

**KARNATAKA ELECTRICITY REGULATORY COMMISSION**  
**No. 16 C-1, Miller Tank Bed Area, Vasanth Nagar, Bengaluru- 560 052**

**Dated:01.06.2023**

**Present:**

<b>Shri P. Ravi Kumar</b>	<b>..</b>	<b>Chairman</b>
<b>Shri H.M. Manjunatha</b>	<b>..</b>	<b>Member (Legal)</b>
<b>Shri. M.D. Ravi</b>	<b>..</b>	<b>Member</b>

**In the matter of:**

**Determination of Tariff and norms in respect of Solar Power Projects (including Solar Rooftop Photovoltaic Projects) for FY24.**

**ORDER**

**a) Preamble:**

1. Section 86(1)(e) of the Electricity Act, 2003 (the Act), mandates the State Electricity Regulatory Commissions to promote generation of electricity from renewable sources of energy.
2. Accordingly, the Karnataka electricity Regulatory Commission has been promoting generation of power from renewable sources, by determining feed in tariff (generic tariff) periodically, based on the normative operational and financial parameters for different control periods. Section 61(h) of the Act provides for specifying the terms and conditions of determination of tariff and Section 62(1) empowers the Commission for determination of Tariff. Section 64 of

the Act provides procedure for determination of tariff in respect of generating companies or licensees.

3. The Commission, in its Tariff Order dated 18.08.2021, had determined tariff for solar power projects (including Solar Rooftop Photovoltaic Projects) from FY22 to FY23. In the said order, the Commission has determined a levelized tariff of Rs.3.10 per unit for Megawatt scale solar project, Rs.3.19 per unit for 1kW to 2000 kW scale solar rooftop photovoltaic projects and Rs.4.02 per unit for 1kW to 10kW for domestic consumers' solar rooftop photovoltaic units, applicable for the life of the projects, i.e. for 25 years. These tariffs rates were applicable to the projects commissioned on or after 01.04.2021 as per the terms of the PPA. This Order was in force till 31.03.2023.
4. In order to encourage installation of SRTPV units in the State, earlier the Commission has allowed installation of SRTPV on Government Buildings, multiple SRTPV units on consumer premises, and various other models through third party investments by prescribing timelines to implement various activities.
5. As per Section 61(a) of the Electricity Act, 2003, for determination of tariff, the Commission is guided by the Regulations issued by the CERC in the matter of transmission and generation of electricity. Under this provision, the Commission has to determine the tariff for the supply of electricity by a generating company to a distribution licensee.
6. Since, the control period of the order dated 18<sup>th</sup> August, 2021 of generic tariff of Solar projects was valid up to 31.03.2023, the Commission was required to determine the generic tariff in respect of the Solar projects to be given effect from 1<sup>st</sup> of April, 2023. Hence, the Commission issued a Discussion paper on 7<sup>th</sup> February, 2023 inviting suggestions/ views / objections from the stakeholders.

7. In response to the said Discussion Paper issued by the Commission, various stakeholders including some of the ESCOMs have submitted their written comments/views/suggestions. The Commission has considered some of the suggestions relating to Operational and Financial Parameters, for determining the tariff and has also noted other views/suggestions submitted by the stakeholders.
8. A public hearing was also fixed on 13.04.2023 to enable the stake holders to express their views/ opinion in the matter. The stakeholders who participated in the hearing, made their oral submissions before the Commission. The list of stakeholders who filed their comments/suggestions and those who made oral submissions in the public hearing is given in the Annexure, to this Order. The decisions of the Commission on the suggestions relevant to the issue, are discussed in the relevant paras of this Order.
9. After duly considering the written and oral submissions made, the Commission, in exercise of powers conferred under section 62(1)(a), read with Section 64 and 86(1)(e) and other enabling provisions of the Electricity Act, 2003, hereby passes this Order.

**b) Scope of the present Tariff Determination:**

The tariff determined in this Order is applicable to all grid connected Solar Rooftop Photovoltaic generators (SRTPV) upto 2000 kW including to 1kW to 10 kW SRTPV units, entering into power purchase agreements (PPA) with ESCOMs, on or after 01.04.2023 and would remain in force until 31.03.2024. This Order is also applicable for the procurement of energy from MW Scale Solar Power Projects done through transparent process of competitive bidding, using the Commission determined tariff, as a bench mark. The discussion and decisions on the operational and financial

parameters, for determination of tariff for the above plants is brought out in the following paragraphs:

**c) Determination of Tariff for Solar Rooftop Photovoltaic (SRTPV) for kW scale and benchmark tariff for ground mounted MW scale projects:**

**i) Life of the Plant:**

The Commission had proposed in the discussion paper, the useful life of Solar plant as 25 years, for the purpose of determination of tariff.

**Commission's Decision:**

The Commission notes that as of now there are no grid connected solar Plants of MW/kW scale in India which have completed their assumed useful life of 25 years. However, considering the life assured by the manufacturers /developers and the life considered by other Commissions in the country, the Commission decides that the useful life of the plant shall be 25 years.

**ii) Term and Tariff design:**

The Commission, in its discussion paper had proposed to reduce the term of PPA to 15 years, providing options to the parties to extend it for further period of 5 years, as per the tariff approved by the Commission for the extended period.

Powergate Energy (Mysore) Pvt Ltd., Bangalore Apartments' Federation (BAF), B.R. Umakanth, KREA, and Siva Raman have submitted that the reduction in term of the PPA to 15 years affects the cash flow of the consumer and have requested to continue the PPA term as 25 years. In the public hearing, the participants also requested the Commission to consider the term of the PPA as 25 years in view of the life of the plant being 25 years, instead of 15 years.

