

GUJARAT ELECTRICITY REGULATORY COMMISSION

Notification No. 5/2016

Regulations for Net Metering Rooftop Solar PV Grid Interactive Systems

June 2016

Table of Contents

| | | |
|----|--|----|
| 1 | Short title, and commencement..... | 2 |
| 2 | Definitions and Interpretations..... | 2 |
| 3 | Scope and application..... | 7 |
| 4 | General Principles..... | 7 |
| 5 | Capacity Targets for distribution licensee..... | 8 |
| 6 | Eligible Entity and individual project capacity..... | 9 |
| 7 | Procedure for Application..... | 10 |
| 8 | Interconnection with the Grid..... | 14 |
| 9 | Energy Accounting and Settlement..... | 19 |
| 10 | Dispute Resolution..... | 22 |
| 11 | Solar Renewable Purchase Obligation..... | 22 |
| 12 | Applicability of other charges..... | 23 |
| 13 | Metering arrangement..... | 23 |
| 14 | Sharing of CDM benefits..... | 24 |
| 15 | DemandCut..... | 24 |
| 16 | Penalty for Compensation..... | 25 |
| 17 | Power to give directions..... | 25 |
| 18 | Power to relax..... | 25 |
| 19 | Power to amend..... | 25 |
| 20 | Power to Removal of difficulty..... | 26 |
| 21 | Annexure - I | 27 |
| 22 | Annexure - II | 29 |
| 23 | Anneuxre - III..... | 30 |
| 24 | Annexure - IV | 31 |
| 25 | Annexure - V..... | 42 |
| 26 | Annexure - VI | 49 |

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In exercise of powers conferred under Sections 61, 66, 86(1)(e) and 181 of the Electricity Act, 2003 (Act 36 of 2003) and all other powers enabling it in this behalf, the Gujarat Electricity Regulatory Commission hereby makes the following Regulations for the grid connected Solar Rooftop Photovoltaic System:

1 Short title, and commencement

- 1.1 These Regulations shall be called the Gujarat Electricity Regulatory Commission (Net Metering Rooftop Solar PV Grid Interactive Systems) Regulations, 2016.
- 1.2 These Regulations shall come into force from the date of its notification in the Official Gazette.

2 Definitions and Interpretations

- 2.1 In these Regulations, unless the context otherwise requires,
 - a) “**Act**” means the Electricity Act, 2003 (36 of 2003) as amended from time to time ;
 - b) “**Agreement**” means a connection agreement entered into between the Distribution Licensee and the consumer;

- c) **“Area of supply”** means the geographic area within which the licensee, for the time being, is authorised by its licence to supply the electrical energy;
- d) **“Average Power Purchase Cost”** (APPC) means the Weighted Average Pooled Price at which the distribution licensee has purchased the electricity including cost of self generation, if any, in the previous year from all the energy suppliers on long-term, medium-term and short-term basis, but excluding energy purchased from renewable energy sources,
- e) **“Billing Cycle or Billing Period”** means the period for which regular electricity bills are prepared for different categories of consumers by the Distribution licensee, as specified by the Commission;
- f) **“Commission”** means the Gujarat Electricity Regulatory Commission constituted under the Act;
- g) **“Consumer”** means any person who is supplied with electricity for his own use by a Distribution 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, for the time being, is 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;
- h) **“Connected load”** expressed in kW, kVA or HP, refers to aggregate of the manufacturer’s rated capacities of all the energy consuming devices or apparatus connected with the Distribution licensee’s service line on the consumer’s premises which can be operated simultaneously. For the purpose of levy of any charges and for deciding the supply voltage, the connected load shall be determined as per the method prescribed in the Gujarat Electricity

Regulatory Commission (Electricity Supply Code and Related Matters) Regulations, 2015 and subsequent amendments thereto;

- i) **“Contracted load”** or **“Sanctioned load”** or **“Contracted demand”** means the maximum demand in kW, kVA or HP, agreed to be supplied by the licensee and indicated in the agreement executed between the licensee and the consumer;
- j) **“Distribution licensee”** or **“licensee”** or **“supply licensee”** means a person who is granted a licence under Section 14 of the Act authorizing him to operate and maintain a distribution system and supplying electricity to the consumers in his area of supply;
- k) **“Electricity Supply Code”** means the GERC (Electricity Supply Code and Related Matters) Regulations, 2015 notified by the Commission under Section 50 of the Act as amended from time to time;
- l) **“Eligible Consumer”** means a consumer of electricity in the area of supply of the distribution licensee, who intends to use a Rooftop Solar PV System, given that such system is self owned, to offset part or all of the consumer's own electrical requirements.
- m) **“Financial Year”** or **“Year”** means the period beginning from first (1st) of April in an English calendar year and ending on thirty first (31st) of March of the next year;
- n) **“Interconnection Point”** means the interface of Rooftop Solar PV System connected with the load side of meter/Distribution licensee cut out/switch gear fixed in the premises of the consumer.

- o) **“Invoice”** means either a Regular Bill / Supplementary Bill or a Regular Invoice/ Supplementary Invoice raised by the distribution licensee as provided in Regulation 2.1(e) of these Regulations;
- p) **“Net Metering”** means an arrangement under which Rooftop Solar PV System installed at Eligible Consumer’s premises delivers surplus electricity, if any, to the Distribution Licensee after off-setting the electricity supplied by the distribution licensee to such Eligible Consumer during the applicable billing period.
- q) **“Net meter”** means an appropriate energy meter capable of recording both import & export of electricity or a pair of meters one each for recording the import and export of electricity as the case may be;
- r) **“Obligated entity”** means the entity mandated under clause (e) of sub-section (1) of Section 86 of the Act to fulfil the Renewable Purchase Obligation and identified as such under Gujarat Electricity Regulatory Commission (Procurement of Energy from Renewable Energy Sources) Regulations, 2010 as amended from time to time;
- s) **“Premises”** means rooftops or/and Open 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;
- t) **“Rooftop Solar PV Power Plant”** or **“Rooftop Solar PV System”** or **“Solar Generating Plant”** means the Solar Photo Voltaic Power Plant including small solar systems installed on the rooftops/ground mounted or open land of

consumer premises that uses sunlight for direct conversion into electricity through photovoltaic technology;

- u) **“Renewable Energy Certificate (REC)”** means the certificate issued in accordance with the procedures approved by the Central Electricity Regulatory Commission;
 - v) **“Renewable Energy System”** means the system to generate electricity from such source(s) which are recognized as renewable energy source(s) by the Gujarat Electricity Regulatory Commission in GERC (Procurement of Energy from Renewable Energy Sources) Regulations, 2010 as amended from time to time;
 - w) **“State Nodal Agency”** means the agency as designated by the State Government through Solar Policy 2015;
 - x) **“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 to various categories of consumers for supply of electrical energy and services;
- 2.2 All other words and expressions used in these Regulations although not specifically defined herein above, but defined in the Act, or defined under any law passed by the Parliament applicable to the electricity industry in the State shall have the meaning assigned to them in the Act or in such law.
- 2.3 Headings or Capital words are inserted for convenience and may not be taken into account for the purpose of interpretation of these Regulations;
- 2.4 Words in the singular or plural term, as the case may be, shall also be deemed to include the plural or the singular term, respectively;

2.5 Abbreviations used in these Regulations shall have the meanings as stated in Annexure - I.

3 Scope and Application

3.1 These Regulations shall apply to the distribution licensee and consumers of electricity of distribution licensee availing supply from it in its area of supply in the State of Gujarat, or consumers who are receiving electricity from its own generating source but situated in the distribution licensee area.

3.2 The Eligible Consumer may install the Rooftop Solar PV System under net metering arrangement which,

a) shall be within the permissible rated capacity as defined under these Regulations.

b) shall be located in the consumer's premises.

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

3.3 These Regulations do not preclude the right of relevant Distribution licensee or State Government Department/authorities to undertake Rooftop Solar PV projects above 1 MW capacity through alternative mechanisms.

4 General Principles

The distribution licensee shall provide the net metering arrangement to the eligible consumer, who intends to install grid connected Rooftop Solar PV System, in its area of supply on non-discriminatory and first come first served basis.

