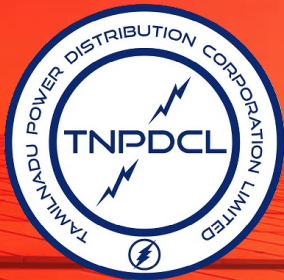




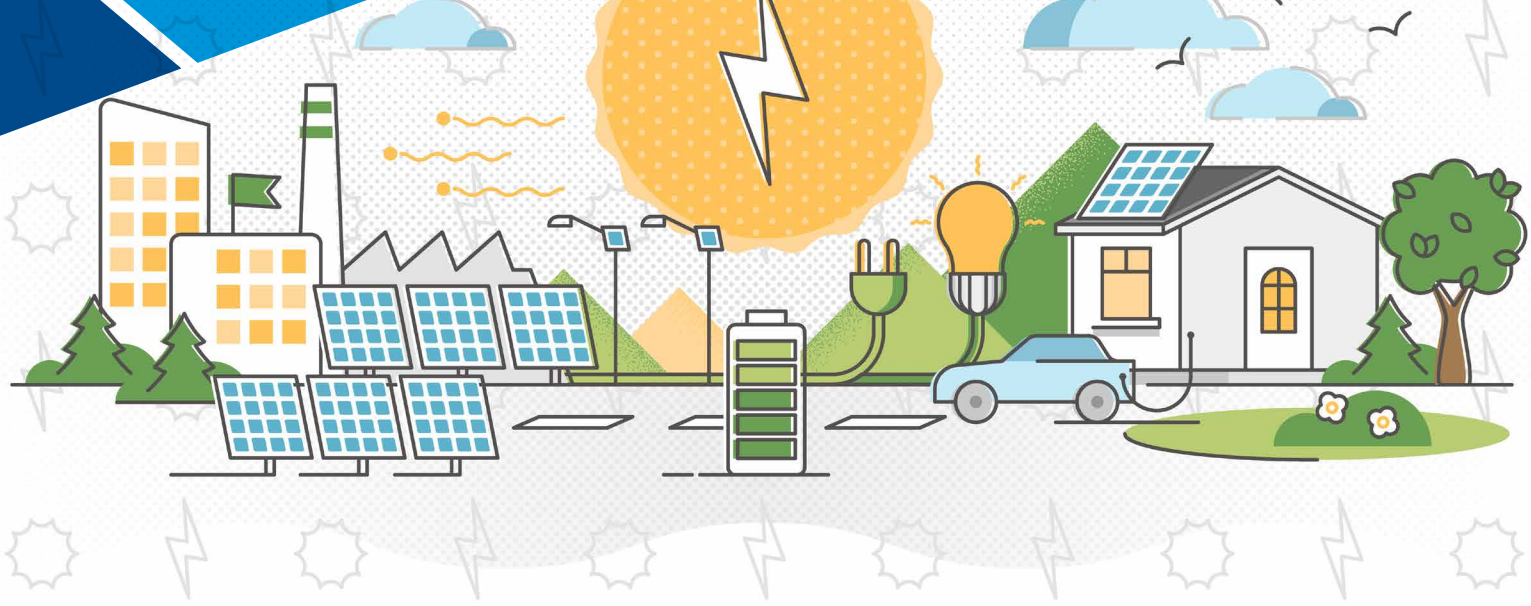
नवीन एवं
नवीकरणीय ऊर्जा मंत्रालय
MINISTRY OF
NEW AND
RENEWABLE ENERGY
सत्यमेव जयते