The Commission, in the discussion paper, had also desired to know from the stakeholders and interested persons as to whether a separate tariff should be

determined for power plants of SRTPV projects of 1kW to 10 kW and 1 to 2000 kW and availing the benefits of capital subsidy from MNRE.

**Commission's Decision:**

The stakeholders in general, have suggested the term of the PPA to be 25 years in order to enable the investor to recover his cost. As regards the type of the tariff, the levelized tariff considers the time value of the money for the period of tariff determination. Considering the views of the majority of the stakeholders and in order to provide certainty of cash flows to the investors, the Commission decides to adopt levelized tariff for 25 years, to execute the PPA.

**iii) Degradation Factor:**

The Commission has not proposed allowing any degradation factor in the discussion paper. But, the Commission has been considering the degradation factor in its earlier Orders. The Commission notes that, there is no reliable data on degradation factor, as solar power generation in the country is in growing stage. Powergate Energy (Mysore) Pvt Ltd., KREA, B.R Umakanth and other stakeholders have proposed in the public hearing that the energy output of the panels will reduce by 0.9255% every year in solar panels and also proposed that the manufacturers' warranty on the panel will be 80% of their nominal output at the end of 25 years and requested the Commission to consider degradation factor of 1% for determination of tariff.

**Commission's Decision:**

The Commission, in its earlier Order has considered reduction of 0.5% of net generation as annual degradation factor commencing from fifth year onwards, for MW scale projects and not considered the same for SRTPV. However, the stake holders have not furnished any document to establish the degradation factor of 1%.

Therefore, the Commission, decides to continue to allow degradation factor of 0.5% of the net generation, as annual degradation factor, from fifth year onwards, only in respect of MW scale projects.

**iv) Capacity Utilisation Factor: (CUF)**

In the Discussion Paper, the Commission had proposed a CUF of 19% for all the Solar Power Plants.

Some of the stakeholders such as Eco Soch Solar Private Limited, Powergate Energy (Mysore) Private Limited, KREA, BALARK have submitted to consider the CUF of 15% to 17.5% for SRTPV. PCKL has proposed a CUF of 21% to be considered for all solar PV projects.

In the public hearing, the participants have requested the Commission to consider the capacity utilization factor as follows:

<b>SRTPV Capacity</b>	<b>Suggested CUF</b>
1kW to 3kW	13%
3kW to 10kW	12%
above 10 kW	17%,
ground mounted solar power plants.	24% to 30%

**Commission's Decision:**

The Commission, in its earlier tariff Orders had considered CUF of 19% for solar photovoltaic plants. The Commission notes that the CUF of Solar Plants would vary based on the irradiation profile and other parameters prevailing in the locations and not based on the energy generation of the Solar plant as suggested by some stakeholders. The irradiation profile depends upon power projects that are taken up, based on studies at 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 results in a lower CUF which is not in the interest of the investors/

Prosumers. In any case, while determining generic tariff, locational disadvantages of a few plants cannot be generalised and factored.

The Commission is of the view that, since the available technologies are yet to establish the exact CUF supported by adequate data, the Commission needs to consider a reasonable CUF, to balance the interest of the investors as well as the consumers. Hence, based on the earlier Orders, the Commission hereby decides to adopt a CUF of 19% for solar Plants (both ground mounted and SRTPV Plant).

**v) Debt Equity Ratio:**

For determination of Generic Tariff keeping in view, the tariff policy, industry norms and earlier orders, the Commission had proposed to continue the debt equity ratio of 70:30 for all the Solar Power Plants. Since, none of the stakeholders have suggested any changes in the debt equity ratio, the Commission decides to continue the Debt-Equity ratio of 70:30 for determination of Generic Tariff.

**vi) Capital Cost:**

- a. The Commission, in its earlier Generic Tariff Order dated 18.08.2021, had considered the Capital Cost as follows:
  - i. 1kW to 10 kW (domestic consumer) at Rs. 46,500 per kW;
  - ii. 1kW to 2000 kW-at Rs. 35,046 per kW for SRTPV plants (other than SRTPV consumer covered under (i)) and;
  - iii. For MW scale projects and ground mounted solar power plants-, Rs.350.46 lakhs per MW
- b. In the Discussion Paper, the Commission had proposed to consider the following Capital Costs based on the latest market rates:
  - i. 1kW to 10 kW (domestic consumer) at Rs. 47,000 per kW;
  - ii. 1kW to 2000 kW-at Rs. 40,000 per kW for SRTPV plants (other than SRTPV consumer covered under (i)) and;

iii. For MW scale and ground mounted solar power plants- Rs. 400 lakhs per MW.

c. Suggestions from the stakeholders:

The following stakeholders have suggested the capital cost for various capacity for implementing SRTPV:

i. Powergate Energy (Mysore) Pvt Ltd.,

Range	Value
1-4 kWp	Rs. 70,000
5-14 kWp	Rs. 65,000
15-48 kWp	Rs. 60,000
49-2000 kWp	Rs. 50,000

ii. PCKL has submitted the benchmark cost issued by MNRE for 21-22 as detailed below for implementing grid connected solar rooftop:

Capacity Range	Bench Mark cost (Rs/kW)
1kW	51,100
>1kW-2kW	46,980
>2kW -3kW	45,760
>3kW -10kW	44,640
>10KW – 100 KW	41,640
>100KW – 500 KW	39,080

iii. KREA has submitted the capital cost as per the rates discovered by BESCOM in implementing Soura Gruha Yojane Scheme for SRTPV:

Capacity Range	Value
1 kW to 3 kW	Rs. 53,344/ kW
3 kW to 10 kW	Rs. 51, 353/ kW
10 kW to 100 kW	Rs. 48,900/ kW
100 kW to 500 kW	Rs. 60,312/ kW

iv. In the public hearing, the participants requested the Commission to consider the capital cost including GST as Rs. 53,486 per kW for the capacity of 1kW to 10kW and up to 200 kW around Rs. 50,000 per kW.

