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How are Indian States Enabling Rooftop Solar Adoption?

Analysing Subnational Policies and Regulations

Arohi Patil, Kumaresh Ramesh, and Bhawna Tyagi

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The Council on Energy, Environment and Water (CEEW) is one of Asia's leading not-for-profit policy research institutions and among the world's top climate think tanks. The Council uses **data, integrated analysis, and strategic outreach to explain — and change — the use, reuse, and misuse of resources**. The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public. CEEW is a strategic/ knowledge partner to 11 ministries for India's G20 presidency.

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The Council's major contributions include: Informing India's net-zero goals; work for the PMO on accelerated targets for renewables, power sector reforms, environmental clearances, *Swachh Bharat*; pathbreaking work for India's G20 presidency, the Paris Agreement, the HFC deal, the aviation emissions agreement, and international climate technology cooperation; the first independent evaluation of the *National Solar Mission*; India's first report on global governance, submitted to the National Security Advisor; support to the National Green Hydrogen and Green Steel Missions; the 584-page *National Water Resources Framework Study* for India's 12th Five Year Plan; irrigation reform for Bihar; the birth of the Clean Energy Access Network; the concept and strategy for the International Solar Alliance (ISA); the Common Risk Mitigation Mechanism (CRMM); India's largest multidimensional energy access survey (ACCESS); critical minerals for *Make in India*; India's climate geoengineering governance; analysing energy transition in emerging economies, including Indonesia, South Africa, Sri Lanka, and Viet Nam. CEEW published *Jobs, Growth and Sustainability: A New Social Contract for India's Recovery*, the first economic recovery report by a think tank during the COVID-19 pandemic.

The Council's current initiatives include: State-level modelling for energy and climate policies; consumer-centric smart metering transition and wholesale power market reforms; modelling carbon markets; piloting business models for solar rooftop adoption; fleet electrification and developing low-emission zones across cities; assessing green jobs potential at the state-level, circular economy of solar supply chains and wastewater; assessing carbon pricing mechanisms and India's carbon capture, usage and storage (CCUS) potential; developing a first-of-its-kind Climate Risk Atlas for India; sustainable cooling solutions; developing state-specific dairy sector roadmaps; supporting India's electric vehicle and battery ambitions; and enhancing global action for clean air via a global commission 'Our Common Air'.

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Contents

Scaling rooftop solar deployment requires a conducive policy and regulatory ecosystem at both state and national level.

Image: Emotive Lens/CEEW

Executive summary

India targets to install 500 gigawatts (GW) of capacity from non-fossil fuel sources by 2030. The Ministry of New and Renewable Energy (MNRE) aims to install 30 GW of rooftop solar (RTS) capacity by 2027. Utility-scale deployment dominates the renewables mix, however, rooftop solar is catching up and is expected to play a critical role in achieving the 500 GW target.

Scaling RTS deployment requires a conducive policy and regulatory ecosystem at both state and national levels. Through MNRE's *Grid-connected Rooftop Solar Programme*, the Centre has been encouraging the adoption of RTS. Recent initiatives – *PM Surya Ghar: Muft Bijli Yojana*, *New Solar Power Scheme under PM JANMAN*, and the 2024 amendment to the *Electricity (Rights of Consumers) Rules* – have continued the momentum.

Both the central government and state governments have jurisdiction over electricity. Therefore, the RTS sector is impacted by – in addition to central programmes – state policies, regulations, and interventions. States have announced solar policies, and distributed renewable energy (RE) policies that set targets and incentives, along with enabling regulations. Developers, investors, and financing institutions track these policies and regulations to evaluate state-level conduciveness for RTS deployment.

State-level policy and regulatory provisions have been examined (CEEW 2019; TERI and Shakti Energy Foundation 2019; CSE 2023). The ecosystem is evolving continually, however; significant developments have taken place in the past few years; and so, it is important now to not merely tabulate policy and regulatory provisions but analyse their impact on RTS deployment in a state.

In this issue brief we review 30 state policy documents and 29 regulatory documents on grid-connected RTS systems notified till 31 December 2024. We have also reviewed important documents such as the *Electricity (Rights of Consumers) Rules, Model Solar Policy*, and the guidelines of national RTS schemes and programmes.

Our goal is to answer three questions to help states create an environment conducive for deploying RTS:

- How conducive is a state's regulatory framework for RTS deployment?
- How are states progressing in terms of RTS policy provisions?
- What are the best practices states have adopted for accelerating RTS deployment?

Key insights

- **The minimum capacity restrictions for RTS systems limit installation**. In 24 of 29 state and UT regulations require that RTS systems have a capacity of 1 kW at minimum. On the other hand, 23 of 29 regulations have a maximum capacity limit of 500–2000 kW. The minimum requirement prevents low-consumption consumers from installing small systems and states from cutting expenditures on electricity subsidies. The maximum requirement may result in undersizing an RTS system, particularly by large commercial and industrial (C&I) consumers.
- **Most states have adopted the net metering regime[1] or the gross metering regime. A few, more progressive states have adopted the net billing, group net metering, and virtual net metering regimes as well**. Net metering, the most common metering regime notified across all states allows consumers to substitute expensive grid electricity and, in some cases, receive compensation for generating excess electricity. Group net metering lets consumers offset electricity consumption in multiple premises. Virtual net metering allows consumers to benefit from systems set up outside their premises. Both regimes have been adopted in twelve regulations. Gross metering is more favourable for discoms and 22 state and UT regulations have adopted the gross metering regime. Net billing benefits both consumers and discoms but only 12 state and UT regulations have adopted it.

> There is a need to review policies and regulations to evaluate state-level conduciveness for RTS deployment.

1. In gross metering, the prosumer is billed for their entire consumption; they are compensated for the generation from the system at a predetermined feed-in tariff rate. In net metering, the prosumer is billed only for the net electricity imported from the grid in the billing period; if there is a net export of electricity, they may be compensated at a predetermined rate. In net billing (or net feed-in), the prosumer is billed for a net import of electricity or compensated for a net export in 15-minute intervals.

- **States vary in terms of the length of the settlement period and in determining net metering compensation**. 21 of 29 state and UT regulations allow annual settlement for residential consumers. 6 state and UT regulations offer monthly settlements. Telangana offers a half-yearly settlement. Compensation for excess electricity generated by net-metered systems at the end of the settlement period is provided for by 21 of 29 state and UT regulations. The rate of compensation is linked to the discom's average power purchase cost (APPC) in 6 regulations; set by the State Electricity Regulatory Commission (SERC) in 7 regulations; linked to the tariffs discovered in bids for utility-scale solar or RE projects in 5 regulations; and linked to the minimum of two of these methodologies in three regulations.
- **Some states have recently notified policies outlining their vision for rooftop solar**. Policies have been notified by 14 states and UTs between 2019 and 2024; 9 of them notified their policy between 2012 and 2016. Two-thirds of the state and UT policies outline the vision and set a clear, time-bound target for the rooftop solar segment. Assam, Goa, Jharkhand, Sikkim, Uttarakhand, and Uttar Pradesh, more progressive, have set targets by consumer category; 11 states and UTs have specified mandates for residential and government installation; and 4 states have set mandates for C&I consumers as well.
- **A few states financially incentivise end-consumers to adopt RTS**. Assam, Delhi, Goa, Gujarat, Jharkhand, Uttarakhand, and Uttar Pradesh provide residential consumers incentives in the form of a capital subsidy. Delhi and Kerala offer generation-based incentives (GBI). While states generally offer capital subsidies to residential consumers, Goa extends the subsidy to C&I consumers and Uttarakhand to battery storage technologies. A few states and UTs offer electricity duty and tax exemptions.
- **Some states incentivise RTS adoption through targeted schemes**. Chandigarh, Goa, Gujarat, Jharkhand, Kerala, Uttarakhand, and Uttar Pradesh have devised schemes for residential and rural consumers. Most states focus on residential consumers as a group, but Jharkhand and Uttarakhand have proposed schemes dedicated to solarising villages.
- **State policies address the challenges of end-user financing and the availability of adequate roof area**. Jharkhand, Kerala, and Uttarakhand have tasked their state nodal agency (SNA) with developing end-user financing options. Delhi, Jharkhand, Karnataka, Uttarakhand, and Uttar Pradesh have introduced novel business models (community solar, peer-to-peer (P2P) energy trading) supported by enabling regulations (virtual net metering, guidelines for P2P energy trading).
- **Most states have streamlined processes for implementing policy and monitoring data**. Policy in 21 of 30 states and UTs provides for single-window clearance for RTS processes; 7 states have also instituted a solar or RTS cell. Delhi, Jharkhand, and Tamil Nadu require their discom to maintain a database of net metering applications and their status.

Recommendations

To strengthen and streamline the grid-connected rooftop solar ecosystem, we recommend the following:

- **Set clear, time-bound targets to establish the state's vision for rooftop solar**. State policy should set comprehensive, measurable, time-bound targets based on exercises to estimate the technical potential of each consumer segment. These targets should be disaggregated by consumer category. Schemes should be rolled out for each consumer segment (residential; micro, small, and medium enterprises (MSME)). New, upcoming technologies like battery storage systems that enable RTS adoption should be targeted.
- **Mandate solarisation of government buildings**. The state implementation agency can leverage existing mandates to solarise state government buildings. The mandate should be extended to other sectors and new construction. The SNA can ensure that the policy mandates are consistent with building performance standards and thresholds as per state and national building codes (*Energy Conservation Building Code, Energy Conservation and Sustainability Building Code*).

> Rooftop solar provides an opportunity for the states to fast-track their energy transition.

- **Standardise RTS installation processes**. The state implementation agency should conduct benchmarking exercises and set reasonable timelines for installation, application processing, inspection, and metering.
- **Create the right set of economic incentives for the consumers**. Low- and middle-income households and MSMEs require support to adopt RTS; state energy departments and SNAs should design financial incentives to support them. The SERCs should provide these consumers with longer settlement periods and higher compensation rates.
- **Align metering arrangement with state objectives**. Adopting metering regimes – net metering, gross metering, net billing – will let SERCs effectively share the economic benefits of RTS based on state objectives and market maturity. Where penetration is low, states can offer net metering, with attractive feed-in tariff rates, to incentivise particular consumer segments to adopt RTS. Where the market is mature, states can adopt net billing, with time-of-day tariff rates, to ensure long-term equitable impact for adopters, non-adopters, and discoms.
- **Enact regulations to enable innovative business models**. State implementation agencies (SNAs and SERCs) should coordinate the periodic introduction and amendment of metering regulations to enable the implementation of novel business models (community solar, P2P energy trading). The Ministry of Power (MoP) must ensure that the definitions of these metering regimes are harmonised in line with their guidelines.
- **Re-evaluate capacity restrictions for RTS systems**. The SERCs need to consider relaxing the minimum system capacity restriction of 1 kW for residential consumers. With support from the Central Electricity Authority (CEA) and Forum of Regulators, SERCs need to technically evaluate the restrictions linked to sanctioned load and distribution transformer (DT) capacity and amend those accordingly.
- **Create a rooftop solar data registry**. State implementation agencies and energy departments can maintain a registry for RTS installations and generation. The availability of updated, disaggregated data on installations, metering applications, and electricity generation can assist implementation agencies and policymakers in making better decisions.
- **Review policy mid-term and course correct if needed**. The state and national implementation agencies should conduct a mid-term policy review. The review process should be consultative; it should take stock of the progress (target achievement, metering applications, subsidy disbursal, performance monitoring) and introduce corrective measures where necessary.
- **Synchronise national and state RTS interventions**. State implementation agencies should design policy and regulatory interventions, incentive structures, and schemes to align with and complement national programmes.

1. Role of rooftop solar in India's energy transition

At COP26, in Glasgow, as part of its long-term low-carbon development strategy, India set the goal of achieving a net zero target by 2070. Decarbonising the electricity sector is paramount in achieving this goal, and increasingly progressive targets have been set for renewable energy (RE) penetration. In 2015, India set a target of installing 175 gigawatts (GW) of RE capacity by 2022; 100 GW was to come from solar photovoltaics (PV) (MNRE 2015) – 60 GW from utility-scale solar and 40 GW from rooftop solar (RTS).

