



Bangalore Electricity Supply Company Limited
(wholly owned Government of Karnataka undertaking)

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Encl :

Ref No. : BESCOM/BC-51/2018-19/CYS-06

Office of the
General Manager (Ele).,
DSM, Corporate Office,
BESCOM, K.R. Circle,
Bangalore-560 001.
Date: 21.06.2018

Official Memorandum

Sub: Determination of tariff and other norms in respect of Grid connected Solar Rooftop Photo Voltaic plants (SRTPV) in BESCOM – Reg.

Ref: 1. KERC order for “Determination of tariff and other norms in respect of Solar Rooftop Photovoltaic units” dt: 18.05.2018.
2. Hon’ble KERC letter No. S/03/1/271 dated: 21.05.2018.

Preamble:

As per Section 86(1) (e) of the Electricity Act, 2003, the Karnataka State Electricity Regulatory Commission (KERC) mandated to promote generation of electricity from renewable sources of energy. Accordingly, the KERC has determined the tariff and others norms related to Solar Roof top Photovoltaic plants from time to time. The gist of the orders/ Regulation is listed below:

Date of Order	Particulars
02.05.2016	Tariff order for Solar Rooftop Photovoltaic plants and small solar power projects
19.09.2016	Modification order to the Tariff order 02.05.2016:
11.11.2016	Determination of tariff and other norms for Solar RTPV power plants installed on the Government buildings under central Government scheme
15.09.2016	Tariff and other operation procedures applicable in respect of Multiple / Combined Solar Rooftop Photovoltaic (SRTPV) installation in a single premises
15.12.2016	KERC Regulation with respect to Implementation of Solar Rooftop Power Plants

Due to reduction in the capital cost for SRTPV plants Hon’ble Commission has issued the draft discussion paper inviting comments/suggestions from the stake holders and the public hearing was issued for this tariff order for SRTPV plants applicable from 01.04.2018 to 31.03.2019 hence this OM:

No: BESCO/BC-51/2018-19/CYS-

Dated: 21.06.2018

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

From 1MW & below	Without capital subsidy	Rs.3.56 per unit
	With capital subsidy	Rs.2.67 per unit

2. The above tariff shall be applicable to all new Solar RTPV projects for which PPA's are entered into and approved by commission after the date of issue of this order that achieve commercial operation on or after 01.04.2018.
3. The tenure of the PPA, shall be for the life of Solar power projects i.e. 25 years.
4. The generic tariff determined in this Order shall also be applicable for payment towards any banked energy purchased by the Distribution Licensees and in such other cases as specified in the relevant orders of the Commission
5. All the other issues not covered under this Order, shall be governed by the respective Regulations and Orders issued by the Commission and PPA signed by the Parties; and
6. This order shall be in force with effect from 1st April 2018 and till 31st March 2019.
7. Installed capacity of Solar Rooftop Photovoltaic plants limited to 100% of the sanctioned load of the respective consumer's installation.
8. The SRTPV plants coming under the above order were entitled for

Gross Metering & Net Metering	Applicable for Domestic, Hospital and Educational institutions consumers.
Net Metering	Applicable to Industrial, Commercial and all categories of consumers.

9. **Hon'ble KERC order dated 11.11.2016 for Determination of tariff and other norms for Solar RTPV power plants installed on the Government buildings under central Government scheme:**

Commission has continued this scheme with the tariff for any surplus energy injected as determined by the Commission in its order dated 18.05.2018 or in this OM.

10. **Hon'ble KERC order dated 15.09.2017 - Tariff and other operational procedures applicable in respect of Multiple/ Combined Solar RTPV installations in a single premises:**

Commission has continued the scheme but with 90% of the tariff as determined by the Commission in its order dated 18.05.2018 or this OM.

11. The eligible consumer shall commission the SRTPV plant within 180 days from the date of approval of the PPA.
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 :
- a. Tariff agreed to in the PPA. **OR**
 - b. Any revised tariff determined by the Commission **OR**
 - c. The Average pooled power purchase cost as notified by the Commission prevailing on the date of commissioning.

All the field officers are hereby directed **"to accept and execute PPA regarding SRTPV installation as per the present guidelines"**.

