CAG
Citizen consumer and civic Action Group

TAMIL NADU'S SOLAR ENERGY POLICY AND REGULATIONS

CONSUMER'S GUIDE

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A CONSUMER'S GUIDE

About CAG

Citizen consumer and civic Action Group (CAG) is a 39-year-old Chennai-based non-profit, non-political and professional organisation that works towards protecting citizens' rights in consumer and environmental issues, and promoting good governance processes including transparency, accountability and participatory decision-making.

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Introduction

The Tamil Nadu Solar Energy Policy 2012 was the state's first comprehensive solar policy, introducing net metering, and aiming to promote both utility-scale and rooftop solar installations. Building on this, the Tamil Nadu Solar Energy Policy 2019 set a target of 9,000 MW of installed solar capacity by 2023, with 40% allocated to consumer category systems such as rooftop solar. The 2019 policy established mechanisms for both net feed-in and gross feed-in, allowing consumers to either offset their consumption with solar generation or sell all generated power to the grid. The policy also defined eligibility, capacity limits, and technical requirements for grid-connected solar systems8.

To operationalise these provisions, the Grid-Interactive Solar PV Energy Generating Systems (GISS) Tariff Order 2021 specified metering mechanisms, tariff structures, and consumer rights for grid-connected solar installations4. The tariff order set rates for different system sizes and clarified that both net feed-in and gross metering are available to all consumer categories, subject to technical and contractual limits. These frameworks are designed to facilitate solar adoption, support grid integration, and contribute to the state's renewable energy and climate targets.

This booklet provides information on a) policy's grid integration mechanisms and b) the GISS Tariff Order's Regulations, and related mandates.

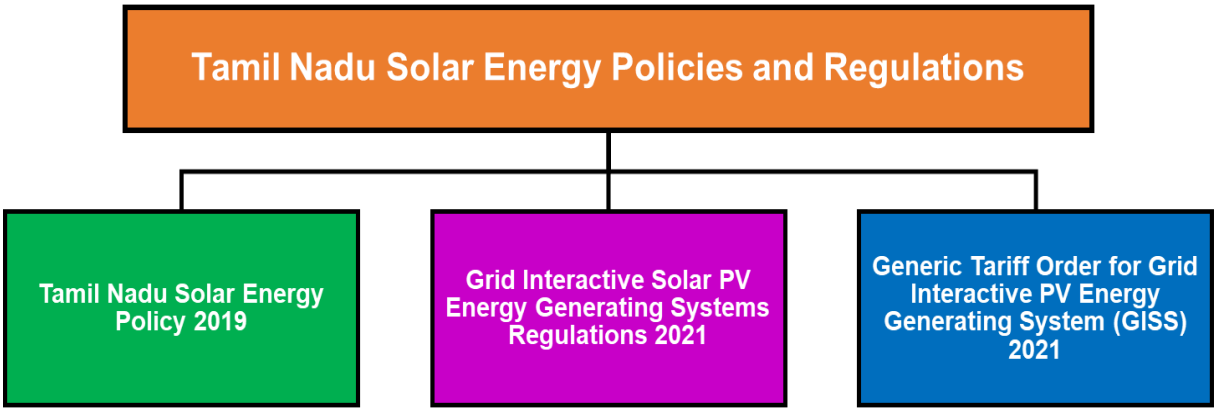

Fig 1 : Solar Energy related policies and regulations in Tamil Nadu

Tamil Nadu Solar Energy Policy 2019

The Tamil Nadu Solar Energy Policy 2019 establishes a framework to promote solar energy adoption and integrate it into the state's electricity grid. Grid integration enables solar energy producers to connect their systems to the main electricity grid, facilitating efficient energy exchange and supporting renewable energy goals. This chapter outlines the policy's grid integration mechanisms, tariff structures, implementation models, and specific mandates designed to enhance solar energy utilisation across various sectors.

