Consumer guidelines for availing Grid connectivity of Solar Rooftop PV systems in BESCOM
(On net-metering basis)
**Introduction**

Solar energy is a clean, pollution free and renewable source of energy. Karnataka being located between 11°40' and 18°27' North latitude and the geographic position favours the harvesting and development of solar energy.

Karnataka state is blessed with about 300 sunny days with good solar radiation of 5.4 to 6.2KWh/square meter/day.

On 10.10.2013, Karnataka Electricity Regulatory Commission has fixed a tariff of Rs.9.56 per unit (without subsidy) & Rs.7.20/unit (with subsidy) to the Rooftop and Small Solar P.V. plants for the energy generated exceeding the energy consumed during a billing period. The above approved tariff is applicable to solar power generators entering into power purchase agreements (PPA) on or after 01.04.2013 and up to 31.03.2018 other than those where the tariff is discovered through bidding process.

The Government of Karnataka has announced the Solar policy 2014-21 on 22.5.2014, for Solar P.V. and Solar thermal Power plants including grid connected solar rooftop P.V. systems (under net-metering basis). It is proposed to achieve a minimum of 400 MWs of grid connected Roof Top Solar P.V. Generation projects in the Karnataka State by 2018.

On 7.11.2014, Hon’ble Energy minister Sri. D K Shivakumar has launched Solar RTPV programme at corporate office, Bangalore and extended this facility to all the ESCOMS for entire Karnataka State.

**Grid connected Rooftop Solar Power Plants**

![Diagram of a Typical Grid connected Solar Roof Top Power Plant](image)

**Fig: A Schematic sketch of a Typical Grid connected Solar Roof Top Power Plant.**
Solar PV Cells converts sunlight to generate electricity through a photovoltaic process.

In grid connected rooftop or small SPV system, the DC power generated from SPV panel is converted to AC power using power conditioning unit and is fed to the grid either of 11 kV lines or of 415/240 Volt three/ single phase lines.

They generate power during the day time which is utilized fully by powering captive loads and feed excess power to the grid as long as grid is available. In case, where solar power is not sufficient due to cloud cover etc., the captive loads are served by drawing power from the grid. The grid-interactive rooftop system can work on net metering basis wherein the utility pays to the power plant on net meter reading basis only. Alternatively two meters can also be installed to major the export and import of power separately.

Many such power plants can be installed at the roofs of residential and commercial complex, housing societies, community centers, government organizations, private institutions etc.

Ideally, grid interactive systems do not require battery back-up as the BESCOM grid acts as the back-up for feeding excess solar power and vice-versa. However, to enhance the performance reliability of the overall systems, a minimum battery backup of one hour of load capacity is recommended.

In grid interactive systems, it has, however to be ensured that in case the grid fails, the solar power has to be fully utilized or stopped immediately feeding to the grid (if any in excess) so as to safe-guard any grid person/technician from getting shock (electrocuted) while working on the grid for maintenance etc. This feature is termed as 'Islanding Protection'.

This scheme is only for the Solar Rooftop facility owned, operated and maintained by the consumer(s).

**Objective of the Programme:**

- To promote the grid connected SPV rooftop and small SPV power generating plants among the residential, community, institutional, industrial and commercial establishments.
- To mitigate the dependence on fossil fuel based electricity generation and encourage environment friendly Solar electricity generation.
- To create enabling environment for investment in solar energy sector by private sector, state government and the individuals.
- To create enabling environment for supply of solar power from rooftops to the grid.
- To encourage innovation in addressing market needs and promoting sustainable business models and ensures employment opportunities.
- To provide support to channel partners and potential beneficiaries, within the framework of boundary conditions and in a flexible demand driven mode.
- To create a paradigm shift needed for commoditization of grid connected SPV rooftop applications.
- To support consultancy services, seminars, symposia, capacity building, awareness campaigns, human resource development, etc.
Overview of Solar RTPV Power plants:
A solar RTPV Power plant consists of:

- **Solar Panels/Solar PV Modules**: These are mounted on the roof of buildings and convert sunlight into Direct Current.

- **Mounting Structures**: These Galvanised Steel structures secure the solar panels/PV modules to the roof of your building. Most mounting structures require your roof to be penetrated. If you are worried about water seepage, non-penetrating options are also available. Mounting structures should be strong enough to hold your solar panels even at high wind speeds.

