Bangalore Electricity Supply Company Limited

(wholly owned Government of Karnataka undertaking)

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Ref No. : BESCOM/BC-51/2019-20/CYS-24
Encl : Annexure-A to E

Office of the
General Manager (Ele).,
DSM, Corporate Office,
BESCOM, K.R. Circle,
Bangalore–560 001.
Date: 08-09-2019

OFFICIAL MEMORANDUM

Sub: Determination of tariff and other norms in respect of Grid connected Solar Rooftop Photo Voltaic plants (SRTPV) in BESCOM for FY19-20-reg

Ref: 1. KERC Order for *"Determination of tariff in respect of Solar Power Projects (Including Solar Rooftop Photo Voltaic plants (SRTPV) for FY-20"* dated:01.08.19

2. This Office Circular No: BESCOM/BC-51/2019-20/CYS-06 dated:15.05.2019
3. KERC Letter No:KERC/S/F-6/Vol-All/2018-19/84 dated:15.04.19
4. This Office Circular No: BESCOM/BC-51/2019-20/CYS-01 dated:04.04.2019
5. Approval of MD, BESCOM dated: 27.09.2019 &

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PREAMBLE:

The section 86(1) (e) of the Electricity Act, 2003 has mandated the State Electricity Regulatory Commission to promote generation of electricity from renewable sources of energy. Accordingly, the Karnataka Electricity regulatory Commission (KERC) has been promoting generation of power from renewable sources by determining the feed in tariff (generic tariff) periodically based on the normative operational and financial parameters for different control periods from the year 2005 onwards.

The Commission vide order dated: 18.05.2018 had determined the tariff for SRTPV projects for FY-19, which was valid from 01.04.2018 up to 31.03.2019.

BESCOM has filed Review Petition to the Hon'ble Commission's order dated: 19.12.2018 and the case is pending before the said court.

In order to determine a tariff which reflects the latest market trend and price, the Commission had issued a Discussion Paper in the matter, on 06.02.2019 duly inviting comments/suggestions from the stakeholders.

In the above circumstances, pending determination of tariff, this office vide circular cited under ref(4) had directed all the field officers to process the SRTPV applications for FY-20 by duly obtaining an undertaking from the consumer on a Rs.200/- stamp paper stating that

"the SRTPV applicant will abide to the tariff and other terms and conditions, determined by the commission from 01.04.2019 and PPA shall not be executed as per previous tariff order dated:18.05.2018 whose control period was from 01.04.2018 up to 31.03.2019".

Further, the Commission vide its order cited under ref(3) had directed the ESCOMs to execute the PPA for FY-20 relating to SRTPV projects by suitably amending Clause 6.1(a) of the approved standard PPA format as:

"The .....ESCOM shall pay for net energy/gross energy (as the case may be) at the tariff that may be determined by the commission for the period from 01.04.2019 upto 31.03.2020, subject to such other conditions, if any, as may be imposed in the tariff order, for the term of the agreement."

In this regard, this office vide circular cited under ref(2) had instructed all the concerned field officers to execute the PPA for FY-20 by duly amending the clause as cited above.

The Commission vide order cited under ref(1) has determined the tariff rates of SRTPV projects for FY-20. **Hence, this OM.**

No: BESCOM/BC-51/2019-20/CYS-24 **Dated:** 08-11-2019

1. The Hon'ble KERC has determined the tariff of grid connected Solar rooftop photovoltaic plants as below:

Sl no.	Capacity	Tariff Rs per unit		Remarks
		Without Capital subsidy	With Capital subsidy	
1	**1 to 10kW** Domestic consumers i.e Residential consumer	**Rs.3.99/-**	**Rs.2.97/-**	-
2	**1kW to 2000kW** Other than Domestic consumers	**Rs.3.07/-**	**Rs.2.32/-**	**The EE of C, O & M division shall executive PPAs from 500kWp upto 2000kWp and Commission & Synchronize the plant in co-ordianation with MT staff**

2. The above tariff shall be applicable to all such new SRTPV projects for which PPAs are entered into on or after 01.04.2019 and approved by the Commission after the date of issue of this order, that achieve commercial operation on or after 01.04.2019.

3. The tenure of the PPA shall be for the life of the solar power projects **i.e. Twenty Five (25) years.**

4. The generic tariff determined by the order shall also be applicable for payment towards any banked energy deemed to have purchased by the Distribution Licensee and in such other cases as specified in the relevant orders of the Commission.

5. All other issues not covered under this Order, shall be governed by the respective Regulations and Orders issued by the Commission and PPAs signed by the parties.

6. This order shall be in force **with effect from 1st April 2019 and till 31st March 2020.**

7. **Installed capacity of Solar Rooftop PV plants should be equivalent to 100% of the sanctioned load** of the respective consumer's installation based on gross or net metering.

8. **Hon'ble KERC in its order dated: 11.11.2016 has determined tariff and other norms for installation of SRTPV plants on the Government buildings under funding from the Government.**
   The Commission has continued the scheme but with the tariff for any surplus energy injected as determined by KERC in its order dated: 01.08.2019.

9. **Hon'ble KERC in its order dated: 15.09.2017 has allowed installation of multiple SRTPV units or single SRTPV unit with the combined installed capacity in single premises not exceeding the total sanctioned load of all the consumers in that premises.**
   The Commission has continued the scheme but with 90% of the tariff as determined by KERC in its order dated: 01.08.2019.

10. It may also be noted that, while execution of PPA, the tariff rates should be written and typed compulsorily **in figures and words, both**.

The KERC SRTPV Orders/ SRTPV Regulation-2016 dated:11.11.2016, 15.12.2016, 15.09.2017 & 01.08.2019 are enclosed with this circular as **Annexure-A to D and** BESCOM guidelines as **Annexure-E.**

General Manager (Ele)
DSM, BESCOM

Copy to:

1. The CEE of BMANZ/BMASZ/BRAZ/CTAZ of C, O&M Zone, BESCOM for information.
2. The General Manager, Revenue Section, Corporate Office, BESCOM.
3. The SEEs/EEEs of C, O&M Circles/Divisions, BESCOM.
4. PS to MD/D (T)/D(F) with a request to place before the chair.
5. MF / OC.

ANNEXURE - A

KARNATAKA ELECTRICITY REGULATORY COMMISSION

No.9/2, 6th & 7th Floor, Mahalakshmi Chambers,

M.G. Road, Bangalore-560 001

Present:

Sri. M.K. Shankaralinge Gowda	Chairman
Sri. H.D. Arun Kumar	Member
Sri. D.B. Manival Raju	Member

In the matter of:

Determination of tariff and other norms for Solar Rooftop Power Plants installed on Government Buildings under Central Government Scheme

S/03/1 Date: **11th November, 2016**

1. Preamble:

The Commission in its Order dated 2nd May, 2015 has determined the tariff and other norms for Solar Rooftop and Small Photovoltaic Power Plants installed by consumers. Subsequently, the Commission has issued Order dated 19th September, 2016 allowing one time irrevocable option of either gross or net metering to the consumers under Domestic, Hospital and Educational institution categories at the time of signing of PPA. Further, the installed

capacity of Solar rooftop PV plant was limited to 100% of the sanctioned load of the installation of the consumer.

BESCOM vide its letter dated 25th August, 2016 has stated that, the Ministry of Finance, Government of India has allocated an amount of Rs.67.66 Crores under the 13th Finance Commission for installation of SRTPV Plants on Government buildings in its jurisdiction. In reply to the clarifications sought by the Commission regarding the scheme, BESCOM has stated that, it is proposed to execute PPA with rooftop owners for purchase of energy at Average Power Purchase cost determined by the Commission from time to time.

It is noted that the Ministry of New and Renewable Energy vide its letter dated 31st March, 2015 has allowed earmarking of funds for laying rooftop solar plants on Government buildings. The Energy Department, Government of Karnataka in its Order No. EN 34 VSE 2015 dated 03.11.2015 has allocated an amount of Rs.145.86 Crores of grant in aid received from Government of India among all the ESCOMs in the State and has directed the ESCOMs to submit detailed proposals.

The Commission, having taken note of the proposal of the Ministry of New and Renewable Energy, Government of India, Order of the Government of Karnataka and proposal of BESCOM and that the entire funding of the scheme is by the Government and no investment is being made by the ESCOMs ESCOMs which propose to install and maintain the SRTPV installations on the roof of the Government buildings, considers it necessary to specify the applicable tariff and main operating conditions for the scheme. Hence the following Order:

ORDER

i. The Distribution Licensees (ESCOMs) in the State may install Solar Rooftop power plants on Government buildings of capacity commensurate with available rooftop area irrespective of the sanctioned load. The ESCOMs shall not incur any capital cost towards such installation other than for expenditure towards evacuation of power, if any.

ii. The Offices, Institutions and Government Departments occupying such Government buildings will be allowed to utilise the energy generated by such SRTPV plants and inject any surplus energy into the grid to the account of the concerned ESCOMs on net-metering basis.

iii. The ESCOMs shall enter into PPA with the appropriate/authorised Officers/authority of the Government Buildings for purchase of surplus power. The ESCOMs for the purpose of accounting shall reckon purchase of such surplus at the average pooled power purchase cost as notified by the Commission annually without actually making any payments.

v. ESCOMs shall be eligible to account the power generated from the said solar plant towards meeting the Renewable Purchase Obligation (RPO) of the ESCOMs but they shall not be eligible for Renewable Energy Certificates (REC).

vi. Both the parties to the PPA shall be responsible for maintenance of the SRTPV installation and they shall ensure that the plant remains in good working condition for its useful life. The cost of maintenance, if any, shall be borne by the concerned ESCOMs.

All the other provisions of the Commission's Order dated 2nd May, 2016 shall be applicable to the proposed SRTPV installations on Government Buildings also.

This Order is signed and issued by Karnataka Electricity Regulatory Commission on this 11th day of November, 2016.

M.K.Shankaralinge Gowda	H.D.Arun Kumar	D.B.Manival Raju
Chairman	Member	Member

ANNEXURE - B

RNI No. KARBIL/2001/47147

ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

ವಿಶೇಷ ರಾಜ್ಯ ಪತ್ರಿಕೆ

ಭಾಗ-IVA	ಬೆಂಗಳೂರು, ಸೋಮವಾರ, ಡಿಸೆಂಬರ್ ೧೯, ೨೦೧೬ (ಮಾರ್ಗಶಿರ ೨೮, ಶಕ ವರ್ಷ ೧೯೩೮)	ಸಂ. ೧೩೬೭
Part-IVA	Bengaluru, Monday, December 19, 2016 (Margashira 28, Shaka Varsha 1938)	No. 1367

KARNATAKA ELECTRICITY REGULATORY COMMISSION

9/2, 6th& 7th Floors, Mahalakshmi Chambers, M.G.Road Bengaluru – 560 001

Notification

No.S/03/1 dated 15th December, 2016

KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016

PREAMBLE:

Section 86(1)(e) of the Electricity Act, 2003 (hereinafter referred to as the Act) mandates the Karnataka Electricity Regulatory Commission (Commission) to promote co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person.Section 61(h) of the Act provides that, while specifying the terms and conditions for determination of tariff, the Commission shall be guided by the objective of promotion of co-generation and generation of electricity from renewable sources of energy.

Section 62(1)(a) read with Section 64 of the Act provides for determination of tariff for supply of electricity by a generating company to a distribution licensee by the Commission.Section 86(1)(b) provides for Regulation of electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licensees. Section 181 of the Act provides for making Regulations by the Commission consistent with the Act to carry out the provisions of the Act.

Therefore, in exercise of the power conferred under the above provisions of the Act,the Commission hadproposed to makeRegulations in respect of Implementation of Solar Rooftop Photovoltaic Power Plants.

As required under Sub Section (3) of Section 181 of the Act, the draft Regulations wasnotified in the official gazette on 2nd September, 2016 to elicit objections / suggestions / views of the stakeholders within thirty days. Subsequently, public hearing was held in the Office of the Commission on 23rd November, 2016.

The Commission, having considered the suggestions and comments received, hereby makes the following Regulations.

1. **Short Title and Commencement-**

(1) These Regulations may be calledthe **KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016.**

(2) These Regulations shall come into effect from the date of their publication inthe Official Gazette.

(3) These Regulations shall be applicable to the Distribution Licensees and the Eligible Consumers in the State of Karnataka.

2. **Definitions and Interpretations-**

(1) In these Regulations, unless the context otherwise requires -

(a) "**Act**" means the Electricity Act, 2003;

(b) "**Billing cycle or billing period**" means the period between two consecutive Meter reading dates;

(c) "**Commission**" means the Karnataka Electricity Regulatory Commission;

(d) "**Distribution Licensee**" means a licensee authorised to operate and maintain aDistributionSystem for supplying electricity to the consumers in his area of supply;

(e) "**Eligible Consumer**" means a consumer of electricity in the area of supply of a distribution licensee, who has installed or proposes to install SRTPV plant for generation of electricity and supply to such distribution licensee on gross / net-metering basis and who satisfies such other conditions as may be specified by the Commission for this purpose;

(f) "**Financial year**" means the period beginning from first day of April in an English calendar year and ending with the thirty first day of March of the following year;

(g) "**Gross metering**" means an arrangement under whichaneligible consumer supplies the entire electricity generated from his SRTPV plant to the Distribution Licensee during the billing period;

(h) "**Interconnection point**" means the interface of SRTPV plant with the network of the Distribution Licensee upto 11kV system;

(i) "**Net-metering**" means an arrangement under which an eligible consumer supplies the surplus electricity generated from his SRTPV plant to the Distribution Licensee after off-setting the electricity supplied by the distribution licensee to such eligible consumer during the billing period;

(j) "**Renewable Energy Certificate** (REC)" means the certificate issued in accordance with the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 as amended from time to time.

(k) "**Solar Rooftop Photovoltaic Power Plant**"(SRTPV Plant) means the solar photovoltaic plant installed on theexisting roof of the consumer's premises that uses sunlight for direct conversion into electricity through photovoltaic technology with the solar panels of SRTPV Plant mandatorily mounted in the space available on the roof of any residential, commercial, institutional, industrial and other buildings which are constructed as per the building construction laws/norms and such other Solar Photovoltaic plants as may be included by the Commission in its Orders issued from time to time.

(2)Words and expressions used in these Regulations not specifically defined herein above, but defined in the ActandRules or any other Regulations made thereunder shall have the meaning assigned to them in the Act and Rules or Regulations.

3. **General Principles -**

The distribution licensee shall provide gross metering or net-metering arrangement to the eligible consumers in its area of supply,as decided by the Commission from time to time on non-discriminatory and first come first served basis.