**Commission's Decision:**

The Commission has taken note of the suggestions from the various stakeholders and also finds that there is an increase in the cost of PV modules with other civil and electrical equipment.

The Capital cost of Rs.400 lakhs per MW was proposed in the discussion paper based on the market prices as on 30.01.2023 available on the website- PV Insight, a network of reliable price information contributors of actual prices and sales contracts of Solar PV components. The average module cost was Rs.17.79 per watt. It is noted that most of the developers have expressed serious concern about the increase in the cost of module/panel/inverter due to levy of Basic Customs Duty (BCD) and GST on the solar panels and have proposed a higher capital cost. The Commission has found that as per PV Insight report as on 30.01.2023, the average module cost is at Rs.17.79 per watt. The increase in the cost is also due to increase in the exchange rate of USD. The average of 6 months USD rate as per RBI has been considered. The Commission also notes that there is an increase in the cost of civil works, mounting structure, power conditioning unit, evacuation lines and equipment and general works etc., which accounts for an increase by more than 10% as compared to the earlier costs adopted in the previous tariff order.

As per the Ministry of New & Renewable Energy (MNRE) Notification dated 09.03.2021 and 27.09.2022, the applicable rate of basic customs duty is 40% for solar modules and 25% for solar cells with effect from 01.04.2022. The imposition of BCD as per above rates shall not be considered as change in law and RE implementing Agencies, stakeholders are required to take these BCD rates into account while quoting the tariff in the bidding process.

Considering the increase in the costs as discussed above, the Commission has considered capital cost of Rs.400 Lakhs per MW for determination of tariff, by considering the Basic Customs Duty at the rate of 40% and GST as per the clarification issued by the Ministry of Finance (MoF) Government of India dated 22<sup>nd</sup> December, 2018, wherein 70% of the gross value shall be deemed as the value of supply of said goods attracting 5% rate and the remaining portion (30%) of the aggregate value of such EPC contract shall be deemed as the value of supply of taxable service attracting standard GST rate, which needs to be considered for computation of GST. As per the notification dated 31.12.2018, issued by the Ministry of Finance (MoF) Government of India, 18% of GST is considered for service by way of construction or engineering or installation or other technical services, provided in relation to setting up of solar power generating system.

In respect of SRTPV plants of 1 kW to 2000 kW, the capital cost of MW projects has been considered on a prorated basis and computed as Rs. 40,000 per kW.

The Commission further notes that the smaller consumers have not shown much interest in installing SRTPV units on their rooftops, even though the potential for installation of smaller capacity SRTPV units, especially by the domestic consumers, is substantial, since the installation of SRTPV plants benefits both the consumers and the distribution licensees. Hence, to encourage the domestic consumers to put up SRTPV projects, the Commission has considered capital cost of Rs. 50,000 per kW which is inclusive of all taxes, Duties and GST and extra premia.

The Commission, therefore, decides to adopt the capital cost per MW, for ground mounted Solar projects, as follows:

<b>Capital Cost for Solar power plants.</b>		
<b>Sl. No.</b>	<b>Particulars</b>	<b>FY24</b>
1	Average Module cost-USD/Watt peak	0.216
2	Average of 6 months USD in Rs. as per RBI	82.12
3	Cost of Solar Module in Rs./Watt	17.74
4	Cost of Solar Module in Rs. lakhs /MW	177.38
5	As per MNRE official Memorandum dated 9 <sup>th</sup> March, 2021 the imposition of Basic Custom Duty (BCD) for solar module w.e.f 01.04.2022 of 40% in Rs lakh	70.95
6	Cost in Rs Lakhs /MW(Before GST)	248.33
7	Civil and General Works, Mounting Structure, Power Conditioning Unit, Evacuation Lines & Equipment preliminary and preoperative expenses IDC etc., Rs Lakhs /MW	163.16
8	Total Capital Cost in Rs Lakhs /MW	411.49
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 per MW	14.40
10	GST of 18% for 30% of the total cost of the project as per clarification issued by Ministry of Finance (MoF) Government of India dated 22.12.2018) in Rs Lakhs per MW	22.22
11	Total cost of the project on Rs Lakhs per MW	448.11
12	Land Cost @ Rs.5.00 Lakhs per acre (5 Acres per MW)	25
13	Total Cost of the project including land cost in Rs Lakhs.	473.11
14	Less: The BCD and GST on the capital cost, to be reimbursed on production of proof of payment of the BCD by the generators/developers in Rs Lakhs per MW.	77.27
15	<b>Total Capital cost considered for determination-in of Tariff in Rs. Lakhs per MW</b>	<b>395.84</b>
		<b>400.00 (rounded off)</b>

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

1. 1kW to 10kW SRTPV project (domestic consumer) at Rs. 50,000 per kW
2. 1 kW to 2000 kW SRTPV project (other than SRTPV consumer covered under (1)) at Rs. 40,000 per kW.
3. Ground mounted solar projects at Rs. 400 Lakhs per MW.

## **vii) Operation & Maintenance Cost:**

In the discussion paper the Commission had proposed O & M expenses at Rs.708/kW for SRTPV units and at Rs.5.32 lakh/MW for ground mounted Megawatt Scale solar plants duly considering the inflation in the O & M costs.

PCKL has suggested to include the O&M charges in the capital cost as considered by MNRE for 5 years and the expenses may be considered from 6<sup>th</sup> year onwards.