- **Inverter**: It is an intelligent equipment that converts the generated Direct Current into the Alternating Current which is required for all the electrical appliances through a charge controller. It also regulates battery charging (if required).

- **Balance of Systems (BoS)**: All the other components of the solar plant, such as cables, junction boxes, fuses, etc.

- The size of solar plant you require depends on your requirement of electrical loads, number of kWh (units) you consume and how much Money would you like to earn etc.. The size of solar plant you can install is limited by the extent of shade-free rooftop space available.

- The expected lifetime of a solar PV plant is 25 years.

**Incentives**

**Accelerated Depreciation (AD)**

Accelerated depreciation of 80% is available under the Income Tax act for the Commercial and Industrial rooftop solar PV systems. This can provide significant savings to a SRTPV power plant generator who is a taxable assessee and has sufficient profits against which the depreciation can be charged.

- Section 32 Of Indian Income Tax Act.

- Provides Accelerated Depreciation Of 80% of the Invested Capital in To Solar Pv Projects to Professional Companies with Tax Liability.

  Investors Can Set off Their Tax Liability on the Taxable Income to the tune of 80% in the 1st Year and subsequently 20% in the 2nd Year.

- Section 80-IA (sub section 4) of income tax Act, 1961 allows 100% tax waiver on the income generated for any single 10 year period during first 15 years of operational life of a power generation project.

- The Reserve Bank of India has taken a decision to grant Special Status to the Renewable energy sector, among others, under priority sector for Lending.
Solar irradiation data of Bangalore City is given below for reference

**Solar Irradiation in Bengaluru, Karnataka, India**

<table>
<thead>
<tr>
<th>Solar Radiation</th>
<th>Annual Average: 5.26 (kWh/m²/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Average</td>
<td></td>
</tr>
<tr>
<td>Jan 5.36</td>
<td>Feb 6.06</td>
</tr>
<tr>
<td>Mar 6.56</td>
<td>Apr 6.38</td>
</tr>
<tr>
<td>May 6.03</td>
<td>Jun 4.84</td>
</tr>
<tr>
<td>Jul 4.50</td>
<td>Aug 4.47</td>
</tr>
<tr>
<td>Sep 5.03</td>
<td>Oct 4.63</td>
</tr>
<tr>
<td>Nov 4.50</td>
<td>Dec 4.74</td>
</tr>
</tbody>
</table>

Under Standard test Conditions of 25 degree C of ambient temperature & 1000 Watts/ Square Mts. of solar insolation, the Solar PV Generation is Maximum. For every 10 degree C rise in ambient temperature, the Solar Generation reduces by about 6%. Bangalore City is blessed with an ideal temperature that ranges between 20 to 30 degree C for most of the time and hence we can expect Maximum Solar Generation in Bangalore City. In Bangalore City, on an annual average, the Solar PV generation would be around 5.26 KWhrs/Square Meter.

**GENERAL INSTRUCTIONS TO THE APPLICANTS FOR AVAILING SRTPV CONNECTION**

1. This scheme is only for the Solar Rooftop facility owned, operated and maintained by the consumer(s).

2. The interested applicants of domestic, commercial, educational institutions, industrial establishments etc., who are consumers of BESCOM can download the Application forms from BESCOM website [www.bescom.org](http://www.bescom.org) (Format-1).

3. **On-line application:** Application can be registered through online, however, after submitting the application in on-line, the applicant shall take a printout of on-line application and approach the AEE of concerned O&M sub-division and pay the prescribed the application fee.
4. The fee payable are as follows:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Capacity of proposed SRTPV system</th>
<th>Registration fee</th>
<th>Facilitation fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upto and inclusive of 5.0 kWp</td>
<td>Rs.500/-</td>
<td>Rs.1000/-</td>
</tr>
<tr>
<td>2.</td>
<td>Above 5.0 kWp and up to 50 kWp (67 Hp/59 kVA)</td>
<td>Rs.1000/-</td>
<td>Rs.2000/-</td>
</tr>
<tr>
<td>3.</td>
<td>Above 50 kWp (67 Hp/59 kVA) and upto 1MWp*</td>
<td>Rs.2000/-</td>
<td>Rs.5000/-</td>
</tr>
</tbody>
</table>

1. **Note:** For the applicants who obtain subsidy from MNRE, the capacity range is from 1kWp to 500kWp (as per MNRE guidelines).

5. The AEE, C,O&M sub-division is the signing authority for PPA up to sanctioning load upto 50kWp and EE, C, O&M division is the signing authority for PPA of sanctioning load of 50kWp and above.