1. Tamil Nadu Solar Energy Vision :

- Solar energy will be a major contributor to a sustainable energy future for Tamil Nadu
- Solar energy development will be part of an overall energy strategy that includes demand side management, energy conservation, energy efficiency initiatives, distributed renewable energy generation, electric mobility and smart grids
- Solar energy development will provide green jobs to a significant number of the state's workforce.
- Solar energy will become available, accessible and affordable to all citizens of Tamil Nadu
- Solar energy generation will significantly contribute to reducing the carbon and water footprint of the state's energy sector.
- Tamil Nadu will be an international climate leader for emerging economies by 2023.

2. Scope of Solar Energy Policy

- This policy will be applicable to projects, programs and installations relating to solar photovoltaic energy (solar PV) and solar thermal energy and to both utility and consumer category systems.
- Utility category systems : Where the objective is sale of solar energy to a distribution licensee or a third party or self consumption at a remote location. For these systems the grid connection is through a dedicated gross metering interface.
- Consumer category systems : Where the objective is self-consumption of solar energy and export of surplus energy to the grid. For these systems the grid connection is through a consumer service connection of a distribution licensee.

3. Grid integration of Solar Energy in Tamil Nadu

A major focus of the Tamil Nadu Solar Energy Policy 2019 is to facilitate seamless integration of solar energy with the electricity grid. The policy envisions the grid functioning as a virtual battery, allowing surplus solar power to be fed into it and enabling withdrawal of electricity as needed. This approach ensures optimal utilization of solar energy resources, enhances system reliability, and promotes distributed generation.

The policy outlines two primary mechanisms for grid-connected solar energy systems: **Gross Feed-in** and **Net Feed-in**.

(i) Gross Feed-in Mechanism

Gross Feed-in is primarily applicable to utility-scale projects or entities generating solar power for sale to the distribution licensee or a third party. In this arrangement:

- All electricity generated from the solar system is fed directly into the grid.
- The distribution licensee purchases the energy at tariffs approved by the Tamil Nadu Electricity Regulatory Commission (TNERC) or determined through competitive bidding for large-scale projects.
- Feed-in is permitted at all voltage levels, subject to applicable wheeling and other relevant charges.
- Solar energy fed into the grid is considered "infirm power" and is compensated at rates notified by TNERC, which may be lower than the retail electricity tariff.

(ii) Net Feed-in Mechanism

Net Feed-in is intended for Low Tension (LT) category consumers, including households, small businesses, and institutions, as governed by TNERC regulations. Under this mechanism:

- The solar energy generated is first consumed on-site to meet the consumer’s own electricity demand.
- Any surplus energy not consumed is exported to the grid.
- A bidirectional service connection energy meter is installed to record both the imported (from the grid) and exported (to the grid) energy.
- Imported energy is billed at the applicable consumer tariff, while exported energy is credited at TNERC-determined solar feed-in rates.

- If export credits exceed import charges during a billing cycle, the balance is carried forward to the subsequent billing cycle.
- At the end of a 12-month settlement period, any net credit balance may be claimed by the consumer as a monetary settlement, subject to TNERC guidelines.

