

DISCUSSION PAPER

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on

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

I. Introduction:

1. This discussion paper is being issued by the Karnataka Electricity Regulatory Commission, for the determination of tariff for the Solar Power projects, in exercise of the powers conferred under Sections 3 (1), 61 (h), 62 (1) (a), and 86 (1) (e) of the Electricity Act, 2003 and the provisions of the National Electricity Policy and all the other powers enabling it, in this behalf.
2. As per Section 86(1)(e) of the Electricity Act, 2003, the State Electricity Regulatory Commission is mandated to promote generation of electricity from renewable sources of energy. Accordingly, the Karnataka Electricity Regulatory Commission has been promoting electricity generation from renewable sources, by determining the feed-in-tariff (generic tariff) periodically, based on the operational and financial normative parameters for different control periods from the year 2005 onwards. This approach of the Commission has enabled creation of a favourable environment for investment in Renewable Energy (RE) projects in the State, ensuring the investors to get reasonable returns on their investments. As a result, the State has made substantial progress in capacity addition in respect of Wind and Solar power generation.
3. The Commission, vide its Order dated 18.08.2021, in respect of the Generic Tariff Order for solar power projects (including Solar Rooftop Photovoltaic Projects) for FY22 to FY23 had determined a levellised tariff of Rs.3.10 per unit

in respect of 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 (without capital subsidy) and Rs.2.67 per unit (with capital subsidy) for 1kW to 10kW for domestic consumer's solar rooftop photovoltaic projects, applicable for 25 years, being the life of the projects. These tariffs were applicable to all such new solar power projects for which PPAs are entered into and approved by the Commission, after the date of issue of the said Order and also for those projects which achieved commercial operation on or after 01.04.2021. This Order will be in force till 31.03.2023.

4. The Commission notes that, the State had an installed Solar Power Generation capacity of 7855 MW in both Grid Connected ground mounted solar photovoltaic and rooftop solar photovoltaic plants as on 31.12.2022. However, it was noticed that, the investment in solar rooftop installations is not encouraging as could be seen from the fact that, out of the above capacity, the installed capacity of SRTPV plants is only 400 MW. Further, bulk of these projects pertained to large rooftop capacity projects, indicating that smaller consumers had not shown much interest in installing SRTPV units on their rooftops, even though the potential for installation of small capacity SRTPV units, especially by the domestic consumers, is substantial as the installation of SRTPV plants benefits both the consumers and the distribution licensees. It was also noted that, earlier the domestic consumers have actively supported the State Government's initiative in installation of solar water heaters across the State.
5. The Government of Karnataka Notification dated 16.04.2022, issued "Karnataka Renewable Energy Policy 2022-27", wherein it is emphasised to

support the Government of India in meeting the RE target of 500GW and to promote new initiatives and emerging energy technologies in the State.

6. The new Tariff Policy dated 28.01.2016, issued by the Government of India (GoI), envisages that, all the future procurements of renewable energy (except from waste to energy plants) shall be made only through competitive bidding, as per the bidding guidelines issued by the GoI. Pursuant to the said Policy, the Government of India had issued the Bidding Guidelines on 03rd 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., to facilitate power procurement by the DISCOMs.
7. The Karnataka Renewable Energy Policy 2022-27 also states that the selection of projects under intra-State Category, shall be through a competitive bidding process as per the requirement of ESCOMs in the state to fulfil the RPO target fixed by the Commission or any requirement beyond RPO target subject to the approval of the Commission. The target to achieve the grid connected SRTPV projects is now fixed at 1000MW instead of 2400MW fixed earlier in Solar Policy- 2014-21.
8. Even prior to issue of the Policy, procurement of energy from megawatt scale solar power projects was done through a transparent process of competitive bidding, using the Commission determined tariff, as a bench mark. The Commission has also decided that all the future power procurements from RE sources shall be made through transparent process of competitive bidding. The Commission is required to determine the generic tariff effective from

01.04.2023 as benchmark tariff for competitive bidding only for ground mounted solar project and Generic Tariff for SRTPV upto 2000 kW.

9. The Policy also encourages the Energy Storage with grid integration and balancing of variable generation sources. By increasing the system's overall flexibility, it can improve power quality, reduce peak demand, enhance capacity of distribution/transmission grids, avoid/reduce deviation penalties etc. Use of energy storage systems through batteries, by residential, commercial or industrial consumers, to store energy generated from renewable energy, has potential to improve power quality and reliability for such consumers. This would also allow for minimization of diesel consumption from back-up power applications.