6. The Content of Power Purchase Agreements, for more than 500kWp, individual approvals have to be obtained from KERC.

7. For applications of loads requesting above 500 kWp to 1 MWp, the draft PPA’s from O&M division office will be forwarded to the office to the Office of GM(DSM), Corporate Office, Bescom. GM (DSM) , in turn will arrange to forward these PPA’s to the KERC for approval on case by case. In this case, the office of GM (DSM) will only act like a facilitator for obtaining approval to the PPAs.

8. The applicant is required to select a reputed system installer to install the SRTPV System, who have experience in design, supply and installation of SRTPV system.

9. After installation of SRTPV system, AEE (Ele,), C, O&M Sub-division, BESCOM is the inspecting authority for SRTPV systems up to and including 10kWp. For above 10kWp SRTPV systems, Chief Electrical Inspectorate, Government of Karnataka is the inspecting authority to meet safety standards.

10. BESCOM shall not be held responsible for any legal disputes between the applicant and SRTPV system installer arising out of the contract.

11. The applicant shall be very careful in selecting and finalising a contract with the System Installer as there is every chance of misleading by some of the System Installers. Hence it is advisable to consider following options before finalising a contract.

- The applicant may enter in to an agreement with the system Installer: For designing, testing, Supplying, Installing, Commissioning and to maintain for a period of Five years after following all the Safety and Quality of the equipment supplied as per relevant standards.
- The applicant should see that the System Installer shall guarantee a minimum solar energy generation for a period of Five years. The applicant is advisable to select high efficiency P.V. Modules as their rate of return is
directly proportional to the no. of units generated/day. Please note this guarantee is not applicable for day to day cleaning of Solar P.V. Modules.

- It is advisable for the applicant to get a comprehensive Insurance policy against theft/damage/fire/cyclone/riot incidences and also a third party liability insurance against risk of Mechanical/electrical accidents that may happen during installation of solar roof top panels or during maintenance afterwards.

- The applicant should ensure a clear & complete scope from System Installer in assisting for preparation of drawings, procuring and testing Bi direction Meters, to get approvals from BESCOM/C.E.I. and to have comprehensive maintenance contract for periodical maintenance of P.V. modules, Inverter and other connections or else S.I. will refuse to render appropriate service at a later date.

- For more information prospective consumers are advised to visit Web sites on Solar energy such as solar mango, bridge to India etc.

12. List of On-grid MNRE approved Channel Partners is available in BESCOM/MNRE website for guidance and it is not mandatory to select one of the MNRE channel partners only.

13. The list of approved vendors for Bi directional meters is available in BESCOM website.

14. Inverters of BESCOM approved manufacturers shall be used.

BESCOM is empanelling inverter manufacturers on continuous basis. On 12.01.2015, BESCOM has called Expression of Interest (EOI) for “Empanelment of Grid-tied Inverter manufacturers for implementation of Solar Roof-top (SRTPV) programme in BESCOM area for a period of one year, which may be extended upto 2 years”. The Registration of Empanelment of Grid tied Inverter manufacturers commenced from 16.01.2015.

2. The list of approved vendors for inverters which meet all required IEC standards are available in BESCOM website. Test reports for the tests conducted as per IS/IEC standards and Technical specifications of SPV system shall be submitted along with Work Completion Certificate as per Format-7 before Commissioning.

15. The Technical, safety, grid connectivity standards to be followed as per the technical standards enclosed with Format – 5 and 6 are as below:
Technical Standards to followed for SRTPV systems