Provided that the consumer is eligible to install the grid connected Rooftop Solar PV System of the rated capacity as specified under these Regulations;

Provided further that the interconnection of such system with the grid is undertaken as specified under the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 read with Central Electricity Authority (Technical Standards for Connectivity of Distributed Generated Resources) Regulations, 2013 and provisions of GERC (Terms and Condition of Intra-State Open Access) Regulations, 2011 as amended from time to time.

5 Capacity Targets for Distribution Licensee

The Distribution Licensee shall provide net metering arrangement to Eligible Consumers.

Provided that the cumulative capacity to be allowed at a particular distribution transformer shall not exceed 65% of the peak capacity of the distribution transformer;

- 5.1 The distribution licensee shall update distribution transformer capacity available for connecting Rooftop Solar PV Systems under net metering arrangement on yearly basis and shall provide the information to the Commission.

Provided that if augmentation of transformer/distribution network is required, the cost of such augmentation shall be borne by the consumer.

The capacity of Rooftop Solar PV System to be installed at the premises of any consumer shall not be less than one Kilo Watt (1kW).

6 Eligible Consumer and individual project capacity

6.1 In addition to the general eligibility defined in Regulation 2.1(l) of these Regulations, the Eligible Consumer for the Rooftop Solar PV System with net metering shall:

- i. be a consumer of the local distribution licensee;
- ii. own or be in legal possession of the premises including the rooftop or terrace or building or infrastructure or open areas of the land or part or combination thereof on which the Solar PV System is proposed to be installed;
- iii. connect the proposed Rooftop Solar PV System to the Distribution System of the Licensee;
- iv. consume all of the electricity generated from the Rooftop Solar PV System at the same premises. If the consumer is not able to consume all of generated electricity in the same premises, he shall be governed by Regulation 9 of these Regulations.

6.2 The maximum Rooftop Solar PV System capacity to be installed at any Eligible Consumer's premises shall be upto a maximum of 50% of consumer's sanctioned load/contract demand;

Provided that the installed capacity shall not be less than 1 kW and shall not exceed 1 MW;

Provided also that the installed capacity is aligned with the provisions for permitting consumer connections as stated in the Gujarat Electricity Regulatory Commission (Electricity Supply Code and Related Matters) Regulations, 2015 as amended from time to time, read with the provisions of GERC (Terms and Conditions of the Intra-State Open Access) Regulations, 2011 as amended from time to time.

7 Procedure for Application

Various activities and different authorities are associated with the Solar Rooftop PV project. It is necessary that the different entities carry out the works within prescribed time limit. Therefore, time frame prescribed in the table below shall be scrupulously followed by the concerned authorities.

| Sr. No. | Activity | Sub Activity | Duration in day(s) |
|---------|--|--|--|
| 1. | Registration at GEDA | GEDA shall issue Registration Certificate | 5 days from receipt of duty completed application |
| 2. | Approval from Chief Electrical Inspector | CEI shall approve Single Line Diagram, Earthing Diagram and Wiring Diagram | 10 days from receipt of duly completed application |
| 3. | Application to Distribution Licensee | <p>Applicant shall submit application in prescribed format along with following compliance and documents to Distribution Licensee</p> <ul style="list-style-type: none"> • Capacity of Solar Rooftop to be installed (Maximum shall be 50% of the Consumer's sanctioned load) • Copy of registration at GEDA • Documents related to legal possession of roof-top /NOC of co-owners, in case of joint ownership. • Approval of Chief Electrical Inspector (CEI) for Single Line Diagram, Earthing Diagram and Wiring Diagram. | |
| 4. | Technical Feasibility Report (TFR) | On Registration with Distribution Licensee, letter to concerned Circle/Division for TFR and informing applicant regarding specifications of CTPT, meter. | 5 days from receipt of duly completed application |
| 5. | TFR from field | TFR to include following | 10 days from the |

| Sr. No. | Activity | Sub Activity | Duration in day(s) |
|---------|----------|--|--|
| | | <p>a) Name of Consumer.</p> <p>b) Load details of the building where roof-top is to be installed as under: Name of Division, Sub-Division, Consumer Name, Consumer No., Address, Tariff, Contract Demand/ Load, Connected Load</p> <p>c) Name of 11KV feeder, Transformer capacity, Solar Rooftop capacity already connected as well as approved/sanctioned on this transformer including this proposed Solar Rooftop capacity whether total Rooftop solar capacity is within the rated capacity of transformer.</p> <p>d) Maximum demand recorded during last one year.</p> <p>e) No dues certificate.</p> <p>f) No legal disputes pending certificate.</p> <p>g) Detailed estimate to be recovered from applicant for strengthening of Distribution Licensee's system for the work to be carried out for providing connectivity and evacuation facility of surplus power to be injected by the applicant.</p> <p>Note: Solar installation to be restricted up to T/C capacity, and if required, it is to be strengthened at the cost of Solar Rooftop Generator.</p> | letter of Head Office |
| 6 | Post TFR | <p>On receipt of TFR from field, Head Office shall issue letter to applicant regarding</p> <p>In principle consent for connectivity, payment of connectivity charges and execution of connectivity agreement within 15 days.</p> <p>OR</p> <p>Issuing estimate to applicant for system strengthening (if required) to be paid</p> | 5 days from receipt of TFR from field office |

| Sr. No. | Activity | Sub Activity | Duration in day(s) |
|---------|--|---|---|
| | | within 30 days, payment of connectivity charges and execution of connectivity agreement. | |
| 7 | Signing of connectivity agreement and issuance of letter to applicant for completion of project work | <p>Case 1 (No system strengthening required) On payment of Connectivity Charges and execution of Connectivity Agreement within 15 days of consent. Letter to applicant to complete the project work within 6 months</p> <p>Case 2 (If system Strengthening required) On payment of Connectivity Charges and execution of Connectivity Agreement within 30 days along with payment of estimate. Letter to applicant to complete the project work within 6 months.</p> | <p>5 days from execution of agreement</p> <p>5 days from execution of agreement</p> |
| 8 | System strengthening by Distribution Licensee | Distribution Licensee to complete the work of system strengthening on payment of estimate. | 45 days in parallel to project installation |
| 9 | Notice to applicant for commissioning | Issuance of two months notice to applicant for commissioning of the project on expiry of 6 months project completion period. | Within 5 days on expiry of 6 months |
| 10 | In case of non-completion of work by applicant | If no intimation received from applicant on expiry of 2 months notice period, application shall be cancelled informing the applicant within 30 days forfeiting all charges paid for Solar Rooftop Project. | Within 5 days on expiry of 2 months |
| 11 | On completion of work by applicant | Intimation to applicant to submit following documents within 5 days: (if not submitted along with intimation of commissioning by applicant) <ol style="list-style-type: none"> 1. Ownership of Solar PV system 2. Installation charging approval of Chief Electrical Inspector(CEI) 3. Meter/ CTPT testing certificate from High-tech lab and ERDA. 4. All equipment should comply with | 5 days from receipt of completion letter from applicant |

| Sr. No. | Activity | Sub Activity | Duration in day(s) |
|---------|---|--|--|
| | | <p>IEC standards. Applicant to submit relevant IEC certificate/test reports for all equipments ,i.e. for modules/SPV/inverters/cables/junction box/Transformer /RMU/CTPT/meter etc.</p> <p>5. Installation of proper protection system (inverter shall have anti islanding feature) along with second line of protection such as no volt relay, applicant has to pay connectivity charges and execute connectivity agreement with Distribution Licensee</p> <p>Note: If applicant is not submitting above documents within 5 days, application shall be cancelled forfeiting all charges paid for Solar Rooftop Project.</p> | |
| 12 | Intimation to Field Office | On receipt of documents from the applicant, intimation to Field Office/Sub-division for installation of meter (Solar meter to record total generation and bidirectional/ABT meter for net metering). | 5 days from receipt of documents from the applicant |
| 13 | Report from field/sub-division | Installation of meter (Solar meter to record total generation and bidirectional/ABT meter for net metering) and intimate to applicant and report to HO | 7 days from receipt of letter from HO |
| 14 | Intimation to GEDA | Distribution Licensee shall intimate to GEDA for issuing commissioning certificate | 5 days from receipt of letter from Distribution Licensee |
| 15 | Issuance of Commissioning Certificate from GEDA | GEDA shall visit the site in consultation with Distribution Licensee and applicant and issue Commissioning Certificate | 5 days from the receipt of intimation from applicant |

8 Interconnection with the Grid: Standards and Safety

- (1) The interconnection of the Rooftop Solar PV System with the network of the distribution licensee shall be made as per the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007, CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 and GERC (Terms and Conditions of Intra-State Open Access), Regulations, 2011 as amended from time to time.