Provided that the Consumer shall install the grid connected SRTPV Plants of the installedcapacity, as specified under these Regulations.

Provided further that the inter-connection of such plant with the distribution networkshall be undertaken as specified under these Regulations and in compliance with the KERC Grid Code / Distribution Code and the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 as amended from time to time.

4. **Conditions for Installation of SRTPV -**

Aneligible consumer in the area of supply of a distribution licensee shall be allowed to install SRTPV plant with installed capacityof not less than one kilowatt but not exceeding one megawatt, subject to further limit based onthe sanctioned load of the consumer's installation,as may be specified by the Commission from time to time.

Provided that the Distribution Licensee shall allow installation of grid connected SRTPV Plants as per these Regulations as long as the cumulative capacity of such plants does not exceed the total capacity for the State as determined or approved by the Commission for this purpose.

5. **Procedure for Implementation & Reporting -**

(1) Every Distribution Licensee shall adopt a transparent and uniform procedure for enabling anEligible Consumer,on first come first served basis,to install and connect the SRTPV plant duly indicating time frame for each of the activities involved in such process.

(2) On receipt of an application for installation of the SRTPV, the distribution licensee shall issue its approval or otherwise based on the field report and technical feasibility, withinfifteen days from the date of receipt of such application.Upon such approval, the Eligible Consumer shall enter into power purchase agreement with the distribution licensee within fifteen days from the date of receipt of the approval.

Provided that approval of the Commission shall be necessary in respect of such power purchase agreements as the Commission may specify.

(3) The eligible consumer shall commission the SRTPV plant within 180 daysfrom the date of approval of the PPA. In case, the eligible consumer fails to commission the SRTPV plant within 180 days,the applicable tariff for the electricity supplied from the SRTPV plant shall be the agreed tariff or any revised tariff determined by the Commission or the average pooled power purchase cost as notified by the Commission prevailing on the date of commissioning, whichever is lower.

(4) Every Distribution licensee shall monitor the process of installation of the SRTPV plants by the Consumers and submit quarterly report to the Commission in such formats, as may be specified by the Commission.

6. **Technical Parameters -**

(1)Interconnection with the Distribution System:

(a) The Solar Rooftop PV Power Plants shall be connected to the distribution network at the connectivity level specified below:

Sl. No.	Installed Capacity of SRTPV	Voltage level
1.	Upto 5 kW	230 V- single phase
2.	Above 5 kW and upto 50 kW	400 V-Three phase
3.	Above 50 kW and upto 1000kW	11kV HT

(b) The above connectivity norms are applicable to all the SRTPV plants seeking connectivity with network of the distribution licensee. EHT/HT consumers may install solar power generators at LT/HT voltage and connect them to their LT/HT system.

(c) In case of gross metering, exclusive line shall be laid from the SRTPV Plant to the Distribution System.

(d) The cost of Distribution network upto the inter-connection point shall be borne by the eligible consumer.

(e) Every SRTPV plant of less than 50kW capacity shall be connected only to the existing distribution transformer through which the eligible consumers are being supplied electricity. In such cases,the total capacity of the existing and proposed SRTPV plants on that distribution transformer shall not exceed 80% of the rated capacity.

Illustration: If the rated capacity of the distribution transformer is 100 kVA the total allowable capacity of the SRTPV Plants to be connected shall be80 kVA.

(f) Every SRTPV plant of more than 50kW shall be connected only to the existing 11kV Distribution System.In such cases, the total capacity of the existing and proposed SRTPV plants shall be limited so that the line current does not exceed 80% of the rated current carrying capacity of that line.

(g) The Distribution Licensee while evaluating thetechnical feasibility of any proposed SRTPV plant shall ensure that the above said parameters are adhered to and any system improvement works beyond interconnection point shall not be taken up by the Distribution Licensee for the sole purpose of connecting the SRTPV plant.

(h) Prior to synchronization of any SRTPV Plant for the first time with the distribution system, the eligible consumer and the distribution licensee shall agree on the protection features and control diagrams.

(i) The SRTPV plant shall have the facility for limiting the harmonics and other distortions, as specified in the Karnataka Electricity Distribution Code as amended from time to time, before injecting the energy into the distribution system.

(2) Technical Standards -

All technical and operational aspects of the SRTPVplant shall conform to the standards specified in the following Regulations / Codes as amended from time to time:

i) The KERC (Karnataka Electricity Grid Code) Regulations, 2015

ii) The KERC (Karnataka Electricity Distribution Code) Regulations, 2015

iii) The Central Electricity Authority (Technical Standards for connectivity of the Distributed Generating Resources) Regulations, 2013.

iv)The Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.

v) The KERC Conditions of Supply of Electricity of Distribution Licensees.

vi) TheCentral Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010and all other relevant Regulations issued from time to time.

(3) Safety Aspect -

(a) Everyeligible consumer shall be responsible for safe operation, maintenance and rectification of defect of the SRTPV system up to the interconnection point beyond which the responsibility of safe operation, maintenance and rectification of any defect in the distribution system shall rest with the distribution licensee.

(b) Every eligible 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 SRTPV plant when the supply from distribution network is switched off. The Distribution Licensee reserves the right to disconnect the SRTPV Plant at any time in the event of such exigencies to prevent accidents.

(c) Any alternate source of supply shall be restricted to the consumer's premises and the consumer shall be responsible for taking adequate safety measures to prevent battery power / diesel generator power / backup power extending to distribution network on failure of distribution licensee's grid supply.

(d) The distribution licensee shall have the right to disconnect the SRTPVplant from its system at any time in the following circumstances:

(i) Any emergency or maintenance requirement on the distribution system.

(ii) Hazardous condition occurring on the Distribution System due to operation of the SRTPV Plant.

(iii) Adverse electrical effects, such as power quality problems, on the electrical equipment of the other consumers of the distribution licensee caused by generation from the SRTPVplant as established by the distribution licensee.

(e) Subject to Clause(a)above, the Distribution Licensee may call upon the eligible consumer to rectify any defect within a reasonable time.

(f) Every SRTPV Plant should be capable of having anti- islanding protection.Every SRTPV Plant shall be equipped with automatic synchronization device.

(g) Every SRTPV Plant shall be equipped with the protective functions to sense abnormal conditions on distribution system and cause the SRTPV Plant to be automatically disconnected from the distribution system to prevent any back feeding.

(h) Every SRTPV Plant and associated equipment shall be designed so that the failure of any single device or component shall not potentially compromise the safety and reliability of the distribution system.

(i) The distribution licensee may require the eligible consumer to provide a manually operated isolating switch between hisSRTPV Plant and the distribution system, which shall meet the following requirements:

(a) Separation of SRTPV from the distribution system;

(b) Indications to clearly show open and closed positions;

(c) Quick and convenient accessibility twenty four hours a day tothe Distribution licensee's personnel without requiring clearance from the eligible consumer; and

(d) Necessary locking arrangements in the open position.

7. Filing of application and proceedings for determination of tariff -

(1) The Commission shall determine the generic tariff for SRTPV Plantson the basis ofany application filed by the stakeholders or suo-motu, at the beginningof every Control period specified by the Commission.

Provided that the Commission in case of any major changes noticed in the tariff parameters, shall revise such tariffs during the control period either suo-motu orbased on anyreview petitions filed before it.

(2) Notwithstanding anything contained in these Regulations, for the SRTPV plants for which Power Purchase agreements are signed and which are commissioned within a control period, the generic tariff determined for SRTPV plants based on thecapital cost and other norms applicable for such controlperiod shall continue forthe term of the PPA subject to compliance to clause (3) of Regulation 5.

8. **Parameters for determination of tariff -**

The following parameters shall be applicable for determination of generic tariff for the grid connected SRTPV plants.

(1) Capacity Utilisation Factor (CUF):

The Capacity Utilisation Factor for SRTPV plant shall be 19%.

Provided that the Commission may adopt any other CUF based on the availability of reliable data.

(2) Tariff Structure:

The tariff for SRTPV Plants shall be a single part tariff consisting of the following fixed cost components:

(a) Operation and maintenance expenses;

(b)Depreciation;

(c) Interest on loan capital;

(d) Interest on working capital and

(e) Return on equity.

(3) Tariff Period and Tariff Design:

The Tariff period shall be equivalent to the useful life of the plant which shall be 25 years or such other period as may be decided by the Commission. The tariff shall be determined on levelised basis. For the purpose of levelised tariff computation, the discount factor equivalent to Post Tax weighted average cost of capital shall be considered.

(4) Capital Cost:

The norms for the Capital cost shall be inclusive of the cost of all capital works including plant and machinery, civil work, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point.

(5) Debt Equity Ratio -

For the determination of generic tariff, the debt equity ratio shall be 70:30 or such other ratio as may be decided by the Commission from time to time.

(6) Loan and Finance Charges:

(a) For the purpose of determination of generic tariff, loan tenure of 12 years or such term equivalent to recover 70% of the capital cost shall be considered. The amount of loan arrived at in the manner indicated in these Regulations shall be considered as normative loan for calculation of interest on loan.

The normative loan outstanding as on first day of April of every year shall be worked out by deducting the annual loan repayment up to thirty first day of March of the previous year from the normative loan. The interest on loan capital shall be computed on the average loan based on opening and closing balances of loans for the financial year.

(b) For the purpose of computation of tariff, the normative interest rate shall be considered on the basis of prevalentReserve Bank of India (RBI) Base rate plus additional basis points as may be decided by the Commission from time to time.

(c) Notwithstanding any moratorium period availed by an eligible consumer, the yearly repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed.

(7) Depreciation:

(a) The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset and salvage value of the asset shall be considered as 10% of the Capital Cost.

(b) Depreciation shall be based on 'Differential Depreciation Approach' over the loan period and over useful life of the SRTPV plant beyond the loan tenure computed annually on 'Straight Line Method'.

(c) In case the debt component is 70% of the capital cost, the depreciation rate for the first 12 years of the Tariff Period shall be 5.83% per annum and inothercases the depreciation rate shall depend on the debt component and tenure of the loan and the remaining depreciation shall be spread over the balance useful life of the project. Depreciation shall be chargeable from the first year of commissioning of the SRTPV plant.

(8)Return on Equity:

The value base for the equity shall be 30% of the capital cost and the normative Return on Equity shall be 16% per annum for the tariff period or such other value base and Return on Equity as may be decided by the Commission from time to time.

(9) Interest on Working Capital:

(a) The Working Capital shall be computed considering the following components:

(i) Operation & Maintenance expenses for one month.

(ii) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF.

(b) The Interest on Working Capital shall be at a rate equivalent to the prevalent Reserve Bank of India Base Rate plus additional basis points as may be decided by the Commission from time to time.

(10) Operation and Maintenance Expenses:

'Operation and Maintenance or O&M expenses' shall be equivalent to 1% of the capital cost. The Normative O&M expenses allowed during first year of the Control Period shall be escalated at the rate of 5.72% per annum over the Tariff Period.

(11) Taxes on Income:

Tariff determined under these regulations shall be exclusive of Income tax payable on Return on Equity annually. Such Income Tax, levied by the Central Government, shall be borne by the eligible consumer.

9. Metering System -

The metering system shall be as per the Standards specified in the CEA (Installation and Operation of meters) Regulations, 2006 for the SRTPV Plants under both gross and net-metering arrangement.

Provided that for consumers eligible for gross metering arrangement, thebi-directional (net meter) shall be installed at the interconnection point of such consumer with the network of the distribution licensee.

Provided further that for consumers eligible for net-metering arrangement, the existing consumer meter shall be replaced with the bi-directional (net meter) having the facility for downloading meter readings using Meter Reading Instrument (MRI)and the cost of new or additional meter (s) shall be borne by the Eligible Consumer and installed by the distribution licensee.

Provided, also that if bills are prepared on the basis of MRI downloads or if the 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 to do so by the distribution licensee.

Provided also that the meters installed shall be jointly inspected and sealed on behalf of both the parties andthe meters shall be tested or checked only in the presence of the representatives of the Eligible Consumer and Distribution Licensee.

Provided also that the Eligible Consumer shall follow the metering specifications and provisions for location of meter as stipulated by the distribution licensee from time to time.

Provided also that in case the Eligible Consumer with net-metering iscovered under the time of day (TOD) tariff, the SRTPV meters shall have features of recording time of day consumption / generation.

10. Energy accounting and settlement -

(1) Meter readings shall be taken on monthly basis or as per the billing cycle specified in the Electricity Supply Code.

(2) For each billing period, in the case of gross metering, the licensee shall show the quantum of electricity exported by the Eligible Consumer during the billing period. In case any import of energy is recorded in the bi-directional meter during a billing period, such energy shall be billed at the rate which is higher of the:

(a) Tariff agreed to in the PPA,

or

(b) Prevailing retail supply tariff applicable to the category of the installation of the eligible consumer.

(3) For each billing period in the case of net-metering, the licensee shall show separately the quantum of electricity injected by the Eligible Consumer during the billing period, electricity supplied by the distribution licensee during the billing period and the net electricity billed for payment by the eligible consumer for that billing period.

Provided that if the electricity generated exceeds the electricity consumed during the billing period, such excess electricity injectedto the distribution networkshall be paid by the Distribution Licensee at the tariff as agreed to in the PPA.

Provided further that where the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer's SRTPV Plant, the distribution licensee shall raise bill for the net electricity consumption at the tariff applicable to such eligible consumer.

11. Power Purchase Agreement (PPA) -

(1) The distribution licensee shall enter into power purchase agreement based on gross metering or net metering, as the case may be, in the standard format of the PPAas approved by the Commission.

(2) The Power purchase agreements as per approved standard formats after following the procedure specified in Regulations 5 in respect of SRTPV plants with installed capacity of below 500kW shall be deemed to be approved by the Commission on the date of its execution by the parties.

(3) The Distribution Licensee shall seek approval of the Commission within seven days from the date of signing the PPA,where the installed capacity is 500kW and above by paying necessary fee as per the KERC(Fee) Regulations, 2016 as amended from time to time.

12. Miscellaneous:

(1) Sharing of Clean Development Mechanism (CDM) Benefits:

The proceeds of carbon credit from any SRTPV plant approved as a CDM project shall be shared between the eligible consumerand the distribution licensee in the following manner, namely 100% of the gross proceeds on account of CDM benefit shall be retained by the eligible consumer in the first year after the date of commissioning of the SRTPV plantin the second year, the share of the distribution licensee shall be 10% which shall be progressively increased by 10% every year till it reaches 50%, and thereafter the proceeds shall be shared in equal proportion, by the eligible consumer and the distribution licensee.

(2) Solar Renewable Purchase Obligation:

The quantum of electricity purchased by the distribution licensees under gross or Netmetering arrangement from the SRTPV plants in their respective areas shall qualify towards their compliance of Renewable Purchase Obligation.