<table>
<thead>
<tr>
<th>BOS Item / System</th>
<th>Applicable BIS / Equivalent IEC Standards / Applicable MNRE Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Description</strong></td>
<td><strong>Standard Number</strong></td>
</tr>
<tr>
<td><strong>Modules</strong></td>
<td></td>
</tr>
</tbody>
</table>
| i Crystalline Silicon Terrestrial PV modules
Thin film Terrestrial PV modules | IEC 61215/IS14286
IEC 61646 |
| ii Solar PV module safety qualification requirements | IEC 61730 (P1 – P2) |
| iii PV modules to be used in a highly corrosive atmosphere (Coastal area etc.,) must qualify Salt Mist corrosion Testing | IEC 61701/ IS 61701 |
| **Solar PV modules** | |
| Each PV module must use RFID tag which must contain the following information as per MNRE requirements: | |
| i. Name of the manufacturer of PV Module | |
| ii. Name of the manufacturer of Solar Cells | |
| iii. Date of year of manufacture (separately for solar cells and module) | |
| iv. Peak wattage, Im, Vm and FF for the module | |
| v. Unique Sl. No. and model no. of the module | |
| vi. Date and year of obtaining IEC PV module qualification certificate | |
| vii. Name of the test lab issuing IEC certificate | |
| **WARRANTY:** | |
| PV modules used in solar power system must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years | |
| **Grid tied inverters** | |
| i* Environmental Testing | IEC 60068-2 (1, 2,14,30) / Equivalent BIS Std |
| ii* Efficiency Measurements | IEC 61683:1999 |
| iii Product safety standard | IEC 62109-1 (2010)
IEC 62109-2 (2011) |
| iv Grid Connectivity utility interface | IEC 61727:2004 (as per IEEE 519 specifications) |
| v Test procedure for islanding prevention measures for utility/interconnected PV inverters | IEC 62116 or
IEEE 1547 and IEEE 1547.1 |
| vi Electromagnetic compatibility & Electro Magnetic Interference | IEC 61000-6-1:2007
IEC 61000-6-3:2007
IEC 61000-3-2:2006
IEC 61000-3-3:2006 |

* Note: for testing sl. no. i & ii beyond 10KVA self-certification by manufacturers are acceptable in case if the Charge controller is not built-in the inverter, IEC 62093 test is required separately for Charge controller.
### Cables

<table>
<thead>
<tr>
<th></th>
<th>Ingress protection</th>
<th>IP 65 (for outdoor)/ IP 21 (for indoor) As per IEC 60529</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Test and Measuring Method PVC insulated cables for working voltage upto and including 1100 V and UV resistant for outdoor installation for A.C. cables. (It is suggested to use D.C. rated, UV resistant Photovoltaic cable having plug and play capability cables)</td>
<td>IEC 60227 / IS 694 IEC 60502 / IS 1554 (part I &amp; II)</td>
</tr>
</tbody>
</table>

### Earthing

<table>
<thead>
<tr>
<th></th>
<th>Grounding</th>
<th>IS 3043: 1986</th>
</tr>
</thead>
</table>

### Switches/Circuit Breakers/Connectors

|---|-----------------------------------------------------|----------------------------------------------------------|

### Junction Boxes/Enclosures for Charge Controllers/Luminaries

<table>
<thead>
<tr>
<th></th>
<th>General Requirements</th>
<th>IP 65 (for outdoor)/ IP 21 (for indoor) As per IEC 60529</th>
</tr>
</thead>
</table>

16. After installation of SRTPV system, AEE C, O&M Sub-division, BESCOM is the inspection authority for SRTPV systems up to 10kWp and for above 10kWp for applied load, Chief Electrical Inspectorate, Government of Karnataka is the inspecting authority to meet safety standards.

17. The rooftop/terrace must have easy access.

18. The applicant should be the owner of the property or authorized person and Consumer of BESCOM. If the property is in the name of the Company, Trust, Co-operatives / partnership firms, then authorization shall be assigned to a person for correspondence, paperwork, execution of various agreements, etc. Such person must be authorized by the management of the organization. In case of partnership firms, the authorized signatory must be one of the partners, to whom written consent has been given by the other partners.

19. The authorization Format - 1A/1B can be downloaded from the website.

20. If consumer is not willing to avail subsidy, shall furnish self-certification for not availing Capital subsidy.

21. Application registered is not transferable.

22. Net metered energy means: The difference of meter readings of energy injected by the SRTPV system into the grid (export) and the energy drawn from the grid for use by the Prosumer (import) is recorded in the bi-directional meter.

23. **Metering:**

- The Applicant has to procure Callibrated bi-directional meter from any of the approved vendors of BESCOM as per CEA guidelines. The vendor list of bi-
directional meters can be downloaded from BESCOM website.