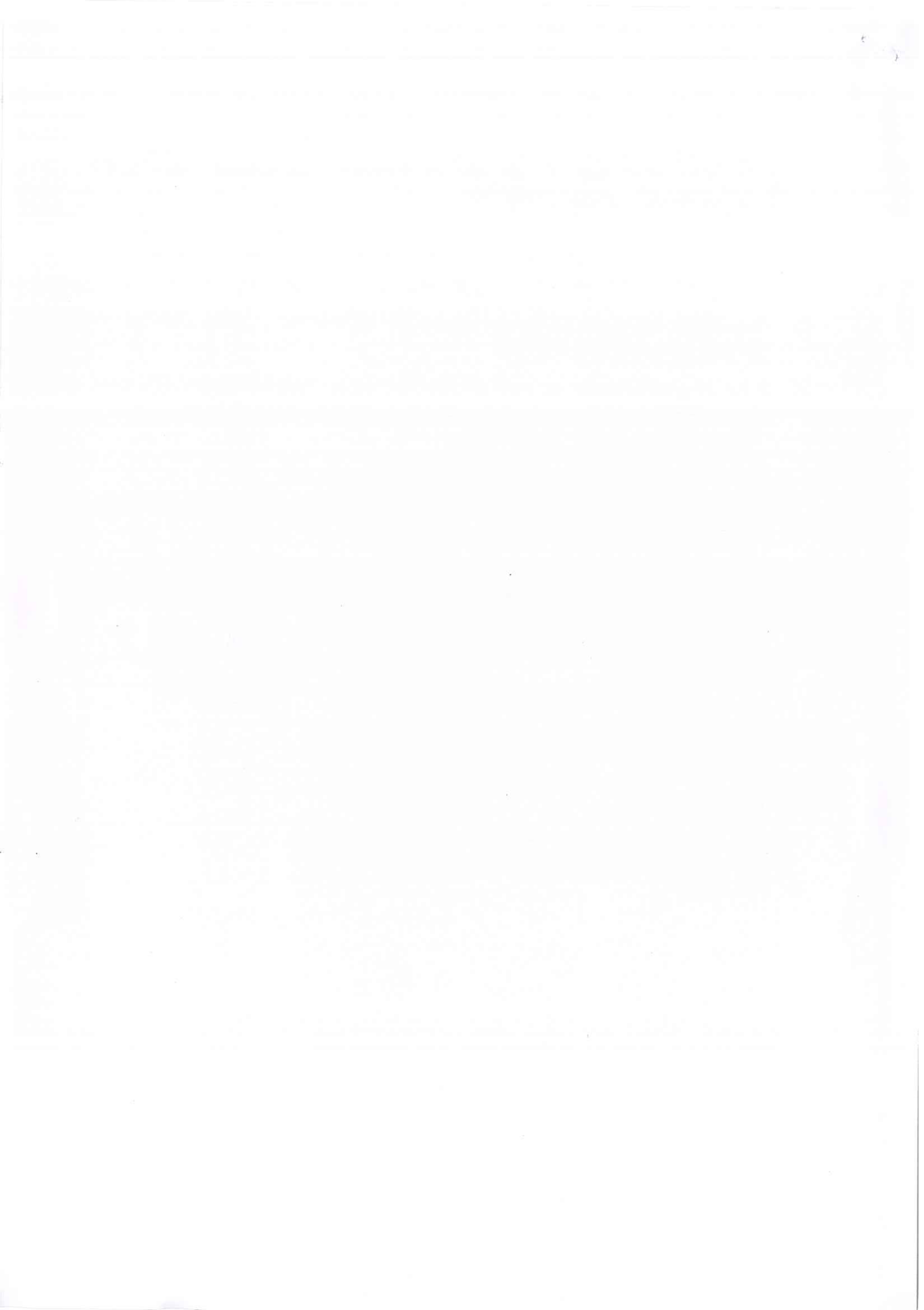
**General Manager (Ele)
DSM, BESCOM**

Copy for kind information:

1. The CEE of BMAZ-1/ BMAZ-2/BRAZ/CTAZ, BESCOM.

Copy for information:

2. SEE's/EEE's of C, O&M, Circles/Divisions, BESCOM.
3. PS to MD/DT with a request to place before the chair.
4. MF / OC.