Provided that in respect of SRTPV installations installed and commissioned by the distribution licensees on any Government Building under funds provided by the Government, the entire energy generated by the SRTPV plant shall qualify towards their compliance of Renewable Purchase Obligation.

Provided further that, in such cases, the Distribution Licensees shall not be eligible to avail any Renewable Energy Certificates.

13. **Power to remove difficulties–**

(1) The Commission may from time to time issue such directions and orders as considered appropriate for the implementation of these Regulations.

(2) 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 any stakeholder.

(3) The Commission may from tinie to time, add vary alter suspend modify, amend or repeal any provisions of these Regulations.

By order of the Commission

Sd/-

SECRETARY

Karnataka Electricity Regulatory Commission Bengaluru

ಸರ್ಕಾರಿ ಮುದ್ರಣಾಲಯ, ವಿಕಾಸ ಸೌಧ ಫಟಕ, ಬೆಂಗಳೂರು. (ಪಿ7) ಪ್ರತಿಗಳು: 100

ANNEXURE-C

KARNATAKA ELECTRICITY REGULATORY COMMISSION
No.9/2, 6th & 7th Floor, Mahalakshmi Chambers,
M.G. Road, Bengaluru-560 001

Present:

Sri. M.K. Shankaralinge Gowda	**Chairman**
Sri. H.D. Arun Kumar	**Member**
Sri. D.B. Manival Raju	**Member**

In the matter of:

Tariff and other Operational procedures applicable in respect of Multiple / Combined Solar Rooftop Photovoltaic (SRTPV) Installations in a single premises

ORDERS

S/03/1 **Date:15.09.2017**

1. The Commission in its Order dated 10th October, 2013 had determined the tariff and other norms for Solar Rooftop and Small Photovoltaic Power Plants under net-metering concept, wherein Tariff of Rs 9.56 per unit was determined and such plants were allowed to have installed capacity upto 1MW irrespective of the sanctioned load of the installation of the consumer related to net metering.

2. Subsequently, the Commission in its Order dated 2nd May, 2016 has determined the revised tariff and other norms for Solar Rooftop and Small Photovoltaic Power Plants. The Commission while adopting net-metering in general, has adopted gross-metering concept for consumers of Domestic, Hospital and Educational institution categories under which the entire energy generated by the solar rooftop plant is allowed to be injected into the grid. The Commission has also restricted the installed capacity of such plants to be upto 150 per cent of the sanctioned load of the installation of the consumer.

3. The Commission, further, in its Order dated 19th September, 2016, decided to allow one-time irrevocable option of either gross or net metering for the consumers under Domestic, Hospital and Educational institution

categories, at the time of signing of PPA. It also decided to further limit the installed capacity of the Solar PV plant to 100 per cent of the sanctioned load of the installation of the consumer.

4. The BESCOM in its letter dated 6th February, 2017 sought clarification on allowing more than one SRTPV plant in a single premises of the consumer. It stated that some of the consumers are requesting permission for setting up of one SRTPV plant on the basis of the combined sanctioned load of all the consumer installations in a premises.

5. The CESC in its letter dated 15th April ,2017 sought clarification on reduction of sanctioned load/contract demand of the installation connected to SRTPV plants for which Power Purchase Agreements have been executed prior to 2nd May, 2016. Further, clarification was also sought on increasing the installed capacity of the SRTPV plants upto the sanctioned load of the consumer installations for the plants commissioned earlier.

6. The Commission having examined the issue, notes that at present, the consumers are allowed to install SRTPV units equivalent to sanctioned load of the installation of such consumers based on gross or net-metering basis as the case may be. If multiple SRTPV units on a common rooftop in a premises with individual units having different tariff structures are allowed, it would lead to over lapping and pose practical difficulties to the ESCOMs in monitoring and settling accounts of such multiple installations for the term of the PPAs. Further, if the SRTPV units are to be allowed on the basis of combined sanctioned load of all the installations in a premises, the attendant benefits of solar power generation should be equitably available to all the consumers and only one or a few consumers cannot be allowed to avail such benefits.

7. The Commission considers that, while promotion of solar power generation with tariff higher than conventional sources and renewable power purchase obligation on ESCOMs has its obvious benefits, solar power capacity creation beyond a reasonable limit is not desirable and sustainable because of attendant financial and operational issues.

8. The Commission notes that in the last couple of years, there has been large capacity addition of solar power in the State, from both megawatt scale plants and small kilowatt scale rooftop plants. As on date, megawatt scale plants of 1092 MW capacity and SRTPV installations of 148 MW have been commissioned. The ESCOMs in the State will be able to meet their RPO targets in the near future with these capacities commissioned and also planned. Thus, now there is a need to moderate additional capacity creation in Solar plants. The new Tariff Policy, issued by the Government of India, provides for procurement of power from

renewable sources of energy mainly through competitive bidding. Further, the rates offered by solar project developers have seen a drastic downward trend due to competitive bidding. The current tariffs in respect of SRTPV projects are higher than such rates. In the circumstances, the Commission is of the view that any capacity addition in respect of SRTPV units through multiple installations on a single roof requires to be regulated to ensure better utilisation of idle rooftops with least impact on technical operations and financial health of the ESCOMs and also tariff burden on the general consumers.

9. The Commission is of the view that, the multiple SRTPV units could be allowed on a common rooftop, if the tariff for all the units is uniform and remains the same for the term of their PPAs. The Commission, hitherto, is allowing purchase of solar power from SRTPV units at tariffs determined based on cost plus return approach. If, the multiple units on a common roof are to be allowed, the slab-wise tariff based on installed capacity as per the Commission's Tariff Order dated 2nd May, 2016, cannot be applied to such installations.

10. The Commission considering it necessary to elicit the views of the stakeholders in the matter had hosted the Draft Order it proposes to issue in this regard, on the Commission's website www.karnataka.gov.in/kerc on 05.06.2017 inviting objections/suggestions/views from them. A Public Notice was also published in certain newspapers informing the public/stakeholders/interested persons to file their objections/suggestions/views if any, to the Draft Order. The Commission had received views from the CESC, the HESCOM, the MESCOM and the BESCOM.

11. As part of further consultative process, the Commission also held a 'Public Hearing' on 01.08.2017 in the matter and has considered the views/suggestions / objections raised by the stakeholders.

12. The Commission, having considered all aspects of the matter and the feedback received, in addition to and in partial modification to its Orders dated 10th October, 2013, 2nd May, 2016 and 19th September, 2016 decides to issue the following:

ORDER

Subject to the other terms specified in the Commission's Orders dated 10th October, 2013, 2nd May, 2016 and 19th September, 2016, and further subject to the provisions of the KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016, the Commission decides;

i. To allow on net metering basis, installation of multiple SRTPV units, by a single registered consumer or multiple registered consumers on common rooftop in a premises without any existing SRTPV unit, with the capacity of such units not exceeding the sanctioned load of the connected installation of the respective registered consumer.

ii. To allow on gross metering basis, a registered consumer having multiple installations in a premises without any existing SRTPV unit to install single SRTPV unit with installed capacity not exceeding the total combined sanctioned load of all the installations of such registered consumer and with billing on one chosen installation.

iii. To allow on gross metering basis, multiple registered consumers having multiple installations in a premises without any existing SRTPV unit to install single SRTPV unit with installed capacity not exceeding the total combined sanctioned load of all such installations, subject to nomination of any one consumer in whose name the gross metered energy is to be billed.

iv. To allow on net metering basis, multiple registered consumers having multiple installations in a premises having an existing SRTPV unit of a single consumer, to install multiple SRTPV units with the capacity of each such unit not exceeding the sanctioned load of the connected installation of respective registered consumer, provided the consumer of the existing SRTPV installation agrees to cancel the existing PPA and enters into a new PPA on net metering basis with the tariff prescribed in this Order.

v. To allow on gross metering basis multiple registered consumers having multiple installations in a premises having an existing SRTPV unit of a single consumer, to install additional SRTPV unit with the combined installed capacity of such unit including the existing unit not exceeding the total combined sanctioned load of all the registered consumers in the premises and with the billing of the additional SRTPV unit being done on one nominated consumer. Provided that the consumer of the existing SRTPV unit agrees to cancel the existing PPA and enters into a new PPA for his existing SRTPV unit under gross metering with the tariff prescribed in this Order.

vi. To allow in all the above cases, phased capacity addition so as not to exceed the sanctioned capacity as applicable to the respective single SRTPV unit or multiple SRTPV units.

vii. To allow on gross metering basis, a single registered consumer with multiple installations in a premises having an existing SRTPV unit to scale up the capacity of such SRTPV unit to the combined sanctioned load of all his installations, provided the consumer agrees to cancel the existing PPA and enters into a new PPA for the total installed capacity.

viii. To allow in the case of existing SRTPV units, any change in the sanctioned load of the connected consumer installation or any change in the tariff category of the connected consumer installation, provided such consumer agrees to cancel the existing PPA and enters into a new PPA with the tariff prescribed in this Order.

ix. To specify that the tariff payable for the energy injected into the distribution licensee's system in all the above cases either under net metering or gross metering, shall be the latest finalised APPC rates notified by the Commission or Rs 4/- per unit whichever is less.

This Order shall be effective from the date of this Order and shall be in force till 31st March, 2018.

This Order is signed and issued by the Karnataka Electricity Regulatory Commission at Bengaluru, on Friday 15th of September, 2017.

Sd/-	Sd/-	Sd/-
M.K.Shankaralinge Gowda	**H.D.Arun Kumar**	**D.B.Manival Raju**
Chairman	**Member**	**Member**

ANNEXURE – D

BEFORE THE KARNATAKA ELECTRICITY REGULATORY COMMISSION

No. 16 C-1, Miller Tank Bed Area, Vasanth Nagar, Bengaluru- 560 052

Dated: 1st August, 2019

Present:

Shri Shambhu Dayal Meena	:	Chairman
Shri H.M. Manjunatha	:	Member
Shri M.D. Ravi	:	Member

In the matter of:

Determination of tariff in respect of Solar Power Projects (including Solar Rooftop Photovoltaic Projects) for FY20

ORDER

Preamble:

1. Section 86(1)(e) of the Electricity Act, 2003, mandates the State Electricity Regulatory Commissions to promote generation of electricity from renewable sources of energy. Accordingly, the Karnataka Electricity Regulatory Commission has been promoting generation of power from renewable sources, by determining the feed-in-tariff (generic tariff) periodically, based on the normative operational and financial parameters for different control periods from the year 2005 onwards. This approach of the Commission has enabled creation of a favourable environment for investment in Renewable Energy (RE) projects in the State, ensuring the investors to get reasonable returns on their

investments. As a result, the State has made substantial progress in Wind and Solar capacity addition.

2. The Commission, vide its Order dated 18.05.2018 had determined a levelized tariff of Rs.3.05 per unit for Megawatt scale solar projects and Rs.3.56 per unit for kW scale solar rooftop photovoltaic projects, applicable for the life of the projects, i.e. for 25 years. These tariffs were applicable to all such new solar power projects for which PPAs are entered into and approved by the Commission, after the date of issue of the said Order and also those which achieved commercial operation on or after 01.04.2018. This Order was in force till 31.03.2019.

3. Thereafter, as on 31.12.2018, the State had an installed Solar Power Generation capacity of 5329 MW in both Grid Connected ground mounted solar photovoltaic and rooftop solar photovoltaic plants. However, it was noticed that, the investment in solar rooftop installations is not encouraging as could be seen from the fact that, out of the above capacity, the installed capacity of SRTPV plants is only 154 MW. Further, bulk of these projects pertained to large rooftop capacity projects, indicating that smaller consumers had not shown much interest in installing SRTPV units on their rooftops, even though the potential for installation of small capacity SRTPV units, especially by the domestic consumers, is substantial and the installation of SRTPV plants benefits both the consumers and the distribution licensees. It was also noted that earlier, the domestic consumers have actively supported the State Government's initiative in installation of solar water heaters across the State.

4. The Commission notes that as per the revised National Solar Mission target of 1,00,000MW solar projects has to be achieved by the year 2021-22. As per the Government of Karnataka's Solar Policy 2014-21, it is proposed to install a

minimum of 6000MW solar power projects by March 2021, of which the share of grid connected SRTPV projects shall be 2400MW.

5. The new Tariff Policy dated 28.01.2016, issued by the Government of India (GoI), envisages that all the future procurements of renewable energy (except from waste to energy plants) shall be made only through competitive bidding, as per the bidding guidelines issued by the GoI. Pursuant to the said Policy, the Central Government has issued the Bidding Guidelines on 03rd August, 2017, which has prescribed standard bidding documents along with Models for Request For Selection (RFS), Power Purchase Agreement (PPA), Power Sale Agreement (PSA) etc., to facilitate power procurement by the DISCOMs. Even prior to this, the Karnataka State has been procuring megawatt scale solar power through a transparent process of competitive bidding, using the Commission determined tariff, as a bench mark. The Commission also decided that all the future power procurements of RE shall be made through the process of competitive bidding, subject to the capacity limit, as may be fixed by the Government. In respect of power purchased from the small ground mounted solar projects of the capacity of less than 5 MW, which are not covered under competitive bidding and SRTPV projects of up to 2000kW, the Commission has to determine tariff effective from 01.04.2019.

6. The Commission also notes that, one of the reasons for the poor response for installation of SRTPV units by the domestic consumers may be, a low Feed in Tariff (FIT), fixed by the Commission, as compared to a relatively higher capital cost involved in installing the SRTPV units. Hence, the Commission is of the considered view that, there is a need to promote smaller capacity solar

rooftop power plants by the domestic consumers, in order to achieve the desired capacity addition in respect of SRTPV units, in the State.

7. In order to encourage installation of SRTPV units in the State, the following steps were taken by the Commission:

   a. The Commission, on 19.12.2018 issued an Order revising the tariff in respect of new solar rooftop photovoltaic units of 1kW to 10kW capacity installed by domestic consumers to Rs. 4.15 per unit (without subsidy) and Rs. 3.08 per unit (with capital subsidy);

   b. The Commission, in its Order dated 18.05.2018, allowed installation of SRTPV plants on the Government buildings by the ESCOMs under funding from the Government, with the energy from such plants being allowed to be utilised by the concerned office/institution on net metering basis and inject any surplus energy into the grid, with the tariff as indicated in the said Order;

   c. The Commission, in its Order dated 18.05.2018, also allowed installation of multiple SRTPV units or single SRTPV unit with the combined installed capacity in a single premises not exceeding the total sanctioned load of all the consumers in that premises, at a tariff equal to 90% of the tariff as per Order dated 18.05.2018;

   d. As per Regulation 13 of KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016, the Commission has also allowed to install SRTPV up to 2000kW subject to further limit based on the sanctioned load of the consumer's installation, as may be specified by the Commission from time to time.