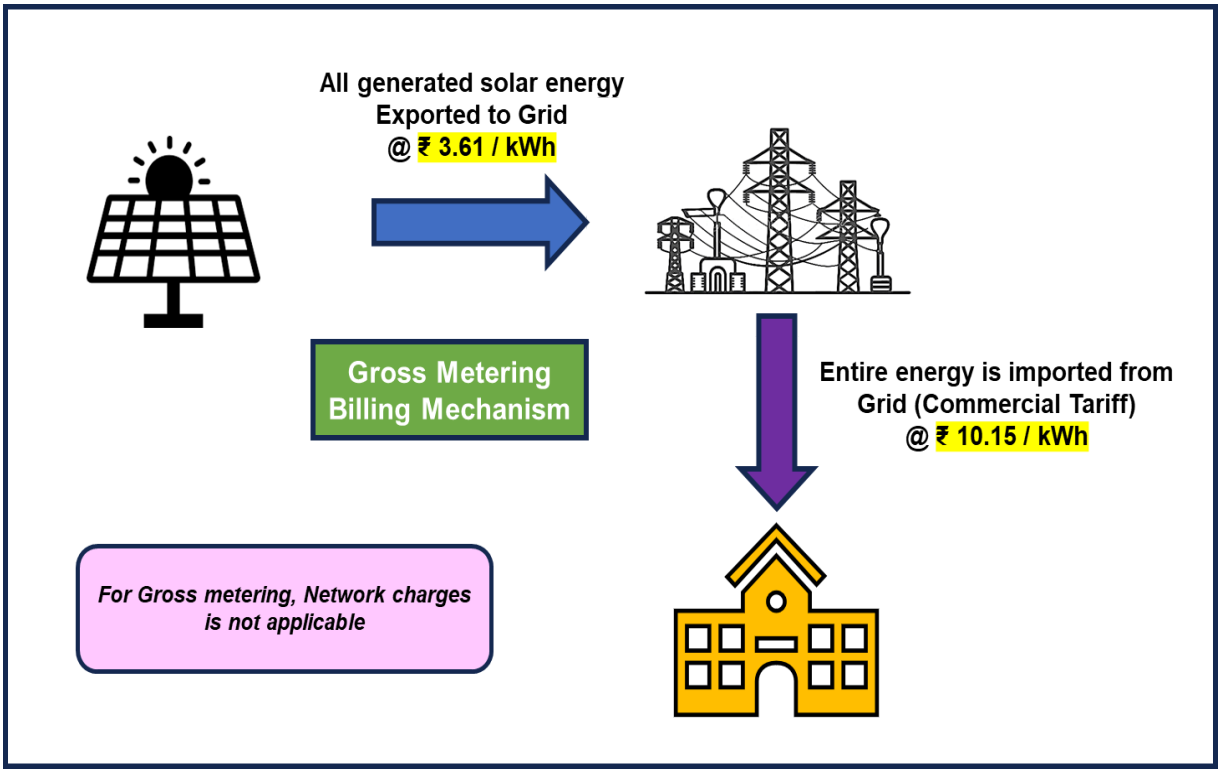

Fig 2 : Gross metering billing mechanism | CAG

4. Tariff Determination

- The value of energy exported to the grid is based on tariffs established by TNERC.
- For Gross Feed-in, tariffs are determined through bidding or direct TNERC orders.
- For Net Feed-in consumers, the export tariff is set by TNERC and reviewed periodically.
- The policy also permits the introduction of Time-of-Day (ToD) tariffs, encouraging solar producers and storage providers to feed electricity into the grid during peak demand periods, thereby enhancing grid stability and optimizing economic returns.