1.1 India's rooftop solar journey so far

The *National Solar Mission* was launched in 2010 to establish India as a global leader in solar energy. The programme focused on solar energy at both centralised and decentralised levels (MNRE 2010). The roll-out of the *Grid Connected Rooftop and Small Solar Power Plants Programme* (RTS programme) in 2014 emphasised the focus on RTS. The programme provided residential consumers, institutional consumers, and the social sector central financial assistance (CFA); SNAs acted as the implementing agency (MNRE 2014).

To continue the momentum, the second phase of the programme, announced in 2019, emphasised the target of 40 GW by 2022, and continued CFA for the residential sector. The programme recognised the role of discoms in its implementation as they are the key interfacing agency between the electricity grid and end-consumers (MNRE 2019). Additionally, central solarisation schemes have been undertaken at Modhera and Konark with support from the respective states (MNRE 2020a, MNRE 2020b).

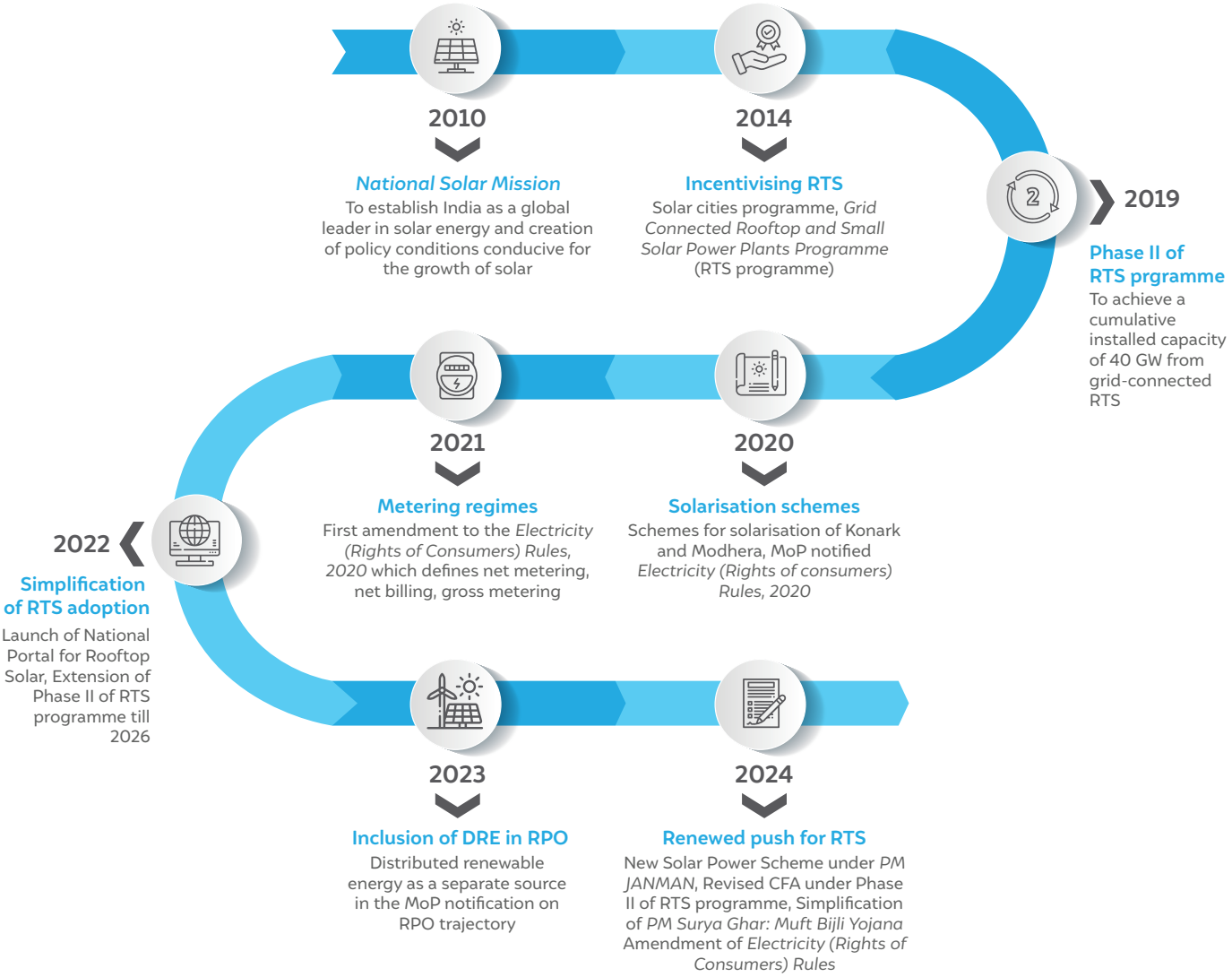
The *Electricity (Rights of Consumers) Rules* (henceforth, the Rules) were notified in 2020. The Rules recognised the role of the consumer as a prosumer and set the limits for net metering and gross metering (MoP 2020). The first amendment to the Rules, in 2021, introduced – in addition to net metering and gross metering – the provision of net billing (MoP 2021). The fourth amendment, in 2024, specifies the timeline for the technical feasibility study for the installation of an

National-level programmes such as the *Grid Connected Rooftop* and *Small Solar Power Plants Programme* have emphasised the role of RTS in India's energy transition.

RTS system (15 days) and waives the requirement of a feasibility study for RTS systems up to 10 kW capacity. The amended Rules provide discoms with a timeline – 15 days from the date of submission of the installation certificate – to complete post-installation processes (signing the connection agreement, meter installation, commissioning the RTS project) (MoP 2024). To simplify the application process, the National Portal for Rooftop Solar was developed in 2022.

The target of 40 GW was not met by 2022 – due in part to limited consumer awareness, low residential electricity tariffs, high upfront costs, inadequate affordable financing options, restrictive metering regulations in a few states, and less targeted capital subsidies – and the second phase of the RTS programme was extended till 2026 (Zachariah, Tyagi, and Kuldeep 2023). In 2023, an MoP notification included distributed RE as a separate component for designated consumers to meet their RE consumption targets (MoP 2023).

Figure 1 Key programmes and announcements in India's rooftop solar journey



Source: Authors' compilation based on MNRE and MoP notifications and regulations

Note: RPO is a renewable purchase obligation

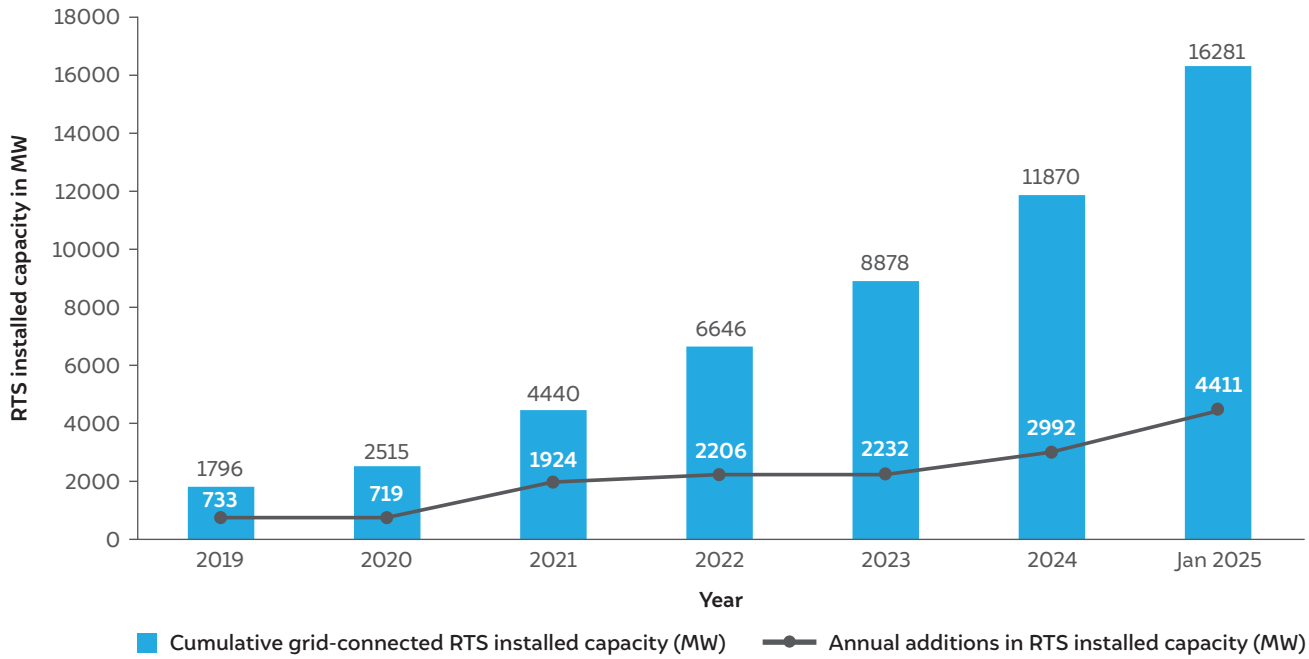
The first quarter of 2024 has seen a slew of RTS-related announcements and initiatives: the CFA under the RTS programme was revised; the documentation requirements[2] for technical feasibility, project commissioning, and net metering were simplified; and the *PM Surya Ghar: Muft Bijli Yojana*, which aims to install 1 crore RTS systems, was announced. The scheme provides residential consumers a capital subsidy of INR 30,000 per kW, for systems up to 2 kW; for systems 2–3 kW in capacity, an additional subsidy of INR 18,000 per kW capacity is provided. This scheme received administrative approval in March 2024. The total financial outlay for all the scheme components is INR 75,021 crore. The guidelines for offering the residential sector CFA were drafted in April 2024 (MNRE 2024b). The evolution of the RTS target, and the development of central programmes and regulations, is illustrated in Figure 1.

As of January 2025, ~16.3 GW of RTS was installed, as shown in Figure 2, – nearly 73 per cent in the C&I segment and the remaining in the residential segment (Bridge To India 2024). More than 25 crore households have a technical RTS potential of 637 GW, however, finds a recent CEEW study (Zachariah, Tyagi, and Kuldeep 2023). To unlock the full potential of solar in India, the RTS segment requires special focus, and momentum must be accelerated, as RTS can contribute to the overall non-fossil fuel target of 500 GW by 2030 (MNRE 2023). Rooftop solar can play a key role in meeting India's increasing electricity demand and providing affordable and reliable power to all. RTS can contribute to reducing distribution losses by bringing the point of generation closer to the point of consumption.

1.2 States are key in driving rooftop solar adoption

The MNRE introduced tentative RTS adoption targets by state in 2015. Five states (Gujarat, Maharashtra, Rajasthan, Kerala, and Tamil Nadu) lead RTS deployment and account for nearly 70 per cent of India's installed RTS capacity, as shown in Figure 3. As of 2025, Gujarat and Kerala have surpassed their target capacity. Maharashtra, Uttarakhand, Rajasthan, and Chandigarh have achieved more than 60 per cent of their target capacity (see Figure 4). Installations are skewed towards the C&I segment, which accounts for 73 per cent of India's RTS capacity (Bridge To India 2024).

