



# ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

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ಸರ್ಕಾರದ ಆಯಾ ಇಲಾಖೆಗಳ ಮುಖ್ಯಸ್ಥರ ಮತ್ತು ಸ್ಥಳೀಯ ಪ್ರಾಧಿಕಾರಿಗಳಿಗೆ  
ಸಂಬಂಧಿಸಿದ ಅಧಿಸೂಚನೆಗಳು

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

## Notification

**No. KERC/S/F-31/Vol-1401/768**

**Date:09.10.2024**

**Draft KERC (Implementation of rooftop aero turbine with solar or without solar) Regulations, 2024**

### **PREAMBLE:**

1. Section 86(1)(e) of the Electricity Act 2003 (the Act) mandates the 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 of 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.
2. 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 consistent with the Act to carry out the provisions of the Act, by the Commission.

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3. Rooftop Aero Turbine(RAT) is a small-scale wind energy plant that is installed on rooftops to generate electricity by harnessing wind power. These turbines are designed to operate in urban or suburban environments where wind speeds are typically lower and more turbulent than in open areas. Rooftop aero turbines can be an effective way to harness wind energy for residential power use, especially in combination with solar power or without solar power. It is also envisaged to implement rooftop aero turbine with solar in Karnataka RE Policy 2022-27 under new initiatives.
4. Therefore, in exercise of the powers conferred under the provisions of the Electricity Act, 2003, the Karnataka Electricity Regulatory Commission hereby specifies the following Regulations in respect of implementation of rooftop aero turbine with solar or without solar.
5. As required under Sub Section (3) of Section 181 of the Electricity Act, 2003, the draft Regulations are hereby published for information of all the stakeholders and notice is hereby given that the said draft will be finalised after thirty (30) days from the date of its publication in the official gazette. Any objections / suggestions / views on the proposed draft shall be furnished within thirty (30) days from the date of its publication to the Secretary of the Commission at the following address:

**The Secretary**  
**Karnataka Electricity Regulatory Commission**  
**No. 16 C-1, Miller Tank Bed Area, Vasanth Nagar,**  
**Bengaluru- 560 052**

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

**No: KERC/S/03/1/769**

**Date: 09.10.2024**

**NOTIFICATION**

In exercise of the powers conferred under section 181 of the Electricity Act, 2003 (herein after referred to as the Act) read with section 61 thereof and all other powers enabling it in this behalf, and after previous publication, the Karnataka Electricity Regulatory Commission hereby makes the following regulations, namely:

**1) Short Title and Commencement:**

These Regulations shall be called, the KERC (Implementation of rooftop aero turbine with solar or without solar) Regulations, 2024.

These Regulations shall come into effect from the date of their publication in the Official Gazette.

**2) Definitions and Interpretations: -**

i. 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 RAT plant with solar or without solar 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 RAT plant with solar or without solar to the Distribution Licensee during the billing period;
- (h) "**Interconnection point**" means the interface of RAT plant with solar or without solar with the network of Distribution Licensee upto 11 kV system.
- (i) "**Net metering**" means an arrangement under which an eligible consumer supplies the surplus electricity generated from his RAT plant with solar or without solar to the Distribution Licensee after off-setting the electricity supplied by the distribution licensee to such eligible consumer during the billing period.
- (j) "**Rooftop Aero Turbine plant**" (**RAT Plant**) means a small-scale wind energy plant that is installed on the existing roof of the consumers' premises to generate electricity by harnessing wind power with the solar panels or without solar panels. RAT 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.
- (k) "**Solar Rooftop Photovoltaic Power Plant**" (SRTPV Plant) means the solar photovoltaic plant installed on the existing roof of the consumers' 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 Regulations/Orders issued from time to time.
- ii. 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 same 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 RAT Plants with solar or without solar 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 RAT:**

An eligible consumer having solar roof top or proposed to install RAT plant with solar or without solar in the area of supply of a distribution licensee shall be allowed,

- i. to install RAT plant with solar with the installed capacity of not less than one kilowatt and the installed capacity of one resource shall not exceed the sanctioned load of his installation and the other resource shall be upto a maximum of 25% of the installed capacity resource. In such cases the total installed capacity of the plant shall not exceed 1.25 times of the sanctioned load.

*Illustration:*

*Let's assume a consumer having a sanctioned load of 10kW and installs solar or RAT of upto his sanctioned load of 10kW and he is allowed to install RAT or Solar plant of 25% of 10kW respectively. The total installed capacity of RAT plant with solar is 12.5kW.*

- ii. to install RAT plant without solar with installed capacity of not less than one kilowatt and shall not exceed the sanctioned load of his installation.