### **Commission's Decision:**

The Commission notes that the stakeholders have submitted the proposal for O & M expenses without substantiating the reasons and without submitting document for consideration. The operation and maintenance cost consists of employee cost, administrative & general expenses and Repairs & Maintenance expenses (R & M). The Commission, in its earlier Orders, had considered O&M expenses at Rs.670/kW for SRTPV units and at Rs.5.03 lakh/MW for ground mounted Megawatt Scale solar plants, with an annual escalation of 5.72%. The Commission, after considering the inflation factor, decides to allow O&M expenses at Rs.708/kW for SRTPV units and at Rs.5.32 lakh/MW for ground mounted Megawatt Scale solar plants, with an annual escalation of 5.72%.

## **viii) Interest and Tenure of Debt:**

In the discussion paper the Commission had proposed the normative tenure of long term debts/ loans as 13 years and to allow the interest on loan at 10.60% per annum. The stakeholders have not suggested any change in the proposed interest rates and tenor of loans.

**Commission's Decision:**

CERC, in its CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020, has proposed normative interest rate (MCLR) plus two hundred (200) basis points above the average State Bank of India MCLR (One-year Tenure) prevalent during the last available six months.

Considering the prevalent lending rate being the Marginal Cost of Funds-Based Lending Rate (MCLR) at which the bank charges interest for all its loans, the Commission proposes to adopt the latest MCLR rate of 3 years of 8.70% per annum notified by the State Bank of India plus 200 basis points, which works out to 10.70% per annum.

Therefore, the Commission decides to adopt interest rate of 10.70 % per annum for 13 years' loan period.

**ix) Working Capital and Interest on Working Capital:**

In the discussion paper the Commission had proposed one month's receivables for SRTPV Projects and Two Months' receivables for MW scales Ground Mounted Solar Projects and to allow interest on working capital at the rate of 10.90% p.a. The stakeholders have not suggested any change in the proposed interest rate for working capital.

**Commission's Decision:**

The Marginal Cost of Funds-Based Lending Rate(MCLR) is the rate at which the bank prices all its loans. The Commission, in view of the massive reduction in the interest rates being charged on the loans by the banking sector, decides to adopt the latest MCLR rate of 1 year of 8.50% notified by the State Bank of India plus 300 points which will be 11.50% per annum.

The Commission therefore decides to allow 11.50% per annum as the interest rate for calculating the Interest on Working Capital, equal to one month's receivables for SRTPV Projects and Two Months' receivables for MW scales Ground Mounted Solar Projects.

**x) Depreciation:**

The Commission, had proposed to adopt the depreciation on 90% of the capital cost (excluding land cost) at a rate of 5.83% per annum for the ground mounted project and 5.38% per annum for the SRTPV Projects for the first 13 years, and the remaining depreciation spread equally over the remaining useful life of the ground mounted projects and SRTPV plants.

The PCKL has suggested the depreciation for solar projects to be considered for first 15 years and balance depreciation spread equally over the remaining useful life of the plants.

In the public hearing the participants including BALARK have requested the Commission not to consider the depreciation on SRTPV plants since the project is on kW basis.

**Commission's Decision:**

The Commission has considered depreciation amount equal to amount of loan repayment over a period of 13 years. The amount of said depreciation is divided by the capital cost (excluding land cost) to arrive at rate of depreciation of 5.744% per annum for the ground mounted project and 5.38% per annum for the SRTPV Projects. The depreciation has been allowed on 90% of the capital cost recoverable in first 13 years and the balance of 10% to be recovered over the remaining useful life of the project of 12 years.

**xi) Return on Equity:**

The Commission, in its discussion paper, had proposed RoE of 14%. The CERC, in its Regulations has also allowed normative RoE of 14%. The Stakeholders have not furnished any comments on this proposal.

**Commission's Decision:**

The Commission notes that the prevailing CERC Regulations specify RoE of 14% per annum and this Commission has also adopted such rates in other Generic Tariff Orders. The Commission, therefore, decides to allow RoE of 14% per annum.

**xii) Discount Rate:**

The Commission in its discussion paper, had proposed a discount factor of 11.62%. 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 levelized tariff. The Commission, therefore, decides to reckon Discount Rate of 11.69%, based on WACC.

**xiii) Auxiliary consumption:**

The Commission, in its discussion paper had proposed the auxiliary consumption of 0.25% of the gross generation for MW scale projects based and not to allow any auxiliary consumption for SRTPV plants. The Stakeholders have not furnished any comments on this proposal.

**Commission's Decision:**

The Commission also notes that, there is no substantial documentary evidence to consider the maximum percentage of auxiliary consumption and hence, decides to allow the auxiliary consumption of 0.25% for MW

Solar PV Plants in line with the earlier decisions and not to allow any auxiliary consumption for SRTPV units.

**xiv) Other Issues for kW projects (SRTPV plants):**

- a) The Commission, in its earlier Orders has allowed all the domestic and other consumers to install SRTPV units, with their own investment, with the capacity equivalent to the sanctioned load of the respective consumer's installation by allowing net metering or gross metering arrangements.

**Commission's Decision:**

The Commission, in this order decides to continue to allow all the domestic and other consumers to install SRTPV units, with their own investment, with the capacity equivalent to the sanctioned load of the respective consumer's installation by allowing net metering or gross metering arrangements.

- b) 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. Under this scheme, the Government installations are allowed to utilize the SRTPV generated energy under net metering arrangement and to allow the excess energy to be injected to the ESCOM's grid without making any payment by the ESCOMs to the Government installations, since the ESCOMs shall have to maintain the SRTPV units installed on the Government buildings. The cost of maintenance of the SRTPV installations on Government buildings shall be borne by the respective ESCOMs by adjusting amount towards the surplus energy injected to their grid, at the generic tariff rate determined by the Commission from time to time.

**Commission's Decision:**

The Commission, in this Order decides to continue the said scheme. For the purpose of computing the maintenance cost, the tariff shall be considered as per this Order.