- Cost of various capacities of Net Meters of SECURE make and its prices are as below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Capacity</th>
<th>Class of Accuracy</th>
<th>Description of Type of Bi-directional Meter*</th>
<th>Rate in Rs. (inclusive of 14.5% VAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Up to 5 kWs</td>
<td>1.0</td>
<td>S-phase, 2 Wire</td>
<td>2,805.00</td>
</tr>
<tr>
<td>2</td>
<td>Above 5 kWs to 17.5 kWs</td>
<td>1.0</td>
<td>3-phase, 4 Wire, Whole current</td>
<td>6,985.00</td>
</tr>
<tr>
<td>3</td>
<td>17.5 kWs to 50 kWs</td>
<td>0.5</td>
<td>3-phase, 4 Wire, C.T. Operated</td>
<td>10,076.00</td>
</tr>
<tr>
<td>4</td>
<td>50 kWs and above</td>
<td>0.2s</td>
<td>3-phase, 4 Wire, C.T. Operated</td>
<td>21,755.00</td>
</tr>
</tbody>
</table>

**Note:** *All the Meters shall have 60 months of warranty from the date of supply.*

- Cost of meter testing fee to be paid at MT lab is as below (as per SR 2014-15):

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of meter</th>
<th>Cost of testing fee per meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bi-directional Single Phase 2 wire meter</td>
<td>Rs. 200/-</td>
</tr>
<tr>
<td>2</td>
<td>Bi-directional 3 Phase ETV meter</td>
<td>Rs. 1800/-</td>
</tr>
<tr>
<td>3</td>
<td>ABT feature 3 phase meter</td>
<td>Rs. 2400/-</td>
</tr>
</tbody>
</table>

- At the time of synchronization, the existing metering wiring shall be changed to solar power generation side in presence of AEE/EE, O&M and MT, BESCOM to measure solar generation.
- Solar meter reading will be taken for solar obligation purpose only and not for billing.
- The Applicant shall install the meter to read Solar energy of SRTPV system and a bi-directional meter in separate meter boxes along with Bus bar chamber in the same proximity or at a suitable place in the premises accessible for the purpose of reading.
- The Applicant shall provide check meters when the SRTPV system is more than 20kWp. Procuring CT’s separately for the Check Meter are not required as the wiring of main meter shall be used for check meter also.
- In case of H.T. Installations, Bi-directional meter of 0.2s class of accuracy shall be purchased from BESCOM approved vendors (as per BESCOM approved Technical specifications) and to be fixed at net-metering point in consultation with the EE, MT division. Name and address of the BESCOM approved vendors (Format-15) is available in the BESCOM website www.bescom.org.
• If the grid connectivity is on L.T. side, the applicant shall arrange to connect Bescom approved L.T. Meter with C.T.’s to read solar generation, as approved by E.E. M.T. Division, BESCOM.
• If the existing meter cubicle is having 2 element system of 2 CTs, 2 PTs and metering with three wire system, it shall be replaced by 3 element system of 3 CTs, 3 PTs and metering with four wire system.

24. In case of L.T. Power Installations, if the proposed capacity of the SRTPV system is higher than 50kWp, then, as per KERC tariff Order, the Applicant/Developer shall provide evacuation facility upto the interconnection point by extending 11KV line and providing the Distribution transformer & protection equipment. The applicant shall use equipment such as Transformer, Conductor etc., from BESCOM approved vendors only.

25. As per CEA guide lines, the applicant/ firm is responsible for planning, design, construction, reliability, protection and safe operation of all the equipment’s subject to the regulations for construction, operation maintenance, connectivity and other statutory provisions.

26. The list of documents to be furnished along with the application are:
   a. Copy of the latest Electricity bill.
   c. Copy of the Subsidy sanction letter from MNRE.

27. The Commission decides that, the S.T.U. shall arrange necessary facilities to evacuate power from the interconnection point as below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>System Capacity</th>
<th>Voltage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upto inclusive of 5 kWp</td>
<td>240 Volts</td>
</tr>
<tr>
<td>2</td>
<td>Above 5 kWp to upto 50 kWp</td>
<td>415 Volts</td>
</tr>
<tr>
<td>3</td>
<td>Above 50 kWp* &amp; upto 1MWp</td>
<td>415 Volts /11KV</td>
</tr>
</tbody>
</table>

Please note *: In certain cases, the evacuation voltages can either be 415V or 11kV which will be as determined by the Executive Engineer (Ele,) of C,O&M Division. In case of clarification, the Executive Engineer (Ele,) shall contact E.E, M.T. Division & GM (DSM), Corporate Office, BESCOM.

28. If the existing power supply of the consumer is of single phase and wishes to apply for three phase SRTPV system, conversion of 1ph to 3ph installations shall be sanctioned from AEE, C, O&M Sub-division before applying.