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

**5) Procedure for Implementation & Reporting:**

- I. 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 RAT plant with or without SRTPV duly indicating time frame for each of the activities involved in such process.
- II. On receipt of an application for installation of the RAT with or without solar, the distribution licensee shall issue its approval based on the field report and technical feasibility, as specified in the time lines issued by the Commission from time to time. Upon such approval, the Eligible Consumer shall enter into power purchase agreement with the distribution licensee'  
Provided that approval of the Commission shall be necessary in respect of such power purchase agreements as the Commission may specify from time to time.
- III. The eligible consumer shall commission the RAT plant with solar or without solar within 180 days from the date of approval of the PPA. In case, the eligible consumer fails to commission the RAT plant with solar or without solar within 180 days, the applicable tariff for the electricity supplied from the RAT plant with solar or without solar shall be the tariff determined by the Commission prevailing on the date of Commissioning or 90% of the PPA tariff agreed whichever is lower.
- IV. Every Distribution licensee shall monitor the process of installation of the RAT plants by the Consumers and submit quarterly reports to the Commission in such formats, as may be specified by the Commission.

**6) Technical Parameters:****I. Interconnection with the Distribution System:**

- (a) The Rat plant with solar or without solar shall be connected to the distribution network at the connectivity level specified below:

Sl. No.	Installed Capacity of RAT	Voltage level
1.	Upto 5 kW	230 V- single phase
2.	Above 5 kW and upto 150 kW	400 V-Three phase
3.	Above 150 kW and above	11kV HT

- (b) The above connectivity norms are applicable to all the RAT plants with solar or without solar seeking connectivity with the 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 RAT Plant with solar or without solar to the Distribution System.

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

(e) Every RAT plant with solar or without solar 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 RAT plants with solar or without solar 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 RAT Plants with solar or without solar to be connected shall be 80 kVA.*

(f) Every RAT plant with solar or without solar 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 RAT plants with solar or without solar 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 RAT plant with solar or without solar 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 sole purpose of connecting the RAT plant with solar or without solar with the grid.

(h) Prior to synchronization of any RAT Plant with solar or without solar 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 RAT plant with solar or without solar shall have the facility for limiting the harmonics and other distortions, as specified in the Karnataka Electricity Grid Code/Distribution Code as amended from time to time, before injecting the energy into the distribution system.

## II. Technical Standards -

All technical and operational aspects of the RAT plant with solar or without solar shall conform to the standards specified in the following Regulations / Codes as amended from time to time.

- a) The KERC (Karnataka Electricity Grid Code) Regulations, 2015
- b) The KERC (Karnataka Electricity Distribution Code) Regulations, 2015
- c) The Central Electricity Authority (Technical Standards for connectivity of the Distributed Generating Resources) Regulations, 2013.
- d) The Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.
- e) The Conditions of Supply of Electricity of Distribution Licensees, in the State of Karnataka.
- f) The Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023 and all other relevant Regulations issued from time to time.

## III. Safety Aspect –

- a) Every eligible consumer shall be responsible for safe operation, maintenance and rectification of defect of the RAT system with solar or without solar 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 RAT plant with solar or without solar when the supply from distribution network is switched off. The Distribution Licensee reserves the right to disconnect the RAT Plant with solar or without solar 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 RAT plant with solar or without solar 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 RAT Plant with solar or without solar.
  - 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 RAT plant with solar or without solar as established by the distribution licensee.
- e) Subject to Clause(I) above, the Distribution Licensee may call upon the eligible consumer to rectify any defect within a reasonable time.
- f) Every RAT Plant with solar or without solar should be capable of having anti- islanding protection. Every RAT Plant with solar or without solar shall be equipped with automatic synchronization device.
- g) Every RAT Plant with solar or without solar shall be equipped with the protective functions to sense abnormal conditions on distribution system and cause the RAT Plant with solar or without solar to be automatically disconnected from the distribution system to prevent any back feeding.
- h) Every RAT Plant with solar or without solar 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 RAT Plant with solar or without solar and the distribution system, which shall meet the following requirements:
  - i. Separation of RAT/SRTPV from the distribution system;
  - ii. Indications to clearly show open and closed positions;

- iii. Quick and convenient accessibility twenty-four hours a day to the Distribution licensee's personnel without requiring clearance from the eligible consumer; and
- iv. Necessary locking arrangements in the open position.