- c) The Commission, in its Order dated 15.09.2017 has allowed installation of multiple SRTPV units in respect of multiple/ single registered consumers on a common rooftop in the premises, or single SRTPV unit having multiple installations, under own investment. The installed capacity to be considered for installing the SRTPV was limited to the combined installed capacity not exceeding the total sanctioned load. The tariff allowed in such cases is 90% of the generic tariff, as determined by the Commission from time to time.

Powergate Energy (Mysore) Pvt Ltd., has requested the Commission to treat each RR No. / Meter Connection, as an independent identity, with no reduction in tariff in PPA rate – upon installation of multiple SRTPV systems, at the same / different points of time.

BESCOM has informed the Commission that the Consumers who have executed PPA at a tariff of Rs.9.56/- has come forward for execution of additional capacity of solar and in few cases have revised the contract demand of the installation. Hence, it has requested the Commission to allow lower of 90% of the tariff agreed as per the PPA or the prevailing tariff as determined by the Commission at the time of execution of PPA.

Mohana Krishnaiah has informed the Commission that to charge electric vehicle via SRTPV using net-metering, the building is already having SRTPV with net metering with a unit rate of Rs 9.56 not able to go ahead

with SRTPV because, the old agreement has to be cancelled and new agreement has to be signed with 90% of current rate. This comes to be almost 3 times less than the current agreement and requested to encourage the consumers to use Electric Cars and charge these electric cars at the latest net-metering price without asking to cancel existing SRTPV agreements, which is causing lot of financial loss to the earlier commissioned SRTPV installations.

**Commission's Decision:**

The Commission, after examining the suggestions, decides to continue the existing scheme with the generic tariff of 90% as determined by the Commission. The existing system of charging 90% of tariff as per PPA or the prevailing tariff, whichever is lower, for any change in sanction load/ tariff of the consumer, would continue.

The Commission has also decided to allow net metering arrangement for the multiple registered consumers/single registered consumer in the same premises having an existing SRTPV plant and willing to enhance the capacity of the plant within the sanctioned load or increase the sanctioned load to enhance the capacity of SRTPV plant, by executing a separate PPA and connected to the same load. The tariff for the enhanced capacity will be the prevailing tariff as on the date of execution of the second PPA. The billing arrangement will be on prorata basis with reference to the generated energy and tariff as per the respective PPAs.

- d) The Commission, in its Order dated 09.12.2019 has allowed various models on the third party investments for installing SRTPV on the Consumers' buildings, with the Generic tariff as determined by the

Commission from time to time. In this Order net metering was allowed only in respect of Domestic consumers and gross metering to all the other consumers.

**Commission's Decision:**

M/s Amplus Energy Solutions Private limited and others, have challenged the above Order before Hon'ble ATE vide Appeal No:41 of 2021 and IA No:168 of 2020 praying for allowing the Appeal by setting aside the orders passed by this Commission and also to extend net/ gross metering arrangement for all categories of non-domestic LT & HT consumers of SRTPV units.

The Commission decides to continue the existing scheme with the tariff as determined in this Order, subject to the decision of the Hon'ble ATE in the above Appeal.

The Commission also decides to exempt payment of Cross Subsidy Surcharge and Additional Surcharge if any, in respect of all the SRTPV projects of LT Domestic(Residential) consumers, under third party investment schemes for a period of three years from the date of Commercial Operation Date(CoD) in respect of projects Commissioned within 31.03.2024, as a promotional measure.

- e) The Commission, in its Order dated:18.07.2022 has decided not to allow net metering facility in respect of SRTPV plants to the consumers availing power from the other sources/captive sources through open access mechanism and the consumer may opt for Gross Metering Arrangements or may opt for establishing captive plant for self-consumption.

**Commission's Decision:**

The Commission decides to continue the existing order.

- f) The Commission, in its discussion paper had proposed to determine tariff in respect of Grid integrated solar roof top plant with Energy storage system, with a view to encourage the battery energy storage system connected with the SRTPV power plants.

The stakeholders were requested to furnish required data for determination of tariff., in the prescribed format for different makes duly supported by necessary documents.

C-Step has submitted operational and financial parameters collected from various manufacturers and other secondary literature without any supporting document.

**Commission's Decision:**

The Commission notes that no proper documents, comments or suggestions or any recommendation were submitted by the stakeholders. BESCO has submitted that in BESCO area 323 number of its Consumers have already installed hybrid systems for a cumulative capacity of 1.347MW as at the end of February 2023, under net metering arrangement. Hence, the Commission, in order to determine tariff, directs the BESCO to submit the data with the operational and financial parameters for such projects.

- g) The Commission, in its discussion paper had proposed Virtual Net-metering aimed at promoting solar power plants in rural areas. In this arrangement, the entire electricity generated from a Solar Project installed at the consumer premises or any other location, is injected

through bi-directional Solar energy meters and the electricity exported is adjusted in either one or more than one electricity service connection(s) of the participating Consumer(s) located within the same Distribution Licensee's area of supply. In order to support virtual net-metering arrangement, the Commission had proposed virtual net-metering with Capex, Third party investment (RESCO) and utility financial models, for investment in rural areas.

The Commission had requested the stakeholders to submit their views/suggestions for implementing the virtual net-metering arrangement along with financial models with the necessary supporting documents.

KREA has submitted to the Commission to obtain details of virtual net metering under various investment models, from the case study by MNRE or the concept note on virtual net-metering by MNRE or the guidelines issued for implementation of virtual net-metering by Delhi ERC.

CESC has submitted that in the present scenario of surplus solar energy, virtual net-metering with Capex will be a financial burden on CESC. However, if complete financial assistance is provided by State Government, this scheme can be taken up. Hence, implementation of virtual net-metering with Capex and utility financial models may not be taken up.