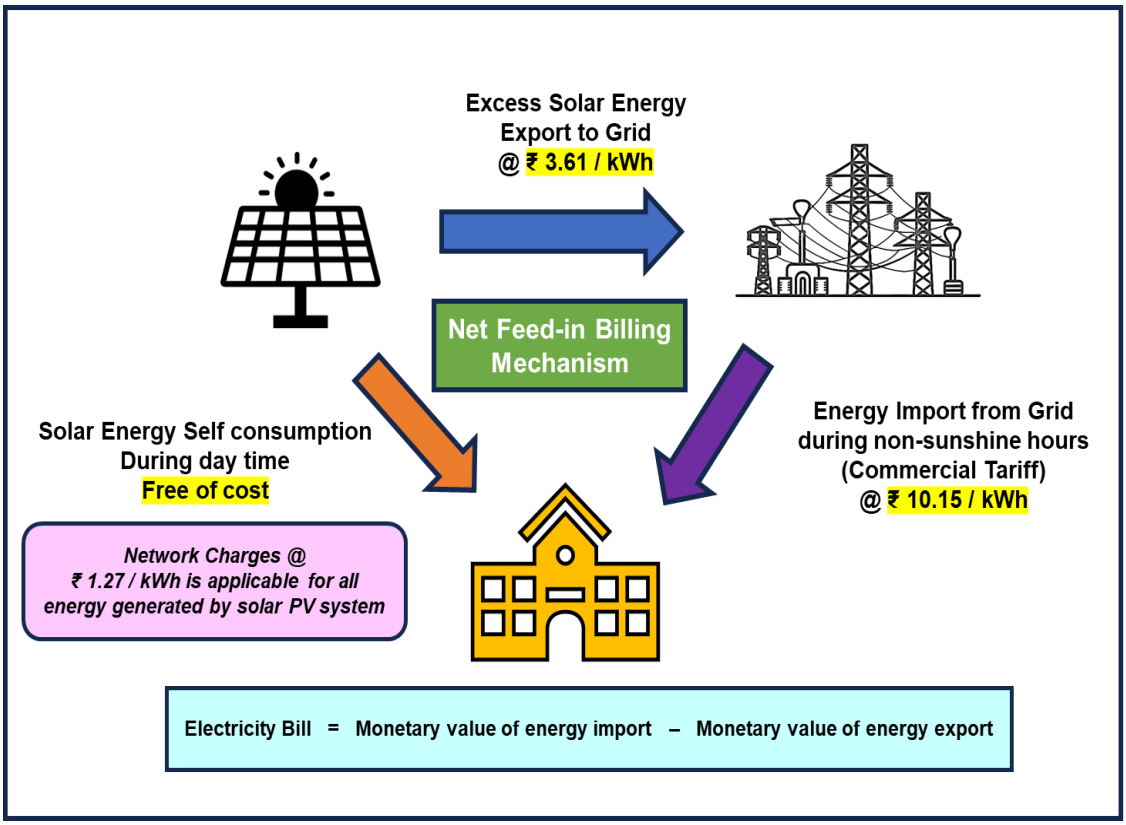

Fig 3 : Net feed-in billing mechanism | CAG

5. Implementation Models for Solar Adoption

The policy supports multiple ownership and financing models to facilitate the adoption of solar energy systems.

(i) Upfront Ownership Model

In this traditional model, the consumer pays the full cost of the solar system upfront and assumes complete ownership and operational responsibility.

(ii) Deferred Ownership Model

Also referred to as third-party ownership or performance-based models, the system is installed and operated by a supplier. The consumer makes periodic payments based on system performance or electricity consumption. Ownership may transfer to the consumer after a mutually agreed term or event. This model includes arrangements such as solar leasing or power purchase agreements (PPA).

6. Regulatory Mandates and Promotional Programs

The policy includes specific mandates and initiatives to institutionalise solar energy adoption across sectors:

- **Building Compliance:** Buildings subject to the Energy Conservation Building Code (ECBC) must integrate solar photovoltaic (PV) and solar thermal systems. Local bodies and the Chennai Metropolitan Development Authority (CMDA) are required to modify by-laws accordingly, with compliance monitored annually by designated authorities such as the Electrical Inspectorate.
- **Electric Vehicles and Solar Charging:** A dedicated policy will be introduced to promote the use of electric vehicles powered by solar-based charging infrastructure.
- **Public Buildings**: All buildings falling under the Tamil Nadu Public Buildings (Licensing) Act are encouraged to install solar PV and thermal systems for electricity generation and water/air heating.
- **Urban Local Bodies:** Municipal corporations, municipalities, and urban local bodies are urged to implement solar-based solutions for street lighting and water supply systems.
- **Promotion of Solar Thermal Systems:** Solar thermal technologies are promoted for residential, institutional, and commercial applications, especially for heating requirements.
- **Industrial Sector Applications:** The policy encourages the use of solar technologies in industrial operations, including the deployment of Concentrated Solar Power (CSP) systems, which utilize mirrors to focus solar radiation for heat and power generation.

7. Incentives

- Consumer category solar energy will be exempted from electricity tax for two years from the date the policy is published.
- Suitable incentives will be designed to promote solar energy generation in the agricultural sector. This may include incentives to farmers.
- Solar energy injected in the grid of the distribution licensee by solar energy producers who have no renewable energy purchase obligations (non-obligated entities), including the solar energy export by non-obligated electricity consumers, can be claimed by the distribution licensee towards fulfilment of their Renewable Energy Purchase Obligations (RPO)

- The Government of Tamil Nadu will promote the manufacture of solar energy components including solar cells, inverters, mounting structures and batteries etc in the state. Lands will be provided for the manufacturing of solar system components. A single window process for all departmental approvals, including a set time limit for each approval will be designed and managed by Tamil Nadu Energy Development Agency (TEDA).
- A suitable incentive scheme will be designed to promote the co-utilization of land for solar energy projects, crop cultivation and water conservation.