KARNATAKA ELECTRICITY REGULATORY COMMISSION
No 16 C-1, Miller Tank Bed Area, Vasanthanagara, Bengaluru-52
Dated: 18th May, 2018

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 in respect of new Solar Power Projects
(Ground mounted and Solar Rooftop Photovoltaic Units)"**

S/03/1

Preamble:

1. As per Section 86(1)(e) of the Electricity Act, 2003, the State Electricity Regulatory Commissions are mandated to promote generation of electricity from renewable sources of energy. Accordingly, this Commission has been promoting the generation of power from renewable sources, by determining the feed-in-tariff (generic tariff) periodically, based on the normative financial and operational parameters for the control period as stipulated from time to time. This approach of the Commission has helped in creation of an enabling

environment for investment in RE projects in the State in order to get reasonable returns to the investors. As a result, the State has been able to achieve substantial capacity addition of Solar and Wind Power generation.

2. The Commission, in its Order dated 12th April, 2017, had determined a levelised tariff of Rs.4.36 per unit for megawatt scale solar projects (ground mounted), for the life of the projects, i.e. for 25 years. The tariff determined in this Order was applicable to the projects entering into Power Purchase Agreements (PPA) with the State's Distribution Licensees on or after 1st April, 2017 but before 1st April, 2018, and also for those projects for which the PPAs were entered into before 1st April, 2017, but were not commissioned within the Scheduled Commercial Operation Date and get commissioned during the period from 1st April, 2017 to 31st March,2018.
3. In respect of Solar Rooftop Photovoltaic Plants (SRTPV Plants) and small solar power projects, the Commission, in its Order dated 2nd May, 2016, had determined the generic tariff ranging from Rs. 7.08 to Rs. 5.20 per unit depending on the capacity of the SRTPV project and the subsidy availed by the developer. These rates were applicable for such projects entering into PPA and commissioned on or after 2nd May, 2016 and upto 31st March, 2018.

4. The above tariff was also made applicable to those SRTPV projects for which the PPA was entered into before 2nd May, 2016, but not commissioned within the Scheduled Commercial Operation Date and get commissioned during the period from 2nd May, 2016 to 31st March, 2018. The SRTPV plants coming under the above Order were entitled for net metering facility with the consumers falling under domestic, hospital and educational institutions categories (both LT & HT consumers) entitled for gross metering facility. Further, the installed capacity of the SRTPV plants was limited to 150% of the sanctioned load of the respective consumer's installation. The Commission, subsequently, in its Order dated 19th September, 2016, allowed one-time irrevocable option of either gross or net metering for the consumers under domestic, hospital and educational institutions categories, at the time of signing of PPA. It also decided to limit the installed capacity of all the SRTPV plants to 100% of the sanctioned load of the respective consumer's installation.
5. In respect of SRTPV plants installed by the distribution licensees on the roof tops of Government buildings under Government funding, the Commission, in its Order dated 11th November, 2016 allowed the offices and institutions located in such buildings to utilize the energy generated by the SRTPV plants and inject any

surplus energy into the grid without any actual payment by the concerned ESCOM.

6. Further, the Commission in its Order dated 15th September, 2017 allowed installation of a single or multiple SRTPV Plants on a common roof top by the consumers with the combined installed capacity of the plant/plants not exceeding the aggregate sanctioned load of all the installations in the building, on gross or net-metering basis as the case may be. Further, the Commission allowed installation of the SRTPV units on the basis of combined sanctioned load of all the installations in the premises with the attendant benefit of solar power generation made available equitably to all the consumers.
7. The new National Tariff Policy issued on 28th January, 2016, envisages future procurement of renewable energy (except from waste to energy plants) only through competitive bidding, as per the bidding guidelines issued by the Government of India. Pursuant to the said Policy, the Bidding Guidelines have been issued by the MNRE, Govt. of India on 3rd August, 2017, duly prescribing the standard bidding documents along with Models for Request For Selection (RFS), Power Purchase Agreement (PPA), Power Sale Agreement (PSA)etc.
8. In respect of power purchased from the small solar projects of the capacity of less than 5 MW and SRTPV projects of up to one MW, which are not covered under competitive bidding, the Commission has to determine tariff effective

from 01.04.2018. Accordingly, the Commission had issued a Discussion Paper in the matter, on 6th February, 2018, duly inviting comments / suggestions from the stakeholders, to be submitted to the Commission on or before 05th March, 2018.