BESCOM has proposed that in the Virtual Net Metering arrangements, the total capacity of the plant should not exceed total sanctioned load of all the beneficiary installations.

**Commission's Decision:**

The Commission, after examining the suggestions from the stakeholders, decides to formulate separate Guidelines/Orders/Regulations in the matter.

- h) The grid interactive support charges or grid support charges towards the Distribution wire business was proposed to charge all the HT prosumers at 80 Paise/ kWh and for LT prosumers at Rs.1.26 / kWh. The charges were proposed to all new prosumers under net metering SRTPV and any captive plant which is connected to the grid as specified under respective category.

M/s Clean Max have submitted that no Parallel Operation / Grid Support Charges shall be levied on rooftop solar Power Plant either under net metering / captive / self-consumption mode till such time the capacity of the project is not exceeding the contract demand of the consumer.

Eco Soch Solar Pvt. Ltd submitted that levy of grid support charges will discourage consumers from adopting solar rooftop photovoltaic (SRTPV) projects and will ultimately defeat the purpose of promoting renewable energy-sources.

Powergate Energy (Mysore) Pvt Ltd has requested the Commission not to levy Grid Support Charges.

Bangalore Apartments' Federation (BAF) has submitted to the Commission that the societies are investing in Rooftop solar power generation plants as such the ROI reduces. BAF believes at best such a charge may be explored for the number of units exported not on the basis of solar power generation.

Enerparc Energy Pvt Ltd has suggested to combine both and have a max 40 paise overall (Grid Network Charges + Generation tax).

B.R. Umakanth has submitted to the Commission not to impose grid support charges.

Reliance Jio Infocomm Limited requested the Commission not to levy grid support charges. It needs to be studied a methodology to be adopted to measure the grid support and grid support charges shall be levied on the basis of support provided by the grid.

S.S. Agencies requested the Commission to waive of grid support charges.

Hinren Engineering Pvt Limited., requested the Commission to reduce the feed in tariff rather than introducing grid support charges or to keep grid support charges fixed for the term of the PPA.

**Commission's Decision:**

The stakeholders and the captive generators explaining the financial implications on imposing grid support charges, have urged the Commission not to levy the grid support charges.

The Commission is of the considered view that the Commission needs to initiate a study before taking any decision in the matter. As such the Commission decides not to levy any grid support charges to the SRTPV installations until the Commission determines the grid support charges after conducting necessary studies.

In respect of captive plants, the Commission decides to continue the existing arrangement of collecting demand charges in lieu of grid support charges to be collected as per W & B Agreement, until the

Commission determines the grid support charges after conducting necessary studies.

- i) The Commission, in its discussion paper had proposed that as per the KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016 and the Commission's Orders issued from time to time, the SRTPV installations of above 50kW upto 2000kW is required to be connected to the 11kV distribution network. As per Conditions of Supply of Electricity of Distribution Licensees in the State of Karnataka (CoS) (Ninth Amendment), 2020, the SRTPV consumers have been requesting the Commission to allow to connect the SRTPV installation at LT level upto 150kW.

The Commission had requested the ESCOMs to examine this proposal and furnish their views as to the technical feasibility in allowing SRTPV connections upto 150 kW at LT level.

BESCOM, in its submission has stated that SRTPV connections up to 150 kW may be allowed to integrate at LT Voltage levels under net metering arrangement. Hence, for self-utilization purposes, the SRTPV plant may be integrated at LT 230V /440V levels or any other voltage levels at which the Consumer is utilizing power.

The other stakeholders have also requested the Commission to allow SRTPV connections to connect at LT level upto 150kW.

**Commission's Decision:**

As per the Regulation (6)(a) of KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations,2016 and subsequent Orders of

the Commission, the Solar rooftop PV Power plants is being connected to the distribution network at the connectivity level as specified below:

Sl. No.	Installed Capacity of SRTPV	Voltage level
1.	Upto 5kW	230V-Single Phase
2.	Above 5kW and upto 50kW	400V- Three Phase
3.	Above 50kW and upto 2000kW	11kV HT

It is seen from the above that at present the installations above 50KW and upto 2000 Kw are required to be connected at HT level. As proposed in the Discussion Paper and also as per the request of the stakeholders, the Commission decides to permit SRTPV installations above 5KW and upto 150 KW at LT level, 400 volts 3ph and above 150KW and upto 2000 KW at 11KV HT.

In order to implement the above change, the Commission, in exercise of the powers conferred under Regulation (13) of the KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations,2016 decides to substitute Regulations 6(a), (e)(f), (g) as detailed below:

6(a) The Solar rooftop PV Power plants shall be connected to the distribution network at the connectivity level as specified below:

Sl No.	Installed Capacity of SRTPV	Voltage level
1.	Upto 5kW	230V-Single Phase
2.	Above 5kW and upto 150kW	400V- Three Phase
3.	Above 150kW and upto 2000kW	11kV HT

xxxxx

6(e) Each SRTPV plant of less than 150kW 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.

- 6(f) Every SRTPV plant of more than 150kW shall be connected only to the existing 11kV Distribution System. In such cases, the total capacity of the existing and proposed SRTPV plants on that feeder shall not exceed 80% of the rated current carrying capacity of that line.
- 6(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 be taken up by the Distribution Licensee for the purpose of connecting the SRTPV plant with the grid.
- j) As per the Commission's Order dated 16.09.2014, the ESCOMs have been seeking approval of the PPAs by the Commission for more than 500 kW. Now, in response, to the comments / suggestions received from the stakeholders, to enhance the deemed approval upto 1000 kW.