8. Solar Energy evacuation

- For consumer category solar PV systems, the system capacity at the service connection point shall not exceed 100% of the sanctioned load of the service connection.
- All new service connection meters in Tamil Nadu shall be configured for bidirectional energy recording and display so that all new service connections and existing service connections for which the meters are replaced in the normal course of maintenance are ready for effecting solar energy net feed-in metering at any time in the future.
- For consumer category solar systems, the distribution licensee will install the required energy meters and commission the solar metering facility within three weeks from the date of application by the consumer.
- The distribution licensee will enhance and update its billing system such that relevant details pertaining to solar gross feed-in and net feed-in are included in the consumers electricity bills and should be available online.
- Distribution licensees shall update the status of the cumulative solar capacity connected at each distribution transformer on their website.
- For high tension consumers, open access regulations of TNERC will apply, subject to the conditions imposed by the State Load Dispatch Centre (SLDC). However wheeling for less than 1 MW shall not be allowed.

9. Awareness creation, education, research and capacity building

- All public and private schools are encouraged to introduce a curriculum on energy and environment into their syllabus. All higher education institutions are encouraged to host an annual energy and environment day to create awareness about climate change and the benefits of renewable energy as a climate change mitigation strategy.

- State government departments and PSUs will be encouraged to participate in annual solar energy and energy conservation training programs organized by TEDA and other agencies.
- Tamil Nadu will closely collaborate with multilateral agencies to advance solar energy research and will constitute a Solar Energy Research Fund (SERF)

Grid Interactive Solar PV Energy Generating Systems Regulations, 2021

Grid-interactive solar PV Energy Generating Systems Regulations, 2021 were introduced to streamline the integration of solar photovoltaic (PV) systems into the electricity grid, promoting renewable energy adoption across Tamil Nadu. These regulations encompass various aspects, including metering arrangements, consumer rights, and incentives. These regulations are applicable to both the distribution licensee and the consumers of electricity served by it within its designated supply area. This pertains to generators who are establishing Grid-Interactive Solar PV Energy Generating Systems (GISS) for solar power production in the state.

1. Eligibility to install Solar Rooftop Systems :

- Any electricity consumer in Tamil Nadu with a load less than 1 MW can install a solar rooftop system
- **Types of Users:**
    - Domestic consumers (homes)
    - Prosumers (who both consume and generate electricity)
    - Generators (who only generate and sell electricity)
- **Premises:** The system can be installed on rooftops, terraces, or open land owned or legally possessed by the consumer (including rented or leased property)

2. Types of Metering Mechanisms

There are three main options for connecting your solar system to the grid:

Billing Mechanism	Applicable consumers	Description	Meter Used	Remarks
Net Metering	All domestic consumers	Units exported to the grid are deducted from units imported; the bill is for net usage	Bidirectional (Net) Meter	Surplus units at year-end lapse
Net Billing / Net Feed-in	All except huts/ agriculture	Imported energy billed at retail rate; exported energy credited at feed-in tariff	Bidirectional Meter	Net credit can be carried over or paid out
Gross Metering	Large consumers/ generators (>150 kW)	All solar energy sold to the grid at a feed-in tariff; all consumption billed separately	Generation Meter	Separate line for export; no netting

- For net metering, the meter records both import and export.
- For gross metering, a separate meter records only solar generation exported to the grid.