The interconnection of the Rooftop Solar PV System with the distribution system of the licensee shall conform to the relevant provisions of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 as amended from time to time.

Provided that a variation in the rated capacity of the system within a range of five percent (5%) shall be allowed;

Provided further that the system qualifies the technical requirements for grid interconnection with the network of the distribution licensee.

- (2) The connectivity levels at which the Rooftop PV Solar System shall be connected with the grid are as specified below:

| Sr. No. | Connected load of Eligible Consumer | Connectivity level |
|---------|-------------------------------------|---------------------|
| 1. | Upto 6 kW | 240 V- single phase |
| 2. | Above 6 kW and upto 18.65 kW | 415 V-Three phase |
| 3. | Above 18.65 kW and upto 100 kW/kVA | 415 V-Three phase |
| 4. | Above 100 kW/kVA | HT level |

- (3) The above connectivity norms are applicable to all the Rooftop Solar PV System for seeking connectivity with the network of the distribution licensees. HT consumers may install Rooftop Solar PV System at LT/HT voltage and connect

them to their LT/HT system for interconnection of Rooftop Solar PV System with the local distribution licensee's grid, for which the relevant provisions of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, as amended from time to time, Central Electricity Authority (Standards of connectivity of distributed generation resources) Regulations, 2013 and GERC (Terms and Conditions of Intra-State Open Access) Regulations, 2011 as amended from time to time shall be applicable.

- (4) The Rooftop Solar PV Energy Generator shall be responsible for safe operation, maintenance and rectification of defects of its system up to the interconnection point beyond which the responsibility of safe operation, maintenance and rectification of any defects in the system including the net meter shall rest with the distribution licensee.
- (5) The consumer/ Rooftop Solar PV Energy Generator shall be solely responsible for any accident to human being/ animals whatsoever (fatal/non-fatal/departmental/non-departmental) that may occur due to back feeding from the Rooftop Solar PV System when the grid supply is off, based on the issue decided by the Chief Electrical Inspector. The distribution licensee reserves the right to disconnect the consumer's installation at any time in the event of such exigencies to prevent accident or damage to men and materials.
- (6) The tests as per EN 50160 and as per distribution licensee's standards shall be carried out by the Chief Electrical Inspector to ensure the quality of power generated from the Rooftop Solar PV System.
- (7) Any alternate source of supply shall be restricted to the consumer's network and the consumer shall be responsible to take adequate safety measures to prevent battery power/diesel generator power/back-up power extending to distribution licensee's LT grid on failure of distribution licensee's grid supply.

(8) The distribution licensee shall have the right to disconnect the Rooftop Solar PV System from its system at any time in the following conditions:

(i) Emergencies or maintenance requirement on the distribution licensee's system,

(ii) Hazardous conditions existing on the distribution licensee's system due to operation of Rooftop Solar PV System or protective equipment as determined by the Distribution Licensee/Transmission Licensee/SLDC, and

(iii) Adverse electrical effects, such as power quality problems, on the electrical equipment of other consumers of the distribution licensee caused by the Rooftop Solar PVS system as determined by the distribution licensee.

(9) Subject to sub Regulation 8(4) above, the distribution licensee may call upon the Rooftop Solar PV generator to rectify the defect within two days of such intimation.

(10) The Rooftop Solar PV System should be capable of detecting an unintended islanding condition. This system must have anti-islanding protection to prevent any unfavourable conditions including failure of supply. IEC-62116 shall be followed to test islanding prevention measure for grid connected photovoltaic inverters.

(11) Every Rooftop Solar PV System shall be equipped with automatic synchronization device:

Provided that Rooftop Solar PV System using inverter shall not be required to have separate synchronization device, if the same is inherently built into the inverter.

(12) The Rooftop Solar PV System operating in parallel with electricity system shall be equipped with the following protective functions to sense abnormal conditions on electricity system and cause the Rooftop Solar PV System to be

automatically disconnected from the electricity system or to prevent the Rooftop Solar PV System from being connected inappropriately to the electricity system;

- (i) Over and under voltage trip functions if voltage reaches above 110% or below 80% respectively with a clearing time upto two (2) seconds;
- (ii) Over and under frequency trip functions, if frequency reaches 50.5 Hz or below 47.5 Hz with a clearing time upto 0.2 seconds;
- (iii) The Rooftop Solar PV System shall cease to energize the circuit to which it is connected in case of any fault in the circuit;
- (iv) A voltage and frequency sensing and time delay function to prevent the Rooftop Solar PV System from energizing a de-energized circuit and to prevent the Rooftop Solar PV System from reconnecting with electricity system unless voltage and frequency is within the prescribed limits and are stable for at least sixty (60) seconds; and
- (v) A function to prevent the Rooftop Solar PV System from contributing to the formation of an unintended island, and cease to energize the electricity system within two (2) seconds of the formation of an unintended island.

(13) The equipment of the Rooftop Solar PV System shall meet the following requirements:

- (i) Circuit Breakers or other interrupting equipment shall be suitable for their intended application with the capability of interrupting the maximum available fault current expected at their location,
- (ii) The Rooftop Solar PV System and associated equipment shall be so designed that the failure of any single device or component shall not potentially compromise the safety and reliability of the electricity system and
- (iii) Paralleling device of the Rooftop Solar PV System shall be capable of withstanding 220% of the nominal voltage at the interconnection point.

(14) Every time the Rooftop Solar PV System of the Eligible Consumer is synchronized with the distribution system, it shall not cause voltage fluctuation greater than $\pm 5\%$ at the point of inter connection.

(15) After considering the maintenance and safety procedures, the distribution licensee may require a Rooftop Solar PV System to provide a manually operated isolating switch between the Rooftop Solar PV System and the electricity system, which shall meet following requirements:

(i) Allow visible verification that separation has been accomplished;

(ii) Include indications to clearly show open and closed positions;

(iii) Be capable of being reached quickly and conveniently twenty four (24) hours a day by licensee's personnel without requiring clearance from the applicant;

(iv) Be capable of being locked in the open position;

(v) May not be rated for load break nor may have feature of over-current protection; and

(vi) Be located at a height of at least 2.44 m above the ground level.

(16) Prior to synchronization of the Rooftop Solar PV System for the first time with the distribution system of the licensee the applicant and the licensee shall agree on the protection features and control diagrams.

(17) The power conditioning unit shall have the features of filtering out harmonics and other distortions before injecting the energy into the system of the distribution utility. The technical standards, power quality standards and inverter standards shall be as per Annexure - V of these Regulations or any other standards as may be specified by CEA from time to time.

(18) The commissioning test of the Rooftop Solar PV System shall be carried out in the presence of representatives of consumer/owner of Rooftop Solar PV System,

GEDA and concerned officer of the distribution licensee. The commissioning certificate shall be signed by all the above named parties. Date of commissioning shall be recognised from the date on which successful commissioning test is conducted.

(19) The Commissioning certificate must contain of the following details:

- I. Details of Solar PV panels including name of the manufacturer, type, size/capacity of the panels, etc.;
- II. Details regarding inverter, types of inverters and size;
- III. Total capacity of the Solar PV Plant;
- IV. Details of meter installed along with the types of meter accuracy, serial number, etc.

9 Energy Accounting and Settlement

Any energy injected prior to commissioning shall be deemed as inadvertent power. The consumer/Solar PV owner is not eligible to receive any monetary compensation for such inadvertent power.