Figure 2 India's RTS installed capacity increased from 1 GW in 2019 to 11 GW in 2024



Source: Authors' analysis based on MNRE (2024a)

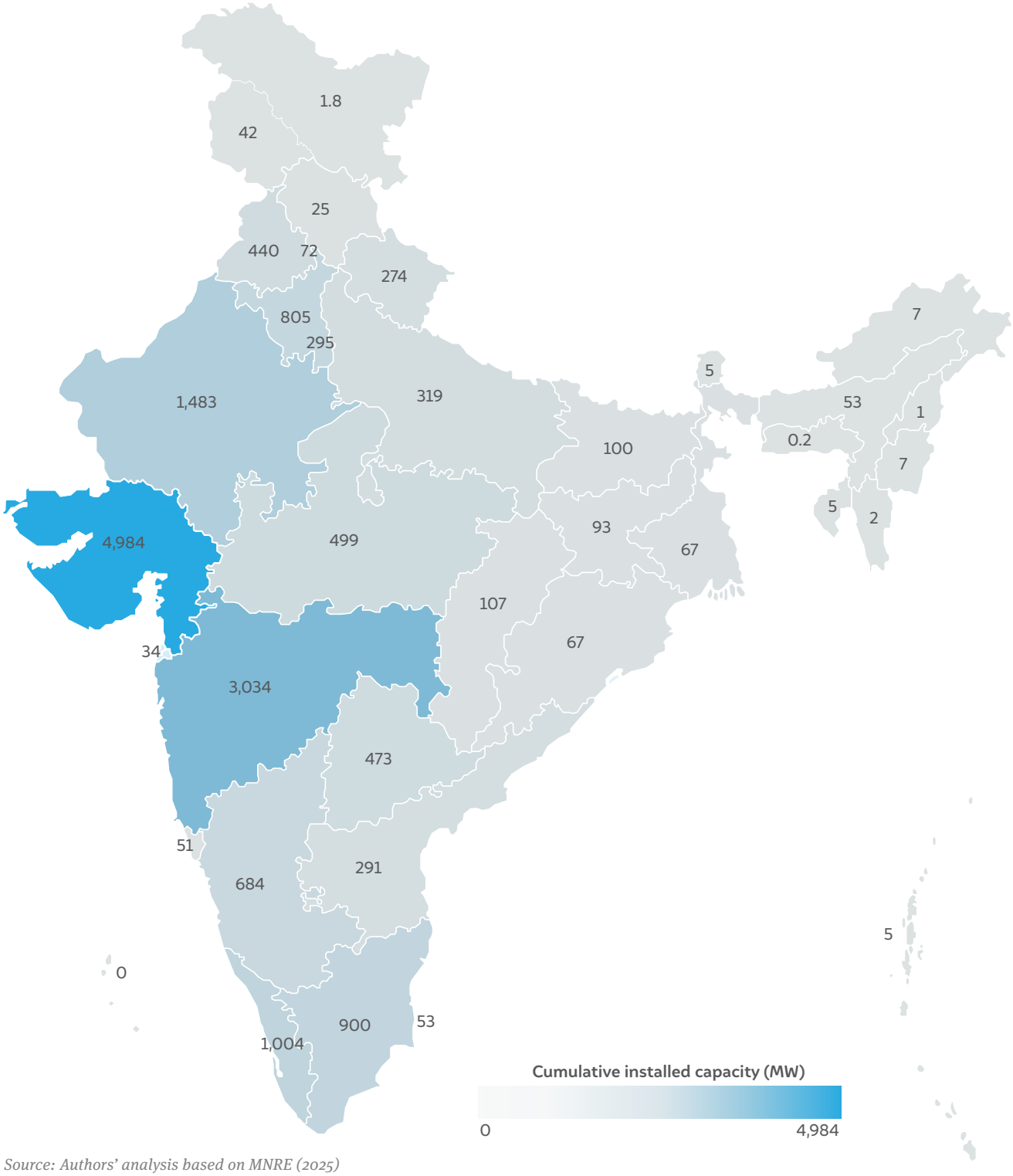
Note: Data points are as of 31 March of the respective year

2. Simplified the documents required for technical feasibility approval (electricity bill for the previous six months) and project commissioning/net metering (project completion report, photograph of RTS project and consumer-vendor agreement).

Only in Gujarat, Kerala, and Chandigarh does the residential segment account for more than 50 per cent of total RTS installations. The residential RTS potential is spread across states, and they can tap it to accelerate their energy transition, finds a CEEW study (Zachariah, Tyagi, and Kuldeep 2023).

There is a need for concentrated efforts by state-level actors–discoms, SNAs, SERCs–to unlock rooftop solar potential across states.

Figure 3 India's rooftop solar progress has varied by state, with top 5 states accounting for 70% of India's installed RTS capacity



Source: Authors' analysis based on MNRE (2025)

Figure 4 Few states and union territories have achieved more than 50% of their target

Source: Authors' analysis based on MNRE (2025) and Jani et al. (2016)

Note: The RTS target and installed capacity for Jammu & Kashmir and Ladakh are clubbed together as the target was set together. The state-wise targets were set for 2022 and the programme was later extended to 2026.

1.3 Objective

State-level strategic interventions are needed to accelerate RTS deployment; therefore, this issue brief examines the current status of state-level regulatory and policy tools and instruments under the purview of key state-level institutions (SERCs, SNAs, state implementation agencies, discoms). Their roles and responsibilities are discussed in Box 1.

The overarching objective of this issue brief is to understand how conducive each state's ecosystem is for RTS deployment. Identifying best practices can help states learn from one another and create an enabling environment to enhance RTS capacity.

The issue brief aims to answer three main questions -

- How conducive is the state's regulatory framework for RTS deployment?
- How are states progressing in terms of RTS policy provisions?
- What are some best practices and novel measures adopted for accelerating RTS deployment?

BOX 1 Institutional structure governing the rooftop solar sector

The electricity sector is divided into generation, transmission, distribution, and retail (distribution and retail are considered together in India). Unlike transmission or distribution, electricity generation is deregulated in India. Utility-scale solar power plants continue to be connected to the high-voltage transmission network, but point-of-consumption RTS installations have disrupted the historical idea of the electricity grid and provided consumers an opportunity to become prosumers.

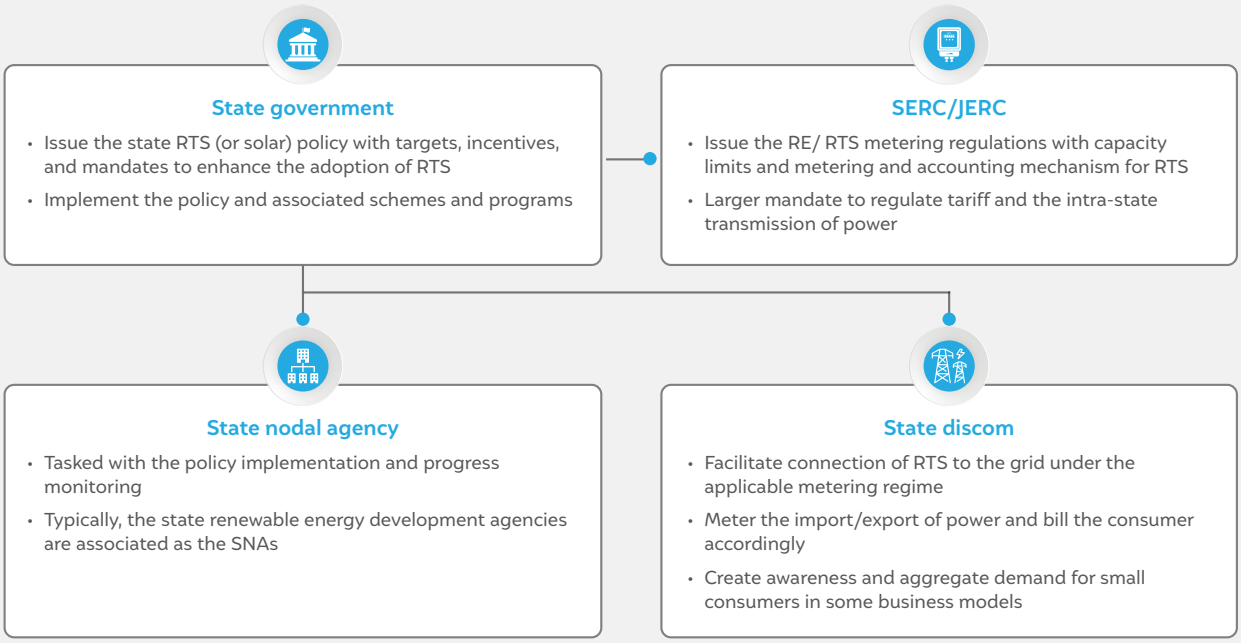
Electricity-sector Institutions – discoms, SNAs, SERCs, Joint Electricity Regulatory Commissions (JERCs)[3] – and their interventions have evolved to promote RTS adoption while mitigating possible impacts on the grid and safeguarding consumer interest. Discoms interface between consumers and the electricity sector and so have become vital for the RTS segment in the institutional structure. Discoms facilitate consumers in connecting RTS systems to the grid and procure excess electricity and act as providers of last resort by ensuring that the supply of electricity is reliable. In some cases, discoms may be involved in improving consumer awareness and aggregating demand. By making discoms the nodal points for programme implementation, Phase II of the RTS programme recognised their key role.

By issuing regulations and orders, SERCs and JERCs ensure that the terms of transactions between discoms and consumers are fair and balanced. While 25 states and Delhi have their own SERCs, there are three JERCs with the following jurisdictions:

1. Goa and 5 UTs (Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Lakshadweep, and Puducherry)
2. Jammu & Kashmir and Ladakh
3. Manipur and Mizoram

State governments advance RTS adoption through incentives and mandates and fostering awareness among potential consumers. These interventions are usually captured within a single policy document that may lay out the vision and targets for RTS or the entire solar sector. Lastly, each state tasks their SNA with the implementation of its RE policies. The key roles and responsibilities of RTS-sector institutions are summarised in Figure 5.

Figure 5 State-level rooftop solar governance framework



Source: Authors' compilation

3. Unless required by context, SERCs and JERCs are henceforth collectively referred to as SERCs in this report.

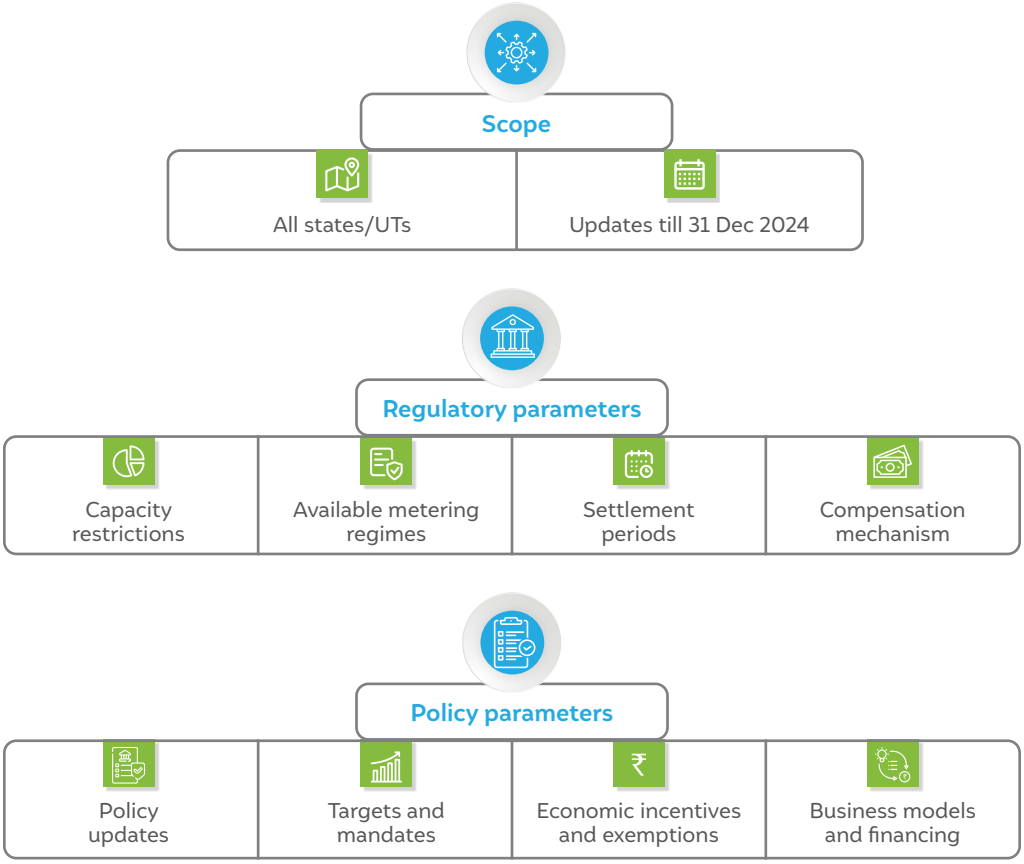
1.4 Methodology

National-level developments shape the RTS policy ecosystem, but state-level policies, regulations, and institutions drive implementation.