8. The Commission notes that the tariffs discovered through competitive bidding continue to show a significant downward trend as compared to the

Feed In Tariff (FIT). The rapidly growing solar markets and increased competition along with reduction in capital costs, resulted in discovery of lower tariffs, which are far below the tariff determined by the Commission. In other States as well, there is a downward trend in the tariffs discovered through competitive bidding.

9. In order to determine a Tariff which reflects the latest market trend and price, the Commission had issued a Discussion Paper in the matter, on 06.02.2019 duly inviting comments / suggestions from the stakeholders, to be submitted to the Commission on or before 26.02.2019.

10. The Commission has received many representations/ letters from Solar Roof Top Developers and SRTPV consumers requesting for extending the existing tariff of solar roof top projects, as per the existing order until a new tariff is determined. In the above circumstances, pending determination of tariff, the Commission has decided to permit the ESCOMs vide its letter dated 15.04.2019 to execute the PPA with the SRTPV consumers for FY 20, by suitably amending the Article 6.1(a) of the approved standard format of PPA relating to SRTPV projects as indicated below;

> "6.1(a). The .... ESCOM shall pay for the net energy/ gross energy (as the case may be) at the tariff that may be determined by the Commission for the period from 1.4.2019 to 31.03.2020, subject to such other conditions, if any, as may be imposed in the tariff Order, for the term of the agreement."

11. In response to the said Discussion Paper, various stakeholders including some of the ESCOMs have submitted their written comments / suggestions. The Commission had proposed in the public hearing Notice published on

11.06.2019 to consider a revised capital cost of Rs.373.30 Lakhs, duly considering the levy of Safeguard Duty imposed by the Government of India (GoI) and Goods & Services Tax (GST) charged on solar modules/panels.

12. The Commission also held a public hearing in the matter on 25.06.2019 in the Court Hall of the Commission. The list of the stakeholders who filed their comments/suggestions and those who made oral submissions in the public hearing is given in the Annexure to this Order.

13. After considering the views and submissions made by the stakeholders and in exercise of powers conferred under Section 62(1)(a), read with Sections 64 and 86(1)(e) and other enabling provisions of the Electricity Act, 2003, the Commission hereby proceeds to determine the generic tariff Order for ground mounted solar power projects of capacity up to five MW and the kW scale Solar Roof Top Photovoltaic Power Plants up to 2000kW capacity.

ORDER

1. The analysis and decisions on the operational and financial parameters, for determination of tariff in respect of the above mentioned solar capacity plants/ units, are discussed in the following paragraphs:

i) Life of the Plant:

The Commission had proposed to consider the life of the solar plants as 25 years. No comments or suggestions have been received on this proposal.

Commission's Decision:

The Commission, in its earlier Orders has considered 25 years as the useful life of the Solar Power Plant. **The Commission, therefore, decides to adopt the useful life of the Solar Power Plants as 25 years, from the date of their commissioning.**

ii) **Term and Tariff design:**

The Commission had proposed to adopt levellised tariff for a period of 25 years. No comments or suggestions have been received on this proposal.

Commission's Decision:

The Commission, in its earlier Orders has adopted the levellised tariff for a period of 25 years, in order to ensure certainty of revenue streams to the investors.

The Commission, therefore, decides to adopt levelised tariff for a period of 25 years.

iii) **Degradation Factor:**

While the Commission had not separately proposed allowing any degradation factor for kW scale projects, Hinren Engineering has suggested to consider the degradation factor from the first year of installation of panels for solar roof top projects(SRTPV).

Commission's Decision:

The Commission in its earlier Order has considered reduction of 0.5% of net generation as annual degradation from the fifth year onwards for MW scale projects. The rate adopted earlier cannot be reviewed based on only one manufacturer's unauthenticated pamphlet. **The Commission, therefore, decides to allow reduction of 0.5% of net generation as annual degradation from the fifth year onwards for MW scale projects.**

iv) **Capacity Utilisation Factor:**

The Commission, in its earlier tariff Orders had considered CUF of 19% for solar photovoltaic plants.

BESCOM, in its suggestion letter dated 23.03.2019, has submitted that Rajasthan ERC, vide its Order dated 09.10.2017, has considered CUF of 20% with deration

factor of 0.5% of CUF for every year after second year and requested the Commission to adopt CUF of 20% .

Sri M.T Kesari suggested that, for plants less than 10kW, the inverter losses are higher and suggested a CUF of 17.5% and 18% for more than 10kW plants. ECO Soch Solar suggested CUF of 16% for SRTPV projects. Hinren Engineering Suggested to consider reduction of CUF every year. Balark Solar has suggested to consider CUF of 15% Powergate Energy (Mysore) Private Limited has suggested to consider 17.5% of CUF for less than 10kW and 18% for more than 10kW plants.

Commission's decision:

The Commission notes that, the CUF of solar plants would vary based on the irradiation profile and other parameters of their locations. It is safe to assume that solar power Projects are taken up based on the initial studies of specific locations and their economic viability. Selection of locations with higher CUF would benefit the grid and also the investor. Commissioning of the Solar power plants in suboptimal locations, thereby resulting a lower CUF is not in the interest of the stakeholders including the investors/developers. In any case while determining generic tariff, locational disadvantages of a few plants cannot be factored.

As per the data published by the MNRE and the capacity utilization factor for solar PV plants considered by the CERC and most of the SERCs in the country, the CUF is 19%.

The Commission, therefore, decides to adopt a CUF of 19% for Solar Power plants (both ground mounted and SRTPV plants).

v) Debt Equity Ratio:

Based on the Tariff Policy and CERC RE Regulations, the Commission decides to continue with same **Debt Equity Ratio of 70:30 in the present tariff determination process.**

vi) Capital Cost:

The Commission had proposed to adopt a Capital Cost of:

i. 1kw to 10kW (domestic consumer) at Rs. 45,000 per kW;

ii. 1kW to 2000kW-at Rs.35,000 per kW for SRTPV plants (other than SRTPV consumer covered under (i)) and;

iii. Rs.314 lakhs per MW for MW scale and ground mounted solar power plants.

Later the Commission, vide its paper notification dated 11.06.2019 had proposed the capital cost of Rs. 373.30 lakhs, after considering the prevailing safeguard duty levied and GST rate charged on solar modules/panels to the revised capital cost for solar power plants.

CEEW Centre for Energy Finance has suggested the revision in Capital Cost based on the differential price based on size and not based on the consumer categories. It has proposed to consider:

For 1 to 3kW, the capital cost of Rs 55,000/kW;

3-10kW Rs.50,000/kW;

10-100kW Rs.40,000/kW and

for 100 to 2000kW Rs.35,000/kW.

Hinren Engineering suggested the capital cost for SRTPV of Rs.90,000/kW. EcoSoch Solar has suggested to consider the capital cost for SRTPV of Rs.75,000 /kW. Balark Solar suggested to consider the capital cost for SRTPV more than Rs.45,000/kW. Sri

Veerabadhraiah has suggested tariff at the rate of retail supply tariff approved by the Commission in the reverse form, but not suggested the capital cost and other parameters for computing the tariff. BESCOM has suggested to consider the Capital cost for SRTPV at Rs.35000 per kW up to 50 kW and Rs.31330 for SRTPV of above 50 kW. Powergate Energy(Mysore) Pvt. Ltd has suggested to consider different rates for small, medium and large scale plants. However, BESCOM and other stakeholders have not furnished any documentary evidence in support of their suggestion on the capital cost.

Commission's Decision:

The Capital cost, as proposed, is inclusive of evacuation infrastructure. The available literature including reports by international organisation like IRENA, indicate rapid decline in cost of the module beginning from the year 2015. They also reveal that the reductions in cost of the module is not only influenced by substantial capacity and deployment upsurge, but more recently because of improvements in the production process, more competitive supply chain, technological improvements and efficiency gains associated with increased adoption of newer cell designs. In the energy markets around the world, rising competitive pressures with continued innovation drive, in bringing down the cost of the PV modules. While equipment costs keep declining, the reduction in balance of-system, O&M and capital cost are important parameters for overall cost considerations. Also, India has emerged as a new market for the solar project developers. The Commission has taken note of these developments while considering the capital costs of the projects/ units.

The Capital Cost of Rs. 350 Lakhs per MW adopted in its Order dated 18.05.2018, is based on the market report, wherein the average module cost was at about Rs19.68/Watt. The Commission had proposed to adopt a new capital cost of Rs.314 Lakhs per MW (i.e. about 10% less), based on the latest market reports available on

the internet (PV insight) as on 22.04.2019, wherein, the average module cost is at about Rs14.89/watt i.e. a reduction in module cost by about 24% as compared to the cost adopted earlier. It is to be noted that, most of the developers have more serious concerns about the likely increase in module/ panel cost because of levy of Safeguard Duty and GST than the rate of modules cost considered in the proposed Capital Cost. While issuing the Discussion paper on 06.02.2019, the levy of Safeguard duty and Goods and Services Tax (GST) on the Solar Modules/ Panels was not considered. Further, no documents like invoices/bills etc. have been produced by any of the stakeholders to support their claim that the actual Capital Costs are higher than the proposed cost. With the reduction in costs of other equipment and materials along with reduced interest rates, the proposed Capital Cost of Rs.314 lakhs/MW is fair and reasonable for megawatt scale ground mounted solar power plants.

The Commission had proposed to consider a revised capital cost of Rs.373.30 Lakhs duly considering the 'Safeguard Duty' at an average rate of 20.79% and GST at 5 % on Solar Modules/ Panels as per Circular of Ministry of Finance (MoF) Government of India dated 31st December, 2018 and18 % GST on Civil works as per Notification of Ministry of Finance (MoF) Government of India dated 31st December, 2018. However, as per the clarification issued by Ministry of Finance (MoF) Government of India dated 22nd December, 2018, 70% of the capital cost of the project towards the Solar Modules/ Panels and 30% of the capital cost of the project towards the EPC contract, needs to be considered.

In the above context, the Commission notes that the rate of Safeguard duty varies between 25%-15% for different periods. As per the Ministry of Finance Notification dated 30.07.2018, for the solar cells, whether or not assembled in modules or panels, the applicable rate of safeguard duty is 25% when imported during the period from

30.07.2018 to 29.07.2019 and 20% when imported during the period from 30.07.2019 to 29.01.2020 and 15% when imported during the period from 30.01.2020 to 29.07.2020.

The Commission further notes that the payment of the safeguard duty arises only in case of import of solar cells whether or not assembled in modules or panels from outside the country and if the developer uses the indigenous panels, they need not incur such duty. Without considering the source of procurement, the inclusion of safeguard duty will result in front loading of the duty in determination of the Generic tariff and would also result in allowing extra tariff by way of safeguard duty, which the Generator/Developer will not have incurred, in case of indigenous modules/panels. Thus, the Commission decides to keep the safeguard duty and applicable GST thereon separately from the capital cost while determining the generic tariff. If the Generator/Developer imports the panel from outside India, the actual safeguard duty with GST on safeguard duty amount will be determined by the concern ESCOM on production of Bill of entry and documents thereon for actual payment of safeguard duty made to the competent authority by the Generators/ Developers. This amount will be paid to the Generator/Developer by the concern ESCOM by spreading the actual safeguard duty incurred, over the Tariff period as per the PPA, every year by cash, on annuity basis during the month of April of the subsequent financial year.

The Commission notes that, the claims of increased capital cost of the SRTPV plants by some of the stakeholders are not supported by any data. It is pertinent to note that, there is a reduction in the Capital Cost of SRTPV plants from the last tariff revision. Even though there is a reduction in capital cost, in order to encourage solar rooftop projects, the Commission has considered the Capital cost of Rs.32800 per kW (excluding safeguard duty) of MW scale solar projects also to the SRTPV projects of

1 kW to 2000 kW. The payment of Safeguard Duty, as applicable to MW scale projects on annuity basis, shall also be applicable to roof top projects of 1kW to 2000 kW.

The Commission further notes that the reduction of capital cost considering the economy of scale will not be applicable to small SRTPV projects. Hence, to encourage the domestic consumers to put up SRTPV projects, the Commission has considered capital cost of Rs. 45000 per kW which is inclusive of Safeguard Duty and GST in the determination of Tariff in respect of SRTPV projects of 1kW to 10kW. Considering the above facts, the Commission decides to consider capital cost for ground mounted Solar projects as follows:

Breakup for Capital Cost for Solar Photovoltaic power plants

Sl no	Particulars	FY20
1	Average Module cost-USD/Watt peak	0.214
2	USD in Rs. as per RBI as on 16.04.2019	69.58
3	Cost of Solar Module in Rs./Watt	14.89
4	Cost of Solar Module in Rs. lakhs /MW	148.90
5	As per the Ministry of Finance vide its notification dated 30.07.2018. the Commission has considered the weighted average rate of safeguard duty, at rate 20.79%.	30.96
6	Cost in Rs Lakhs /MW(Before GST)	179.86
7	Civil and General Works, Mounting Structure, Power Conditioning Unit, Evacuation Lines & Equipment's, Preliminary and preoperative expenses IDC etc.	139.98
8	Total Capital Cost in Rs Lakhs /MW	319.84
9	GST of 5% for 70% of the total cost (Supply of solar modules and its accessories, as per clarification issued by Ministry of Finance (MoF) Government of India dated 22.12.2018) in Rs Lakhs	11.19
10	GST of 18% for 30% of the total cost (Civil and general works, as per clarification issued by Ministry of Finance (MoF) Government of India dated 22.12.2018) in Rs Lakhs	17.27
11	Total cost of the project in Rs Lakhs	348.30
12	Land Cost @ Rs.5.00 Lakhs per acre (5Acres per MW)	25.00
13	Total cost of the project including land cost in Rs Lakhs	373.30
14	Less: The safeguard duty and its GST from the capital cost and allow it to be paid by cash by the respective ESCOMs, every year(Rs 33.72 lakhs /tenure of PPA), on production of proof of payment of the safeguard duty by the generators/ developers in Rs lakhs	33.72
15	Total Capital cost considered for determination of tariff in Rs. Lakhs	**339.58 (round off to 340.00)**

Accordingly, the Commission hereby decides to adopt the following capital cost for

i. **1kW to 10kW SRTPV project (domestic consumer) of Rs 45,000 per kW.**

ii. **1kW to 2000kW SRTPV project (other than SRTPV consumer covered under (i)) Rs 32,800 per kW**

iii. **Ground mounted Solar projects of Rs.340 Lakhs per MW**

vii) Operation & Maintenance Cost:

The Commission had proposed to allow O&M expenses of Rs. 600/ kW SRTPV plants and at Rs. 4.50Lakhs /MW for ground mounted Megawatt scale solar plants, with an annual escalation of 5.72%.to meet the inflationary costs.

