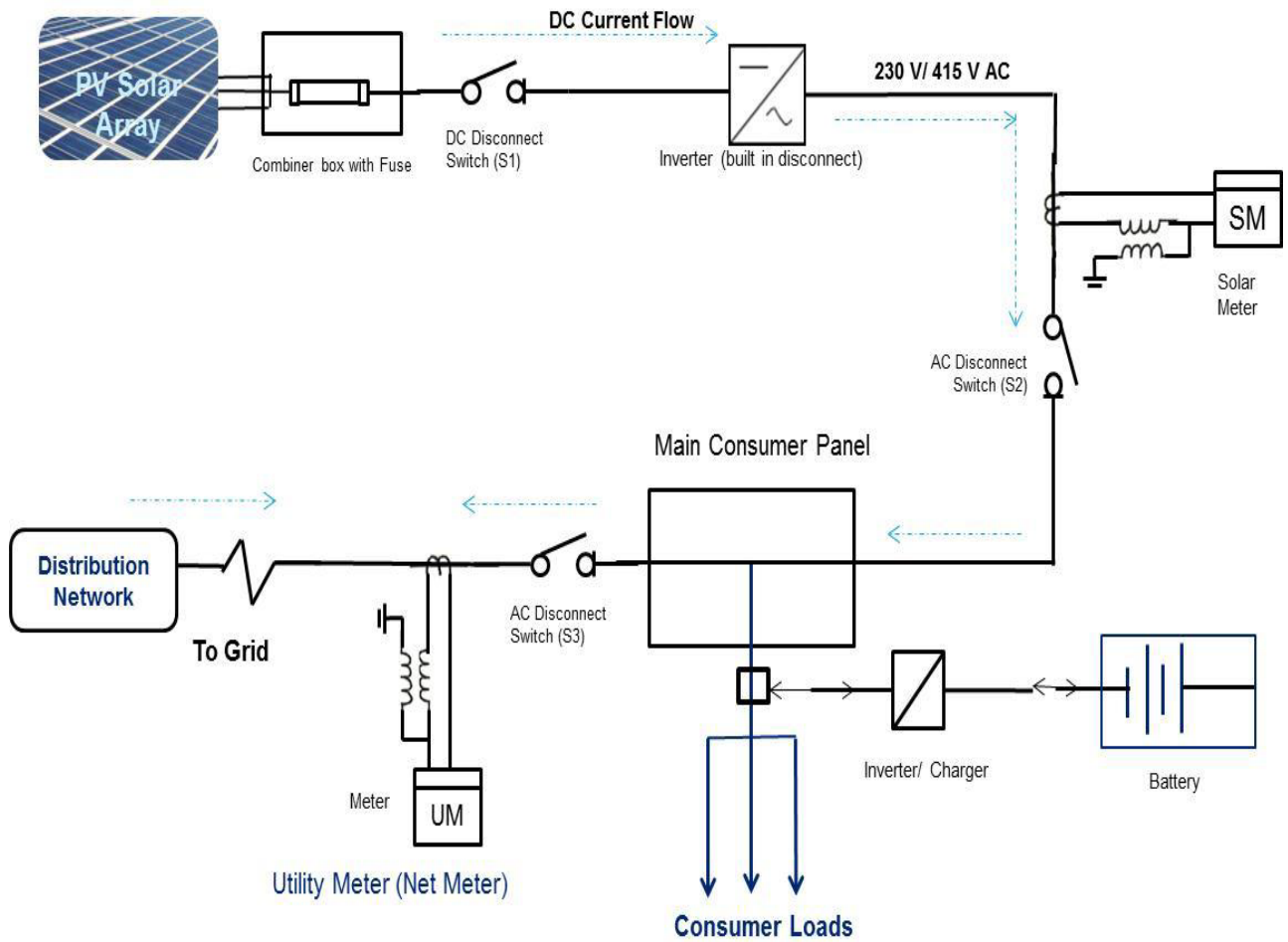
The metering protocol for 'Grid connected rooftop solar PV system without storage' and location of solar meter and consumer meter shall be in accordance with the schematic below:-



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.

## b) 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.