9. In response to the said Discussion Paper, various stakeholders including some of the ESCOMs have submitted their written comments / suggestions. The Commission also held a public hearing in the matter on 11th April,2018 in the Court Hall of the Commission. The stakeholders present made their oral submissions before the Commission. The inputs provided by the stakeholders and the decisions of the Commission on the same are discussed in the subsequent paragraphs of this Order. The Commission has noted the communication dated 13.04.2018 of the Ministry of Power and New & Renewable Energy, Govt. of India to all SERCs that, they have to determine the Feed- in -Tariff for wind power projects of less than 25MW and solar power projects of less than 5 MW capacities which are not covered under the competitive bidding guidelines and that accordingly the Commission is proceeding to determine the generic tariff for such solar power projects.
10. 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.

11. 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 proceeds to determine the generic tariff Order for ground mounted solar power projects of capacity upto five MW and the KW scale Solar Roof Top Photovoltaic Power Plants up to one MW capacity.

ORDERS

1. The discussion and decisions on the operational and financial parameters, for determination of tariff for the above plants are given in the following paragraphs:

1) Life of the Plant:

The Commission had proposed to consider the life of the solar plants 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 at 25 years, from the date of their commissioning.**

2) Term and Tariff design:

The Commission had proposed to adopt levelised 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 levelised 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.

3) Degradation Factor:

While the Commission had not separately proposed allowing any degradation factor, Adani Green Energy Ltd. has suggested that a degradation factor of 0.70% should be considered stating that the GERC has recognized this factor while the CERC was mistakenly considered it at 0.6% and that one of the Solar Module manufactures has declared it to be 0.70%.

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.**

4) Capacity Utilisation factor:

The Commission had proposed as in its earlier Tariff Orders dated 02.05.2016 and 12.04.2017, to consider a CUF of 19% for solar power plants.

KBJNL has submitted that it is difficult for the ground mounted projects to achieve 19% and that in the case of SRTPV plants, CUF would not exceed 16% because of various constraints for such plants. Azure Power India Pvt. Ltd., has suggested that CUF for SRTPV plants should be 15% as adopted by SECI for all India tenders. Powergate Energy (Mysore) Pvt. Ltd., has suggested CUF at 17.5 per cent for SRTPV plants and CUF of 19 per cent for MW scale plants located in 'Sunny' areas. Ecosoch Solar Pvt. Ltd., has suggested CUF of 15% to 17% for SRTPV plants. Ravindra Energy Limited has suggested CUF in the range of 15-17%.

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).

5) Capital Cost:

The Commission had proposed to adopt a Capital Cost of Rs. 40,000/KW for SRTPV plants and Rs. 350 lakhs/MW for ground mounted solar power plants.

KBJNL has suggested a Capital Cost of Rs.510.48 lakhs including evacuation cost for ground mounted solar power projects. Renew Power Ventures Pvt. Ltd., has suggested a capital cost of Rs.430 Lakhs/MW including evacuation cost. Azure Power India Pvt. Ltd., has suggested for SRTPV plants a Capital Cost of Rs.70,000/kWp for less than 10 kW, Rs.65,000/kWp for 10-100 kW and Rs.60,000/kWp for above 100 kW capacities, while stating that the proposed cost of Rs.350 lakhs/MW for megawatt scale projects is too low, considering the increase in module cost and uncertainty in duties. Hero Future Energies Pvt. Ltd. has submitted that considering the proposed Safeguard Duty, the revised Capital Cost would be

Rs.472.00 Lakhs/MW for ground mounted solar projects and Rs.54,000/kWp for SRTPV plants. Powergate Energy (Mysore) Pvt. Ltd. has submitted that even without the proposed Safeguard Duty, the cost of good quality 5kW SRTPV plant is Rs.63,000/kWp and therefore, the current slab-wise Capital Cost should be continued. Eco Soch Solar Pvt. Ltd. has submitted that a Capital Cost of Rs.85,000/kWp to Rs.1,20,000/kWp for 1-5 kWp capacity SRTPV plant and Rs.70,000/kWp to Rs.85,000/kWp for 5-10 kWp should be considered. Ravindra Energy Ltd. has suggested that Capital Cost ranging from Rs.65,00 per KW to Rs.55,00 per kW should be considered for SRTPV plants with capacity ranging from 10kW to above 500 kW.