BESCOM has suggested to adopt O&M factor at 4.88%. Sri M.T Kesari has suggested O&M expenses of Rs 900 per kW per annum with the escalation of 5.72%. Ecosoch Solar suggested 2% of the capital cost in respect of 1kW to 10kW plants. Powergate Energy(Mysore) Pvt. Ltd has suggested to consider Rs. 900/kW/annum with an escalation of 5.72% and to fix base price at the rate 5.72% per succeeding year.

Commission Decision:

The Commission notes that the stakeholders have submitted the proposed O&M expenses, without furnishing the substantial reason and documents for consideration. **The Commission, therefore, decides to allow O&M expenses at Rs.600/kW for SRTPV units and at Rs.4.50Lakh/MW for ground mounted Megawatt Scale solar plants, with an annual escalation of 5.72%.**

viii) Interest and Tenure of Debt:

The Commission had proposed the normative tenure of long term debts /loans as 13 years and to allow Interest on loan at 10% per annum.

Sri M.T. Kesari and Powergate Energy(Mysore) Pvt Ltd. has suggested to consider the loan tenure as 7 years and interest rate at 11%.

Commission's Analysis & Decision:

The Commission notes that, with effect from 19.11.2018, Indian Renewable Energy Development Agency (IREDA) has revised the interest rates, which vary from 9.80% to 10.95% for RE projects, with a reduction of 25, 20 and 15 basis points for grades 1 to 3 respectively with external grading.

Similarly, Power Finance Corporation Limited (PFC) has revised the rates of interest with effect from 28.02.2019, which varies from 10.10% to 10.75% for State Sector and 11.00% to 12.25% for private sector for RE projects other than Biomass Power Plants.

With effect from 10.01.2019, the MCLR of SBI is 8.75% for a loan tenure three years and above. Considering 200 basis points above the MCLR, the maximum interest rate would be 10.75%.

The above facts indicate that the rates of interest for domestic loans for solar projects are in the range of 9.50% to 11.00%, depending upon the credit ratings of the solar power generators and the average works out to 10.25%. The CERC, in its Order dated 11.01.2019 has considered interest rate on term loan at 10.41%.

The Commission has considered the interest rate of 10.50% for wind power project vide in its Order dated 27.02.2019.

Therefore, the Commission by considering all the factors, decides to adopt interest rate of 10.50% per annum and considered the tenure of loans as 13 years.

ix) Working Capital:

The Commission in the discussion paper had proposed one months' receivables for SRTPV projects and two months' receivables for megawatt scale ground mounted solar projects as working capital.

No suggestions are received from the stake holder on working capital.

Commission's Decision:

The Commission notes that a reasonable working capital has to be allowed for enabling the investor to sustain his operations. In respect of SRTPV plants the need for Working Capital would not be as pressing as the megawatt scale projects.

The Commission, therefore, decides to allow one month's receivables for SRTPV projects and two months' receivables for megawatt scale ground mounted Solar Power Projects.

x) Interest on Working Capital:

The Commission had proposed to adopt the interest on working capital of 11% per annum.

Sri. M.T. Keasri and Powergate Energy(Mysore) Pvt Ltd had suggested interest on working capital of 12.25%.

Commission decision:

The Commission notes that the CERC in its recent Order dated 11.01.2019 has considered 11.41% as the interest on Working Capital.

Depending on the interest rate allowed for term loans, the Commission, in all its earlier orders, has considered interest on working capital at 1% more than the

interest rate allowed for the term loan. Following the same approach, the Commission decides to allow at 11.50%.

xi) **Depreciation:**

The Commission had proposed to adopt the depreciation on 90% of the capital cost (excluding land cost) at the rate of 5.38% for the first 13 years, considering the recovery of debt amount and the remaining depreciation amount spread equally over the balance useful life of the projects. BESCOM has suggested to adopt depreciation of 5.28%.

The Commission notes that the CERC in its RE Tariff Regulations on determination of tariff for renewable energy sources of 2017, has specified that the salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset. That a depreciation rate of 5.28% per annum be considered for first 13 years and the remaining depreciation be spread during the balance useful life of the RE projects considering the salvage value of the project as 10% of the project cost.

Commission decision:

The Commission, by considering the amount of debt repayment and the term of the capital loan, decides to consider the depreciation on 90% of the capital cost (excluding land cost) at rate at 5.81% for the ground mounted project and 5.38% for the SRTPV Projects for the first 13 years, and the remaining depreciation spread equally over the balance useful life of the ground mounted projects and SRTPV.

xii) Return on Equity:

The Commission had proposed Return on Equity (RoE) of 14%. on the equity amount of the project. Sri.M.T.Keasri and Powergate Energy(Mysore) Pvt Ltd had suggested RoE of 15%.

Commission's Decision:

The Commission notes that the prevailing CERC Regulation specify RoE of 14% and the Commission has adopted such rates in other Generic Tariff Orders.

The Commission, therefore, decides to allow RoE of 14%.

xiii) Discount Rate:

Since the financing of capital cost is based on 70% debt and 30% equity, the Commission had proposed that it would be appropriate to reckon weighted average cost of capital (WACC) as the discount factor to arrive at the levelised tariff.

No comments or suggestions have been received on the proposal.

Commission's decision:

The Commission, therefore, decides to consider the proposed discount factor of 11.55%

xiv) Auxiliary consumption:

The Commission, had proposed to consider auxiliary consumption of 0.25% of the gross generation for MW scale projects and not allow any auxiliary consumption for SRTPV plants.

BESCOM suggested not to consider the Auxiliary consumption as the same is very negligible.

Commission Decision:

The Commission notes that the CERC has specified auxiliary consumption of 0.25% of the gross generation for Solar PV Plants. **The Commission, therefore, decides to allow auxiliary consumption of 0.25% for MW solar photovoltaic plants and not to allow any auxiliary consumption for SRTPV plants.**

xv) Other Issues for kW projects (SRTPV plants):

i) The Commission in its earlier Order has allowed the consumers to install SRTPV units with capacity equivalent to the sanctioned load of the respective consumer's installation based on gross or net-metering.

Renew Power suggested the capacity limit for installing SRTPV should be restricted only for net metering and to allow without any restriction for other than net metering.

Commission's Decision:

The Claims of restriction/allow the capacity for SRTPV by Renew Power is not supported by any data. **The Commission therefore, decides to allow installation of SRTPV with capacity equivalent to 100% of the sanctioned load of the respective consumer's installation based on gross or net metering.**

ii) The Commission in its Order dated 11.11.2016, has allowed installation of SRTPV plants on the Government buildings by the ESCOMs under funding from the Government, with the energy from such plants being allowed to be utilized by the concerned office/institution on net metering basis and inject any surplus energy into the grid with the tariff for any surplus energy injected as determined by the Commission in the Order 18.05.2018.

Commission's Decision:

The Commission therefore decides to continue to allow the scheme but with the tariff for any surplus energy injected as determined by the Commission in this Order.

iii) The Commission in its Order dated 15.09.2017 has allowed installation of multiple SRTPV units or single SRTPV unit with the combined installed capacity in a single premises not exceeding the total sanctioned load of all the consumers in that premises at a tariff 90% of the tariff as determined by the Commission in the Order 18.05.2018.

Commission's Decision:

The Commission therefore decides to continue the scheme but with 90% of the tariff as determined by the Commission in this Order.

2. With the above parameters considered, the applicable tariff works out as follows:

(a) kW scale SRTPV projects (1 to 2000kW and 1 to 10kW):

Parameters for Kilowatt scale		
Cost/kW- in Rs.	1kW to 10kW-Rs45,000 per kW	1kW to2000 kW-Rs.32800 per kW
Debt: Equity Ratio	70:30	70:30
Debt- in Rs.	31500	22960
Interest Rate on Debt-%	10.50%	10.50%
Debt Repayment in Yrs.	13 Years	13 Years
CUF	19%	19%
Equity- in Rs.	13500	9840
ROE-%	14%	14%
Auxiliary consumption	0.00%	0.00%
O & M expenses in Rs. /kW	0.006	0.006
O & M Escalation p.a.	5.72%	5.72%
WC interest (one month's receivables)	11.50%	11.50%
Depreciation in %	5.38%p.a for first 13 years and remaining depreciation spread equally over balance years of the plant's useful life.	5.38%p.a for first 13 years and remaining depreciation spread equally over balance years of the plant's useful life.

(b) MW scale Solar Power Projects (Ground mounted)

Parameters for Megawatt scale solar projects	
Cost/MW- Rs. Lakhs	340
Debt: Equity Ratio	70:30
Debt-Rs. Lakhs	238
Interest Rate on Debt-%	10.50%
Debt Repayment in Yrs.	13
CUF	19%
Equity- Rs. lakhs	102
ROE-%	14%
Auxiliary consumption	0.25%
O & M expenses in Rs. Lakhs/MW	4.50
O & M Escalation p.a.	5.72%
WC interest (two months' receivables)	11.50%
Depreciation in %	5.81%p.a for first 13 years and remaining depreciation spread equally over balance years of the plant useful life.

3. **Applicability of tariff determined:**

The Commission, in its earlier generic tariff Orders, had approved that the generic tariff determined for a particular RE project was applicable for the projects commissioned within a review period. The Commission always intended that the 'Commissioning of a project' means 'commercial operation of a project' with either sale to an ESCOM under a PPA or sale to third person under open access, by actual injection of energy. However, the approved standard formats of PPA, have not defined the word 'commissioning' but only the words 'commercial operation date'. Therefore, for avoiding any uncertainty, instead of the word 'commissioning', the word 'commercial operation' is specified in this Order.

4. For the forgoing reasons, we pass the following:

ORDER

(i) The Commission hereby determines the generic tariff,

a. for grid connected megawatt scale solar power projects of less than 5MW capacity at Rs.3.08 per unit;

b. subject to para(c) below, for grid connected Solar Rooftop Photovoltaic projects of 1kW to 2000kW at Rs. 3.07 per unit (without capital subsidy) and at Rs.2.32 only per unit (with capital subsidy); and

c. for grid connected Solar Rooftop Photovoltaic projects of 1kW to 10 kW for domestic consumers at Rs.3.99 per unit (without capital subsidy) and at Rs.2.97 per unit (with capital subsidy);

(ii) The above tariff shall be applicable to all such new solar power projects for which PPAs are entered into on or after 01.04.2019 and approved by the Commission after the date of issue of this Order, that achieve commercial operation on or after 01.04.2019;

(iii) The tenure of the PPA, shall be for the life of the solar power projects i.e., twenty-five (25) years;

(iv) The generic tariff determined in this Order shall also be applicable for payment towards any banked energy deemed to have been purchased by the Distribution Licensees and in such other cases as specified in the relevant orders of the Commission;

(v) All the other issues not covered under this Order, shall be governed by the respective Regulations and Orders issued by the Commission and PPAs signed by the parties; and

(v) This Order shall be in force with effect from 1st April, 2019 and till 31st March, 2020.

This Order is signed and issued by the Karnataka Electricity Regulatory Commission on this 1st day of August, 2019.

Sd/- (SHAMBHU DAYAL MEENA) CHAIRMAN	Sd/- (H.M.MANJUNATHA) MEMBER	Sd/- (M.D.RAVI) MEMBER

Annexure

LIST OF STAKEHOLDERS WHO HAVE SUBMITTED COMMENTS / SUGGESTIONS ON THE DISCUSSION PAPER DATED 6TH FEBRUARY, 2019 FOR DETERMINATION OF TARIFF FOR SOLAR PV POWER PLANTS

Sl.No.	Name and Address
1	CEEW Centre for Energy Finance, New Delhi.
2	ReNew Power, Gurgaon, Haryana.
3	Chamundeshwari Electricity Supply Corporation Ltd, Mysore
4	Hubli Electricity Supply Company Limited
5	Bangalore Electricity Supply Company Limited
6	Hinren Engineering, Bangalore
7	Eco Soch, Bangalore
8	Powergate Energy (Mysore) Pvt Ltd., Mysore.

List of persons participated in Public Hearing on 25.06.2019:

Sl.No.	Name and Address
1	M.T. Kesari, Powergate Energy (Mysore) Pvt Ltd
2	Sunil M.S. Hinren Engineering
3	Harsha Kuntu, Ecosoch Solar Pvt Ltd.
4	Krishna Revanuar (Balark Solar)
5	A.C. Eswar, Prides Renewable (KRESMA)
6	Veerabhadraiah.S
7	Vidisha Dubey, Amplus Energy

ANNEXURE-E

Bangalore Electricity Supply Company Limited

(wholly owned Government of Karnataka undertaking)

Telephone : 080-22341199
Email ID : gmdsm@bescom.co.in

Ref No. : BESCOM/BC-51/2018-19/C YS-17
Encl :New Guidelines & Formats

Office of the
General Manager Ele).,
DSM, Corporate Office,
BESCOM, K.R. Circle,
Bangalore–560 001.

Date: 20 SEP 2018

To
All EE's / AEE's of
C, O & M Divisions/ Sub-divisions,
BESCOM.

Sir,

Sub: New Guidelines for Grid connectivity of Solar Rooftop Photovoltaic (SRTPV) systems installed as per the KERC (Implementation of Solar Rooftop Photovoltaic Power Plans) Regulations, 2016- Reg

Ref: Approval of MD note dated: 18.09.2018

******

With reference to the subject, the new simplified Grid connectivity of Solar Rooftop Photovoltaic (SRTPV) systems installed as per the KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016 is drawn for the benefit of the prospective consumers.

In this regard, I am directed to inform all the field officers of C, O & M Divisional & Sub-divisional officers to take necessary action as per the new guidelines with immediate effect. Copy of the new guidelines along with formats is herewith enclosed for needful action.

Yours faithfully

General Manager(Ele) 20/09/
DSM, BESCOM

Copy for information to:
1. All CGM's, Corporate Office, BESCOM, Bengaluru.
2. All CE's of BMANZ/BMASZ/ BRAZ/ CTAZ, C, O & M Zones, BESCOM.