State-level RTS policies and regulations have been reviewed. CEEW's 2019 study *Demystifying India's Rooftop Solar Policies* reviews the state-wise net metering regulations and compensation mechanisms as of October 2019 (Jain et al. 2019). The report examines the limits with respect to system size, sanctioned load, transformer capacity, voltage connectivity, and export of electricity (as a percentage of consumption). Another 2019 study – by TERI and Shakti Sustainable Energy Foundation, titled *Solar Rooftop: Perspective of Discoms* – reviews central and state RTS policies and schemes (Singh, Sethi, and Mazumdar 2019). A recent study, *Rooftop Solar PV in India* (CSE 2023), reviews some state RTS policies and regulations (Karthik 2023). This report provides an overview of the provisions of policies and schemes; it focuses on incentives and targets. In terms of regulations, the report has compiled the net metering capacity limits, and sanctioned load and DT capacity limits.

With renewed focus on RTS, the impact of the most recent updates in state policies and regulations on RTS deployment needs to be analysed. This study evaluates the state-level RTS regulations and policies, identifies gaps in the regulatory and policy framework, and highlights the key learnings from the front-runner states and UTs. For assessment, we have considered both draft and notified policies till December 31, 2024.[4] The scope of the issue brief and the evaluation framework are summarised in Figure 6.

Figure 6 Scope and evaluation framework for state-level regulations and policies



Source: Authors' compilation

4. The draft of the Delhi Solar Policy, notified in March 2024, was released in January 2023. We have considered the policy.

2. Rooftop solar metering regulations

In a state or UT, RTS systems are installed, and their output is metered and accounted for, within the framework provided by SERC regulations. The SERC regulations impose capacity limits, define how the electricity generated would be accounted for and compensated, and enable innovative business models.

We review the regulations issued by the 29 SERCs as updated on 31 December 2024 (the most recent version). We analyse how states and UTs compare on key aspects of the regulation (capacity limits, the rules of settlement under the available metering regimes). The net metering provisions have more regulatory elements than the other metering regimes, and all the SERCs have adopted these in some form; therefore, we pay particular attention to the net metering provisions.

2.1 Metering regimes for rooftop solar

The economic viability of an RTS system depends on the retail electricity tariff consumers pay and the mechanism for metering and settlement of the energy generated. The SERCs set the rules for settlement. The Rules, as amended in 2021, outline three metering regimes – gross metering, net metering, and net billing.

In gross metering, the prosumer is billed for their entire consumption and compensated for the generation from the system at a predetermined feed-in tariff rate.

In net metering, the prosumer is billed only for the net electricity imported from the grid in the billing period, and they may be compensated at a predetermined rate if there is a net export of electricity in the billing period.

Finally, in net billing (or net feed-in), the prosumer is billed in each time block (15-minute interval) when there is a net import of electricity and compensated when there is a net export.

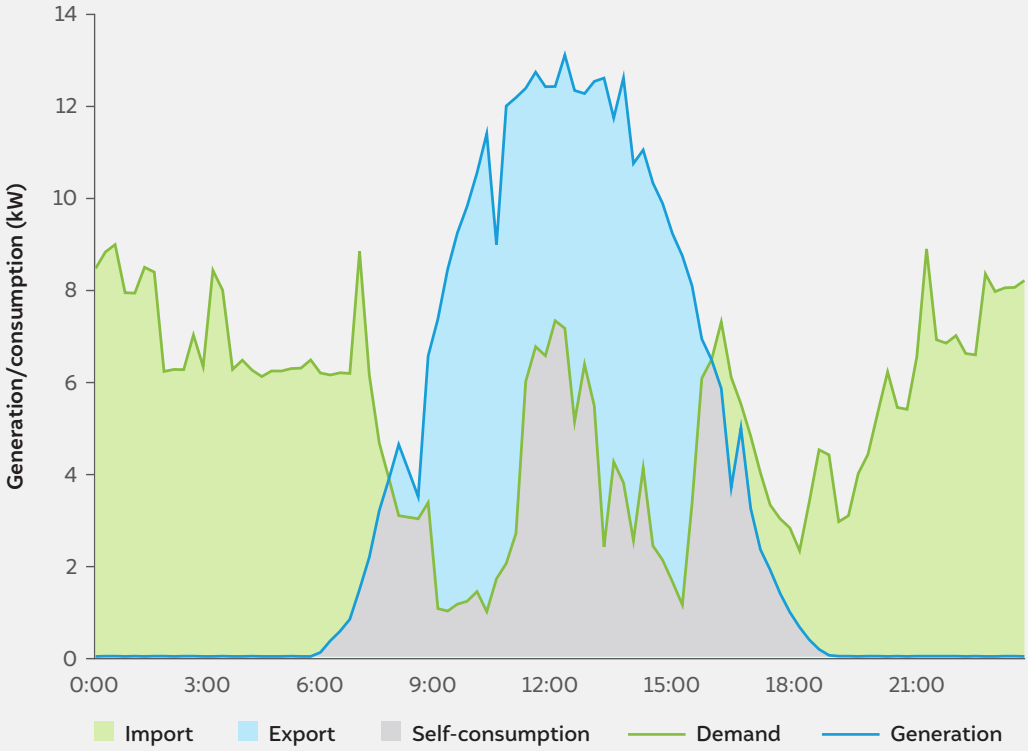
The metering regimes defined by SERC regulations impact the economic viability of an RTS system.

The savings for a prosumer in each of these metering regimes are shown in Box 2.

BOX 2 Sample calculation of consumer bills under different metering regimes

We have considered two types of consumers – a high-paying consumer (tariff 7 INR per kWh) and a low-paying consumer (3 INR per kWh). The feed-in tariff of 3.5 INR per kWh for all three metering regimes. Figure 7 shows the demand and generation for a residential consumer across a single day. The self-consumption from solar traces the minimum of the demand and solar output (shown in grey).

Figure 7 Sample 24-hour generation and consumption pattern for a rooftop solar system



Source: Authors' analysis based on actual consumer data

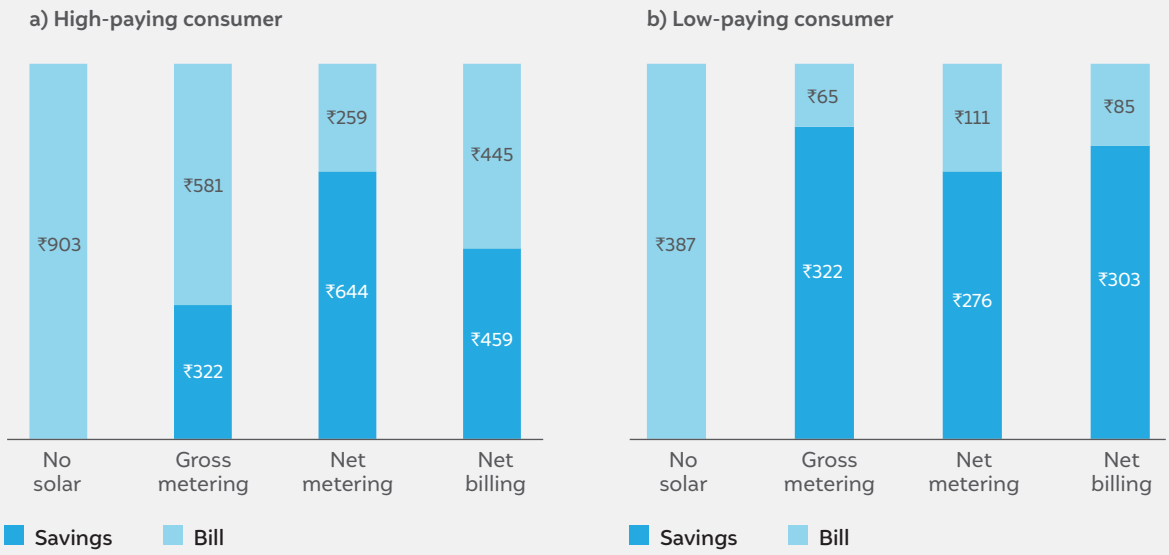
The net payment to be made to the discom for this pattern of consumption and generation under the three metering regimes is calculated in Table 1.

Table 1 Calculation of savings under metering regimes

Metering regime	Prosumer pays discom	Prosumer receives from the discom	Net payment by high-paying prosumer in this example	Net payment by low-paying prosumer in this example
No RTS	Tariff × total demand (import + self-consumption)	—	₹ 7/kWh × (90 kWh + 39 kWh) = ₹ 903	₹ 3/kWh × (90 kWh + 39 kWh) = ₹ 387
Gross metering	Tariff × total demand (import + self-consumption)	Feed-in tariff × total generation (export + self-consumption)	₹ 7/kWh × (90 kWh + 39 kWh) - ₹ 3.5/kWh × (53 kWh + 39 kWh) = ₹ 581 **Savings: ₹ 322**	₹ 3/kWh × (90 kWh + 39 kWh) – ₹ 3.5/kWh × (53 kWh + 39 kWh) = ₹ 65 **Savings: ₹ 322**
Net metering	Tariff × net import (import – export) [If net import is positive]	Feed-in tariff × net export (export – import) [If net export is positive]	₹ 7/kWh × (90 kWh – 53 kWh) = ₹ 259 **Savings: ₹ 644**	₹ 3/kWh × (90 kWh - 53 kWh) = ₹ 111 **Savings: ₹ 276**
Net billing	Tariff × import	Feed-in tariff × export	₹ 7/kWh × 90 kWh - ₹ 3.5/kWh × 53 kWh = ₹ 444.5 **Savings: ₹ 458.5**	₹ 3/kWh × 90 kWh - ₹ 3.5/kWh × 53 kWh = ₹ 84.5 **Savings: ₹ 302.5**

Source: Authors' analysis based on actual consumer data

Figure 8 Savings under the three metering regimes depend on consumer characteristics



Source: Authors' analysis based on actual consumer data

The benefits for a consumer in each metering regime depends on consumer characteristics as well as the features of the regulation.

The following inferences can be drawn from Table 1:

- For high-paying prosumers (tariff > feed-in tariff), net metering is more beneficial than gross metering. However, for low-paying prosumers (tariff < feed-in tariff), gross metering is better than net metering.
- Prosumer benefit (for high-paying prosumers) increases under net metering when a larger amount of the export in one period can be set off against the import in another period instead of just being compensated at the feed-in tariff.
- Net billing – for both high-paying and low-paying prosumers – falls between net metering and gross metering.
- Prosumer benefit (for high-paying prosumers) increases under net billing when self-consumption is higher and the import and export of electricity are reduced commensurately.

Discoms can use the Valuing Grid-connected Rooftop Solar (VGRS) framework to analyse RTS benefits (avoided generation capacity cost, avoided power purchase cost, avoided transmission charges, deferral of distribution upgradation) (Kuldeep et al. 2019). If a low-tariff consumer installs an RTS system, the revenue lost by the discom (equal to prosumer savings) is lower (or equal, in the case of gross metering), when compared to a high-tariff consumer. Thus, considering revenue and other factors under the VGRS framework, the net benefit to the discom is higher when there is higher RTS penetration among low-paying residential or agricultural consumers. As seen from Figure 8, the discom would benefit more by billing high-paying consumers, who typically install larger systems, under gross metering and by billing low-paying consumers, with smaller systems, under net metering.

Traditionally, RTS is associated with individual consumers installing systems on their premises. By offering group and virtual net metering regimes, however, some states and UTs have extended the benefits of net metering to more consumers. Group net metering allows a consumer with multiple connections

within the same discom licence area to set off the excess export from their RTS system against electricity imported by other connections. Virtual net metering goes further to allow multiple consumers connected to the same discom to come to a mutual agreement on the shares of the export from the RTS system that would be set off against the electricity imported by the individual consumers. Thus, these deployments not only help consumers to benefit from economies of scale but also enable those without the roof space to reap the benefits of RTS.

2.2 State-level metering regulations

The benefits to consumers and discoms vary by metering regime (as shown in Section 2.1); therefore, ensuring an equitable tariff and metering regime is crucial for accelerating RTS adoption. The SERCs determine these aspects to balance the interests of prosumers, non-adopters, and discoms; ensure grid stability; and promote RE sources in their state.

It is important that SERCs update regulations periodically to accommodate technological and market developments and the evolving consumer mix (category, location, individual capacity). Solving for rental accommodations requires different business models, for example, and, therefore, changes in the regulations to enable those business models. Regulations in 25 of the 29 states/UTs we surveyed were amended most recently between 2021 and 2024. The remaining 4 were issued or amended between 2016 and 2020.