9.1 For each billing period, the licensee shall show the quantum of electricity injected by Eligible Consumer/Solar PV system in the grid, electricity supplied by the distribution licensee, net billed electricity for payment by the consumer and net exported energy after adjustment against the consumption separately.

(1) For Residential and Government consumers

9.2 In the event the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer's Rooftop Solar PV System, the distribution licensee shall raise invoice for the net electricity consumption at the consumer's prevailing tariff;

In the event the electricity injected exceeds the electricity consumed during the billing period, such excess injected electricity shall be purchased by the concerned Distribution Licensee at the APPC rate determined by the Commission for the year in which the Rooftop Solar PV System is commissioned for whole life of the Rooftop Solar PV System; e.g. for the Rooftop Solar PV System commissioned during 2016-17, the APPC rate determined by the Commission for FY 2015-16 shall be applicable.

Banking of energy shall be allowed within one billing cycle of the consumer.

The distribution licensee in addition to consumer tariff shall be eligible to raise invoice for any other charges as allowed by the Gujarat Electricity Regulatory Commission from time to time.

(2) For Industrial, Commercial and Other Consumers utilizing the ‘energy attribute’ of the generated solar energy from the Rooftop Solar PV System and not registered under REC mechanism.

9.3 In the event the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer’s Rooftop Solar PV System, the distribution licensee shall raise invoice for the net electricity consumption at the consumer’s prevailing tariff;

In the event the electricity injected exceeds the electricity consumed during the billing period, such excess injected electricity after adjustment of consumption shall be purchased by the concerned Distribution Licensee at the APPC rate determined by the Commission for the year in which the Rooftop Solar PV System is commissioned for whole life of the Rooftop Solar PV System;

Banking of energy shall be allowed within one billing cycle of the consumer, wherein set off may be given against energy consumed at any time of the billing

cycle. However, peak charges shall be applicable for consumption during peak hours.

The distribution licensee in addition to consumer tariff shall be eligible to raise invoice for any other charges as allowed by the Gujarat Electricity Regulatory Commission from time to time.

(3) For Industrial, Commercial and Other Consumers utilizing the ‘energy attribute’ of the generated solar energy from the Rooftop Solar PV System and utilizing the ‘renewable attribute’ for RPO compliance.

9.4 In the event the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer’s Rooftop Solar PV System, the distribution licensee shall raise invoice for the net electricity consumption at the consumer’s prevailing tariff;

In the event the electricity injected exceeds the electricity consumed during the billing period, such excess injected electricity after adjustment of consumption in 15 minutes time block shall be purchased by the concerned Distribution Licensee at the APPC rate determined by the Commission for the year in which the Rooftop Solar PV System is commissioned for whole life of the Rooftop Solar PV System;

(4) For Industrial, Commercial and Other Consumers utilizing the ‘energy attribute’ of the generated solar energy from the Roof top Solar PV System and utilizing the ‘renewable attribute’ for REC.

9.5 In the event the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer’s Rooftop Solar PV System, the distribution licensee shall raise invoice for the net electricity consumption at the consumer’s prevailing tariff;

In the event the electricity injected exceeds the electricity consumed during the billing period, such excess injected electricity after adjustment of consumption in 15 minute time block shall be purchased by the concerned Distribution Licensee at the 85% of APPC rate determined by the Commission for the year in which the Rooftop Solar PV System is commissioned for whole life of the project;

- 9.6 The energy accounting and settlement for wheeling power from solar projects other than Rooftop set up for captive purpose shall be in line with the provision at Para 9.3 to 9.5.

10 Dispute Resolution

- 10.1 In case of any dispute pertaining to these Regulations and its interpretation, it shall be decided by the Gujarat Electricity Regulatory Commission by observing the prescribed procedure.

11 Solar Renewable Purchase Obligation

- 11.1 The quantum of electricity consumed by the Eligible Consumer, who is not defined as an obligated entity, from the Rooftop Solar PV System under net-metering arrangement shall qualify towards compliance of Renewable Purchase Obligation (RPO) for the distribution licensee and no REC shall be issued as the generated solar energy shall be used to meet the Distribution licensee's RPO.

Industrial, Commercial and other than Residential and Government Consumers, utilizing both, 'energy attribute' as well as 'renewable attribute' of the generated solar energy, the solar energy generated and consumed by such

consumers during the 15 minute time block shall be credited towards meeting the consumer's RPO and no REC shall be issued for such generation.

- 11.2 However, surplus energy, if any, exported during the 15 minute time block purchased by distribution licensee, shall be credited towards meeting the Distribution Licensee's RPO and no REC shall be issued for such generation.

Provided that if such consumers utilize the 'renewable attribute' to get Renewable Energy Certificate under the REC mechanism then entire solar energy generated in 15 minute time block shall be considered for issuing REC.

12 Applicability of other charges

- 12.1 The Rooftop Solar PV System under net metering arrangement, installed on the Eligible Consumer's premises, shall be exempted from Transmission Charge, Transmission Loss, Wheeling Charge, Wheeling Loss, Cross Subsidy Surcharge and Additional Surcharge.

13 Metering arrangement

- 13.1 The metering system shall be as per the Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006 as amended from time to time.
- 13.2 Bi-directional meter or alternately two separate meters for import and export of the same accuracy class as the consumer's meter existing before the commissioning of the Rooftop Solar PV System shall be installed in replacement of existing meter. Such meters may be provided by the distribution licensee or consumer. If the meter is installed by the distribution licensee in that case, cost of the same shall be recovered from the consumer.

13.3 Industrial, Commercial and Other consumers utilizing both 'energy attribute' as well as 'renewable attribute' of the generated solar energy shall have to use ABT compliant meter.

13.4 These meters shall be Meter Reading instrument (MRI) or wireless equipment compliant for recording meter readings.

Provided, if bills are prepared on the basis of MRI downloads or if meter reading is taken on the basis of remote meter-reading and the consumer wishes to have a record of the reading taken, he shall be allowed so by the licensee.

13.5 The main Solar Meters shall be of 0.2s class accuracy and with facility for recording meter readings using Meter Reading Instrument (MRI) or wireless equipment. Check meters shall be mandatory for Rooftop Solar PV Systems having capacity more than 20 kW. For installations size of less than or equal to 20 kW, the Solar Check meters would be optional.

Provided that the cost of new/additional meter (s) shall be borne by the Eligible Consumer such meter shall be tested and installed by the distribution licensee.

The meters installed shall be inspected, verified for the accuracy and sealed by the distribution licensee in the presence of the representative of the consumer. Provided that in case the Eligible Consumer is under the ambit of time of day tariff, meters compliant of recording time of day consumption/generation shall be installed.

13.6 The meter reading taken by the distribution licensee shall form the basis of commercial settlement.

14 Sharing of CDM benefits

100% of the gross proceeds on account of CDM benefit to be retained by the Rooftop Solar PV System owner.

15 Demand Cut

No demand cut shall be applicable for the Residential and Government consumers. However, Industrial, Commercial and Other consumers shall be exempted from demand cut up to 50% of the installed solar capacity, wherever technically feasible.

16 Penalty or Compensation

In case of failure of net metering system, penalty or compensation shall be payable as per the provisions of the GERC (Standard of Performance of Distribution Licensee) Regulations, 2005 as amended from time to time.

17 Power to give directions

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

18 Power to relax

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected may relax any of the provisions of these Regulations on its own motion or on an application made before it by an interested person, after following due process of law.

19 Power to amend

The Commission may from time to time add, vary, alter, suspend, modify, amend or repeal any provisions of these Regulations after following due process of law.

20 Power to Removal of difficulty

If any difficulty arises in giving effect to these Regulations, the Commission may issue necessary orders or clarification/interpretation to remove such difficulties either on its own volition, or based on representations from stakeholders.