Copy to:
3. All GM's of Corporate Office, BESCOM.
4. All SE's of C, O & M Circles, BESCOM
5. PS to MD/ DT / DF with a request to place before the chair
6. MF/OC

Bangalore Electricity Supply Company Limited

(wholly owned Government of Karnataka undertaking)

Guidelines for Grid connectivity of Solar Rooftop Photo Voltaic (SRTPV) systems installed as per the KERC(Implementation of Solar Rooftop Photovoltaic Power plants) Regulations, 2016:

1. The SRTPV Application is invited from all the consumers of BESCOM through **On-line mode *only*** *and* ***no off-line Applications are allowed***.
2. Applications can be submitted from **1kWp to upto 1000kWp.**
3. The fee details:

Sl. No.	Capacity of proposed SRTPV system	Registration fee	Facilitation fee
1	From 1kWp Upto & inclusive of 5 kWp	Rs.500/-	Rs.1000/-
2	Above 5 kWp & upto 50 kWp	Rs.1000/-	Rs.2000/-
3	Above 50 kWp & upto 1000 kWp	Rs.2000/-	Rs.5000/-

4. The Sub-divisional officer (SDO) shall be **Nodal point of contact** for Solar RTPV program.
5. Type of Metering:

Slno.	Type of Metering	Eligible Consumers
1	**Gross Metering & Net Metering**	Applicable for **Domestic consumers** i.e Residential, Hospital and Educational institutions consumers. (HT-4, HT-2(C), LT2(a) & LT2(b))
2	**Net Metering**	Applicable to Industrial, Commercial and all categories of consumers other than Domestic consumer's i.e Residential, Hospital and Educational Institutions.

6. The Power Purchase Agreement(PPA) Execution and Approval letter issuing Authority for SRTPV installations:

Sl. No.	Capacity wise SRTPV PPA execution & Approval letter Issuing Authority	BESCOM Officer's
1	From 1kWp to 500kWp	**Assistant Executive Engineer(Ele) C, O & M Sub-Division**
2	Above 500kWp upto 1000kWp	**Executive Engineer(Ele) C, O & M Division**

7. The SRTPV plant Commissioning & Synchronizing Authority:

Sl. No.	Capacities	BESCOM Officer's
1	1kW to 17.5kW	**Assistant Executive Engineer(Ele) C, O & M Sub-Division**
2	Above 17.5kW to upto 500kW	**Assistant Executive Engineer(Ele) C, O & M Sub-Division in Co-ordination with Meter Testing (MT) staff**
3	Above 500kW to upto 1000kW	**Executive Engineer(Ele) C, O & M Division in Co-ordination with Meter Testing (MT) staff**

8. The Applicant can select any PV modules and system installer to install the SRTPV System.

9. The Applicant shall use only **tested Bi-directional Meters** from **BESCOM empanelled firms available at Vendor outlets.**

10. The Applicant shall use **Grid tied inverter from BESCOM empanelled firms only.**

11. **Interconnection voltages** as per KERC Regulation-2016, sl. No. 6 (1)(a) shall be as below:

Sl No.	System Capacity	Voltage level
1	From 1kWp Upto & inclusive 5kWp	**240 Volts**
2	Above 5 kWp & upto 50 kWp	**415 Volts**
3	Above 50 kWp & above upto 500 kWp	**11 kV**

12. The cost of distribution network upto the interconnection point shall be borne by the applicant as per KERC Regulation-2016, sl. No. 6 (1)(d).

13. The **check meter** shall be provided for SRTPV systems capacity of **more than 17.5 kW.**

14. CT's, PT's and Metering Cubicle shall be procured from BESCOM approved Vendors only.

15. For Gross Metering and Net Metering, meters shall be procured from BESCOM approved/ empanelled Vendors only.

16. For HT installations, as per BESCOM order no. BESCOM/GM (M & C)/DGM (M)/BC-24/F-1013/12-13 dated 12.02.2013, if the existing metering system is 3 phase 3 wire; it shall be converted to 3 phase 4 wire.

17. SRTPV applicant shall be totally 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 as per KERC Standardized PPA clause 1.6 (a).

18. The Technical, Safety, Grid Connectivity standards are to be followed as per KERC Standardized PPA as below:
    a. **clause 1, Technical and Interconnection requirement,**
    b. **clause 2 (Safety) &**
    c. **clause 7 (Metering)**

19. BESCOM personnel reserve the right to inspect the entire plant routinely at any time as per the Conditions of Supply to the Distribution Licensees clause 18:00, access to Consumer Premises.

20. SRTPV plant of **less than 50kW** capacity shall be connected only to the existing distribution transformer through which the eligible consumers are being supplied electricity as per KERC regulation 2016, clause 6(1)(e).

21. The total capacity of the existing SRTPV and proposed SRTPV plants on that distribution transformer shall not exceed 80% of the rated capacity.

    Example: If the rated capacity of the distribution transformer is 100 kVA, the total allowable capacity of the SRTPV plants to be connected shall be 68kWs (80 KVA)

22. SRTPV plant of **more than 50kW** shall be connected only to the existing 11kV Distribution System.

23. The total capacity of the existing SRTPV and proposed SRTPV plants shall be limited so that the line current does not exceed 80% of the rated current carrying capacity of that line.

24. The Sub-divisional officer (SDO) shall verify for Technical feasibility of the installation and if the application is technically feasible, shall issue the intimation letter for execution the Power Purchase Agreement (either for full or partial SRTPV capacity).

    Example:

    - Existing DTC capacity of 100kVA
    - Already connected/ under progress (SRTPVs) is 60 KWs
    - Newly proposed is 50 KWS
    - Then total Solar capacity on the DTC is 110kW (> 80% of the DTC capacity
    - Hence, the application is technically feasible for partial capacity of 8 kWs only (for total 80% ie 68 Kws/ 80 KVA) as against newly proposed capacity of 50kWs.

25. If the application is not technically feasible, the SDO shall **cancel the Application** and **intimate** the same to the Applicant.

26. The SDO/DO shall execute the PPA and issue the Approval letter for start of SRTPV work to the applicant.

    Note: For above 500kWp SRTPV plants, draft PPAs are to be approved by KERC through Corporate Office.

27. The Application shall be cancelled by the SDO/DO , if the consumer does not come forward for execution of the PPA within 7 days from the date of intimation letter.

    Note: In case of cancellation of the Application, the Application fee and facilitation fee are non-refundable.

28. The consumer portion of work has to be completed and work completion report has to be submitted within 5 months from the date of approval letter for having entered into PPA upto 500kWp or the PPA approved date mentioned in the KERC letter for above 500kWp SRTPV plants.

29. The SDO/DO shall commission and synchronise the SRTPV Plant within 15 days from the date of submission of work completion report by the Applicant, after ensuring that the SRTPV applicant has attended all the observation made by SDO/DO/MT staff, if any.

30. The SDO/DO shall issue Synchronisation certificate to the Applicant.

31. The SRTPV Consumer shall pay the Electricity tax and other statutory levies, pertaining to SRTPV generation, as levied from time to time as per KERC PPA clause 6 (c).

32. As per Government of Karnataka Notification No. EN 135 EBS 2018 dated: 27.08.2018,

    A. Generating units having capacity to produce electricity **above 1 MW from Solar Rooftop sources** of energy shall be inspected by the Electrical Inspector before commissioning.

    B. Solar Rooftop generation units installed as per the KERC (Implementation of Solar Rooftop Photovoltaic Power plants) Regulations, 2016 shall be inspected periodically as per Regulations 30 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010.

1. Procedure and Time Lines for Grid connected SRTPV plants

A. For SRTPV plants ranging from **1kWp to upto 500kWp**:

Step	Procedure	Formats	Time lines
Step - 1	The **Applicant** shall be submit **Only On-line Application** to the Sub-divisional Officer (SDO)	Format-1	3 days from the Date of Registration of Application
Step - 2	a. If the Application is **Technically feasible** (Fully/ Partially): The SDO shall issue the Intimation letter to the Applicant for Execution of the Power Purchase Agreement (PPA). b. If the Application is **not Technically feasible:** The SDO shall **cancel the Application** and **intimate** the same to the Applicant.	Format-2	
Step - 3	The **Applicant** shall **submit the PPA** to SDO for execution, in the non-judicial Rs.200/- stamp paper as per the KERC standard PPA Format: a. Gross Metering	Format-3	7 days from the Date of Intimation letter issued by SDO
	b. Net Metering	Format-3A	
Step - 4	The SDO shall **execute the PPA** and **issue the Approval letter** for start of SRTPV work If the Applicant fails to submit the PPA within 7 days from the date of intimation letter, the SDO shall cancel the Application and intimate the same to the Applicant	Format-4	2 days from the Date of submission of the PPA
Step - 5	The consumer portion of work has to be completed and **work completion report** has to be submitted within **5 months** from the date of Approval letter for start of SRTPV work	Format-5	1 month prior to the last date of completion of the project
Step - 6	The SDO shall Commission and Synchronise the SRTPV Plant within 15 days from the date of submission of work completion report by the Applicant after ensuring that the SRTPV applicant has attended all the observation made by SDO/MT staff, if any. Synchronization Certificate shall be issued by SDO	Format-6 & Format-6A	7 days prior to the last date of completion of the project

B. For SRTPV plants ranging above 500kWp to upto 1000kWp:

Step	Procedure	Formats	Time lines
Step - 1	The **Applicant** shall submit **Only On-line Application** to the Sub-divisional Officer (SDO)	Format-1	3 days from the Date of Registration of Application
Step - 2	a. If the Application is **Technically feasible** (Fully/ Partially): The SDO shall issue the Intimation letter to the Applicant for Execution of the Power Purchase Agreement (PPA). b. If the Application is **Not Technically feasible:** The SDO shall **cancel the Application** and **intimate** the same to the Applicant.	Format-2	
Step - 3	The **Applicant** shall **submit the PPA** to DO for execution, in the non-judicial Rs.200/- stamp paper as per the KERC standard PPA Format: a. Gross Metering	Format-3	7 days from the Date of Intimation letter issued by SDO
	b. Net Metering	Format-3A	
Step - 4	The DO shall **execute the PPA** and forward the same to CO, BESCOM for KERC approval If the Applicant fails to submit the PPA within 7 days from the date of intimation letter, the DO shall cancel the Application and intimate the same to the Applicant.	-	2 days from the Date of submission of the PPA
Step - 5	The Corporate Office (CO), BESCOM shall forward the PPA for KERC Approval	-	3 days from the Date of receipt of PPA by DO
Step - 6	The CO, BESCOM shall forward the approved KERC letter to DO	-	3 days from the Date of receipt of the PPA by KERC
Step - 8	The DO shall issue the Approval letter for start of SRTPV work	Format-4	3 days from the Date of receipt of Approval letter from CO
Step - 9	The consumer portion of work has to be completed and **work completion report** has to be submitted within **5 months** from the date of approval of letter of DO	Format-5	1 Month prior to the last date of completion of the project
Step -10	The DO shall Commission and Synchronise the SRTPV Plant within 15 days from the date of submission of work completion report by the Applicant after ensuring that the SRTPV applicant has attended all the observation made by DO/MT staff, if any. Synchronization Certificate shall be issued by DO	Format-6 & Format-6A	7 days prior to the last Date of completion of the project

BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

(Wholly owned Government of Karnataka Undertaking)

Format-1

Application Form for Grid Connectivity Solar Roof Top PV Generation system on Gross/ Net Metering Basis

1. *Applicant Details*

☐ New	☐ Additional	☐ Multiple
☐ Gross Metering	☐ Net Metering	
☐ CAPEX	☐ SECI	☐ Any other sheme please specify

Applicant details:			
Name of the Applicant			
Address & Contact details			
House/Flat/Shop No.		Cross	
Main Street		Location / City	
Landmark		Pin code	
Land Line Ph. No.		Mobile	
Email			

2. *Installation Details*

Sub-division code		
RR Number		
Account ID No.		
Sanctioned Load in kW	Contract Demand in KVA	
☐ Single Phase	☐ Three phase	
Category of Installation (please tick (√) on the appropriate box)		
☐ Residential	☐ Commercial	☐ Industrial
☐ Educational Institution	☐ Government Organization	☐ Others

3. Rooftop System details *(please tick (√) on the appropriate box)*

Proposed Capacity of Solar RTPV power plant in kW peak					
Type of Installation	☐ **Single phase LT (Upto and inclusive 5kWp)**	☐ **Three phase LT (above 5kWp upto 50kWp)**	☐ **HT(above 50kWp upto 1000kWp)**		
Approximate shadow free area of Rooftop in sq. mts.					

4. *Subsidy*

Whether applicant wish to avail MNRE subsidy	☐ Yes	☐ No
Whether MNRE Subsidy is sanctioned or not	☐ Yes	☐ No

Certificate:

1. The above stated information's are true to best of my knowledge.
2. **Certified** that my building can take up the proposed weight of Solar PV system.

Place:
Date:

Signature of the applicant

Name:

BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

(Wholly owned by Government of Karnataka Undertaking)

Technical Feasibility Report
For the SRTPV plants from 1kWp to 50kWp
(To be submitted by the Assistant Executive Engineer(AEE))

Sl No.	Parameter	Utility Observation
A	Distribution Transformer Details	
1	Location	
2	Capacity in KVA	
3	Total Connected load in kW	
4	SRTPV capacity already connected in kWp	
5	SRTPV Capacity already proposed which is under progress in kWp	
6	Proposed SRTPV capacity in kWp	
7	Total Generation Capacity (4+5+6) in kWp	
8	Whether the transformer capacity is adequate to deliver the proposed SRTPV system in addition to existing/ already proposed under progress solar RTPV systems* (The Transformer shall be loaded upto 80% of capacity)	Yes/ No
B	Feeder Details	
1	Name of the 11kV feeder	
2	Feeder Number	
3	Name of the 66/ 11kV Sub-Station	
4	Type of the conductor/ cable (size)	
5	Total connected load on the feeder in kVA	
6	Total capacity (kWp) of SRTPV systems connected on the feeder	
7	Peak load on the feeder in Amps	
8	Proposed SRTPV installation is technically feasible, if the total SRTPV capacity is less than or equal to the 11kV feeder capacity.	Yes/ No (if it is not feasible, state reasons)

The Transformer shall be loaded upto 80% of capacity.

Enclosure: 11kV feeder & LT Distribution sketch of the transformer.

I hereby certify that the above said SRTPV installation is technically feasible/ not.