10. MNRE, GoI, in its letter dated 11.05.2022 has envisaged that in order to facilitate installation of rooftop solar in Rural areas in the residential sector, a new approach is required and has proposed that instead of installation of solar rooftop on an individual household, it can be aggregated for a group of households by installing ground mounted solar panels at a single place. Such plants may be installed in RESCO/Capex mode with facility of net metering available to the individual household. The solar generation from the plant is proportionately adjusted in the electricity bills of each individual's household of the group. This is termed as virtual net metering.

11. The Commission notes that any solar generation through ground mounted panels or SRTPV units require necessary support from the grid for the purpose of operation and for obtaining interactive support of the Grid, without which the solar generating system would become non-functional. Due to substantial Solar capacity addition, there is a substantial network system development

involving huge investments by the transmission and the distribution licensees in the State.

12. The Commission further notes that for promoting renewable energy, it had not levied the grid support charges so far. As a result, the investment made by the Transmission and Distribution licenses are not being recovered from the generators/ prosumers. The same is being recovered through Aggregate Revenue Requirement/Tariff from the consumers, which is not appropriate. The Grid support charges, for using the grid by the SRTPV / Captive consumers shall have to be borne by these consumers/ prosumers. The Grid support provided by the Transmission/ Distribution network will absorb the load/voltage fluctuations, reactive power variations, harmonics and other distortions from the solar generation plants/ units. This Grid Interactive Support Charges or Grid support charges (GSC) shall be applicable to consumers towards net-metering arrangements of SRTPV Installations or captive consumption from captive generating plants/ units for the total energy generated by such solar plants/ captive units.

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

- a. The Commission, vide its order dated 18.08.2021 had extended the validity of the SRTPV Tariff Order dated 01.08.2019 by keeping tariff of Rs.4.02 per unit (without subsidy), in respect of new solar rooftop photovoltaic units of 1kW to 10kW capacity installed by domestic consumers and Rs.2.67 per unit (with capital subsidy) valid upto 31.03.2023.
- b. The Commission, in its Order dated 18.05.2018, had allowed the installation of SRTPV plants on the Government buildings by the ESCOMs

- under Government funding scheme, with the energy generated from such plants being allowed to be utilised by the concerned office/institution and inject any surplus energy into the grid, on net metering basis with the tariff as indicated in the Order dated 18.08.2021;
- c. The Commission, in its Order dated 18.05.2018, also allowed installation of multiple SRTPV units or single SRTPV unit with the combined installed capacity in a single premises not exceeding the total sanctioned load of all the consumers in that premises, at a tariff equal to 90% of the tariff as per Order dated 18.08.2021;
- d. As per Regulation 13 of KERC (Implementation of Solar Rooftop Photovoltaic Power Plants) Regulations, 2016, the Commission has also allowed consumers to install SRTPV units up to the capacity of 2000 kW subject to sanctioned load of the consumer's installation.
- e. The Commission, vide its Order dated 09.12.2019 allowed third party investment on the Roof of the consumers building under various models and issued the guidelines thereon for Solar Roof Top Photovoltaic units, by approving the Tariff as per the prevailing Generic Tariff Orders issued by the Commission from time to time.
- f. As per the Commission Order dated 18.07.2022, the facility of Net Metering in respect of SRTPV plants shall not be available to the consumers availing power from the other sources/ captive sources through Open Access Mechanism. In such cases, the consumers may opt for Gross Metering arrangements or may opt for establishing Captive Plant for self-consumption.

14. The Central Electricity Regulatory Commission (CERC), on 23.06.2020 has notified "CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2020", for determination of tariff in respect of Renewable energy sources. The following are the salient features of these Regulations:

(1) The generic tariff shall be determined by the Commission on annual basis in accordance with these Regulations for the following types of renewable energy projects:

- a) Small hydro project;
- b) Biomass power project with Rankine cycle technology;
- c) Non-fossil fuel based co-generation project;
- d) Biomass gasifier based power project; and
- e) Biogas based power project

Provided that the generic tariff determined for the year, in which a RE project is commissioned, shall be applicable for such RE Project of same type and shall remain valid for the tariff period.