Commission's Decision:

The Capital cost as proposed is inclusive of evacuation infrastructure. Available literature including reports by international organisation like IRENA indicates rapid decline in module cost beginning from 2010 with costs declining 80% between the end of 2010 and the end of 2016; the decline was 18% between 2015 and 2016. They also reveal that module cost reductions are not only influenced by substantial capacity and deployment upsurge, but more recently because of improvements in the production process and efficiency gains associated with increased adoption of newer cell designs. With installations declining in other parts of the

world like Europe and decline in costs, India has emerged as a new market for solar project developers. Competitive pressures have led to further reduction in installation cost. The Commission takes note of these developments.

As against a Capital Cost of Rs.440 Lakhs per MW adopted in its Order dated 12.04.2017, in which it was noted that as per one of the latest market report the average module cost was at about Rs.23.488/Watt, the Commission had proposed to adopt a cost of Rs.350 Lakhs per MW (i.e. about 20% less).As per one of the market reports available on the internet (PVinsight) as on 02.05.2018, the average module cost is at about Rs.19.26/watt i.e. a reduction in module cost by about 18% as compared to the cost adopted earlier. As noted earlier, most of the developers have more serious concerns about the likely increase in module/ panel cost because of levy of Safeguard Duty and such other duties, than about the proposed Capital Cost. Presently there has been no imposition of such duties. 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 proposed. With the reduction in costs of other equipments and materials along with interest rates, the proposed Capital Cost of Rs.350 lakhs/MW is fair and reasonable for megawatt scale ground mounted solar power plants. Similarly, there is reduction in the Capital Cost of SRTPV plants since the last tariff revision. As

noted earlier, the Commission has allowed installation of multiple SRTPV plants on common roofs by multiple consumers and thereby considering slab-wise Capital Cost for SRTPV plants is longer relevant. The argument of some of the developers that the cost of smaller capacity SRTPV plant would be higher for lack of economies of scale is not acceptable because, it is not as if the panels / modules or other equipments are manufactured for each such project.

Accordingly, the Commission hereby decides to adopt a capital cost of Rs.350 Lakhs per MW for MW scale projects and Rs 40,000 per kW for kW scale SRTPV projects.

6) Operation & Maintenance Cost:

The Commission had proposed to allow O&M expenses at 1% of the Capital cost with an annual escalation of 5.72%.

Adani Green Energy Ltd. has suggested that O&M cost should not be linked to the Capital Cost as held by the Hon'ble ATE and it should be the same as allowed in the earlier generic Tariff Order with an annual escalation of 5.72%, i.e. Rs.7.823 Lakh/MW. KBJNL has suggested that O&M expenses should be at least Rs.6 Lakh/MW with annual escalation of 5.72%. Renew Power Ventures Pvt. Ltd., has suggested that as earlier the O&M expenses should be at 1.7% of the Capital Cost i.e. Rs.7.3 lakhs with annual escalation of 5.72%. Powergate Energy (Mysore) Pvt. Ltd., has suggested that for SRTPV plants, O&M expenses should be allowed

at 2.5% of the current Capital Costs. Eco Soch Solar Pvt. Ltd. has suggested the expenses at 2% of the Capital Cost of the SRTPV plants.

Commission Decision:

The Commission notes that many of the stakeholders have submitted that proposed O&M expenses at 1% of the Capital cost is too low as the O&M expenses have not reduced to the extent of reduction in Capital Cost. **The Commission, therefore, decides to allow O&M expenses at Rs.600/kW SRTPV plants and at Rs.4.5Lakh/MW for ground mounted Megawatt Scale solar plants, with an annual escalation of 5.72%.**

7) Interest and Tenure of Loan:

The Commission had proposed the normative tenure of long term loans as 12 years and to allow Interest on loan at 9% per annum.