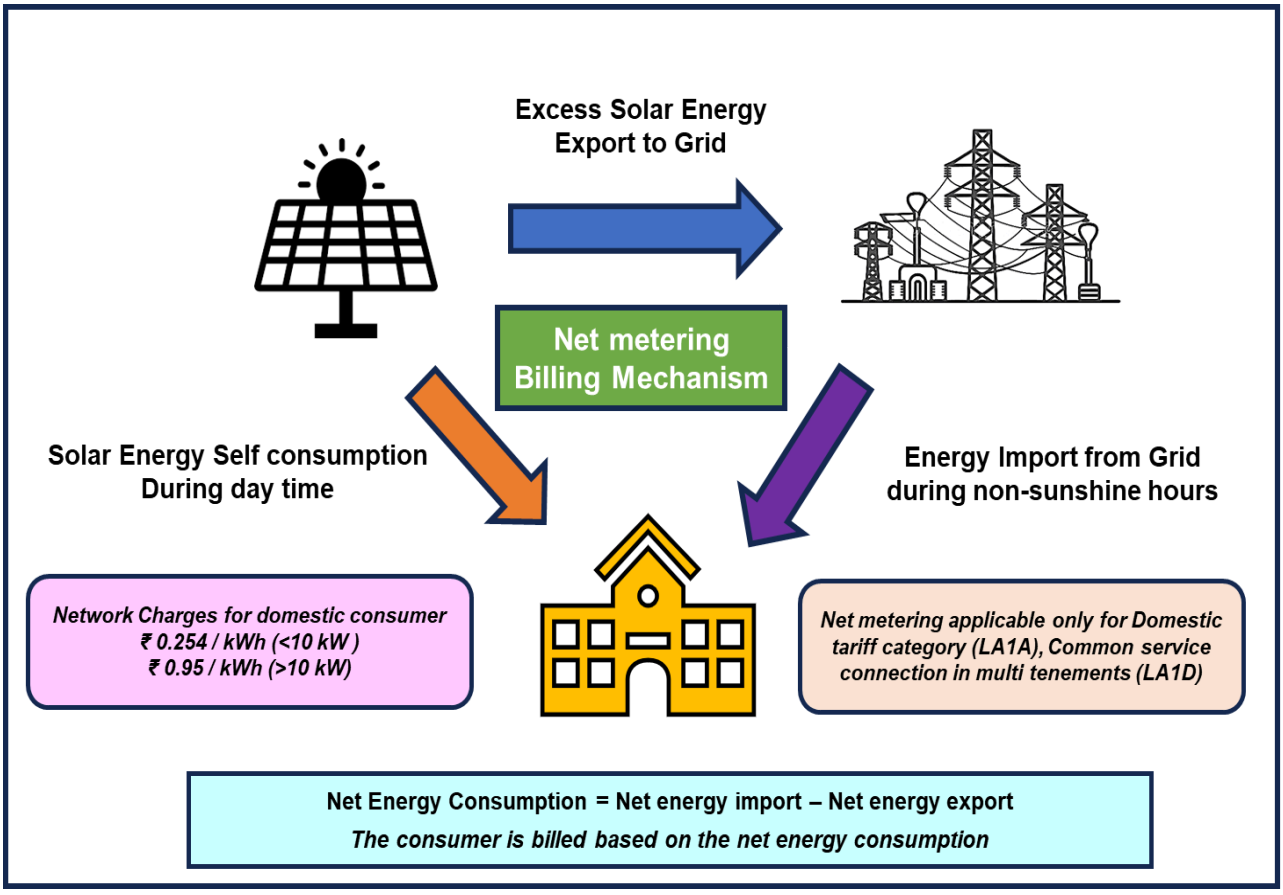

Fig 4 : Net metering billing mechanism | CAG

3. Capacity and Connection Rules

System Size: Solar system capacity is measured by AC output (after the inverter)

Limits:

- Net Metering: Up to the sanctioned load/contracted demand of your connection.
- Net Billing/Feed-in: Up to sanctioned load or 999 kW, whichever is lower.
- Gross Metering: 151 kW to 999 kW (for larger consumers/generators)

Transformer Limits:

Net Metering: Total rooftop solar generation cannot exceed 90% of its transformer capacity (for net metering/billing);

Gross metering: The limit is 70% of the transformer capacity.

4. Billing and Settlement

Mechanism	How billing works
Net Metering	Your bill = (Imported units) – (Exported units). If you export more than you import, surplus lapses at year-end
Net Billing / Feed-in	Imported energy (at retail rate) minus exported energy (at feed-in tariff). Net credits carry over or can be paid out towards the year-end
Gross Metering	All solar generation is sold to the grid at a feed-in tariff; you pay for all the electricity you import from the grid

5. Feed-in Tariff and Time of Day (ToD) tariff incentive:

- Feed-in tariff of excess solar energy exported to grid is based on the levelized cost of energy calculation (LCOE) determined under a cost-plus scenario.