29. If the Consumer is already having a Three Phase Connection and wish to put up a Single phase Solar roof top Installation, he can do so by procuring a Three Phase Bi-directional Meter at Inter connection point and a single phase energy Meter to read Solar Generation. The single phase uni-directional Meter can be bought at Bescom approved retail Meter outlets.

30. The nodal point of contact for Solar RTPV program shall be the AEE, C, O&M Sub-division, BESCOM.
31. BESCOM personnel reserve the right to inspect the entire plant routinely at any time as per the distribution code approved by KERC.

32. The consumer shall pay the Electricity tax and other statutory levies, pertaining to SRTPV generation, as levied from time to time.

33. **Earthing protection:** A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system support structure with a total earth resistance not exceeding 5 ohms.
   
   (i) Equipment earth (DC) and
   
   (ii) System earth (AC)
   
   Both equipment earth (DC) and system earth (AC) shall be checked for proper earthing.
   
   - **Equipment earth (DC):** All the non-current carrying metal parts such as PV modules, DCDB are bonded together and connected to earth to prevent shocks to the manpower and protection of the equipment.
   
   - **System earth (AC):** All the non-current carrying metal parts such as ACDB, Lightening Arresters are bonded together and connected to existing earth.
   
   - **Surge Protection:**
     
     - Surge protection devises (SPD’s) shall be provided on the DC side and AC side of the solar system.
     
     - The DC surge protection devices shall be installed in the DC distribution box adjacent to the solar grid inverter.
     
     - The AC SPD’s shall be installed in the AC distribution box adjacent to the solar grid inverter.
     
     - The SPD’s earthing terminal shall be connected to earth through the above mentioned dedicated earthing system. (The SPD’s shall be of Type 2 as per IEC 60364-5-53.)

   - Earthing shall be done in accordance IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm\(^2\) copper wire or 10 mm\(^2\) aluminium wire or 70 mm\(^2\) hot dip galvanized iron flat. Unprotect aluminium or copper-clad aluminium conductors shall not be used for final underground connections to earth electrodes.

   - The earth electrodes shall have a pre-cast concrete enclosure with a removal lid for inspection and maintenance. The entire earthing system shall comprise non-corrosive components.

   - The synchronization of the SRTPV system shall be carried out by the concerned Sub-divisional/Divisional Engineer along with MT staff within 3 working days from the receipt of Work completion Report.

   - Generally, Lightening Arresters need to be provided for the SRTPV buildings which are of more than 15 meters height only.

34. **Data monitoring:** Online monitoring will be compulsory for all the systems of more than 50kWp capacity. The SRTPV plant parameters such as daily
generated units are measured shall be transmitted to ALDC, BESCOM using SCADA system through Ethernet Connection and the system Installer should give Link/Password to the AEE OF C,O& M subdivision for monitoring.

35. Regarding any queries/ complaints/ information, the Applicant/ Consumer can contact the AEE, C, O & M Sub-division / Solar help desk at DSM section, Corporate Office, BESCOM.

36. **Subsidy:**
   - The Applicant can avail MNRE subsidy for Solar rooftop PV systems.
   - If MNRE subsidy is availed subsidy, MNRE guidelines and standards are to be followed, details may be obtained from MNRE website [www.mnre.gov.in](http://www.mnre.gov.in)
   - MNRE subsidy may be availed through MNRE approved Channel partners or through “KREDL”.

37. **Dispute Resolution:**
   All the disputes between the SRTPV consumer and BESCOM arising out of or in connection with the agreement shall be first tried to be settled through mutual negotiation. The parties shall resolve the dispute in good faith and in equitable manner. In case of failure to resolve the dispute, either of the parties may approach the Consumer Grievance Redressal Forum (CGRF). Details of CGRF can be obtained from the BESCOM website.

38. The technical specifications stated are subjected to change without notice.

39. **Display of caution boards** on the Meter Board/Cubicle of SRTPV installation and on pole as stated below:

   Consumer shall provide “Danger Board” on the Meter Enclosure.

   The Section officer shall arrange: **To paint One Band of Red Colour of 6” around the pole (at about 8 feet height from the Ground Level), below it, One Band of Orange coloured Radium paint of 6” around the pole, duly writing R.R. No. with pre fixing the letters of “SRTPV” in Black coloured paint.**

40. **Applicability of Wheeling and Banking Charges and Cross Subsidy Charges:**
   The KERC has decided not to levy any Wheeling and Banking Charges and Cross Subsidy Charges on the Solar generators who sell electricity on Open access within the state.