Signature and Name

AEE(Ele)

C, O&M Section _____,

BESCOM

Technical Feasibility Report
For SRTPV plants - Above 50 to upto 1000kWp
(To be submitted by the Assistant Executive Engineer(AEE))

Sl No.	Parameter	Utility Observation
A	Distribution Transformer Details	
1	Location	
2	Capacity in KVA	
3	Total Connected load in kW	
4	SRTPV capacity already connected in kWp	
5	SRTPV Capacity already proposed which is under progress in kWp	
6	Proposed SRTPV capacity in kWp	
7	Total Generation Capacity of SRTPV (4+5+6) in kWp	
B	Feeder Details	
1	Name of the 66/ 11kV Sub-Station	
2	Feeder Number	
3	Name of the 11kV feeder	
4	Type of the conductor/ cable (size)	
5	Rate current carrying capacity of the conductor / cable in Amps	
6	Total connected load on the feeder in Amps	
7	SRTPV capacity already connected on the feeder in Amps	
8	SRTPV Capacity already proposed which is under progress on the feeder in Amps	
9	Proposed SRTPV capacity on the feeder in Amps	
10	Total Generation Capacity of SRTPV (7+8+9) on the feeder in Amps	
11	Whether Proposed SRTPV installation is technically feasible or not Note: Total Generation Capacity of SRTPV (7+8+9) on the feeder in Amps should be less than 80% of the current carrying capacity of the feeder in Amps, for Technically Feasible cases	Yes/ No (if not state the reasons)

Format - 2

Bangalore Electricity Supply Company Limited

(wholly owned Government of Karnataka undertaking)

Telephone : Email ID : Ref No.:	Office of the .... Date:

To,

(Name & address of the applicant)

.....

.....

Madam/ Sir,

Sub: Intimation letter for submission of Power Purchase Agreement (PPA) for Gross / Net metering for grid connectivity of SRTPV plants - reg

Ref: Application Reg. No. ..... dtd: .....

With reference to your application cited under reference, it is pleased to inform that your application is technically feasible for Partial / full proposed capacity for grid connectivity. Hence, you are requested to submit the Power Purchase Agreement (PPA) for execution within 7 days from the date of this letter, failing which your application will be treated as cancelled.

The standard Power Purchase Agreement approved by KERC is available in the BESCOM website. www.bescom.org - > solar RTPV online services (Format 3- Gross Metering / Format 3A- Net-metering)

Yours faithfully,

AEE/ Executive Engineer(Ele)
C, O&M ..... sub-div/ division,
BESCOM, ...

STANDARD FORMAT OF POWER PURCHASE AGREEMENT FOR ROOFTOP SOLAR PV PLANTS WITH GROSS METERING

This Power Purchase Agreement is entered into at (place)..... on this ..... day of ..... between ..... Electricity Supply Company Limited (...ESCOM), a Government of Karnataka undertaking, being a Company formed and incorporated in India under the Companies Act, 1956, with its registered office at ....., Karnataka State, represented by ....., hereinafter, referred to as the "..ESCOM", (which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns), as party of the first part

AND

.....,(Name) the consumer of ...ESCOM, residing at (address) ...., hereinafter, referred to as the "Seller" (which expression shall, unless repugnant to the context or meaning thereof, include his successors and permitted assigns), as party of the second part.

Whereas,

a. The Seller intends to connect and operate the Solar Roof Top Photo Voltaic (SRTPV) system with ESCOM's HT/LT, Distribution system for sale of the Solar Power to ESCOM, in terms of the Karnataka Electricity Regulatory Commission's (KERC) Order No. S/03/01 dated: 18.05.2018.

b. The Seller intends to install a SRTPV system of ..... kWp capacity on the existing roof top of the premises, situated at..... . ..... and bearing RR. No..... ..... in the same premises, under ..... Sub-Division of ESCOM.

c. The Seller intends to sell the energy, generated from the SRTPV system to ESCOM, on gross-metering basis, from the date of commissioning of the SRTPV system.

Explanation: *The 'Commissioning' means the stage at which the SRTPV system starts generating the power and injects into the grid.*

d. ESCOM intends to purchase the energy, generated by such SRTPV system, on gross-metering basis, at the tariff determined by the KERC.

Now therefore, in consideration of the foregoing premises, the parties, hereto, intending to be legally bound, hereby, agree as under:

1. Technical and Interconnection Requirements:

Seller shall ensure his SRTPV system complies with the following, technical and interconnection requirements and shall:

1.1 Comply with the applicable standards and conditions, in respect of integrating the SRTPV system with the distribution system.

1.2 Connect and operate the SRTPV system to ESCOM's distribution system, in accordance with the State Grid Code, and Distribution Code as amended from time to time.

1.3 Install, prior to connection of SRTPV system to ESCOM's distribution system, an inverter with an automatic inbuilt isolation devise.

1.4 Provide external manual isolation mechanism with suitable locking facility, so that SRTPV system will not back-feed into the ..ESCOM's network, in case of power outage of the ESCOM's distribution system, and it shall be accessible for ....ESCOM to operate, if required, during maintenance / emergency conditions.

1.5 Install all the equipment of the SRTPV system, compliant with relevant International (IEEE/IEC) and Indian Standards (BIS).

1.6 (a) The SRTPV system shall be designed, engineered and constructed and operated by the seller or any other person on his behalf, with reasonable diligence, subject to all applicable Indian Laws, Rules, Regulations as amended from time to time and orders having the force of law.

(b) The Seller, shall commission the SRTPV system, within six months from the date of approval or deemed approval of the PPA by the Commission.

1.7 Adhere to the following power quality measures, as per the International and Indian standards and/or such other measures, stipulated by the KERC/..ESCOM:

a. Harmonic current: Harmonic current injections from a generation unit shall not exceed the limits specified in IEEE 519.

b. Voltage at the injection point should be in the operating range of 80% to 110%, of the nominal connected voltage.

c. Flicker: Operation of Photovoltaic system shouldn't cause voltage flicker in excess of the limits stated in the relevant sections of the IEC standards or other equivalent Indian standards, if any.

d. Frequency: When the system frequency exceeds the upper limit, specified in the IEGC as amended from time to time, the SRTPV system shall shift to island mode.

e. DC Injection: Photovoltaic system, should not inject DC power more than 0.5% of full rated output at the interconnection point or 1% of rated inverter output current into distribution system, under any operating conditions.

f. Power Factor: While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9, shall be maintained.

g. The SRTPV system, in the event of voltage or frequency variations must island/disconnect itself, as per the IEGC/KEGC Regulations, within the stipulated period.

2. Safety:

The Seller, shall comply with the following safety measures:

2.1 The Seller shall comply with the Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2010.

2.2 The Seller shall ensure that, the design, installation, maintenance, and operation of the SRTPV system, are in a manner, conducive to the safety of the SRTPV system, as well as, the ESCOM's distribution system.

2.3 If the Seller's SRTPV system either, causes damage to and/or produces adverse effects on the other consumers' or ESCOM's assets, Seller will disconnect SRTPV system immediately, from the distribution system, by himself or upon directions from the ESCOM and rectify the same at his own cost before reconnection.

3. Clearances and Approvals

The Seller, shall obtain ESCOM's and other statutory approvals and clearances, before connecting the SRTPV system to the distribution system.

4. Access and Disconnection

4.1 .....ESCOM shall have access to metering equipment and disconnecting device of SRTPV system, both automatic and manual, at all times.

4.2 In emergency or outage situation, where there is no access to a disconnecting device either, automatic or manual, the ...ESCOM shall have the right to disconnect power supply to the premises.

5. Liabilities

The Seller, shall be solely responsible for availing any fiscal or other incentive, provided by the State/ Central government at his own expenses.

6. Commercial Settlement

6.1 Tariff and Charges

a. The ...ESCOM shall pay the tariff for the gross energy at Rs. .....per kWh, as determined by the KERC in the Order dated 18.05.2018, for the term of this agreement.

b. If for any reason the date of commissioning is delayed, beyond the agreed commissioning date , the tariff payable by the ESCOM, shall be lower of the:

i) Tariff agreed to in this agreement.

OR

ii) Any revised tariff, determined by the Commission, prevailing on the date of commissioning.

OR

iii) 90% of the tariff agreed to in this agreement.

c. The import energy recorded in the bi-directional meter during a billing period, shall be billed at higher of the:

i) Tariff agreed to in this agreement

OR

ii) Prevailing retail supply tariff applicable to the category of the installation of the seller.

d. The Seller, shall pay the Electricity tax and other statutory levies, pertaining to SRTPV generation, as may be levied from time to time.

e. The Seller, shall not have any claim for compensation, if the solar power generated by his SRTPV system, could not be absorbed by the distribution system

due to failure of power supply in the grid/ distribution system for the reasons, such as line clear, load shedding and line faults, whatsoever.

7. Metering:

7.1 In addition to the existing consumer meter, the Seller shall arrange to install the Bi-directional meter (whole current/CT operated) at the point of interconnection to the distribution system, at a suitable place in the premises, accessible for recording export of energy, from the SRTPV system to the grid. The bi-directional meter, shall comply with the Central Electricity Authority (Installation and operation of meters) Regulations, 2006 and shall have the following features:

i. Separate registers, for recording export and import energy with facility to download by Meter Reading Instrument (MRI).

ii. kVA, kW and kVAR measuring registers, for both import and export of energy.

iii. The Meter, shall have RS232 (or higher) communication optical port / Radio Frequency (RF) port to support Automatic Meter Reading (AMR).

8. BILLING AND PAYMENT:

8.1 ESCOM, shall issue monthly electricity bill for the gross-energy exported to the grid on the scheduled date of meter reading.

8.2 ESCOM shall pay for the gross energy exported as per the tariff agreed in this agreement within 30 days of issue of bill.

8.3 The import of energy recorded in the bi directional meter during the billing period, shall be billed as per the Clause 6.1 of this agreement and shall be deducted out of the amount payable towards gross energy exported.

8.4 The ESCOM, shall pay interest at the rate of 0.75% per month, in case of any delay in payment, beyond 30 (thirty) days period from the date of issue of bill, for the gross-energy exported.

8.5 The Seller shall continue to pay the charges for the consumption of electricity to his premises as per the retail tariff bill issued to him as required.

9. Term and Termination of the Agreement

9.1 This agreement, shall be in force for a period of 25 years from the date of commissioning of the SRTPV system, unless terminated otherwise, as provided hereunder.

9.2 If the ..ESCOM commits any breach of the terms of the Agreement, Seller shall serve a written notice specifying the breach and calling upon the ESCOM to remedy/ rectify the same, within 30 (thirty) days or at such other period and at the expiry of 30 (Thirty) days or such other period from the delivery of the notice, Seller may terminate the agreement by delivering the termination notice, if the ..ESCOM fails to remedy/ rectify the same.

9.3 If the Seller, commits any breach of the terms of the Agreement, the ..ESCOM shall serve a written notice specifying the breach and calling upon the seller to remedy/ rectify the same within 30 (thirty) days or at such other period and at the expiry of 30 (Thirty) days or such other period from the delivery of the notice, the ..ESCOM may terminate the agreement by delivering the termination notice, if the seller, fails to remedy/ rectify the same.

9.4 Upon termination of this Agreement, Seller shall cease to supply power to the distribution system and any injection of power shall not be paid for by the ..ESCOM.

10. Dispute Resolution:

All the disputes, between the parties, arising out of or in connection with this 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 appropriate Forum.

IN WITNESS WHEREOF, the Seller and the ..ESCOM have entered into this Agreement to be executed as of the date and the year first set forth above.

For AND ON BEHALF OF ..... Electricity Supply Company Limited	For AND ON BEHALF OF SELLER
By: Designation: Address:	By: Designation: Address:
WITNESS In Presence of Name: Designation:	WITNESS In Presence of Name: Designation:
WITNESS In Presence of Name: Designation:	WITNESS In Presence of Name: Designation:

STANDARD FORMAT OF POWER PURCHASE AGREEMENT FOR ROOFTOP SOLAR PV PLANTS WITH NET METERING

This Power Purchase agreement is entered into at (place).... on this.... Day of..... between Bangalore Electricity Supply Company Limited (BESCOM), a Government of Karnataka undertaking, being a Company formed and incorporated in India under the Companies Act-1956, with its registered office located at ....., Karnataka State, represented by.....hereinafter referred to as the "BESCOM", (which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns), as party of the first part

AND

.....(Name) the consumer of BESCOM residing at (address)....., hereinafter, referred to as the "Seller" (which expression shall, unless repugnant to the context or meaning thereof, include his successors and permitted assigns) as party of the second part.

Whereas,

a. The Seller intends to connect and operate the Solar Roof Top Photo Voltaic (SRTPV) system with BESCOM's HT/LT Distribution system for sale of Solar Power to BESCOM, in terms of the Karnataka Electricity Regulatory Commission (KERC) Order No. S/03/01 dated: 18.05.2018.

b. The Seller intends to install a SRTPV system of .....kWp capacity on the existing roof top of the premises, situated at..... and bearing number RR. No ..... in the same premises, under ..... Sub-Division of BESCOM.

c. The Seller intends to sell the energy, generated from the SRTPV system to BESCOM on net metering basis, from the date of commissioning of the SRTPV system.

   Explanation: the 'Commissioning' means the stage at which the SRTPV system starts generating the power for the use by the Seller and injects surplus power if any, into the grid.

d. BESCOM intends to purchase the energy, generated by such SRTPV system, on Net-metering basis, at the tariff determined by the KERC.

Now therefore, in consideration of the foregoing premises, the parties, hereto, intending to be legally bound, hereby agree as under:

1. Technical and Interconnection Requirements:

Seller shall ensure his SRTPV system complies with the following technical and interconnection requirement and shall:

1.1 Comply with the applicable standards and conditions, in respect of integrating the SRTPV system with the distribution system.

1.2 Connect and operate the SRTPV system to BESCOM's distribution system, in accordance with the State Grid code, and distribution Code as amended from time to time.

1.3 Install, prior to connection of SRTPV system to BESCOM's distribution system, an inverter with an automatic inbuilt isolation devise.

1.4 Provide external manual isolation mechanism with suitable locking facility, so that SRTPV system will not back-feed into the BESCOM's network in case of power outage of the BESCOM's distribution system, and it shall be accessible for BESCOM to operate, if required, during maintenance / emergency conditions.

1.5 Install all the equipment of SRTPV system compliant with relevant International (IEEE/IEC) and Indian standards (BIS).

1.6 (a) The SRTPV system shall be designed, engineered and constructed and operated by the Seller or any other person on his behalf, with reasonable diligence, subject to all applicable Indian Laws, Rules, Regulations as amended from time to time and orders having the force of law.

(b) The Seller, shall commission the SRTPV system, within six months from the date of approval of the PPA.