KBJNL has suggested for retention of interest rate at 11%. Renew Power Ventures Pvt. Ltd., has suggested that the interest rate on term loan should be considered at 9.97% as per the CERC Regulations, 2017. Azure Power India Pvt. Ltd. has submitted that the proposed 9% rate is too low. Hero Future Energies Pvt., has requested for considering a rate of atleast 9.5% p.a. Powergate Energy (Mysore) Pvt. Ltd., has

suggested a rate of 11.25% with loan tenure of 7 years. Ravindra Energy Ltd. has suggested interest rate in the range of 11% to 12% in respect of SRTPV projects.

The commission notes that, with effect from 22.01.2018, Indian Renewable Energy Development Agency (IREDA) has revised the interest rates, which vary from 9.55% to 10.75% for wind projects, with a reduction of 25, 20 and 15 base points for grades 1 to 3 respectively with external grading.

Similarly, PFC has revised the rates of interest with effect from 17.04.2018, which varies from 9.60% to 10.00% for State Sector and 9.50% to 11.00% for private sector with rating IR – 1 to IR-5 for RE sources other than Biomass Power Plants. For Biomass Power Plants it varies from 10.50% to 11% for State Sector and 11.00% to 12% for Private Sector.

As per the latest data, with effect from 01.05.2018, the MCLR of SBI is ranging between 8.15% to 8.35% for loan tenure varying from one year to three years. Considering 200 bps above MCLR, the maximum interest rate would be 10.35%.

The above facts indicate that the rate of interest on domestic loan for solar projects would be 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 28.03.2018 has considered interest on term loan at 9.97%.

Commission's Decision:

Therefore, the Commission decides to adopt interest rate of 10% per annum and consider the tenure of loans as 13 years.

8) Working Capital:

The Commission had proposed to consider one months' receivables as Working Capital.

Renew Power Ventures Pvt. Ltd. and Adani Green Energy Ltd., have requested that the working capital should be retained at two months' receivables. Azure Power India Ltd., has suggested it should be 5 months' receivables considering payment delays.

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.

9) Interest on Working Capital:

The Commission considering that the interest rates are on a declining trend, had proposed to consider interest on working capital at 10%.

Adani Green Energy Ltd., has suggested that the rate should be 11.75%. Renew Power Ventures Pvt. Ltd. has suggested a rate of 10.97%, while Azure Power India Ltd., submits that the proposed rate of 10% is low.

Commission decision:

The Commission notes that the CERC in its recent Order dated 28.03.2015 has considered 10.97% as the interest on Working Capital.

The Commission, therefore, decides to adopt 11% per annum as the rate of interest on working capital.

10) Depreciation:

The Commission had proposed to allow depreciation at 5.83% of the capital cost excluding the land cost, for the first 12 years and 1.54% for the remaining 13 years. 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 upto 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.

The Commission, therefore, decides to consider the depreciation on 90% of the capital cost (excluding land cost) at rate at 5.38% for the first 13 years, for recovery of debt, with the remaining depreciation spread equally over the balance useful life of the projects.

11) Return on Equity:

The Commission had proposed RoE of 14%.

Adani Green Energy Ltd., has requested for a RoE of 16% considering the higher risk in RE projects. KBJNL has also suggested the RoE at 16% as reduction will impact investment. Renew Power Ventures Pvt. Ltd. while agreeing with the RoE of 14% has requested it to be grossed upto MAT rate for first 10 years (i.e. at 17.58%) and prevailing corporate tax for the remaining 15 years (i.e. at 21.41%). Azure Power India Pvt. Ltd. has submitted that 14% is too low. Hero Future Energies Pvt. Ltd. has suggested RoE of 16%.

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%.

12) 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 confirm the proposal.

13) 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.

Adani Green Energy Ltd. has suggested that 0.50% of the total energy generated should be considered as auxiliary consumption for megawatt scale projects as in other States.