(2) For Project specific tariff, on case to case basis, shall be determined by the Commission for the following types of renewable energy projects:

- i. Solar PV power projects, floating solar projects and solar thermal power projects;
- ii. Wind power projects (both on-shore and off-shore);
- iii. Biomass gasifier based power projects and biogas based power projects – if a project developer opts for project specific tariff;
- iv. Municipal solid waste based power projects and refuse derived fuel based power projects;

- v. Renewable hybrid energy projects;
- vi. Renewable energy with storage projects; and
- vii. Any other project based on new renewable energy sources or technologies approved by MNRE.

Financial and operational norms specified in these regulations, except for capital cost shall be the ceiling norms while determining the project specific tariff.

15. As per Section 61(a) of the Electricity Act, 2003, the Commission is guided by the Regulations issued by the CERC in the matter of transmission and generation tariffs. In so far as tariff for solar PV or SRTPV is concerned, the CERC Regulations indicated the parameters only in respect of project specific cases. Hence, for the purpose of determining the generic tariff of solar PV/ SRTPV, the Regulations issued by the CERC are not being considered and wherever necessary are being taken as guiding factor.

16. In order to determine a Solar Power Tariff, which reflects the latest market trend in price, the Commission is issuing this Discussion Paper in the matter, for the year 2024.

II. Parameters for determination of Tariff:

The Commission has carried out a detailed analysis of the existing policies/procedures and commercial mechanisms in respect of power generation from Solar power plants. The tariff determined in a cost-plus scenario, would depend significantly on the following operating and financial parameters:

i) Life of the Plant:

The Commission notes that till date there is no established life of the Solar Plants in the country. Generally, manufactures of Photovoltaic modules

provide a warranty of 25 years. Since, the modules form the core component of the solar power generation, the life of the plant could be linked to the life of the modules. The Commission, in the Order dated 18.08.2021 and earlier Orders as well, has considered the life of the plant as 25 years.

Hence, the Commission proposes to retain the life of the plant as 25 years for the purpose of determination of tariff.

ii) Term and Tariff design:

The Commission has been considering the term of the PPA as 25 years in view of life of the plant being 25 years. The long-term PPAs are binding on both the generators and the buyers of electricity (licensees) to sell/buy the energy generated over a long-term of 25 years by enforcing the terms and conditions of the PPA without any choice to end the contract except as provided for in the PPA i.e., due to breach of contract on either side. Due to unforeseen circumstances, it is likely that the terms and condition of PPA may get affected resulting in profit or undue loss to either of the parties. Hence, to provide flexibility to the parties, the Commission proposes to reduce the term of the PPA to 15 years, providing options to the parties may extend it for a further period of five years as per the tariff approved by the Commission for extended period.

Since, capital subsidy has been extended to the SRTPV/ Ground mounted Solar units by the MNRE, the Commission proposes to determine the generic tariff duly considering the applicable subsidy from MNRE.

iii) Capacity Utilisation Factor:

The Commission in its Order dated 18.08.2021 has considered the CUF of 19%. Hence, the Commission proposes to consider a CUF of 19% for Solar Power Plants for the purpose of determination of tariff.

iv) Debt Equity Ratio:

For determination of Generic Tariff, this Commission, in its earlier Solar Tariff Orders, has considered 70:30 as the Debt Equity ratio. The Commission proposes to consider the debt equity ratio of 70:30 for Solar Power Plants.

v) Capital Cost:

The Commission in its earlier Solar Tariff Order dated 18.08.2021 had considered the Capital Cost of:

- i. 1kW to 10kW (domestic consumer) at Rs. 46,500 per kW;
- ii. 1kW to 2000kW-at Rs. 35,046 per kW for SRTPV plants (other than SRTPV consumer covered under (i)) and;
- iii. Rs.350.46 lakhs per MW for MW scale and ground mounted solar power plants.

Considering the latest market rates, the Commission proposes to consider capital cost as under:

- i. 1kW to 10kW (domestic consumer) at Rs. 47000 per kW;
- ii. 1kW to 2000kW-at Rs. 40,000/- per kW for SRTPV plants (other than SRTPV consumer covered under (i)) and;
- iii. Rs.400 lakhs per MW for MW scale and ground mounted solar power plants.