2.3 How capacity restrictions impact RTS installations

Regulations specify minimum and maximum capacity sizes for RTS installation to ensure grid stability and to prevent utility-scale systems (set up primarily for exporting power) from benefiting under the metering framework. In addition to these absolute limits on capacity, individual RTS systems are subject to restrictions in accordance with the consumer's sanctioned load or contract demand.

The cumulative RTS capacity connected to a DT is not allowed to exceed a particular fraction of the transformer's capacity unless the transformer is upgraded; consumer applications are processed on a first-come, first-served basis. However, this restriction must be seen in the context of the 2024 amendment to the Rules which specifies that the cost for upgrades to the distribution infrastructure required for RTS systems up to 5 kW would be included in the discom's annual revenue requirement. This clause of the amendment ensures that small systems are not hindered by inadequate distribution infrastructure or burdened with the cost of upgradation. While the annual revenue requirement would be ultimately recovered from consumers, if discoms plan the upgradation of their distribution infrastructure proactively and well, they can ensure that the impact on consumer tariffs is minimal.

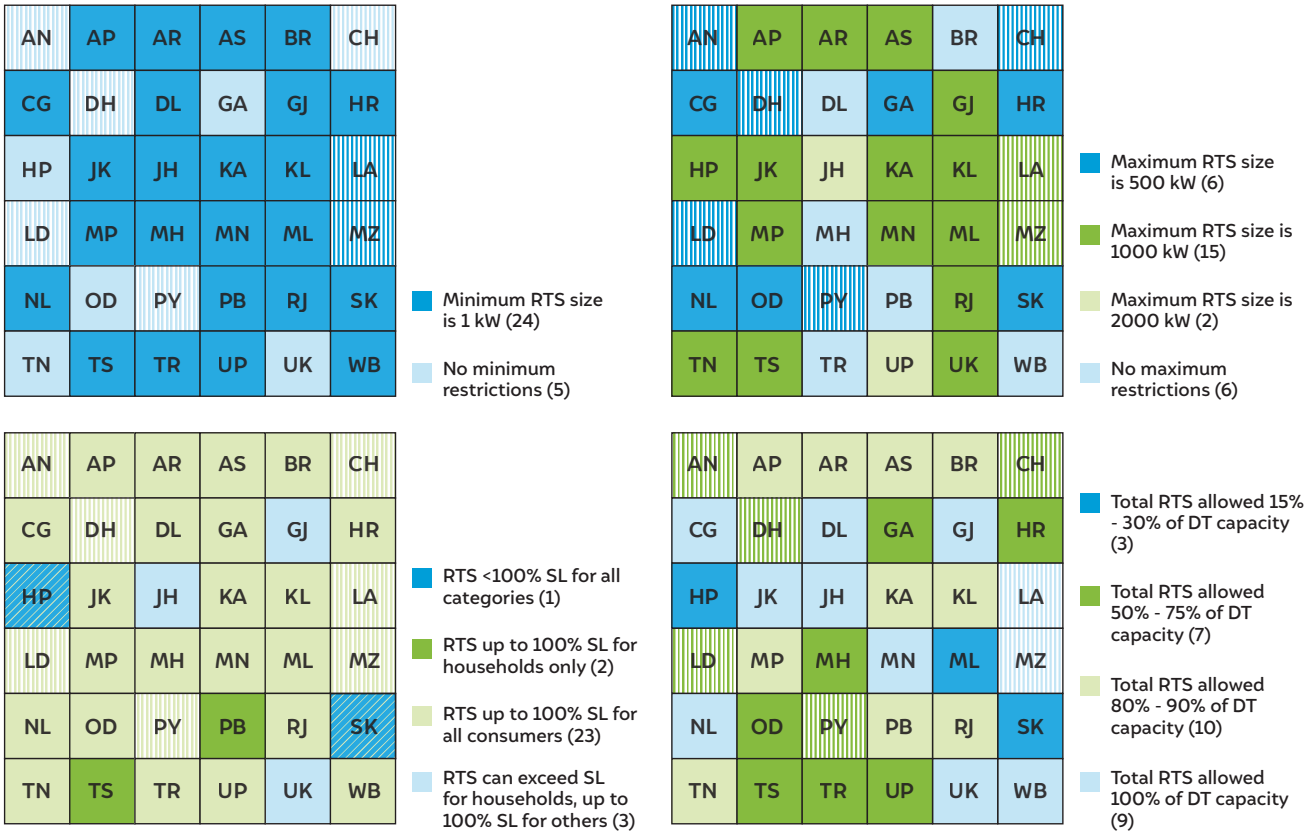
24 of 29 state and UT regulations require RTS systems to be bigger than 1 kW. Goa and 5 UTs, Himachal Pradesh, Odisha, Tamil Nadu, and Uttarakhand do not impose a minimum size requirement on RTS installations. 21 state and UT regulations restrict the size of RTS systems up to 500 kW or 1000 kW; 2 limit it to 2000 kW; and the remaining 6 have no maximum capacity constraint.

In terms of constraint on sanctioned load, 23 state and UT regulations let consumers to set up RTS systems up to their sanctioned load. Gujarat, Jharkhand, and Uttarakhand relaxed the restriction for residential consumers and allowed system oversizing. Himachal Pradesh and Sikkim place differential restrictions on consumer categories and limit the system size to less than their sanctioned load for consumers with sanctioned load greater than 10 kW. The DT-level restrictions in states and UTs vary from 15 per cent to 100 per cent.

Figure 9 summarises the rooftop solar restrictions based on minimum and maximum system sizes, sanctioned load and DT capacity.

> **24 out of 29 states and UT regulations impose a minimum size requirement of 1 kW.**

Figure 9 System size restrictions, sanctioned load, and DT capacity define capacity limits



Source: Authors' analysis of data from SERCs and JERCs (see Annexure - Table A4)

Note: Vertical stripes are used to represent states and UTs that share their JERC with another state and UT (Andaman and Nicobar, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Lakshadweep, and Puducherry share their JERC with Goa; Ladakh shares its JERC with Jammu and Kashmir; and Mizoram shares its JERC with Manipur). For Himachal Pradesh and Sikkim, 100% of SL for consumers with sanctioned load 10 kW or less; 50% and 40% of sanctioned load (respectively for Himachal Pradesh and Sikkim) or 10 kW, whichever is higher, for consumers exceeding 10 kW sanctioned load.

Requiring systems to be at least 1 kW excludes many households from deploying RTS because systems smaller than 1 kW contribute to 35 GW, or 30 per cent, of the total consumption-based RTS potential[5] among residential consumers (Zachariah, Tyagi, and Kuldeep 2023). System sizes less than 1 kW are usually needed by consumers in lower units or slabs availing higher electricity subsidies. Thus, allowing small households to install RTS can reduce the state and discom electricity subsidy burden. Restricting the maximum size may cause large consumers to undersize their systems to take advantage of the net metering regime.

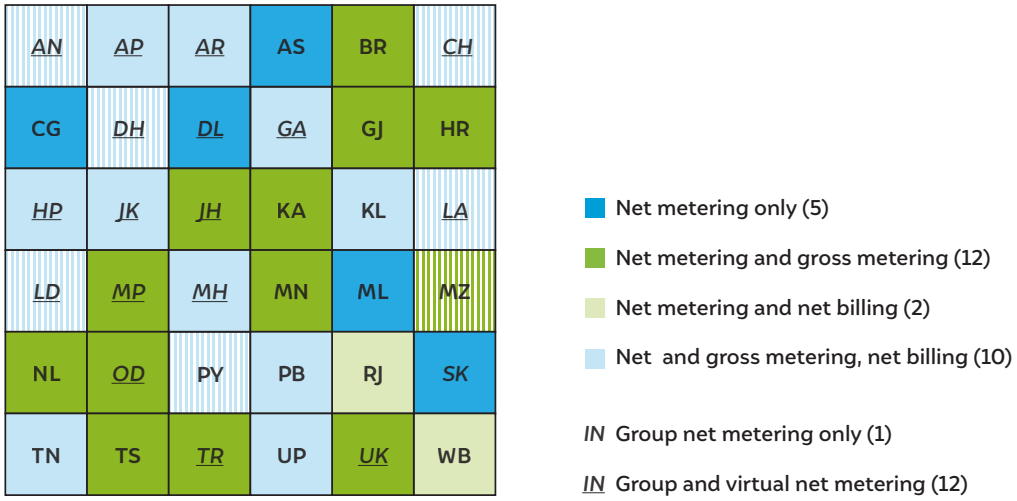
> **Capacity restrictions based on minimum and maximum capacity sizes, sanctioned load, and DT capacity impacts the conversion of RTS potential into installations.**

2.4 Availability of metering regimes

As discussed in Section 2.1, different metering regimes provide different incentives to consumers and discoms. Framing regulations for RTS systems, including metering regimes, is within the ambit of the respective SERC. The MoP, via the original Rules in 2020, permitted net metering only for systems up to 10 kW and gross metering for systems larger than 10 kW. However, the Rules were amended in 2021 to extend net metering to systems up to 500 kW, introduce a common framework for net billing, and clarify the primacy of SERC regulations. The Rules allow consumers to opt for gross metering instead of net metering or net billing. In 2023, the MNRE published model regulations for implementing group and virtual net metering.

5. The total RTS technical potential based on rooftop area availability and suitability is 637 GW. The economic potential based on the household electricity demand is 118 GW. The study finds that 30 per cent of the economic potential (118 GW), 35 GW, falls in the <1 kW category of system size.

Figure 10 All three main metering regimes for rooftop solar are available in ten states



Source: Authors' analysis of data from SERCs and JERCs as listed in the Annexure - Table A4

Note: Vertical stripes are used to represent states or UTs that share their JERC with another state/UT (Andaman and Nicobar, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Lakshadweep, and Puducherry share the JERC with Goa; Ladakh shares the JERC with Jammu and Kashmir; and Mizoram shares JERC with Manipur).

Jammu & Kashmir/Ladakh, Himachal Pradesh, Andhra Pradesh, Maharashtra, Arunachal Pradesh, and Goa (along with Union Territories of Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli and Daman & Diu, Lakshadweep and Puducherry) are the only states or UTs with all five metering regimes – net metering, gross metering, net billing, group net metering, and virtual net metering – as shown in Figure 10. In 2023, while approving net billing and group net metering, the Maharashtra Electricity Regulatory Commission was of the opinion that virtual net metering is akin to green energy open access (GEOA); and, therefore, interested consumers should apply for a GEOA connection. However, this prevents systems smaller than 100 kW that could have been installed under the community solar or solar partners business models.

The analysis of regulations across states and UTs shows that the definitions of metering regimes used therein are not harmonised. For instance, in Rajasthan and West Bengal, under net billing, the consumer is provided credit for 'total generated electricity', effectively turning them into gross metering. Andhra Pradesh allows a group of consumers to set up an RTS system, and Sikkim gives consumers the right to use the excess electricity generated in their other premises, but neither state uses the term 'virtual net metering' or 'group net metering'. Net billing has been adopted by 12 state and UT regulations (including Rajasthan and West Bengal); group net metering by 13 state and UT regulations; and virtual net metering by 12 state and UT regulations – as depicted in Figure 10. Despite the proactive interventions of the MNRE and the benefits of net billing and group/virtual net metering for consumers and discoms, our analysis shows that, on the whole, SERCs have been slow to adopt new metering regimes.

2.5 Unpacking the net metering mechanism at the state level

Net metering is the most common metering regime, present in all states and UTs. As discussed in Section 2.1, net metering is lucrative for high-paying consumers whereas discoms benefit when net metering is utilised by low-paying – typically, small, residential – consumers. In the case of larger consumers, gross metering is more beneficial for discoms. Thus, SERCs try to balance the interests of both stakeholders through provisions for net metering – capacity limits, scoping out eligible consumer categories, settlement periods, and compensation tariffs.