Commission Decision:

The Commission notes that the CERC in its draft terms and conditions for determination of tariff for RE Sources of power generation for FY18, 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.**

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

i) The Commission in its earlier Order has allowed consumers to install SRTPV units with capacity equivalent to the sanctioned load of the respective consumer's installation based on gross or net-metering. The Commission had proposed to allow installation of SRTPV plants with capacity equivalent to 75% of the sanctioned load of the respective consumers' installation based on gross or net-metering.

The stakeholders including CESC have requested the Commission to allow installation of SRTPV plants with capacity equivalent to 100% of the sanctioned load.

Commission's Decision:

The Commission notes that limiting the installed capacity of the SRTPV plants to 75% of the sanctioned load of the consumer would make such investments financially unviable and unattractive to the consumers. **The Commission therefore, decides to allow installation of SRTPV with capacity equivalent to 100% of the sanctioned load of the respective consumer's installation.**

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 utilised by the concerned office/institution on net metering basis and inject any surplus energy into

the grid at APPC rate to be adjusted by the ESCOM towards maintenance of the SRTPV plants without any actual payment. This scheme was proposed to be continued but with the tariff as determined by the Commission instead of APPC rate. CESC has requested the Commission to retain the APPC rate to be adjusted by the ESCOMs towards maintenance of SRTPV.

Commission's Decision:

The Commission notes that with generic tariff and the bid discovered tariff for RE sources falling much below the APPC, allowing the ESCOMs to account the notional tariff payable towards the surplus energy injected at a higher rate would have an adverse impact on the retail tariff to other consumers. **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 equivalent to APPC or Rs.4 per unit, whichever is less. The Commission in the Discussion Paper had proposed to continue the scheme but with the tariff as determined by the Commission.

The Commission has not received any specific comments or suggestion on this issue.

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) MW scale Solar Power Projects:

Parameters for Megawatt scale solar projects	
Cost/MW- Rs. Lakhs	350
Debt: Equity	70:30
Debt-Rs. Lakhs	245
Interest charges on Debt-%	10%
Debt Repayment in Yrs.	13
CUF	19%
Equity- Rs. lakhs	105
ROE-%	14%
Auxiliary consumption	0.25%
O & M expenses in Rs. lakhs	4.5
O & M.Escalation p.a.	5.72%
WC interest (two months' receivables)	11%
Depreciation in %	5.38%p.a for first 13 years and remaining depreciation spread equally over balance years of the plant useful life.

(b) kW scale SRTPV projects(1 to 1000kW):

Parameters for Kilowatt scale	
Cost/KW- Rs. Lakhs	1 to1000 kW-Rs.40000 per kW
Debt: Equity	70:30
Debt-Rs. Lakhs	0.28
Interest charges on Debt-%	10 %
Debt Repayment in Yrs.	13 Years
CUF	19%
Equity- Rs. lakhs	0.12
ROE-%	14%
Auxiliary consumption	00
O & M expenses in Rs. lakhs	0.006
O & M Escalation p.a.	5.72%
WC interest (one month's receivables)	11%
Depreciation in %	5.38%p.a for first 13 years and remaining depreciation spread equally over balance years of the plant's useful life.

3. Applicability of tariff determined:

The Commission in its earlier generic tariff Orders had stated 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, for grid connected megawatt scale solar power projects of less than 5MW capacity at Rs.3.05 [Three Rupees five paise] only per unit; and for grid connected Solar Rooftop Photovoltaic projects of 1MW and below at Rs.3.56 [Three Rupees fifty-six paise] only per unit (without capital subsidy) and at Rs.2.67 [Two Rupees sixty seven paise] only 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 and approved by the Commission after the date of issue of this Order, that achieve commercial operation on or after 01.04.2018;
- (iii) The tenure of the PPA, shall be for 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 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, 2018 and till 31st March, 2019.

This Order is signed and issued by the Karnataka Electricity Regulatory Commission on this 18th day of May, 2018.