GRID-CONNECTED ROOFTOP SOLAR SYSTEM

FOR RESIDENTIAL CONSUMERS

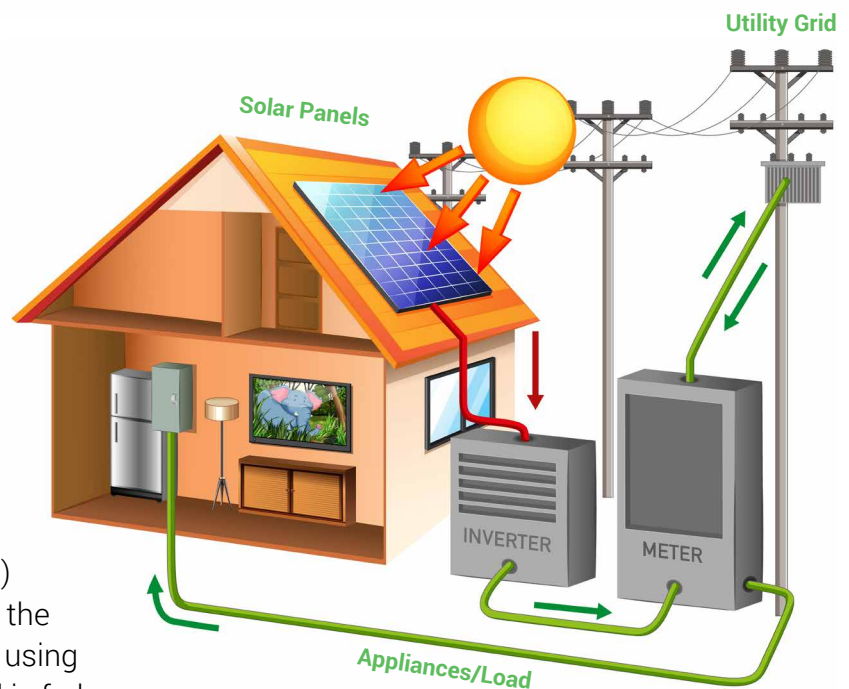




1. ABOUT GRID-CONNECTED ROOFTOP SOLAR (RTS) SYSTEM

1.1 What is a grid-connected rooftop solar system?

In a grid connected rooftop solar (RTS) system, the DC power generated from the solar panels is converted to AC power using a power conditioning unit/Inverter and is fed to the grid.



1.2 What are the main components of a grid-connected RTS system?

- **Solar PV Modules/Solar Panels** – The Solar PV modules/Solar Panels convert solar energy to DC (direct current) electrical energy. Crystalline Silicon Solar PV panels are most commonly used in rooftop solar systems. Multiple panels are connected to form arrays as per the desired capacity of the system.
- **Inverter** – Inverter converts variable DC output of Solar PV panels into AC power. The inverter also synchronizes with the grid so that generated power from the module can be injected into the grid.
- **Module Mounting structure** – The module mounting structure, is the support structure that holds the Solar PV panels in place for full system life and is exposed to all weather conditions. These are normally fixed at particular angles and orientations. But these can also be of a type that tracks the Sun, called trackers.
- **Bi-direction Meters** – Meters are used to record the generation or consumption of electricity. Bi-direction (or Net-Meters) are used to keep track of the electricity that the solar PV system injects into the utility grid and the electricity that is drawn from the utility grid.
- **Balance of System** – These consist of

cables, switchboards, junction boxes, earthing systems, circuit breakers, fuses, lightning protection systems, etc.

1.3 Is a battery included with the grid-connected RTS system?

There is no battery provided with the grid-connected rooftop solar system.

1.4 Will a grid-connected RTS system act as an inverter at the time of the power cut?

The grid-connected RTS system, will not supply power during the power cut. The system requires a reference voltage from the grid to operate which will not be available during power cuts.

1.5 How much area is required for a 1 kWp RTS system?

A 1kWp RTS system generally requires 10 sq. meters of shadow-free area. However, actual area requirements may vary depending on the efficiency of solar modules, their placement, etc.

1.6 Why do I need a shadow-free area for modules?

Solar modules (and cells within) need uninterrupted sunlight to produce maximum electrical energy. Having a shadow on even a part of the module reduces the generation to great extent and wastes the installed system capacity.

1.7 What types of roofs are suitable for RTS systems?

Rooftop solar systems can be installed on any type of roof having sufficient load-bearing capacity.