Capacity limits allow for differential treatment of consumer categories

8 of 29 state and UT regulations have a lower restriction on the maximum installed capacity for RTS systems that opt for net metering rather than for gross metering or net billing. Tamil Nadu does not have an absolute capacity limit on net metering RTS systems; it restricts net billing RTS systems to 1 MW. However, this must be seen in conjunction with the state restricting net metering only to domestic consumers. Uttar Pradesh does not set capacity restrictions by metering regime; net metering is available only to domestic, agricultural, and (by a 2023 amendment) institutional consumers. The differential treatment of consumer categories substantiates the

intent of regulators to promote RTS and net metering among small consumers (domestic and agricultural).

Settlement periods impact benefits derived from rooftop solar

Settlement period is a key element of the net metering regimes. A longer settlement period gives the consumer more opportunities to offset excess generation from the RTS system against consumption at a later date. The regulation in all states and UTs prescribes a uniform settlement period for all consumer categories. In Gujarat, however, the settlement period varies from one day (high-tension (HT) connected C&I installations) to one month (for residential consumers). Of the other regulations, 21 offer annual settlements and 6 provide monthly settlements. Telangana offers half-yearly settlements (January to June and July to December). Figure 11 summarises the settlement periods across states and UTs.

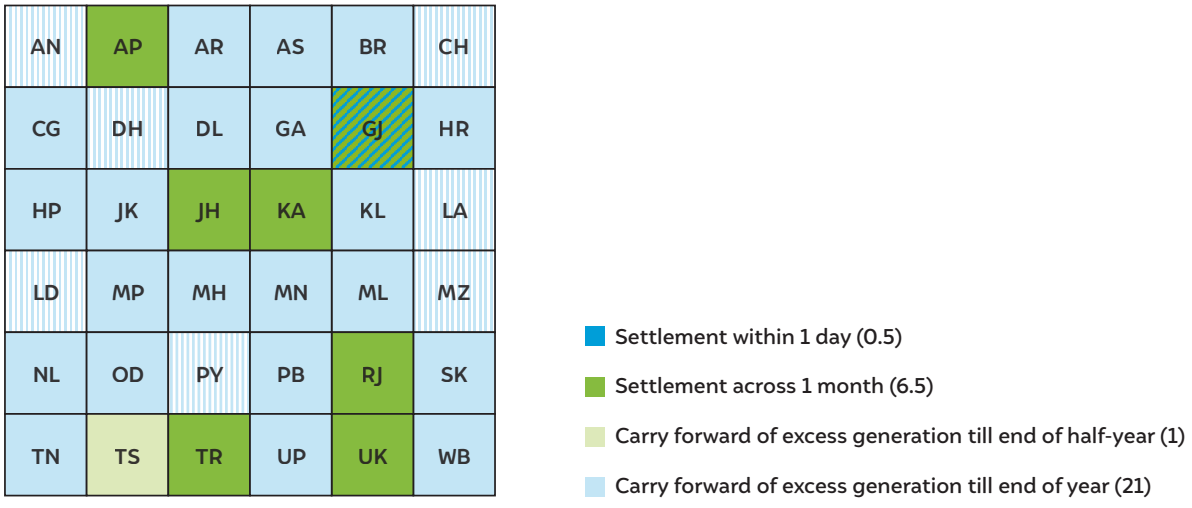
The annual settlement period benefits consumers not only because the settlement period is extended but also because it allows the consumer to hedge against seasonal changes in solar radiation and consumption. The settlement period in Madhya Pradesh and Punjab* is October to September; in Himachal Pradesh, there are 12 billing periods starting immediately after March 14. In all others, the settlement period is equivalent to the financial year. While that helps to align financial settlements with the accounting procedure, it raises two key issues. First, billing periods do not always necessarily coincide with calendar months (and that is why the flexibility in definition offered by Himachal Pradesh and Punjab is appropriate). Second, the annual settlement period is most beneficial for consumers when there is excess generation in the initial part of the settlement period and when there is a net import from the grid towards the end. This is so because the excess generation in an earlier month can be settled against the grid import in a later month; however, the reverse is not allowed. Therefore, in states and UTs where generation in the winter is higher, the period from October to September would be a more consumer-friendly settlement period than the period from April to March.

Compensation mechanisms for excess electricity from rooftop solar

The key value proposition of net metering regimes is that consumers can set off the grid consumption with solar generation from the RTS system, effectively compensating prosumers for generating electricity at the electricity tariff rate – as long as it is less than or equal to the consumption. However, 21 of 29 state and UT regulations also provide for compensating prosumers for excess generation at the end of the settlement period.

Through regulations or tariff orders, SERCs notify the methodology to determine the compensation mechanism, which varies by state. Five regulations link the compensation rate solely to the APPC of the discom, whereas seven regulations provide SERC determined adequate compensation rate.

Figure 11 Settlement periods typically are on an annual basis



Source: Authors' analysis of data from SERCs and JERCs as listed in Annexure - Table A4

Note: Diagonal stripes are used for Gujarat as it has different settlement periods for different consumer categories. Vertical stripes are used to represent states or UTs that share their JERC with another state or UT (Andaman and Nicobar, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Lakshadweep, and Puducherry share the JERC with Goa; Ladakh shares a JERC with Jammu and Kashmir; and Mizoram shares a JERC with Manipur).

*This settlement period, from October to September, does not apply to certain seasonal agricultural industries, where the settlement period follows the financial year.

Typically, when the SERC determines the compensation rate, it also specifies the tariff period (25 years); the discount rate to be used to calculate the levelised rate of compensation; and cost components (depreciation, interest on loan capital, interest on working capital, return on equity, operations and maintenance (O&M) expenses).

In five other regulations, the rate is linked to the cost of power from solar or RE, typically determined from bids for utility-scale projects. Arunachal Pradesh, Goa/5 UTs, and Jammu & Kashmir/Ladakh use the lower of the APPC and the SERC-determined rate. Uttarakhand uses the minimum of UERC-specified generic tariff and the tariff discovered through bids.

Figure 12 summarises the key approaches taken by SERCs to set the compensation rate for excess generation at the end of the settlement period by RTS systems with net metering.

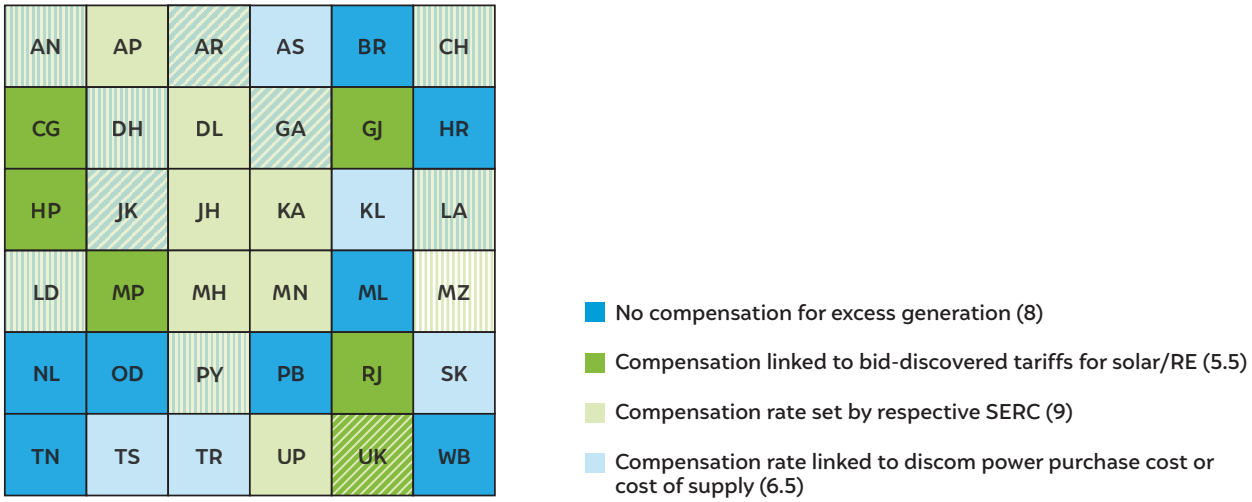
Linking the compensation rate to the APPC enables the regulations to factor in market trends for power supply; for instance, if high gas prices in a particular year push up the power procurement cost, the benefits would be passed on to prosumers. On the other hand, linking the compensation rate for excess generation to the cost of utility-scale solar or RE power may not account for all the challenges consumers may face in installing an RTS system. In such cases, SERC-specified tariffs or methodologies can help consider RTS-specific factors while calculating the compensation rates.

Within these broad approaches, regulations may base the compensation rate on consumer category. For instance, in Rajasthan, residential consumers are compensated at the weighted average tariff of solar projects larger than 5 MW discovered through competitive bidding in the previous financial year plus 25 per cent. Other consumers, however, do not receive any compensation for excess electricity.

In Gujarat, consumers receive 75 per cent of the simple average of the tariff of non-park solar projects discovered through competitive bidding. However, for residential, government, and MSME industrial consumers in these categories who have adopted the capex business model, this rate is applicable only from the sixth year with a higher flat rate of 2.25 INR per kWh for the first five years.

Higher compensation rates for residential consumers in Rajasthan, and for government and MSME consumers in Gujarat, underline the consistent theme of targeted interventions to promote RTS among certain consumer categories.

Figure 12 Compensation for excess feed-in under net metering



Source: Authors' analysis of data from SERCs and JERCs as listed in Annexure - Table A4

Note: Diagonal stripes are used for Arunachal Pradesh, Goa, Jammu and Kashmir, and Uttarakhand that use the minimum of two approaches - Arunachal Pradesh, Goa, and Jammu and Kashmir are counted as 0.5 each in the third and fourth categories while Uttarakhand is counted 0.5 in the second and third categories; Vertical stripes are used to represent states or UTs that share their JERC with another state/UT (Andaman and Nicobar, Chandigarh, Dadra and Nagar Haveli and Daman and Diu, Lakshadweep, and Puducherry share the JERC with Goa; Ladakh shares the JERC with Jammu and Kashmir; and Mizoram shares JERC with Manipur).

Understanding advanced metering regimes: group net metering and virtual net metering

As discussed in earlier Sections 2.1 and 2.4, group net metering and virtual net metering provisions allow multiple connections to benefit from a single RTS system.

Group and virtual net metering regulations enable consumers constrained by financial or physical resources to solarise their premises by accessing other RTS installations and taking benefit of lower cost due to economies of scale. The regulations help unlock unexplored, underexplored business models (community solar, solar partners model, P2P transactions for the trade of RTS energy).

As discussed above, the adoption of group and virtual net metering has been restricted to a few states and, even in these states, the benefits are not extended to all consumers. Of the 12 regulations that offer virtual net metering, Delhi, Goa/5 UTs, Jammu & Kashmir/Ladakh, Odisha, and Uttarakhand restrict it to residential and institutional or government consumers. Himachal Pradesh restricts it to 'single part tariff consumers' which broadly includes consumers up to a sanctioned load of 20 kW. Further, while systems under group and virtual net metering are generally subject to the same capacity limits as net metering, Delhi and Uttarakhand have restricted them to 10 MW (for ground-mounted RE systems; no maximum capacity limit for RTS systems) and 75 kW respectively.

Unlike typical RTS installations with co-located generation and consumption, installations under group and virtual net metering transmit power through the grid to reach the consumers. Thus, certain states also levy transmission and distribution (T&D) losses on these systems. Sikkim and Himachal Pradesh, for instance, levy energy charges of 5 per cent and 9 per cent respectively. While in theory discoms should be compensated for the use of their network, the quantum of losses should be re-examined based on the typical geographical footprint of group and virtual net metering projects in the state.

An alternative approach, followed in Maharashtra, is to establish a moratorium on T&D losses and charges until a certain deployment level (5 GW in this case) is reached. Other instruments enable resource-constrained consumers to access green energy; however, these are skewed towards the C&I segment. Green tariffs, for instance, are available in more than half of India's states (Ramesh 2023); however, these tariffs are usually fixed at a premium for accessing green energy using the discom's network. This premium over and above existing electricity bills will discourage residential consumers from opting for green energy via green tariffs. Instead, virtual net metering can help them reduce their electricity bills and carbon footprint.

3. State-level rooftop solar policies

State-level RE and solar policies shape the RTS sector narrative. We review 30 subnational RTS policy documents (13 solar, 6 RTS, 11 state RE policies) to analyse state-level RTS policies and the readiness of a state's ecosystem to adopt RTS. For assessment, we have considered both draft and notified policies till December 31, 2024.[6] States can learn from each other to design effective, implementable policies.