**Commission's decision:**

Considering the views expressed by the stakeholders, the Commission decides that:

- i. The PPAs of SRTPV plants with an installed capacity up to and inclusive of 1000 kW, executed as per the approved standard PPA format, shall be considered as deemed to have been approved by the Commission and the ESCOMs are not required to obtain a separate approval thereon. The PPAs for a capacity above 1000 kW shall be submitted to the Commission for approval.
- ii. Approval of the Commission shall be obtained in case there is any deviation from the standard approved format of PPA.

- iii. The PPAs of SRTPV installation of above 500 kW and upto 1000kW executed after 01.04.2023 shall be considered as deemed approval of the Commission excluding the PPAs executed prior to 01.04.2023.
- iv. The Commission reserves the right to review any of the PPAs, at its discretion, to verify its conformity to the standard format and other applicable Orders/ Regulations.
- k) The Commission, in its earlier orders has allowed to implement the SRTPV plant only on the roof of the consumer's building. In the public hearing and oral/written submissions made by the stakeholders it was requested to allow to install SRTPV plant on the carport in addition to the rooftop of their buildings so as to effectively utilize the available space. While doing so the capacity of the SRTPV plant will not exceed the sanctioned load of the consumer.

**Commission's Decision:**

The Commission, by considering the views of the stakeholders hereby decides to allows the Non-Residential consumers such as Educational Institutes, Hospitals, IT parks, Industries to implement the SRTPV plant on their rooftops of the building and also on the roof of the carport, duly limiting the capacity of the SRTPV plant to the sanctioned load of the consumer.

- l) The Commission approves the Timelines for various activities involved in implementation of SRTPV projects, as detailed below:

Activity	Responsibility	Timeline
<b>For 1kW-10kW(Domestic Consumers)</b>		
Submission of Application which includes PPA. No separate PPA is required to be executed. The submission of application is deemed to be the approval to commence the work.	Consumer/ ESCOM	Zero Date
<b>Directions:</b> ESCOMs are directed to provide facilities for submission of online application. The PPA and letter of approval to execute the work shall form part of the application. The application format shall be submitted to the Commission for approval within 7 days. The consumer will upload the work completion report within the timelines.		
Online uploading of Work Completion Report by the Consumer.	Consumer	150 ( one hundred and fifty) days from the date of uploading/ submission of application.
Inspection by ESCOM officials for commissioning the project, after receipt of work completion report from the consumer.	ESCOM	Within 5 (five) working days from the receipt of work completion report, after ensuring satisfactory completion of work.  <b>If the plant is not commissioned within 5 days from the date of work completion report, the concerned officer shall be liable to pay penalty of Rs.1000 per day, till the date of commissioning, to the applicant.</b>  <b>After five days of work completion, in case the plant is not commissioned, the consumers are entitled to deemed generation benefit.</b>
Commissioning of Rooftop Solar System in case work completion is delayed by the Consumer	Consumer/ ESCOM	Within six months from the date of uploading the application. In case of delay of more than six months, the tariff payable will be as per the terms of PPA.
Billing Process	ESCOM	30 days from the date of commissioning of the Solar plant.
<b>For 1kW-2000kW (All other consumers excluding 1kW to 10kW domestic consumers)</b>		
Submission of Application online	Consumer	Zero Date
Acknowledgment of Application by distribution licensee (ESCOM)	ESCOM	Within 03 (three) working days from zero date
Site verification / Technical Feasibility & issuance of Letter of Approval / Rejection of application.	ESCOM	Within 10 (ten) working days from the date of acknowledging the application
Execution of PPA (including countersignature by the controlling officer, up to and inclusive of 1000 kW SRTPV projects)	ESCOM & Consumer	Within 5 (five) working days from the date of issuance of Letter of Approval
Submission for approval of the PPA to the ESCOM, less than 1000kW and to the Commission, for more than 1000 kW.	ESCOM	Within 07 (Seven) working days from the date of execution of PPA
Submission of Work Completion Report by the Consumer	Consumer	150 ( one hundred and fifty) days from the date of execution of PPA.
Inspection by ESCOM officials for commissioning the project, after receipt of work completion report from the consumer.	ESCOM	Within 5 (five) working days from the receipt of work completion report, after ensuring satisfactory completion of work.  <b>If the plant is not commissioned within 5 days from the date of work completion report, the concerned officer shall be liable to pay penalty of Rs.1000 per day, till the date of commissioning, to the applicant.</b>

		<b>After five days of work completion, in case the plant is not commissioned, the consumers are entitled to deemed generation benefit.</b>
Commissioning of Rooftop Solar System	Consumer/ ESCOM	Within six months from the date of approval or deemed approval of PPA .
Billing Process	ESCOM	30 days from the date of commissioning of the Solar plant.

m) The consumers are allowed to install Solar panels and other equipment conforming to standards specified by IEEE / BIS, without insisting on procurement from the ESCOM's empanelled vendors.

n) The summary of the parameters for determining the Tariff is as under:

**a. MW scale Solar Power Projects (Ground mounted):**

Parameters for Megawatt scale solar projects	
Cost/MW- Rs. Lakhs	400
Useful life of the plant in years	25
Debt: Equity Ratio	70:30
Debt-Rs. Lakhs	280
Interest Rate on Debt-%	10.70
Debt Repayment in Yrs.	13
CUF	19%
Equity- Rs. lakhs	120
ROE-%	14
Auxiliary consumption	0.25%
O & M expenses in Rs. Lakhs/MW	5.32
O & M Escalation p.a. (%)	5.72
WC interest (two months' receivables)	11.50
Depreciation in %	5.744

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

Parameters for Kilowatt scale		
Cost/kW- in Rs.	1kW to 10 kW – Rs. 50,000 per kW	1kW to 2000 kW- Rs.40,000 per kW
Useful life of the plant in years	25	25
Debt: Equity Ratio	70:30	70:30
Debt- in Rs.	35,000	28,000
Interest Rate on Debt-%	10.70	10.70
Debt Repayment in Yrs.	13	13
CUF in %	19	19
Equity- in Rs.	15,000	12,000
ROE-%	14	14
Auxiliary consumption	0.00%	0.00%
O & M expenses in Rs. /kW	708	708
O & M Escalation p.a. (%)	5.72	5.72
WC interest (one month's receivables) in %	11.50	11.50
Depreciation in %	5.38	5.38