Sd/-

(M.K. SHANKARALINGE GOWDA)

CHAIRMAN

Sd/-

(H.D. ARUN KUMAR)

MEMBER

Sd/-

(D.B. MANIVAL RAJU)

MEMBER

Annexure

**LIST OF STAKEHOLDERS WHO HAVE SUBMITTED COMMENTS / SUGGESTIONS
ON THE DISCUSSION PAPER DATED 6TH FEBRUARY, 2018 FOR DETERMINATION OF TARIFF
FOR SOLAR PV POWER PLANTS**

Sl.No.	Name and Address
1	The Associate Vice President, Adani, Gujarat
2	The Managing Director, KBJNL, Bangalore
3	The COO, ReNew Power, Ventures Private Limited, Haryana
4	Azure Power India Private Limited, New Delhi.
5	The General Manager (Coml), CESC , Mysore.
6	Hero Future Energies Private Limited, New Delhi.

LIST OF PERSONS WHO PARTICIPATED IN PUBLIC HEARING ON 11.04.2018:

1	Sri A.C. Eswar, Microsun Solar, Bengaluru
2	Sri Shiva Prasad Shanthanagowdar, KRESHMA
3	Sri M.T. Kesari, Power Energy (Mysore) Pvt. Ltd.
4	Sri Joseph N, Ecosoch Solar Pvt. Ltd.
5	Sri Yash Marwari, PRDC Pvt. Ltd.
6	Sri Piyush Kapoor, U-Solar Pvt. Ltd.
7	Sri Prashanth, Tata Power Solar
8	Sri Srinivasan Sekar, Terracura Solutions Pvt. Ltd
9	Shanthan Lath, Ravindra Energy Ltd.
10	Sri Viswanath. C., Gurutva Energies Pvt. Ltd.

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 BESCO 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 BESCO.
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/-

**M.K.Shankaralinge Gowda
Chairman**

Sd/-

**H.D.Arun Kumar
Member**

Sd/-

**D.B.Manival Raju
Member**

RNI No. KARBIL/2001/47147



ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

ಬೆಂಗಳೂರು ರಾಜ್ಯ ಪತ್ರಿಕೆ

ಭಾಗ-IVA	ಬೆಂಗಳೂರು, ಸೋಮವಾರ, ಡಿಸೆಂಬರ್ ೧೯, ೨೦೧೬ (ಮಾರ್ಗಶಿರ ೨೮, ಶಕ ವರ್ಷ ೧೯೩೮)	ನಂ. 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 had proposed to make Regulations 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 was notified 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 called the KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016.
- (2) These Regulations shall come into effect from the date of their publication in the 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 a Distribution System 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 which an eligible 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 the existing 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 Act and Rules 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 installed capacity, as specified under these Regulations.

Provided further that the inter-connection of such plant with the distribution network shall 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 -

An eligible consumer in the area of supply of a distribution licensee shall be allowed to install SRTPV plant with installed capacity of not less than one kilowatt but not exceeding one megawatt, 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.

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 an Eligible 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, within fifteen 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 days from 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

*Copy to
PPA G. Approval
15 days
15 days*

- (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 be 80 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 the technical 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 SRTPV plant 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) The Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 and all other relevant Regulations issued from time to time.

(3) Safety Aspect -

- (a) Every eligible 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 SRTPV plant 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 SRTPV plant 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 his SRTPV 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 to the 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 Plant on the basis of any application filed by the stakeholders or suo-motu, at the beginning of 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 or based on any review 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 the capital cost and other norms applicable for such control period shall continue for the 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 prevalent Reserve 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 in other cases 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, the bi-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 and the 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 is covered 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 injected to the distribution network shall 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 PPA as 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 consumer and 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 plant in 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 time 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

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

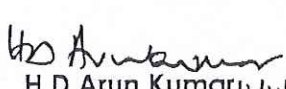
- i. The Distribution Licensees (ESCOMs) in the State may install Solar Rooftop power plants on Government buildings of capacity commensurate with available rooftop area irrespective of the sanctioned load. The ESCOMs shall not incur any capital cost towards such installation other than for expenditure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

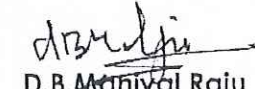
- ii. The Offices, Institutions and Government Departments occupying such Government buildings will be allowed to utilise the energy generated by such SRTPV plants and inject any surplus energy into the grid to the account of the concerned ESCOMs on net-metering basis.
- iii. The ESCOMs shall enter into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


H.D. Arun Kumar
Member


D.B. Manival Raju
Member