1.7 Adhere to the following power quality measures, as per the International and Indian standards and/or such other measures stipulated by KERC/BESCOM:

i) Harmonic current: Harmonic current injections from a generation unit shall not exceed the limits specified in IEEE 519.

ii) Voltage at the injection point should be in the operating range of 80% to 110% of the nominal connected voltage.

iii) Flicker: Operation of Photovoltaic system shouldn't cause voltage flicker in excess of the limits stated in the relevant sections of IEC standards or other equivalent Indian standards, if any.

iv) Frequency: When the system frequency exceeds the upper limit, specified in the IEGC as amended from time to time, the SRTPV system shall shift to island mode.

v) DC Injection: Photovoltaic system should not inject DC power more than 0.5% of full rated output at the interconnection point or 1% of rated inverter output current into distribution system under any operating conditions.

vi) Power Factor: While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9, shall be maintained.

vii) The SRTPV system, in the event of voltage or frequency variations must island/disconnect itself, as per IEGC/KEGC Regulations, within the stipulated period.

2. Safety:

The Seller, shall comply with the following safety measures:

2.1 The Seller shall comply with the Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2010.

2.2 The Seller shall ensure that, the design, installation, maintenance and operation of the SRTPV system, are in a manner conducive to the safety of the SRTPV system, as well as the BESCOM's distribution system.

2.3 If the Seller's SRTPV system either, causes damage to and/or produces adverse effects on the other consumers' or BESCOM's assets, Seller will disconnect SRTPV system immediately, from the distribution system, by himself or upon directions from the BESCOM and rectify the same at his own cost before reconnection.

3. Clearances and Approvals

The Seller shall obtain BESCOM's and other statutory approvals and clearances before connecting the SRTPV system to the distribution system.

4. Access and Disconnection

4.1 BESCOM shall have access to metering equipment and disconnecting device of SRTPV system, both automatic and manual, at all times.

4.2 In emergency or outage situation, where there is no access to a disconnecting device either, automatic or manual, the BESCOM shall have the right to disconnect power supply to the premises.

5. Liabilities

The Seller, shall be solely responsible for availing any fiscal or other incentive provided by the State/ Central government, at his own expenses.

6. Commercial Settlement-

6.1 Tariff:

a. The BESCOM shall pay for the Net energy at Rs....per kWh, as determined by the KERC in the Order dated 18.05.2018, for the term of this agreement.

b. If for any reason the date of commissioning is delayed, beyond the date of commissioning agreed. The tariff payable by the BESCOM shall be lower of the:

   i) Tariff agreed to in this agreement

      OR

   ii) Any revised tariff, determined by the Commission, prevailing on the date of commissioning

      OR

   iii) 90% of the tariff agreed to in this agreement.

c. The Seller, shall pay the Electricity tax and other statutory levies, pertaining to SRTPV generation, as may be levied from time to time.

d. The Seller shall not have any claim for compensation, if the Solar power generated by his SRTPV system could not be absorbed by the distribution system due to failure of power supply in the grid/ distribution system for the reasons, such as line clear, load shedding and line faults, whatsoever.

7. Metering:

7.1 The Seller, shall arrange to shift the existing meter to the generation side of SRTPV plant to measure solar power generation and install Bi-directional meter (whole current/CT operated) at the point of interconnection to the distribution system, at a suitable place in the premises, accessible for recording export of energy, from the SRTPV system to the grid and import of energy to the premises of the consumer from the grid. The bi-directional meter, shall comply with the Central Electricity Authority (Installation and operation of meters) Regulations, 2006 and shall have the following features:

i. Separate registers, for recording export and import energy with facility to download by Meter Reading Instrument (MRI).

ii. kVA, kW and kVAR measuring registers for both import and export.

iii. The Meter shall have RS232 (or higher) communication optical port / Radio Frequency (RF) port to support Automatic Meter Reading (AMR).

8. BILLING AND PAYMENT:

8.1 BESCOM shall issue monthly electricity bill for the net energy on the scheduled date of meter reading.

8.2 In case, the exported energy is more than the imported energy, BESCOM shall pay for the net energy exported, as per Tariff agreed in this agreement, within 30 days from the date of issue of bill, duly adjusting the fixed charges and electricity duty, if any.

8.3 In case, the exported energy is less than the imported energy, the Seller shall pay BESCOM for the Net energy imported as per the prevailing retail supply tariff, determined by the Commission from time to time.

8.4 The BESCOM shall pay interest at the same rates, as is being levied on the consumers, for late payment charges, in case of any delay in payment beyond 30 (thirty) days period from the date of issue of bill, for the Net energy exported.

Explanation: *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 Seller (import,) recorded in the bi-directional meter.*

9. Term and Termination of the Agreement

9.1 This agreement, shall be in force for a period of 25 years from the date of commissioning of the SRTPV system, unless terminated otherwise, as provided here under.

9.2 If the BESCOM commits any breach of the terms of the Agreement, Seller shall serve a written notice specifying the breach and calling upon the BESCOM to remedy/ rectify the same, within 30 (thirty) days or at such other period and at the expiry of 30 (Thirty) days or such other period from the delivery of the notice, Seller may terminate the agreement by delivering the termination notice, if the BESCOM fails to remedy/ rectify the same.

9.3 if the Seller commits any breach of the terms of the Agreement, BESCOM shall serve a written notice specifying the breach and calling upon the Seller to remedy/ rectify the same within 30 (thirty) days or at such other period and at the expiry of 30 (Thirty) days or such other period from the delivery of the notice, the BESCOM may terminate the agreement by delivering the termination notice, if the Seller fails to remedy/ rectify the same.

9.4 Upon termination of this Agreement, Seller shall cease to supply power to the distribution system and any injection of power shall not be paid for by the BESCOM.

10. Dispute Resolution:

All the disputes between the parties arising out of or in connection with this 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 appropriate Forum.

IN WITNESS WHEREOF, the Seller and the BESCOM have entered into this Agreement executed as of the date and the year first set forth above

For AND ON BEHALF OF Bangalore Electricity Supply Company Limited	For AND ON BEHALF OF SELLER
By: (Name) Designation: Address:	By: (Name) RR No: Address:
1. WITNESS In Presence of Name: Designation:	1. WITNESS In Presence of Name:
2. WITNESS In Presence of Name: Designation:	2. WITNESS In Presence of Name:

Format – 4

Bangalore Electricity Supply Company Limited (wholly owned Government of Karnataka undertaking)	
Telephone : Email ID : Ref No.:	Office of the .... Date:

To,

(Name & address of the applicant)

.....

.....

Madam/ Sir,

Sub: Approval for the PPA and start of SRTPV work - reg

Ref: 1. Application Reg. No. ..... dtd: .....
2. PPA executed date:. .....
3. KERC approval letter vide no.....dt:

****

With reference to your SRTPV application, Approval is herewith accorded for PPA executed on ..... for Solar RTPV system of ..... kWp on your rooftop under Net-metering / Gross metering basis and to start the installation work of SRTPV, as per following terms and conditions:

1. As per CEA guide lines, you are 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.

2. You can select a reputed system installer of your choice, who have experience in design, supply, installation and commissioning of SRTPV system.

3. Only BESCOM empaneled inverters and meter shall be used. The empaneled list of inverters and meters are available in BESCOM website.

4. Upgradation of infrastructure, if required, (service main, meter with CT, upgrade) upto the grid connectivity point is to be done at your cost.

5. All the other components of Solar RTPV system shall comply with applicable IS/ IEC standards. The Technical specification of each equipment's is available in BESCOM website.

6. The work of grid connectivity shall be carried out in accordance with the Net- metering / Gross metering schematic diagram available in BESCOM website.

7. Bi-directional meter (whole current/ CT operated) shall be provided before the point of interconnection and the existing meter shall be shifted to the generation side of SRTPV plant to measure solar power generation.

8. Both the meters shall be within the same proximity and easily accessible for taking monthly reading by the meter reader.

9. The Applicant shall provide Bi-directional check meter in series with the proposed Bi-directional meter (Main meter) when the SRTPV system capacity is more than 17.5kWp.

10. You should complete the SRTPV installation work before dd/ mm/ yyyy

    Note:
    a. SRTPV capacities from 1kWp to 500kWp - Within 180 days from the date of this letter.

    b. SRTPV capacities above 500kWp to 1000kWp - Within 180 days from the date mentioned in the KERC approval letter for the PPA.

11. After completion of the work in all respects, you have to submit the work completion report in Format – 5 along with following documents:

    a. Test reports of PV modules and other equipment's (expect Grid tied inverter and bi-directional meter) as per IS/ IEC standards.
    b. Test certificate of Bi-directional meter issued by MT division, BESCOM.
    c. First sheet of Bank pass book containing details of Name of the Bank, Type of account, Account No, Name of the Branch, IFSC code etc.

12. If for any reason the date of commissioning is delayed beyond the date of commissioning agreed, the tariff payable by the BESCOM shall be lower of the:
    I. Tariff agreed to in this agreement

    OR

    II. Any revised tariff, determined by the Commission, prevailing on the date of commissioning

    OR

    III. 90% of the tariff agreed to in this agreement.

Please note that BESCOM will not be held responsible for any legal disputes between the applicant and SRTPV system installer arising out of the contract.

Yours faithfully,

AEE/ EE
C, O&M ..... SD/ Division,
BESCOM

Format – 5

Work completion Report
(To be submitted by the applicant)

To,

The Assistant Executive Engineer(Ele) / Executive Engineer (Ele),

.....C, O & M, Sub-division/Division

.....

Madam/Sir,

Sub: Submission of work completion report.

Ref: Your letter no ..... dt:.....(Format-4).

With reference to the above, the work of installation of SRTPV system is completed and I would like to submit the following information for your kind needful.

A. Solar PV module

1	Make	
2	Type of the module	
3	Capacity of each module in kWp	
4	No. of Modules	
5	Sl.No. of Modules	
6	Total Capacity in kWp	

B. Inverter

1	Make	
2	Type	
3	Capacity	
4	No. of Inverters	
5	Sl.No.	

C. Cables: DC

1	Make	
2	Size & Type	

D. AC wiring

1	Make	
2	Size & Type	

E. DC distribution box

1	Make	
2	Sl. No.	
3	DC Surge Protection Device	
4	MCB / Isolator quantity & capacity	

F. AC distribution box

1	Make	
2	Sl. No.	
3	AC Surge Protection Device	
4	MCB / MCCB quantity & capacity	

G. Earthing

1	Earth resistance (less than 5 ohms)	
2	Size of the Earth flat (3 x 70 sq.mm galvanic iron flat)	
3	Three separate earthing points 1. Modules & DC Surge arrester: 2. Inverter & AC Surge arrester 3. Lightening Arrester:	

H. Bi-directional meter details (please enclose the test report of bi-directional meter issued by MT division, BESCOM)

Sl.No.	Particulars	Main Meter	Check Meter
1	Make		
2	Type		
3	Sl.No.		
4	Single Ph/Three Ph.		
3	CT Ratio		
4	PT Ratio		
5	Date of Test by MT, BESCOM		

j. Caution signs

Size of the caution label: 105 mm width X 20 mm height, with white letters on a red background

1	Panels	
2	Inverters	
3	DC/ AC distribution box	

k. **Provision of manual and automatic switch : Yes / No**

l. **Installation inspection date:**

The SRTPV system has been installed and inspected in compliance with the Electricity Act 2003, the Indian Electricity rules 1956 (Rule 47A).

Inspection by	Inspection date
AEE / EE, C,O&M, Sub-division / Division (for SRTPV capacities upto 1000kWp)	
Electrical inspectorate (Solar RTPV systems above 1000kWp) Approval letter shall be submitted	-

Certified that the above said SRPTV system was installed by me and the equipment's used comply the Technical and Safety standards issued by BESCOM.

Applicant Signature
Name: _____
Date: _____

System Installer Signature & seal
Name of the firm: _____
Date: _____

Bangalore Electricity Supply Company Limited

(wholly owned Government of Karnataka undertaking)

Commissioning & Synchronizing report of SRTPV system (Net / Gross metering)

A	Consumer Details			
1	Name of the Consumer			
2	Category			
3	RR No./Account ID/Connection ID			
4	Pole Number			
B	**Meter Details**	**Bi-directional Meter**		**Existing meter**
		Main Meter	**Check Meter**	
1	Meter make: 1ph / 3 ph			
2	Type			
3	Serial number			
4	Capacity			
5	Meter constant			
6	Initial reading (Tri vector parameters)			
	i) Import			
	ii) Export			

Note:
1. The Bi-directional meter records solar generation and existing meter records installation consumption in case of Gross metering.
2. The Bi-directional meter records export of solar energy to grid and Import of energy by the installation. Existing meter records the total solar energy generated.

C	Grid Tied Inverter	
1	Make	
2	Serial number	

3	Capacity	
4	Input voltage	
5	Output voltage	
6	Whether Anti-islanding feature is in working condition	Yes/No
D	**PV Module**	
1	Make	
2	Serial number	
3	Type of module	
4	Capacity of each module	
5	Number of modules	
6	Total capacity of module	
E	Earthing verified: DC earthing, AC earthing, LA earthing of SRTPV system	Yes/No
F	Details of protective system available	• AC & DC DB: Yes/No • Manual Switch solar side: Yes/No • Relay operated automatic switch at net-meter side: Yes/No
G	AEE, BESCOM inspection & approval letter obtained	Yes/No
H	Work completion report of SRTPV system obtained from agency	Yes/No
I	Date of synchronizing with BESCOM grid	dd/mm/yyyy

AEE(Ele.)/EE(Ele.)
MT S/D/Dvn, ----------, BESCOM

AEE(Ele.)/EE(Ele.)
O&M ----------, BESCOM

Name &
Signature of Consumer

Format – 6A

ಬೆಸ್ಕಂ BESCOM	**Bangalore Electricity Supply Company Limited** *(wholly owned Government of Karnataka undertaking)*
Telephone : Email ID : **Ref No.:**	Office of the .... Date:

To,

(Name & address of the applicant)
.....
.....

Madam/Sir,

Sub: Certificate of synchronization of your ..... kWP SRTPV system
Ref: Application Reg. No. ..... dtd: .....

Synchronization test of Solar Rooftop PV system of ..... kWp, installed on the roof of your installation bearing RR No.: ..... has been conducted and your SRTPV system successfully synchronized with the BESCOM grid at ..... voltage level on dd/mm/yyyy.

Yours faithfully,

AEE/Executive Engineer(Ele)
O&M ..... sub-div/division,
BESCOM .....

Copy submitted to:

1. Chief Engineer (Elect), Load dispatch Centre, KPTCL, Anand Rao Circle, Bangalore.
2. Chief General Manager(Operations), Corporate office, BESCOM, K.R. Circle, Bangalore.
3. General Manager(DSM), Corporate Office, BESCOM, K.R. Circle, Bangalore.
4. EE, C, O & M .....Division, BESCOM.
5. Copy for information EE of MT division.
6. MF/OC

Note:

1. Copy is to be marked to CEE, LDC, CGM (Op) if the SRTPV capacity is more than 500kWp.
2. The file along with all the documents is to be sent to revenue section for billing purpose.