Considering the above parameters and norms, the Commission hereby pass the following

## **ORDER**

- (i) The determination and approval of the generic tariff is as follows:
- a. For grid connected megawatt scale solar power projects the approved benchmark tariff is Rs.3.66 per unit;
  - b. For grid connected solar Rooftop Photovoltaic projects of 1 kW to 2000 kW (excluding 1 kW to 10 kW) the approved tariff is Rs.3.74 per unit and
  - c. For grid connected Solar Rooftop photovoltaic projects of 1 kW to 10 kW for domestic consumers, the approved tariff is Rs. 4.50 per unit, without capital subsidy and with capital subsidy the approved tariff is Rs. 2.97 per unit.
- (ii) The above tariff shall be applicable to all the new solar power projects for which PPAs are entered into on or after 01.04.2023.
- (iii) The tenure of the PPA, shall be for the life of the solar power projects i.e., twenty-five (25) years;
- (iv) All the other issues not covered under this order, shall be governed by the respective Regulations and Orders issued by the Commission and PPAs/ other Agreements executed with the parties; and
- (v) This Order shall be in force with effect from 1<sup>st</sup> of April, 2023 and applicable to the control period FY 24.

**This Order is signed and issued by the Karnataka Electricity Regulatory Commission on this 1<sup>st</sup> day of June, 2023.**

Sd/-  
**(P. RAVI KUMAR)**  
**CHAIRMAN**

Sd/-  
**(H.M.MANJUNATHA)**  
**MEMBER (LEGAL)**

Sd/-  
**(M.D.RAVI)**  
**MEMBER**

**List of stakeholders who have submitted their written Comments/Suggestions**

<b>Sl. No.</b>	<b>List of stakeholders who have submitted their written Comments/Suggestions</b>
1	Cleanmax Enviro Energy Solution Pvt Ltd., Mumbai.
2	EcoSoch Solar Private Limited, Bangalore.
3	Aditya Technologies, Bangalore.
4	Powergate Energy (Mysore) Pvt limited, Mysore.
5	Bangalore Apartment Federation, Bengaluru.
6	BESCOM, Bengaluru.
7	Solar Square Energy, Bangalore.
8	Enerparc Energy Pvt Limited, Bengaluru.
9	B.R. Umakanth, Mysore
10	Amplus Energy Solution Pvt limited.
11	PCKL, Bengaluru
12	CESC, Mysore
13	KREA, Bengaluru,
14	Shivaraman, Bengaluru.
15	Mohan Krishnaih, Bengaluru.

**List of persons participated in Public Hearing on 13.04.2023:**

Sl. No.	Name
1	Raghubandan, President, Karnataka Renewable Energy Association
2	C.S. Gopinath, M.D, GTTS Infrastructure Pvt. Ltd
3	Kesari M.T., M.D, Powergate, Mysore
4	Ashu Gupta, Head-Regulatory, Cleanmax
5	Prakash, R.M. Facilities Infosys, Mysore
6	Pradeep Pai, G.C Member-Bangalore Apartment Federation
7	Sunil Mysore, CEO, Hinren Engineering
8	Shesha Prasanna, Espee Solar Pvt. Ltd.,
9	Vinay C.D., B.D. Head, Sun Esteem India Pvt. Ltd.,
10	Tabish Attar, CSE, Tata Power Solar
11	Mithun Walvekar, Astrix Energy Pvt. Ltd.,
12	Raghendra, Sun Esteem India Pvt. Ltd.,
13	P. Raghuthama Rao, Individual
14	Nithyananda Shetty, Orb Energy Pvt. Ltd.,
15	Adarsha H.J., Possibilities Pvt. Ltd.,
16	Ravi Vittal, Bangalore
17	Srinivas G.V., REAP
18	Imran Amna, Vice President-KIL
19	Krishna Revankar, MD, BALARK
20	Mohan Muruli, Director, BALARK
21	Harsha Kuntur, MD
22	Lohith M, DGM, BESCOM
23	Dhatri Joshi, Asst. Manager, BESCOM
24	Madan, Manager, BESCOM
25	Lata Patil, DGM, KREDL/KSPDCL
26	Sundeendra R, BDM Nuetech solar systems
27	Yogish S, Power Rays
28	Bhyrav N.R./Ambrish, Srikotak
29	Balaji C.P., Power Rays
30	Ganesh, Raga Renewable Energy
31	R. Mallesh, Green Power Solar Solutions.
32	Paresh N.R., Orb Energy Pvt. Ltd.,
33	Divya N,
34	Prabhanjan, ACC designers Foundry
35	Yogesh, ACC designers Foundry
36	Kiran S, TATA Power
37	V. Sreedhar, Krishi Power Solar
38	P. Subrahmanya, Apsaram Technologies Pvt. Ltd.,
39	Dwarakanth, Konark Solar
40	Mukhesh, Shogeo Power
41	Joseph, Ecosoch solar
42	S.M. Shenoy, Tata Power
43	Darshan, TATA Power
44	Srinivas Reddy, RMS Solar Power Pvt. Ltd.,
45	Giridhar, EMMVEE
46	Arathi-Avanthi, AEE, KPTCL
47	B.T. Sudarshan,
48	Gopal Krishnan, Senior Analyst, C-STEP
49	Shalini E, Graduate
50	Sanjay Sa Lu, MAZARS, Advisory LLP
51	Shilpa, AEE, PCKL