**Procedure for Availing SRTPV Connection**

1. The Applicant shall submit the filled-in Application along with the necessary documents either Online/Offline to jurisdictional O&M, Sub-division office, BESCOM and pay required registration fee.

2. If Offline application (In-person) is received, the AEE shall assist applying it Online.
3. On submission of Application form to concerned AEE, Sub-divisional office, will perform general screening and register the application with acknowledgment to the Applicant.

4. After revenue verification, the Application shall be sent to concerned Section officer / Executive Engineer, C, O&M BESCOM as per delegation of powers for Technical feasibility report.

5. In case of L.T. Power Installations, if the proposed capacity of the SRTPV system is higher than 50kWp, then, as per KERC tariff Order, the Applicant/Developer shall provide evacuation facility upto the interconnection point by extending 11KV line and providing the Distribution transformer & protection equipment. The applicant shall use equipment such as Transformer, Conductor etc., from BESCOM approved vendors only

6. The Assistant Executive Engineer, C, O&M BESCOM, as per delegation of powers, shall accord Approval to all the L.T. Installations up to a capacity of 50kWp as per Format-5.

7. The Executive Engineer, C, O&M Division BESCOM as per delegation of powers shall accord Approval to all the H.T. Installations of 50kWp and above the capacity as per Format -6.

8. After completion of installation work of SRTPV system, the work completion report Format-6C is to be submitted by Applicant to AEE/EE, C,O&M, BESCOM along with the following documents:
   i. Facilitation fee of Rs.1000/- upto 5kWp, Rs.2000/- for above 5.0 kWp and upto 50 kWp and Rs.5000/- for above 50 kWp and upto 1MWp shall be paid and enclose the copy of receipt.
   ii. Copy of the Single Line Drawing of the SRTPV System indicating all the Safety aspects of Grid Connectivity.
   
   iii. Approved drawings and approval for Commissioning from Chief Electrical Inspectorate (CEI), GoK (for capacity above 10kWp).
   iv. Test Certificate of bi-directional meter from MT division, BESCOM.
   v. Test reports for the tests conducted as per IS/IEC standards and Technical specifications of SPV system shall be submitted along with Work Completion Certificate as per Format-7 before Commissioning.
   vi. Copy of Power Purchase Agreement on Rs.200/- Non judicial stamp paper with BESCOM.
   vii. Facing sheet of Bank pass book containing details of Name of the Bank, Type of account, Account No, Name of the Branch, IFSC code etc., The maximum time frame for completion of installation work in all respect by the applicant is 180 days.

9. AEE, O&M, BESCOM is the Inspecting authority of Safety procedures upto 10 kWp and for applied loads above 10 kWp, Chief Electrical Inspectorate, Department of Electrical Inspectorate, GoK is the Inspecting authority to meet safety standards.
10. **Signing of Power Purchase Agreement:**

- After completion of SRTPV installation work, the consumer has to enter into a Power Purchase agreement with BESCOM on Rs.200/- Non judicial stamped paper. Format of PP Agreement can be downloaded from BESCOM website **www.bescom.org**
- The PP agreement shall be signed before Commissioning and Synchronizing.
- As per delegation of powers, the AEE of C, O&M sub-divisions are authorised to sign PPA upto 50kWp.
- As per delegation of powers, EE of C, O&M divisions are authorised to sign PPA of 50kWp and above.
- PP Agreements of more than 500kWp, individual approvals have to be obtained from KERC through GM (DSM), Corporate Office, BESCOM.

11. **Submission of work completion report:**

The Applicant/System installer of SRTPV system shall submit the following documents along with work completion report as per Format–7 to the approving authority (C, O&M, and AEE/EE of BESCOM):

a. Approved drawing and approval letter for commissioning the SRTPV system by CEI of DEI, GoK.

b. Specification sheets of all equipments and manufacturer’s test reports and test certificate of modules and inverters.

c. Test certificates of bi-directional meter from MT division, BESCOM.

d. Undertaking of MNRE subsidy Sanction letter or self-declaration Certificate for not availing MNRE subsidy (Format-1C).

e. Details of facilitation fee paid.

f. Power Purchase Agreement on Rs.200/- Non judicial stamp paper.

12. After verification of all documents and completion reports submitted by the Applicant, AEE/EE will issue sanction letter for testing and commissioning of SRTPV system.