Sd/-

[Roopwant Singh, IAS]

Secretary

Gujarat Electricity Regulatory Commission

Date: 18/06/2016

Place: Gandhinagar

ABBREVIATIONS

| | |
|-----------------------|--|
| ABT | Availability Based Tariff |
| AC | Alternating Current |
| AT&C | Aggregate Technical and Commercial |
| BIS | Bureau of Indian Standards |
| CB | Circuit Breaker |
| CEA | Central Electricity Authority |
| CT | Current Transformer |
| DC | Direct Current |
| Distribution Licensee | Dakshin Gujarat Vij Company Limited, Madhya Gujarat Vij Company Limited, Uttar Gujarat Vij Company Limited, Paschim Gujarat Vij Company Limited, Torrent Power Limited- Ahmedabad, Torrent Power Limited- Surat, Torrent Energy Ltd., ASPEN Infrastructure Limited, Kandla Port Turst, MPSEZ Utilities Private Limited and Jubilant Infrastructure Limited |
| EHT | Extra High Tension |
| EHV | Extra High Voltage |
| FOR | Forum of Regulators |
| GBI | Generation Based Incentive |
| GEDA | Gujarat Energy Development Agency |
| GERC | Gujarat Electricity Regulatory Commission |
| GETCO | Gujarat Energy Transmission Corporation Ltd. |
| GIS | Geographical Information System |
| GOI | Government of India |
| GPS | Global Positioning System |
| GSM | Global System for Mobile Communications |
| GSS | Grid Substation |
| GUVNL | Gujarat Urja Vikas Nigam Ltd. |
| HP | Horse Power |
| HT | High Tension |
| IEC | International Electro-technical Commission |
| IEEE | Institution of Electrical and Electronics Engineers |
| INR | Indian Rupee |
| kV | Kilo Volt |
| kVA | Kilo Volt Ampere |
| kW | Kilo Watt |
| kWp | Kilo Watt Peak |

| | |
|-------|--------------------------------------|
| kWh | Kilo-Watt Hour |
| LT | Low Tension |
| MNRE | Ministry of New and Renewable Energy |
| MPLS | Multi protocol Label Switching |
| MVA | Mega Volt-Ampere |
| MW | Mega watt |
| MWp | Mega Watt Peak |
| NM | Net-Meter |
| O&M | Operations and Maintenance |
| PCU | Power Conditioning Unit |
| PT/VT | Potential/Voltage Transformer |
| RE | Renewable Energy |
| REC | Renewable Energy Certificate |
| RPO | Renewable Purchase Obligation |
| SLDC | State Load Despatch Centre |
| SM | Solar Meter |
| SPV | Solar Photo Voltaic |
| TVM | Tri-Vector Meter |
| UM | Utility Meter |

Application Form to be kept on web-site by the distribution licensee

Connectivity charges payable by the solar roof top consumer/Solar PV project owner

Connectivity Charges applicable for Rooftop Solar PV System shall be as under:

| System Size | Applicable fees per connection |
|-----------------------------|---------------------------------------|
| From 1 kW up to 6 kW | INR 1,500 |
| More than 6 kW up to 100 kW | INR 10,000 |
| More than 100 kW up to 1 MW | INR 50,000 |

The Connectivity Charges for Rooftop Solar PV System shall be payable to the respective Distribution Licensee.

Inter connection Agreement between Distribution Licensees and solar roof top PV project owner

Net Metering Inter Connection agreement

This Agreement is made and entered into at (location)____ on this (date) _____ day of (month)_____ year _____ between the Consumer, by the name of ----- having premises at (address) _____ as first party

AND

_____ (Name of the Distribution Licensee), Company registered under the Companies Act 1956/2013 and functioning as the "Distribution Licensee" under the Electricity Act 2003 having its Head Office at, _____ (hereinafter referred to as ___ or Distribution Licensee which expression shall include its permitted assigns and successors) a Party of the Second Part.

AND, WHEREAS _____(name of the consumer) desires to set-up such Solar Photovoltaic Rooftop System of ___ kW at _____ connected with (Name of the Distribution Licensee)'s grid at ___ Voltage level for his/her/its own use within the same premises.

WHEREAS, the Gujarat Energy Development Agency (GEDA) through letter dated _____ has registered for developing and setting up ___ kW own Rooftop Solar PV System for his/her/its own use under Gujarat Solar Power Policy - 2015 at his/her/its premises in legal possession including rooftop or terrace.

And whereas, the Distribution Licensee agrees to provide grid connectivity to the Consumer for injection of the electricity generated from his Rooftop Solar PV System of capacity ___ kilowatts (kW) into the power system of Distribution Licensee and as per conditions of this agreement and in compliance with the applicable Policy / rules/ Regulations/ Codes (as amended from time to time) by the Consumer which includes-

1. Government of Gujarat Solar Power Policy 2015
2. Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010.
3. Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time to time
4. Central Electricity Authority (Installation and Operation of Meters) Regulation 2006.
5. Gujarat Electricity Regulatory Commission (Electricity Supply Code & Related Matters) Regulations, 2015,
6. Gujarat Electricity Regulatory Commission Distribution Code, 2004 and amendments thereto,
7. Instruction, Directions and Circulars issued by Chief Electrical Inspector from time to time.
8. CEA (Technical Standards for connectivity of the Distributed Generation) Regulations, 2013 as amended from time to time.

Both the parties hereby agree as follows:

1. Eligibility

- 1.1 Consumer shall own the Rooftop Solar PV System set up on its own premises or premises in his legal possession.
- 1.2 Consumer needs to consume electricity in the same premises where Rooftop Solar PV System is set up.

- 1.3 Consumer shall ensure capacity of Rooftop Solar not to exceed 50% of his contract load/demand/sanctioned load during initial 2 years of the connectivity agreement.
- 1.4 Consumer has to meet the standards and conditions as specified in Gujarat Electricity Regulatory Commission Regulations and Central Electricity Authority Regulations and provisions of Government of Gujarat's Solar Power Policy 2015 for being integrated into grid/distribution system.

2. Technical and Interconnection Requirements

- 2.1 Consumer agrees that his Rooftop Solar PV System and Net Metering System will conform to the standards and requirements specified in the Policy, Regulations and Supply Code as amended from time to time.
- 2.2 Consumer agrees that he has installed or will install, prior to connection of Rooftop Solar Photovoltaic System to Distribution Licensee's distribution system, an isolation device (both automatic and inbuilt within inverter and external manual relays) and agrees for the Distribution Licensee to have access to and operation of this, if required and for repair & maintenance of the distribution system.
- 2.3 Consumer agrees that in case of non availability of grid, Rooftop Solar Photovoltaic System will disconnect/isolate automatically and his plant will not inject power into the Licensee's distribution system.
- 2.4 All the equipments connected to the distribution system shall be compliant with relevant International (IEEE/IEC) or Indian Standards (BIS) and installations of electrical equipments must comply with Central Electricity Authority (Measures of Safety and Electricity Supply) Regulations, 2010 as amended from time to time.

2.5 Consumer agrees that licensee will specify the interface/inter connection point and metering point.

2.6 Consumer and licensee agree to comply with the relevant CEA Regulations in respect of operation and maintenance of the plant, drawing and diagrams, site responsibility schedule, harmonics, synchronization, voltage, frequency, flicker etc.

2.7 In order to fulfill Distribution Licensee's obligation to maintain a safe and reliable distribution system, Consumer agrees that if it is determined by the Distribution Licensee that Consumer's Rooftop Solar Photovoltaic System either causes damage to and/or produces adverse effects affecting other consumers or Distribution Licensee's assets, Consumer will have to disconnect Rooftop Solar Photovoltaic System immediately from the distribution system upon direction from the Distribution Licensee and correct the problem to the satisfaction of distribution licensee at his own expense prior to reconnection.

2.8 The consumer shall be solely responsible for any accident to human being/animals whatsoever (fatal/non-fatal/departmental/non-departmental) that may occur due to back feeding from the Rooftop Solar plant when the grid supply is off if so decided by CEI. The distribution licensee reserves the right to disconnect the consumer's installation at any time in the event of such exigencies to prevent accident or damage to man and material.

3. Clearances and Approvals

3.1 The Consumer shall obtain all the necessary statutory approvals and clearances (environmental and grid connection related) before connecting the photovoltaic system to the distribution system.