**7) Filing of application and proceedings for determination of tariff:**

- a) The Commission shall determine the generic tariff for RAT Plants with solar or without solar 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.

- b) Notwithstanding anything contained in these Regulations, for the RAT plants with solar or without solar for which Power Purchase agreements are signed and which are commissioned within a control period, the generic tariff determined for RAT plants with solar or without solar 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 RAT plants with solar or without solar.

- a) Capacity Utilisation Factor (CUF):

The Capacity Utilisation Factor for SRTPV plant shall be 19%. For the rooftop aero turbines, it is defined as the ratio of the actual energy produced by the turbine over a period of time to the maximum possible energy it could have produced if it operated at full capacity during the same period.

$$CUF = \frac{\text{Actual Energy Generated (kWh)}}{(\text{installed Capacity (kW)} \times \text{number of Hours in the Period})}$$

*For instance, if the installed capacity of rooftop aero turbine is 5 kW and it generated 500 kWh in a month (30 days), the CUF would be calculated as:*

$$CUF = \frac{500 \times 100}{5 \times 30 \times 24} = 13.9\%$$

In practice, CUF for aero turbines is generally lower than that of solar panels, often ranging between 10-30%, depending on wind conditions and turbine design.

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

b) Tariff Structure:

The tariff for RAT Plants with solar or without solar shall be a single part tariff consisting of the following fixed cost components:

- i. Operation and maintenance expenses;
- ii. Depreciation;
- iii. Interest on loan capital;
- iv. Interest on working capital and
- v. Return on equity.

c) 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 levelized basis. For the purpose of levelized tariff computation, the discount factor equivalent to Post Tax weighted average cost of capital shall be considered.

d) 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.

e) 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.

f) Loan and Finance Charges:

- i. For the purpose of determination of generic tariff, loan tenure of 13 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.

- ii. 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.
- iii. 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.

g) Depreciation:

- i. 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.
- ii. Depreciation shall be based on 'Differential Depreciation Approach' over the loan period and over useful life of the RAT plant with solar or without solar beyond the loan tenure computed annually on 'Straight Line Method'.
- iii. In case the debt component is 70% of the capital cost, the depreciation rate for the first 13 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 RAT plant with or without solar.

h) Return on Equity:

The value base for the equity shall be 30% of the capital cost and the normative Return on Equity shall be 14% 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.

i) Interest on Working Capital:

I. The Working Capital shall be computed considering the following components:

1. Operation & Maintenance expenses for one month.

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

II. 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.

j) 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.

k) 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 RAT Plants with solar or without solar 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 RAT meters with solar or without solar shall have features of recording time of day consumption / generation.

**10) Energy accounting and settlement:**

- i. Meter readings shall be taken on monthly basis or as per the billing cycle specified in the Electricity Supply Code.
- ii. 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.

- iii. 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 RAT Plant with solar or without solar, the distribution licensee shall raise bill for the net electricity consumption at the tariff applicable to such eligible consumer.

#### **11) Power Purchase Agreement (PPA):**

- i. The distribution licensee and eligible consumer 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.

Provided that, an eligible consumer is having existing PPA and intends to install RAT with his existing solar plant, the distribution licensee shall enter into a new PPA by cancelling the existing PPA, with a prevailing tariff for RAT with solar plant as determined by the Commission, for the term of 25 years.

- ii. The Power purchase agreements as per approved standard formats after following the procedure specified in Regulations 5 in respect of RAT plants with installed capacity upto and inclusive of 1000kW shall be deemed to be approved by the Commission on the date of its execution by the parties.

- iii. The Distribution Licensee shall seek approval of the Commission within seven (7) days from the date of signing the PPA, where the installed capacity is more than 1000kW by paying necessary fee as per the KERC(Fee) Regulations, 2016 as amended from time to time.

**12) Redressal mechanism:**

All grievances arising from the implementation of these Regulations, including disputes outlined under Section 86(f) of the Electricity Act, 2003, shall be addressed through the appropriate dispute resolution mechanisms. This includes, but is not limited to, approaching the Commission or other designated authorities in accordance with the legal provisions. Matters requiring adjudication will be handled in accordance with the relevant rules and procedures under the said Act.

**13) Power to remove difficulties:**

- i. The Commission may from time to time issue such directions and orders as considered appropriate for the implementation of these Regulations.
- ii. 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.
- iii. 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

**SECRETARY**

Karnataka Electricity Regulatory Commission

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