13. The testing, commissioning and synchronization of the SRTPV system shall be carried out by the concerned Sub-divisional/Divisional Engineer along with MT staff/Section Officer (To assess the SRTPV Load, the Capacity of Inverter or P.V.Module whichever is Low ,shall be considered).

14. During the period of synchronization of the SRTPV system with BESCOM grid, the BESCOM personnel shall inspect, calibrate and seal the bi-directional meter.

15. The AEE/Section Officer shall record G.P.S. Co-ordinates of all the SRTPV Installations in the Work Completion report submitted by the applicant and System Installer (Format 7) which will be helpful to map all the serviced installations at a later date.
16. The A.E.E. of C, O&M, after commission, shall take a photograph of the Solar R.T.P.V. power plant, retain one copy along with the service docket and shall mail copy to the GM, DSM, Corporate Office, BESCOM.

17. The concerned AEE/EE C, O&M will issue for synchronization certificate to the applicant of the SRTPV system after synchronization and commissioning.

18. **Billing and Payment:**

- The consumer shall receive a monthly net import/export bill indicating either net export to the grid or net import from the grid.
- “Import”- means energy supplied by the BESCOM grid.
- “Export”- means energy delivered to the BESCOM grid.
- The meter reader has to capture present reading of Uni-directional meter provided at solar side.
- Solar side meter reading is used only for MIS report (to measure the quantum of generation) and shall not be used for billing purpose.
- The meter reader has to capture both import & export energy and other billing parameters recorded by the bi-directional meter.
- In case of net import bill, the consumer shall pay the same as per existing tariff.
- In case, the export energy is more than the import, AEE, C,O&M sub-division will arrange for the energy exported as per the KERC approved tariff through NEFT.

  The tariff for injecting surplus energy by rooftop installation will be as per the prevailing tariff determined by KERC from time to time. At present the tariff is Rs.9.56 per unit for installations without subsidy and Rs.7.20 per unit for installations with subsidy.

  Minimum charges/Electricity dues/Statutory levies, if any, shall be adjusted against the energy purchase bill.

  The amount payable by the BESCOM to the Seller for energy injected to the BESCOM grid (excluding self-consumption) during the billing period becomes due for payment, which shall be settled within 30 days from the date of meter reading and credited to the bank account through NEFT.

19. **Display of caution boards** on the Meter Board/Cubicle of SRTPV installation and on pole are as specified.

20. **Please Note:** The terms and conditions are subjected to change without Notice.
**Flow Chart of Interconnection Process**

1. **Application Process**
   - Applicant downloads the application Formats and Guidelines to Consumers from the website: www.bescom.org
   - Yes
   - Applicant submits the Application form online duly attaching copy of electricity bill, Photo and necessary Certificates
   - Registration fee shall be paid at C, O&M Sub-division. If Offline application is received, AEE shall convert it into online format
   - AEE will issue approval letter Format-5 for L.T.Installations & EE will issue approval letter Format-6 for H.T. installations.

2. **Utility Review**
   - After installation of SRTPV Power plant, Applicant submits pays facilitation fee, procures Bi-directional meter & gets tested at MT division and submits test reports along with bank pass book details, AEE/EE of C,O&M will sign PP Agreement with consumer & submits Work completion report and request to commission it in Format-7.
   - Not Ok
   - Applicant & S.I. shall undertake corrective measures and apply
   - Utility shall provide suggestions and reasons for failure

3. **Installation and Commissioning**
   - At the request of Applicant (Format-7), Commissioning & synchronizing will be conducted by AEE/EE C, O&M Div., AEE/EE, MT div after testing SRTPV system
   - Not Ok
   - If the rooftop facility fails to clear the Commissioning test
   - Ok
   - Issues Certificate of synchronization to applicant (Format-8A)

4. **Billing**
   - File will be sent to Revenue section in O&M Sub-division for Billing.
Single Line Diagram of Rooftop Facility

Solar PV array

DC Fuse

DC combiner box

DC surge protection device

DC disconnect Switch

DC distribution box

DC to AC Grid tied Inverter

Solar PV array

Manual disconnect Switch

Uni-directional meter

Solar Meter

Bi-directional Meter

Net Meter

BESCOM Grid

Consumer Distribution Panel

To consumer Loads

AC disconnect Switch

AC surge Protection device

AC distribution box

Distribution Network

Net Meter

Bi-directional Meter

DC to AC Grid tied Inverter

DC surge protection device

DC disconnect Switch

DC distribution box

Solar PV array

Manual disconnect Switch

Uni-directional meter

Solar Meter