4. Access and Disconnection

- 4.1 Distribution Licensee shall have access to metering equipment and disconnecting means of the Rooftop Solar Photovoltaic System, both automatic and manual, at all times.
- 4.2 In emergency or outage situation, where there is no access to the disconnecting means, both automatic and manual, such as a switch or breaker, Distribution Licensee may disconnect service to the premises of the Consumer.

5. Liabilities

- 5.1 Consumer shall indemnify Distribution Licensee for damages or adverse effects from his negligence or intentional misconduct in the connection and operation of Rooftop Solar Photovoltaic System.
- 5.2 Distribution Licensee shall not be liable for delivery or realization by the Consumer of any fiscal or other incentive provided by the Central/State Government.
- 5.3 Distribution Licensee may consider the quantum of electricity generation from the Rooftop Solar PV System owned and operated by (i) Residential and Government Building, (ii) consumers who are not utilizing 'renewable attribute' for meeting its RPO or registered under REC Mechanism, (iii) surplus energy purchased by Distribution Licensees from the Rooftop Solar project which are not under REC Mechanism under net metering arrangement towards RPO compliance.

6. Metering:

Metering arrangement shall be as per Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time.

- (a) In case of Residential and Government Buildings, Bi-directional meter shall be installed of same accuracy class as installed before setting up of Rooftop Solar PV System.

(b) In case of Industrial, Commercial and other consumers-

- (i) Type-1 consumer (consumers not utilizing 'Renewable' attribute for RPO or REC)-Bi-directional meter shall be installed of same accuracy class as installed before setting up of Rooftop Solar PV System.
- (ii) Type-2 (a) & (b) (consumers utilizing both 'renewable attribute' and 'energy attribute') ABT compliant meter having 15 minute integration shall be installed.

7. Commercial Settlement

All the commercial settlements under this agreement shall be as per Government of Gujarat's Solar Power Policy 2015 and Order No. 1 of 2015 dated 17.08.2015 of the Gujarat Electricity Regulatory Commission and any subsequent orders in this regard. The commercial settlement will be as follows:

(A) Residential consumers and Government Building

- (i) In case of net import of energy by the consumer from distribution grid during billing cycle, the energy consumed from Distribution Licensee shall be billed as per applicable tariff to respective category of consumers as approved by the Commission from time to time. The energy generated by Rooftop Solar PV System shall be set off against units consumed (not against load/demand) and consumer shall pay demand charges, other charges, penalty etc as applicable to other consumers.
- (ii) In case of net export of energy by the consumer to distribution grid during billing cycle, Distribution Licensee shall purchase surplus power, after giving set off against consumption during the billing period, at the Average Pooled Power Purchase Cost (APPC) as determined by the Commission for the year in which the Rooftop Solar PV System is commissioned over the life of the system i.e. 25 years. Such surplus purchase shall be utilized for

meeting RPO of Distribution Licensee. However, fixed / demand charges, other charges, penalty etc shall be payable as applicable to other consumers.

(B) For Industrial, Commercial and other consumers

(a) Type-1 consumer (consumers not utilizing 'Renewable' attribute for RPO or REC)

(i) in case of net import of energy by the consumers from distribution grid during billing cycle, the energy consumed from Distribution Licensee shall be billed as per applicable tariff to respective category of consumers as approved by the Commission from time to time. The energy generated by Rooftop Solar PV System shall be set off against units consumed (not against load/demand) and consumer shall pay demand charges, peak charges, other charges, penalty etc as applicable to other consumers of respective category.

(ii) In case of net export of energy by the consumer to distribution grid during billing cycle, Distribution Licensee shall purchase surplus power, after giving set off against consumption during the billing period, at the Average Pooled Power Purchase Cost (APPC) determined by the Commission for the year in which Rooftop Solar PV System is commissioned, over the life of the system i.e. 25 years. Such surplus purchase shall be utilized for meeting RPO of Distribution Licensee. However, fixed / demand charges, peak charges, other charges, penalty etc shall be payable as applicable to the respective category of consumers.

(b) Type-2 (a) - consumers utilizing renewable attribute to meet its RPO

(i) Energy accounting shall be undertaken on 15 minute basis. In case of net import of energy by the consumer from distribution grid, the energy consumed from Distribution Licensee shall be billed as per applicable tariff to respective category of consumers as approved by the Commission from time to time. The energy generated by Rooftop Solar PV System shall be set off against units consumed (not against load/demand) and consumer shall pay demand charges, peak charges, other charges, penalty etc. as applicable to the respective category of consumers.

(ii) In case of net export of power on 15 minutes basis after giving set off against consumption, Distribution Licensee shall purchase such surplus power at the APPC determined by the Commission for the year in which the Rooftop Solar PV System is commissioned over the life of the system i.e. 25 years. Such surplus purchase shall be utilized for meeting RPO of Distribution Licensee. However, fixed / demand charges, peak charges, other charges, penalty etc. shall be payable as applicable to the respective category of consumers.

(c) Type-2 (b) - consumers utilizing renewable attribute under REC Mechanism

(i) Energy accounting shall be undertaken on 15 minute basis. In case of net import of energy by the consumer from distribution grid, the energy consumed from Distribution Licensee shall be billed as per applicable tariff to respective category of consumers as approved by the Commission from time to time. The energy generated by Rooftop Solar PV System shall be set off against units consumed (not against load/demand) and consumer shall pay demand charges, peak charges, other charges, penalty etc. as applicable to the respective category of consumers.

(ii) In case of net export of power on 15 minutes basis after giving set off against consumption, Distribution Licensee shall purchase such surplus power at the 85% of APPC determined by the Commission for the year in which the Rooftop Solar PV System is commissioned over the life of the system i.e. 25 years. However, fixed / demand charges, peak charges, other charges, penalty etc shall be payable as applicable to the respective category of consumers.

8. Connection Costs

8.1 The Consumer shall bear all costs related to setting up of Rooftop Solar Photovoltaic System including metering and inter-connection. The Consumer agrees to pay the actual cost of modifications and upgrades to the service line, cost of up gradation of transformer to connect photovoltaic system to the grid in case it is required.

9. Inspection, Test, Calibration and Maintenance prior to connection

Before connecting, Consumer shall complete all inspections and tests finalized in consultation with the (Name of the Distribution license) and if required Gujarat Energy Transmission Corporation Limited (GETCO) to which his equipment is connected. Consumer shall make available to DISCOM all drawings, specifications and test records of the project or generating station as the case may be.

10. Records:

Each Party shall keep complete and accurate records and all other data required by each of them for the purposes of proper administration of this Agreement and the operation of the Rooftop Solar PV System.

11. Dispute Resolution:

- 11.1 All disputes or differences between the Parties arising out of or in connection with this Agreement shall be first tried to be settled through mutual negotiation, promptly, equitably and in good faith.
- 11.2 In the event that such differences or disputes between the Parties are not settled through mutual negotiations within sixty (60) days or mutually extended period, after such dispute arises, then for
- (a) any dispute in billing pertaining to energy injection and billing amount, it would be settled by the Consumer Grievance Redressal Forum and Electricity Ombudsman.
 - (b) any other issues pertaining to the Regulations and its interpretation; it shall be decided by the Gujarat Electricity Regulatory Commission following appropriate prescribed procedure.

12. Termination

- 12.1 The Consumer can terminate agreement at any time by giving Distribution Licensee 90 days prior notice.
- 12.2 Distribution Licensee has the right to terminate Agreement with 30 days prior written notice, if Consumer commits breach of any of the terms of this Agreement and does not remedy the breach within 30 days of receiving written notice from Distribution Licensee of the breach.
- 12.3 Consumer shall upon termination of this Agreement, disconnect the Rooftop Solar Photovoltaic System from Distribution Licensee's distribution system within one week to the satisfaction of Distribution Licensee.

Communication:

The names of the officials and their addresses, for the purpose of any communication in relation to the matters covered under this Agreement shall be as under:

| | |
|---|---|
| <p style="text-align: center;">In respect of the (Name of distribution licensee):</p> <p style="text-align: center;">* Additional C.E.(R&C) ____ Gujarat Vij Company Limited/Equivalent Authority,</p> | <p style="text-align: center;">In respect of the Consumer</p> <p style="text-align: center;">(_____)</p> |
|---|---|

Authorized person by the distribution licensees ...