1.8 What is the maximum capacity of RTS system that can be installed on my roof?

The maximum capacity that can be installed will be equivalent to the sanctioned load. The actual capacity may vary on the basis of different

parameters like shadow-free area, roof area availability, etc.

1.9 How much energy does a 1 kWp RTS system generate on a daily basis?

On a clear sunny day, a 1 kWp RTS system can generate 4 to 5.5 units in a day.

1.10 Will I get constant/same energy from the RTS system all year round?

No, the daily energy generation from the RTS system shall be dependent on the temperature and solar irradiance among other parameters and these may not be the same every day throughout the year.

1.11 Will I get the same annual energy from the RTS system for all 25 years?

No. On exposure to sunlight and the outside environment, the solar module loses its generation capacity and this is called degradation.

1.12 What are the advantages of a grid-connected RTS system?

- Saving on electricity bills.
- Utilization of available vacant roof space, no additional land required.
- Low gestation period.
- No additional requirement for transmission and distribution (T&D) lines.
- Reduces T&D losses as power consumption and generation are co-located.
- Improvement in the tail-end grid voltages and reduction of system congestion.
- Long-term energy and ecological security due to reduction in carbon emission.
- Better management of daytime peak loads by DISCOM/ utility.
- Meeting of the Renewable Purchase Obligations (RPOs) of obligated entities.

2. COST OF SYSTEM AND SUBSIDIES

2.1 What is the average cost of grid-connected RTS system?

The average cost varies depending on the vendors and the quality of components used in the system. The average will vary between 60 to 70 thousand per kWp.

2.2 What are the subsidies/ financial support available from the Central Government?

Central Financial Assistance (or subsidy) is available only for residential sector grid-connected rooftop solar projects.

Central Financial Assistance (CFA) to the Residential sector

Plant Capacity	Applicable Subsidy
1kW – 2 kW	₹30,000 to ₹60,000/-
2kW – 3 kW	₹60,000 to ₹78,000/-
Above 3 kW	₹78,000/- fixed

2.3 Does the residential consumer have to pay the full cost of the system for residential sector subsidized projects?

Yes, the consumer needs to pay the full cost of the system and the subsidy will be credited to their bank account via Direct Benefit Transfer from the government.

2.4 Whether State has empanelled any vendor for implementation?

TANGEDCO has empanelled several vendors through which you can deploy solar systems at your premises.

The list of vendors can be accessed at: <https://pmsuryaghar.gov.in/#/registered-vendors>

2.5 How should I evaluate vendors offering me RTS system? What are the main points of consideration?

While choosing a vendor, customers should consider the following factors in addition to the price of the system:

- Warranties of system and components.
- Energy generation estimates and guarantees.
- Service backup and arrangements the vendor has in the area.
- Track record of the vendor – along with the feedback of customers.

2.6 How can I make payment to the Electricity Distribution Company (DISCOM)?

Since the system is grid connected through net metering, DISCOM will generate a bill based on the reading provided by the net meter installed at the consumer premises. The consumer will have to pay for the net units (total imported units minus exported solar units) only.

2.7 Can I make my monthly electricity bill 'zero' by installing RTS system?

This is possible in very rare cases because the consumer shall be required to pay some minimum charges like fixed charges, etc. even if the consumed energy is all self-generated.

However, 'electricity charges', a major component of the monthly bill, can be reduced to zero by optimally designing and maintaining the RTS system.

3. COST ECONOMICS AND SAVINGS FROM GRID CONNECTED RTS SYSTEM

3.1 How much savings are expected from the grid-connected RTS system?

The grid-connected RTS system has a direct impact on the monthly electricity bill of each consumer. With the subsidy provided by the Central and State Government, the effective cost of the system reduces significantly. The average monthly generation from a 2kW system is 270 units in Tamil Nadu. The detail of monthly calculation and saving is provided below:

Parameter	Unit	Value
Capacity	kWp	2
Cost per kWp (Tentative)	₹	60000
Cost of system	₹	120000
Total Subsidy (Central + State)	₹	60000
Net Cost of the system	₹	60000
Units' generation per month	kWh	270
Average unit cost	₹	6
Savings from Electricity monthly	₹	1620
Payback (Tentative)	Year	3.08
Life of Plant	Year	25

4. METERING ARRANGEMENT FOR GRID CONNECTED RTS SYSTEM

4.1 What is net metering?

All solar PV systems generate power only during the daytime when the sun is available. In net-metered systems, the generated power

is utilized for self-consumption, and excess power is exported to the grid as long as the grid is available. In cases, where solar power is not sufficient due to cloud cover etc., power is drawn from the grid to power the loads. A bi-directional meter or net meter records the energy flow in both directions and at the end of the billing period, the net energy used is calculated. The beneficiary has to pay for only the net energy used.

Rooftop Solar Plant



Appliances/Load



Bi-directional Energy Meter



Utility Grid

4.2 Can the RTS system be installed for only captive use without being connected to the Grid?

Yes, the plants which are not connected to the grid are normally called behind-the-meter plants and subsidy is not available for such plants even for the residential sector. However, it is required to follow rules and regulations specified for this purpose by the state authorities.

5. INSTALLATION OF A GRID-CONNECTED RTS SYSTEM

5.1 How can I apply for the installation of a grid-connected RTS system?

Residential consumers can apply for the installation of grid-connected RTS system through **PM - Surya Ghar : Muft Bijli Yojana National Portal**. The link for the online portal is **www.pmsuryaghar.gov.in**.

5.2 What will happen to my RTS system, if I shift my residence?

The system is modular and can be easily dismantled and reassembled elsewhere. So, it can be shifted to your new residence.

5.3 What is the general procedure for the installation of a grid-connected RTS system for the beneficiaries?



5.4 Whether solar modules should be made indigenously for subsidized projects?

Yes. Only indigenously manufactured PV modules with indigenous solar cells can be used in RTS systems for subsidized projects. For reference, please check the approved list of Module Manufacturers (ALMM) released on 17th February 2025 - <https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2025/02/202502171464145069.pdf>

However, there is no such limitation in case the project is installed without any subsidy.

5.5 What documents are to be provided during application

Only bank related documents such as cancelled cheque, passbook, etc additionally name of consumer must be identical on bank account and DISCOM electricity bill. If there is a mismatch in names, the consumer must update the name with DISCOM/ bank. Uploading the electricity bill is optional.

5.6 In case of any query in whole process, where can the complaints can be raised?

Consumer need to raise complaint under the grievance section on Notional portal. The following link for the grievance- <https://pmsgg.in/>

6. OPERATION AND MAINTENANCE OF GRID-CONNECTED RTS SYSTEM

6.1 What is the minimum warranty period envisaged under the scheme?

Solar PV modules used in solar power plants

/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 12 years and 80% at the end of 25 years.

The mechanical structures, electrical works including power conditioners/ inverters/charge controllers/maximum power point tracker units/ distribution boards/digital meters/switch gear/ storage batteries, etc., and overall workmanship of the rooftop solar PV power plants/systems must be warranted against any manufacturing/ design/installation defects for a minimum period of 5 years.

6.2 What are the O&M aspects of a grid-connected RTS system?

Compared to most other power-generating technologies, RTS systems have very low maintenance and servicing requirements. However, suitable maintenance of the system is essential to optimize energy yield and maximize the life of the system.

Module cleaning is a typical maintenance activity that is required periodically (dust, bird dropping, and other debris can cause a decrease in power generation). The frequency of cleaning is dependent on local conditions. On an average, the module needs to be cleaned and rinsed with water at an interval of 15 days.

6.3 There is a presence of monkeys in our area. Would they be damaging the RTS system?

The solar modules are made up of toughened or tempered glass tops and so are not easily broken due to monkeys or any falling objects like hail. These can be broken if deliberately someone throws stones. Guarding the module surface with wire mesh is one solution for monkey menace, but not recommended because this regularly casts a shadow on the modules.



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