3.1 Policy notification and target-setting highlighting the state's vision

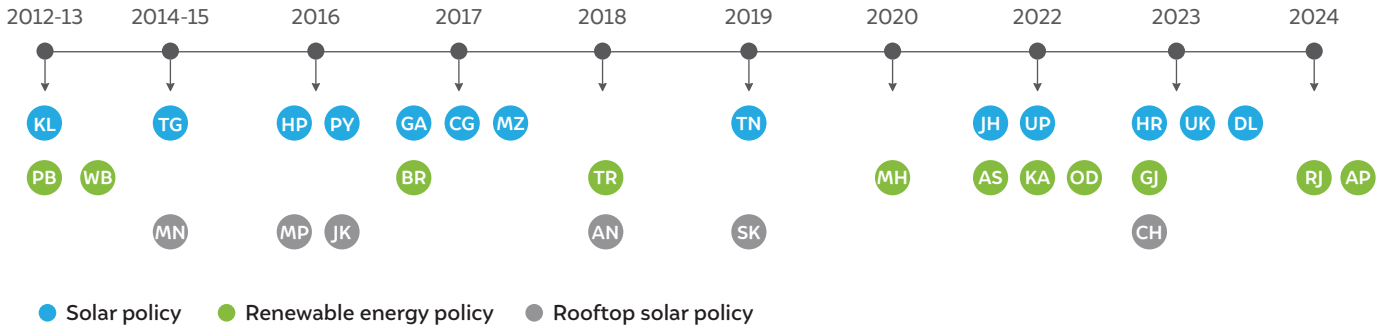
Most states recently announced the RE or solar policy considering the latest market developments (see Figure 13). However, the year of notification for some state RTS policies (Punjab, West Bengal) goes back to 2012–2016.

Unless superseded by a new policy, the typical policy operative period is 3–5 years; certain policy operative periods – as in Chhattisgarh, Goa, Jammu & Kashmir, Odisha – are 7–10 years.

To ensure that the policy ecosystem can adapt to the rapidly evolving solar PV market, the best practices manual[7] recommends a shorter policy tenure (Jani et al. 2016). At the same time, the business environment can be adversely affected by drastic policy changes resulting from changes in political power and priorities during the operative period.

> **We assess 30 state-level policies to identify key interventions for designing effective policies.**

Figure 13 State policy notification period varies between 2012 and 2023



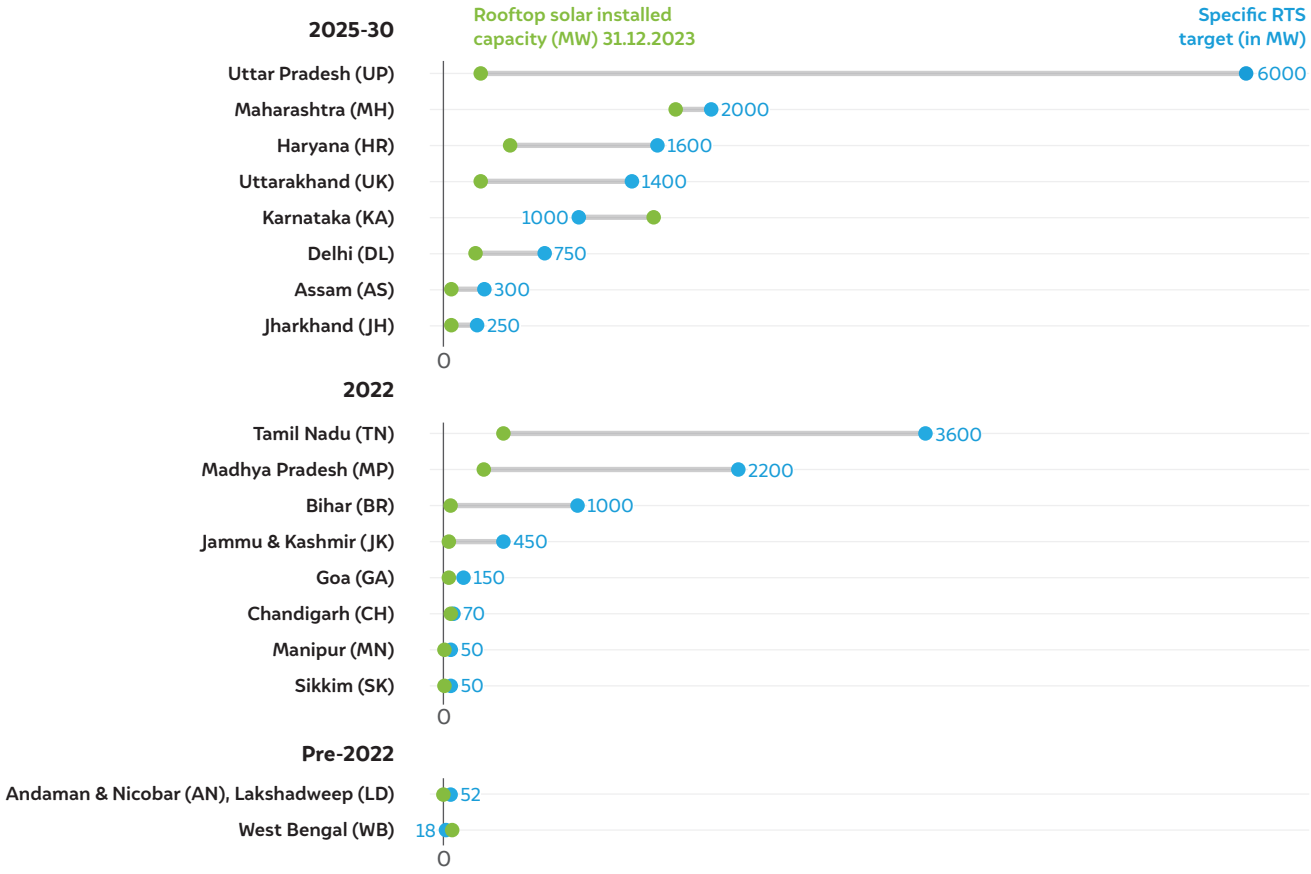
Source: Authors' analysis of state policy documents as listed in Annexure - Table A3

Note: Andaman and Nicobar datapoint includes Lakshadweep.

6. The 2024 Operational Guidelines for Implementation of the scheme 'PM-Surya Ghar: Muft Bijli Yojana' under its 2022 RE policy is included for Assam datapoints.

7. The best practices manual was prepared by the Gujarat Energy Research and Management Institute (GERMI) and the USAID's PACE-D Technical Assistance Programme for MNRE to assist the roll-out of the rooftop solar programme.

Figure 14 State policies play a key role in planning their RTS installation trajectory



Source: Authors' analysis based on the state policy documents as listed in Annexure - Table A3 and MNRE 2024a

Note: The target years vary from state to state and are mainly set according to the policy period.

RTS policy ecosystem needs to adapt to the rapidly evolving market conditions to ensure accelerated installations.

State policies define RTS targets based on either the tentative MNRE target or the state-level assessment of RTS potential. Two-thirds of state policies have set a clear, time-bound target for the RTS segment. Haryana, Kerala, Assam, Jharkhand, Karnataka, and Uttarakhand have set long-term targets, ranging from 2027 to 2030, as seen in Figure 14. The RTS targets of Kerala and Uttar Pradesh are ambitious; these exceed the MNRE target. The RTS targets of Delhi, Jharkhand, Karnataka, and Maharashtra are smaller than the MNRE target. The year of achieving the target installed capacity has lapsed in Bihar, Chandigarh, Jammu & Kashmir, Madhya Pradesh, Manipur, Mizoram, Sikkim, Tamil Nadu, and West Bengal. Karnataka has already met the target set for 2027. Jharkhand, Goa, and Sikkim have been progressive and set RTS targets by category and year. Category-wise targets are set by other states (Assam, Uttarakhand, Uttar Pradesh) to leverage the potential of RTS across consumer categories.

Segregating by target trajectory and consumer segment helps state implementing agencies (SNAs and discoms) to plan their interventions. In addition, policies provide promotional targets for new and upcoming technologies (agrophotovoltaics, for instance) or use the targets to highlight the role of battery storage systems. The policies for Jharkhand, Uttarakhand, and Himachal Pradesh specify targets for solar agriculture. Assam has set a target for RTS plus storage for the industry segment. In coordination with government departments and C&I consumers, Jharkhand and Uttarakhand have provided in their policy for creating data repositories of building details and RTS potential.

State policies utilise building mandates to drive the solarisation of government buildings and new residential and industrial buildings. Solarisation of government-owned buildings can improve visibility and trust in the technology. Eleven states and UTs have specified mandatory installation of RTS for residential and government consumers; West Bengal, Bihar, Delhi, and Uttarakhand have mandates for C&I consumers as well. States have specified the criteria based on either the rooftop area (≥ 500 sq m) or the sanctioned load/ contract demand (100–500 kW). The mandates are based on fulfilling a certain percentage (from 1.5–2 per cent to 10–20 per cent) of the total electricity demand through RE sources.

3.2 Incentivising rooftop solar adoption through state policies and schemes

To accelerate RTS deployment in some consumer segments, states provide direct or indirect financial incentives (capital subsidies, GBI, tax exemption, electricity duty exemption). In Assam, Delhi, Goa, Jharkhand, Uttar Pradesh, and Uttarakhand, the state policy, complements the central subsidy, and provides residential consumers capital subsidies to address the barrier of high upfront costs. The state subsidy is a percentage of the capital cost (50–80 per cent) or flat subsidy (2000 - 17000 INR per kW). Unlike other states, Jharkhand provides an income-linked capital subsidy to target residential consumers in lower electricity slabs by limiting the subsidy to consumers with annual incomes less than INR 0.3 million. The state capital subsidies provide higher incentives to lower system sizes.

Capital subsidies are effective for the lower kW category because the electricity tariff for these consumers is low, according to a CEEW study (Zachariah, Tyagi, and Kuldeep 2023). As a result of capital subsidy, the economic feasibility of the system increases, and the economic potential for RTS increases by ~5 GW for RTS systems of 1–3 kW. However, the subsidy does not significantly impact the economic potential for RTS above 3 kW systems.

Uttarakhand, Goa, Delhi, and Jharkhand – where the electricity tariff is lower or which offer electricity subsidies – have used capital subsidies to incentivise RTS adoption among residential consumers. Uttar Pradesh and Assam, where the electricity tariff for residential consumers is moderate to high, continue to provide capital subsidies. Uttarakhand extends the benefits under the MSME policy by providing capital and interest subsidies to consumers applying for RTS and captive solar plants. Goa extends capital subsidies to C&I consumers up to 20 per cent of the MNRE benchmark cost, or the derived cost by the Goa Energy Development Agency, whichever is lower.

> **State policies use a mix of interventions such as capital subsidies, generation-based incentives and building mandates to drive RTS adoption.**

States use GBI in addition to direct capital subsidies to improve the economic feasibility of an RTS system. The Delhi Solar Policy proposes that a GBI for five years be offered to domestic consumers adopting RTS and that higher rates be provided to lower-consumption consumers. As depicted in Table 2, the GBI is extended to group housing societies, residential welfare associations, and C&I consumers.

The policy provides GBI to consumers adopting community solar as per their ownership share of the project and to the renewable energy service company (RESCO) developer in the case of projects developed under the hybrid RESCO model. Therefore, it is seen that the GBI is made available to a variety of consumer categories and business models.

The Kerala Solar Policy states that the existing capital subsidy can be restructured to provide GBI to off-grid systems such that it ensures RTS systems are well-maintained and continue to remain functional. The Sikkim RTS policy states that the SNA and SERC will assess the feasibility of introducing a GBI and identify the list of consumer categories that require GBI support. A summary of the economic incentives provided by states is depicted in Figure 15.