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed by their authorised officers, and copies delivered to each Party, as of the day and year herein above stated.

| | |
|---|---|
| <p>FOR AND ON BEHALF OF Distribution Licensee</p> <p>_____ Authorized Signatory</p> <p>WITNESSES</p> <p>1. _____ (_____)</p> <p>2. _____ (_____)</p> | <p>FOR AND ON BEHALF OF THE PROJECT OWNER</p> <p>_____ Authorized Signatory</p> <p>WITNESSES</p> <p>1. _____ (_____)</p> <p>2. _____ (_____)</p> |
|---|---|

Inverter Standards

Inverter should comply with IEC61683/IS61683 for efficiency and measurements and should comply with 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) overvoltage, Solar System should be disconnected by the circuit Breaker/Auto switch provided in the inverter and shall comply with requirements specified at Regulation 8 of these Regulations.

Harmonics Standards

As per the standard IEEE519, 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 Parameter

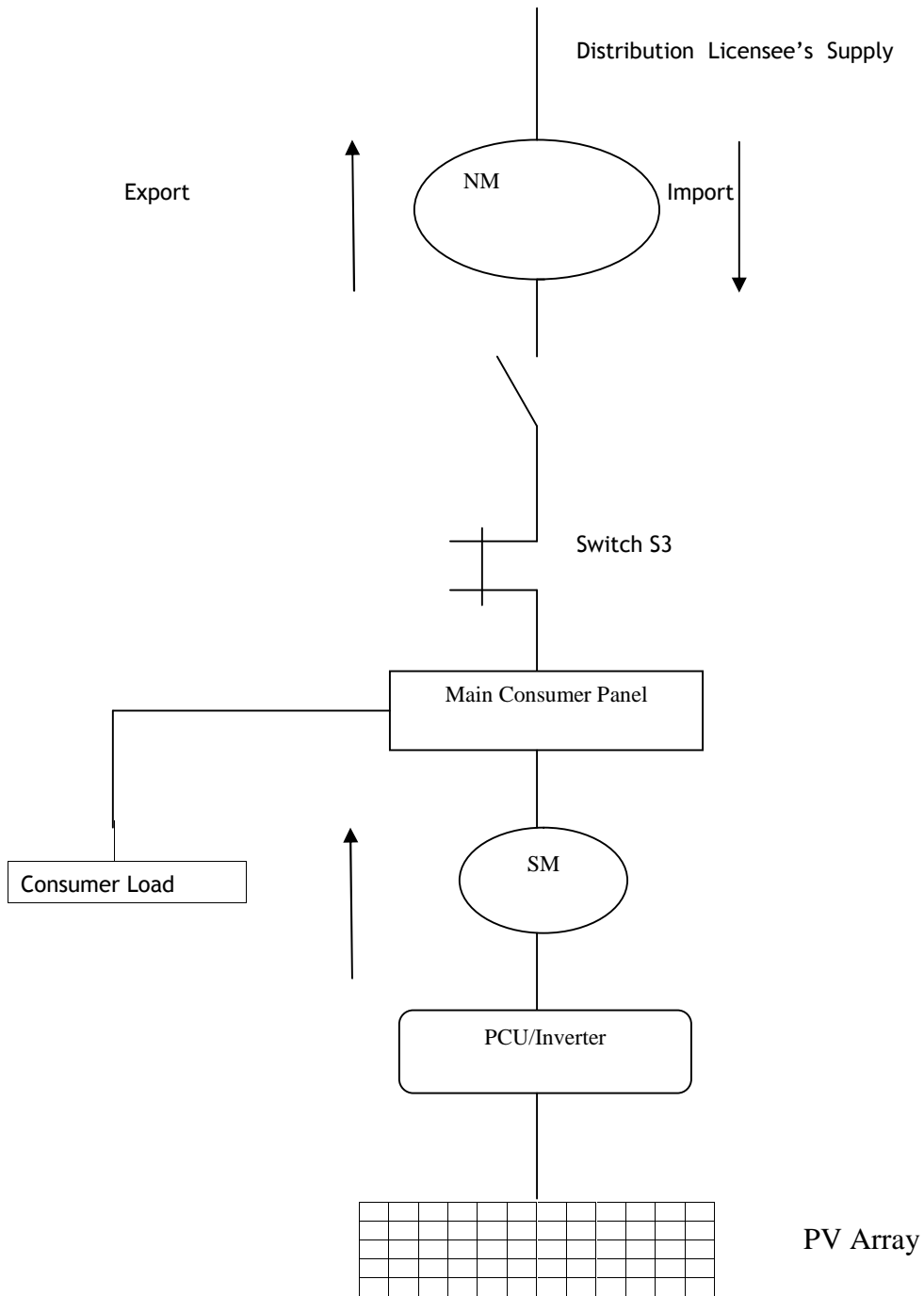
| Parameter | Reference (as amended from time to time) | Requirement |
|--------------------------------------|--|---|
| Overall conditions of service | State Distribution/Supply Code | Compliance with the terms and conditions of supply. |
| Overall Grid Standards | Central Electricity Authority (Grid Standards) Regulations 2010 | Compliance with Grid standards as regards the frequency, voltage and protection coordination. |
| Meters | Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006 | Compliance with the specifications of the meters. |

| Parameter | Reference (as amended from time to time) | Requirement |
|---|---|--|
| Safety and supply | Central Electricity Authority(Measures relating to Safety and Electric Supply)Regulations,2010 as amended from time to time | Compliance with safety provisions for electrical installations and apparatus with voltage below and above 650volts. |
| Harmonic Requirements Harmonic Current | IEEE519 CEA (Technical Standards for Connectivity to the Grid)Regulations,2007 as amended from time to time | The Total Harmonic Distortion (THD) for voltage at the interconnection point should not exceed5%. For the current distortion limits, the Total Demand Distortion(TDD) in terms of ratio of available short circuit current to the demand current(Isc/IL) should remain within limits specified for various harmonics for different TDD values. |
| Synchronization | CEA (Technical Standards for Connectivity to the Grid)Regulations, 2007 as amended from time to time | Photo Voltaic 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 inter connection. |

| Parameter | Reference (as amended from time to time) | Requirement |
|------------------|--|---|
| Voltage | CEA (Technical Standards for Connectivity to the Grid)Regulations, 2007 as amended from time | The voltage-operating window should minimize nuisance tripping and should be with in operating range of 80%to110%of the nominal connected voltage. The photovoltaic system must isolate itself from the grid within a clearing time of 2 seconds. |
| Flicker | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time. | Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000standardsas follows: Short-term flicker(Pst):The flicker severity evaluated over a short period of time (10 minutes) should be ≤ 1 . <u>Long-term flicker (Plt):</u> The flicker severity evaluated over a long period of time (typically 2hours) should be ≤ 0.65 . |
| Frequency | CEA (Technical Standards for Connectivity to the Grid)Regulations,2007 as amended from time | There should be over and under frequency trip functions with a clearing time of 0.2 seconds, when the Distribution system frequency deviates outside the specified conditions (50.5 Hz on upper side and 47.5Hz on lower side). |

| Parameter | Reference (as amended from time to time) | Requirement |
|------------------------------------|--|--|
| DC injection | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time. | Photovoltaic system should not inject DC power more than 0.5% of full rated output at the inter connection point or 1% of rated inverter output current into distribution system under any Operating conditions. |
| Power Factor | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time | When the output of the inverter is greater than 50%, the power output from the inverter shall have a lagging power factor of greater than 0.9. |
| Islanding and Disconnection | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time | The photovoltaic system must island/disconnect itself within IEC standard stipulated time in the event of fault, voltage or frequency variations. |
| Overload and Overheat | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time | 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 | CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 as amended from time | Paralleling device of photovoltaic system shall be capable of withstanding 220% of the normal voltage at the interconnection point. |

Schematic Arrangement for interconnection of Rooftop & Small PV Solar Power Plant with the Distribution Licensee's/Distribution Licensee's grid