Capacity Range	Levelized Feed-in Tariff
1-10 kW	₹ 3.61 / kWh
11-150 kW	₹ 3.37 / kWh
151-999 kW	₹ 3.10 / kWh

- To promote the adoption of grid-interactive energy storage systems and incentivize solar prosumers to export energy during high-demand periods, a ToD tariff is introduced.
- Applicable during evening peak hours: 6:00 PM to 10:00 PM, offers a 20% higher tariff than the corresponding LCOE based feed-in tariff.
- This differential tariff mechanism is designed to align prosumer energy export with grid demand, thereby enhancing grid reliability and supporting the transition to a decentralized, renewable-rich energy ecosystem.

6. Metering and Technical Requirements

- **Meters:** All meters must be digital, accurate, and comply with Indian standards. Net/gross meters and generation meters are required as per the chosen mechanism.

- **Safety:** Your system must have automatic and manual isolation switches to prevent feeding power into the grid during outages (to protect workers and equipment).
- **Maintenance:** You are responsible for your system up to the meter; the utility is responsible beyond that point.
- **Approvals:** All installations must comply with Central Electricity Authority (CEA) safety and technical standards.

7. Application Process and Fees

- **Application:** Apply to your local distribution licensee with proof of ownership/lease, system details, and a diagram of your setup.
- **Agreement:** You must sign a connection agreement with the utility.
- **Fees:** Registration and metering fees apply, depending on system size and connection type.
- **Timeline:** Utilities are required to process applications and install meters within set timeframes.

8. Switching and Migration

- Domestic consumers can switch between net metering and net feed-in up to two times per year.
- Existing consumers can add more capacity, but total must not exceed the sanctioned limit

9. Key Do's and Don'ts

Do:

- Ensure your system is installed by a qualified professional.
- Use approved meters and safety devices.
- Inform the utility before making any changes or upgrades.

Don't:

- Connect your system to the grid without approval-this can result in disconnection and penalties.
- Exceed your sanctioned load or system size

10. Frequently Asked Questions

Q: Can I use batteries?

A: Yes, but the system must prevent battery power from feeding into the grid during outages.

Q: What happens if I have outstanding electricity dues?

A: You are not eligible for solar rooftop provisions until dues are cleared.

Q: What if my solar generation is more than my usage?

A: For net metering, surplus units lapse at the end of the year. For net billing/feed-in, surplus credit can be paid out or carried over.

11. Quick Comparison Table

Solar Tariff Insights:

Category	**Eligibility**	**Metering Mechanism**			**Network Charges**	**Feed-in Tariff**		
		Net Metering	**Net Feed–in**	**Gross Metering**		**0-10 kW**	**11-150 kW**	**151-999 KW**
Domestic LT Category	Up to Sanctioned load	✓	✓	✱	Rs.1.27 / kWh 20% up to 10 kw 75% above 10 kW	Rs. 3.61	Rs. 3.37	
Other than the domestic category in LT	Up to sanctioned load	✱	✓	✱	Rs. 1.27 / kWh for total generation			
Consumers of more than 150 kW	151-999 kW	✱	✓	✓	Rs. 0.83/ kWh for Net Feed–in. No Charges for Gross Metering			Rs. 3.10
Generator other than consumer	151-999 kW	✱	✱	✓	NIL			

Comparison of different solar energy metering mechanisms:

Feature	Net Metering	Net Billing/Feed-in	Gross Metering
Applicable consumer	Domestic	All except huts / agri	Large consumers
Meter Type	Bidirectional	Bidirectional	Generation Meter
Billing	Net units	Net monetary value	All solar sold
Surplus Handling	Lapses yearly	Credit/pay-out	Paid for all
Max Size	Up to sanctioned	Up to 999 kW	151–999 kW
Network Charges	Yes	Yes	No

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