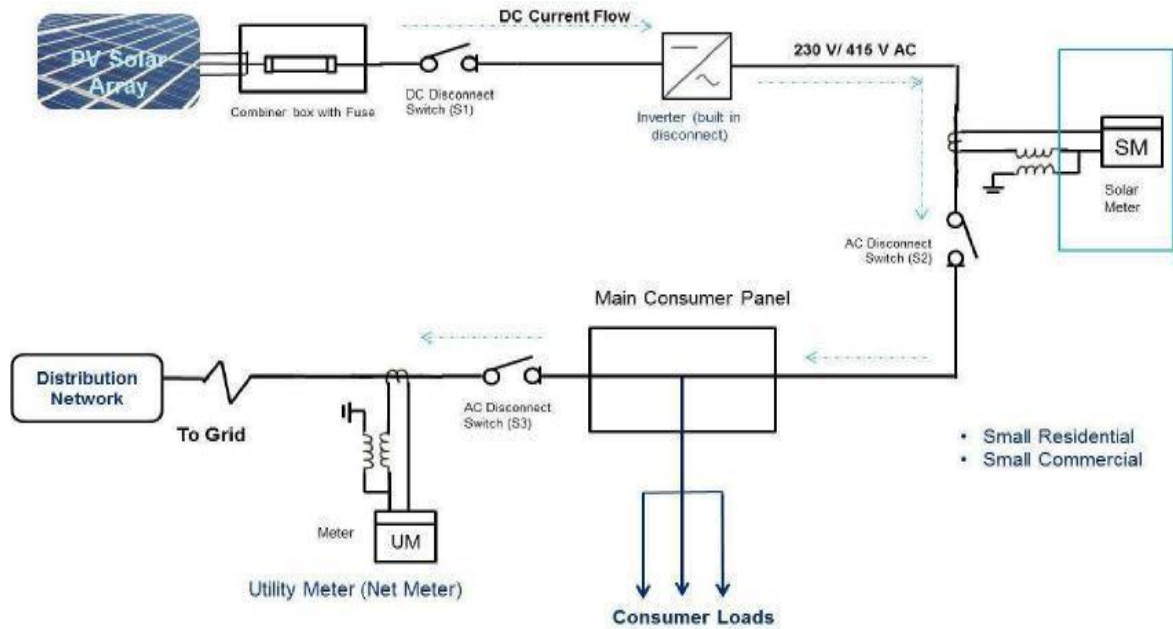


**Normally, Solar Generation shall be connected with Grid.
When grid fails, Inverter controlled Switch S3 Opens and
on restoration of grid S3 Closes.**

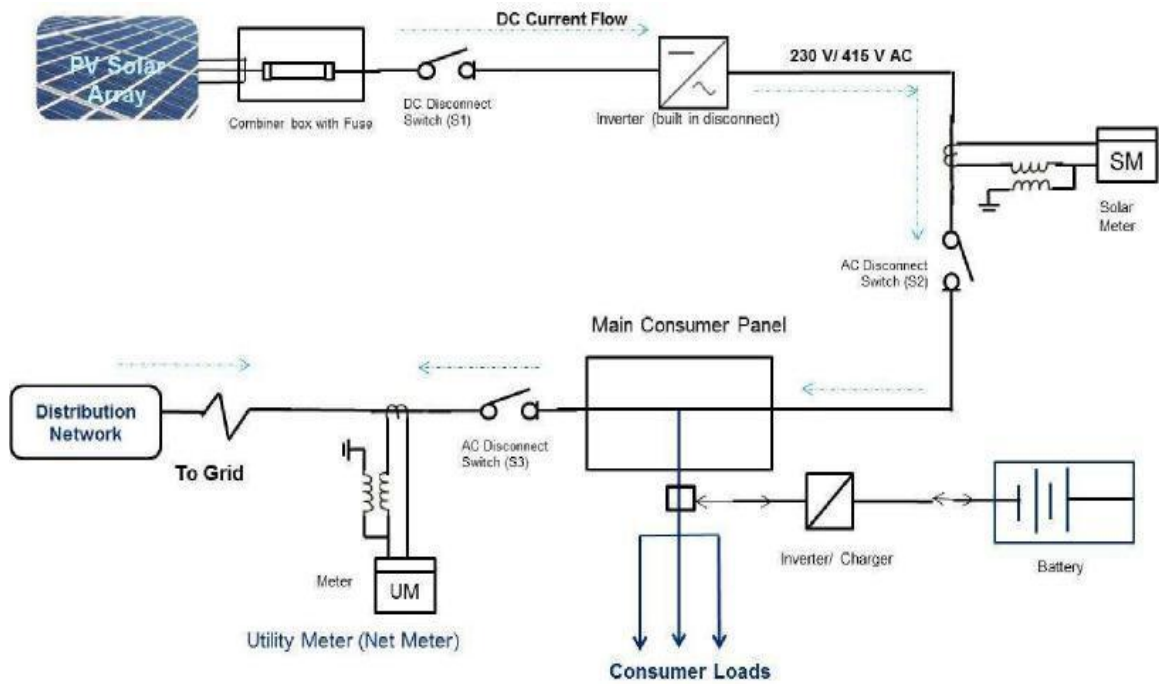
Abbreviations:
NM: Net Meter, SM: Solar Meter, PCU: Power Conditioning Unit

Net Metering configuration options

(1) Two meter configuration without storage



(2) Two meter configuration with storage



Specification for meters for net metering

(a) Meter for Solar Generation Measurements:

Solar Meter Major Technical Parameters

| Sr. No. | Technical Parameters | Connectivity at 415 V & below voltage level | | |
|---------|--|---|--|---|
| | | Whole current meters | | CT operated |
| 1. | Applicability | Solar plant capacity upto 6 kW | Solar plant capacity above 6 kW and upto 15 kW | Solar Plant Capacity above 15 kW and upto 50 kW |
| 2. | Number of phases and wires | Single Phase, 2 Wire | Three Phase, 4Wire | ThreePhase, 4 Wire |
| 3. | Measurand(s) | kWh | kWh | kWh, kVAh, kVA, PF |
| 4. | Standard Voltage and frequency | 240 V, 50±5% | 3X240V(P- N), 415V(P- P) 50±5% | 3X240V(P-N), 415V(P-P) 50±5% |
| 5. | Current Rating | 5-30 | 10-60 | 5 Amp |
| 6. | Accuracy class | 1.0 | 1.0 | 0.5S |
| 7. | Indian Standard or IEC to which conforming | IS 13779-1999 | IS 13779-1999 | IS 14697, IS13779 |
| 8. | Import-export feature | Only Import | Only Import | Only Import |
| 9. | Communication Port/Protocol | Optical/ DLMS | Optical, RS-232/DLMS | Optical, RS-232/ DLMS |

(b) Meter for Net-Metering Measurements:

Net-Meter Major Technical Parameters

| Sr. No. | Technical Parameters | Connectivity at 415 V & below voltage level | | |
|---------|--|---|---|--|
| | | Whole current meters | | CT operated |
| 1. | Applicability | Upto 6 kW connected load | Above 6 kW and upto 18.65 kW connected load | Above 18.65 kW and upto 50 kVA contract demand |
| 2. | Number of phases and wires | Single Phase, 2 Wire | Three Phase, 4 Wire | Three Phase, 4 Wire |
| 3. | Measurand(s) | kWh | kWh | kWh, kVAh, kVA, PF |
| 4. | Standard Voltage and frequency | 240 V, | 3X240 V (P-N), 415 V (P- P) 50±5% | 3X240 V (P-N), 415 V (P-P) 50±5% |
| 5. | Current Rating | 10-60 | 10-60 | 1 Amp |
| 6. | Accuracy class | 1.0 | 1.0 | 0.5S |
| 7. | Indian Standard or IEC to which conforming | IS 13779-1999 | IS 13779-1999 | IS 14697,IS 13779 |
| 8. | Import-export feature | Import & Export | Import & Export | Import & Export |
| 9. | Communication Port/ Protocol | Optical/ DLMS | Optical, RS-232/ DLMS | Optical, RS-232/ DLMS |