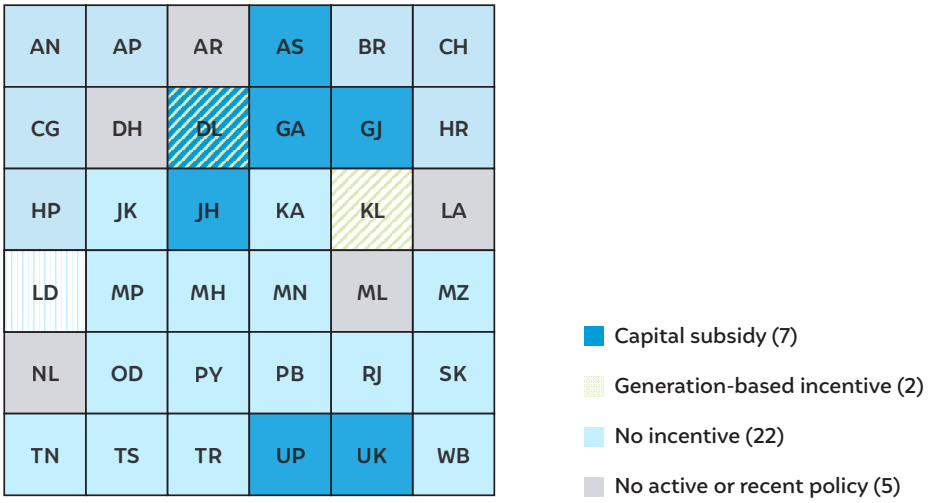
To increase self-consumption, some states are promoting the adoption of RTS with battery storage. By providing an incentive of 50 paise in addition to the APPC, Goa incentivises prosumers with battery storage to inject power during peak hours. Residential consumers in Uttarakhand opting for behind-the-meter arrangements with battery storage are provided with an additional INR 5,000 per kW subsidy as compared to those without storage. As seen in Figure 16, state solar policies offer other economic incentives such as exemptions or reimbursement from certain taxes (goods and services tax (GST) and value-added tax (VAT)) to subsidise the cost of the purchase of RTS equipment.

Table 2 Delhi policy offers GBI to various consumer categories while Kerala policy offers GBI to residential consumers

State	Consumer category	GBI (INR/ kWh)	Other applicability conditions (if any)
Delhi	Residential - up to 3 kW	3	-
	Residential - 3 to 10 kW	2	-
	Group housing societies/ residential welfare associations	2	A system up to 500 kW with 10 kW per house
	C&I	1	The first 200 MW installed capacity
Kerala	Residential	1	Off-grid systems

Source: Authors' compilation from state policy documents as listed in Annexure - Table A3

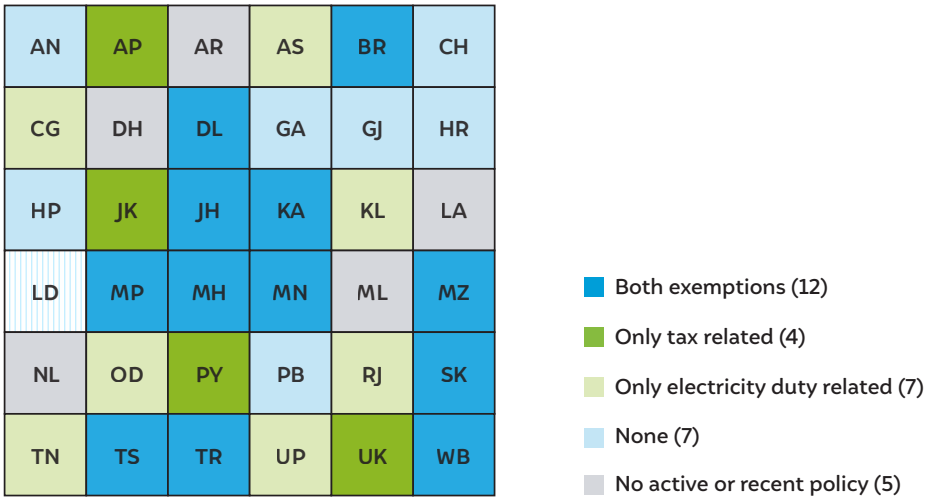
Figure 15 Capital subsidy and GBI are the primary state-level economic incentives



Source: Authors' analysis of state policy documents as listed in Annexure - Table A3

Note: For Andaman & Nicobar and Lakshadweep, the same RTS scheme has been reviewed.

Figure 16 States exempt rooftop solar from electricity duty and tax



Source: Authors' analysis of state policy documents as listed in Annexure - Table A3

Note: For Andaman & Nicobar and Lakshadweep, the same RTS scheme has been reviewed.

Andhra Pradesh provides 100 per cent reimbursement of net SGST on RTS projects implemented on residential and government buildings. Jharkhand and Telangana offer 100 per cent reimbursement of State Goods and Services Tax (SGST) on solar plant inputs for 5 years. Uttarakhand offers 50 per cent reimbursement for 5 years. Tripura, Delhi, and Mizoram, which offer similar exemptions, do not specify their quantum or time period. Madhya Pradesh offers exemption from liability related to property tax for RTS installations. Sikkim offers exemption from conversion of house tax to commercial tax for RTS installations.

The electricity generated from RTS plants is exempt from duty in 14 of 30 states and UTs for 2–25 years. Tamil Nadu offers the exemption for 2 years; Assam, Madhya Pradesh, Jharkhand, Sikkim, and Uttar Pradesh for 5–10 years; and Odisha for 20–25 years. Madhya Pradesh offers an exemption for the total life of the system for beneficiaries connected at the low-tension (LT) level. The remaining states have not specified the time period for this exemption.

State solar policies have dedicated schemes and detailed provisions on financial assistance and incentives, timelines, and the roles and responsibilities of departments. To accelerate RTS adoption, Chandigarh and several states – Goa, Gujarat, Kerala, Jharkhand, Uttar Pradesh, Uttarakhand – have made provisions for introducing schemes ranging from solarising the residential segment to focusing on the low-consumption and rural consumer categories and off-grid solar systems.

The *Gujarat Surya scheme, Chandigarh BOT scheme*,[8] *Uttar Pradesh Saurya scheme*, and *Kerala Project Soura* focus on the adoption of RTS in the residential segment. Goa has introduced a net metering scheme for residential and educational institutions. The scheme provides financial assistance to residential and educational institutions (50 per cent of the MNRE benchmark cost or the Goa Energy Development Agency (GEDA)-derived cost) and C&I consumers (20 per cent of MNRE benchmark cost or the GEDA-derived cost) for installations up to LT level, i.e. 1–90 kW. The Jharkhand and Uttarakhand policies include the development and implementation of solar village schemes and focus on driving RTS adoption in rural areas. Jharkhand has set a target of solarising 1,000 villages and Uttarakhand targets the solarising of 300 villages. The details of a few state-level schemes are mentioned in Box 3.

8. Discussed in detail under the BOT model.

BOX 3 Gujarat and Kerala: Implementation of schemes and business models

The *Surya Gujarat* scheme (2019) focused on implementing RTS systems for 8 lakh residential consumers by 2022. The scheme provides for a state subsidy (40 per cent for systems up to 3 kW; 20 per cent for 3–10 kW systems). The state subsidy provided under the scheme may not be clubbed with the existing central subsidy. While the system size is not restricted by the consumer's sanctioned load, the subsidy is limited to RTS systems with a capacity of 10 kW at the maximum.

The scheme states that consumers would be provided net metering. The discom would purchase the surplus electricity at the rate of INR 2.25 per unit. The scheme was amended to include a 20 per cent subsidy for group housing societies or residential welfare associations. The system size in this category would be 10 kW per house and not exceed 500 kW. Gujarat Urja Vikas Nigam Limited was designated the nodal agency for the scheme. State discoms were tasked with scheme implementation and subsidy disbursal.

Kerala's *Project Soura* targeted the addition of 500 MW to the Kerala State Electricity Board Limited's (KSEBL) discom network by 2022, through RTS installations in domestic, public and private buildings and commercial buildings. The KSEBL would be actively involved in implementing the business models under the scheme.

Under the first model, KSEBL would utilise the roof space of consumers for installation and maintain the RTS plant for 25 years. The KSEBL bore the cost of installation, the electricity generated was fed into the grid, and the consumer was provided a fixed percentage (10 per cent) of the electricity generated.

Under the second model, KSEBL would install the RTS plant on the consumer's roof space and pay for installation; it would pay for maintenance costs for 25 years; and through a power purchase agreement (PPA), and also for 25 years, it would sell the electricity generated to the consumer at a fixed price.

In the third model, KSEBL set up the RTS plant, the consumer bore the cost of installation, and the excess electricity was settled at the APPC rate as approved by the Kerala State Electricity Regulatory Commission at the end of the settlement period.

Gujarat and Kerala developed RTS portals for consumers to register, submit subsidy applications, and track their applications. The portals include information on RTS and calculators for estimating plant capacity and savings. The state rooftop portal for Gujarat is SURYA Gujarat; for Kerala, it is E-kiran.

3.3 Market creation through innovative business models and financing ecosystem

Financing is a key barrier to RTS deployment. The key concerns of financing institutions include small, fragmented demand; high risk of default; and limited understanding of the RTS sector (technology and developers). States propose several instruments in their solar policies to de-risk investment in RTS systems, as outlined in Figure 17. One of these is a payment security mechanism, as in the state policies of Assam, Delhi, Jharkhand, Sikkim, Uttarakhand, and Manipur. The Delhi policy includes payment security as part of the tripartite agreement between the RESCO developer, discom, and consumer under the hybrid RESCO model. The Assam RE policy provides payment security under the RESCO model in the case of RTS installations for state government organisations or for organisations aided or owned by the government. The Manipur policy states that the discom needs to provide a payment security mechanism for the PPA between the consumer, discom, SNA, and third-party RTS installer. In Jharkhand and Uttarakhand, SNAs are to set up a payment security mechanism for selling electricity to state government departments. The Sikkim policy states that the SNA will assess the requirement of payment security in the case of residential and government sector RTS installations.

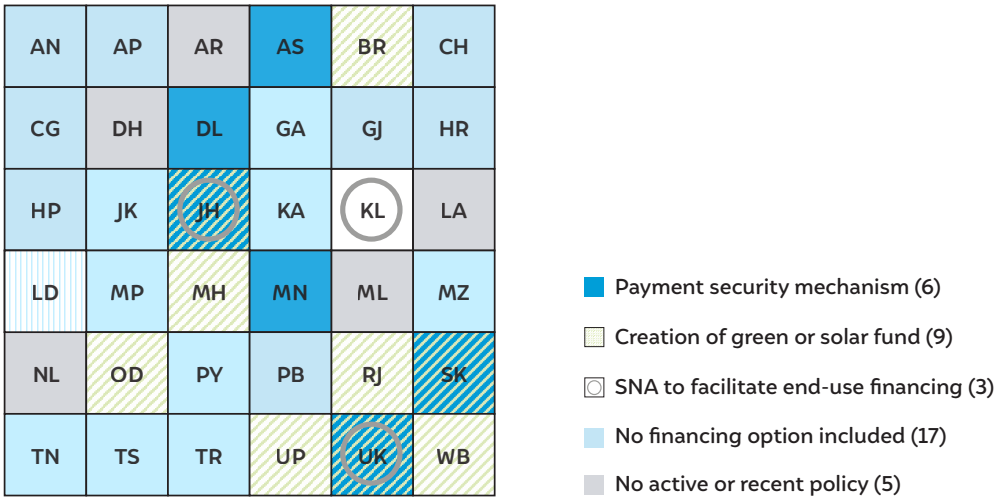
States have introduced other provisions to improve access to low-cost finance. The state policies of Jharkhand, Kerala, and Uttarakhand assign responsibility to the SNAs to facilitate end-user financing support. Bihar, Odisha, Rajasthan, Jharkhand, Sikkim, Uttar Pradesh, Uttarakhand, West Bengal, and Maharashtra have provisions for the creation of a green or solar fund. This fund can be leveraged to address the challenges of high upfront costs, for instance, by providing interest subvention.

The development of business models can make RTS accessible and affordable to consumers. Beyond the traditional CAPEX and RESCO models, some state solar policies have designed and introduced novel business models to address challenges like high upfront costs and issues of roof ownership or access.

As seen in Delhi, Jharkhand, and Uttarakhand, the policies have introduced a community solar model to overcome the challenge of exclusive roof ownership, limited space, or high costs. In the community solar model, consumers who do not have a suitable roof for installing RTS can subscribe to a community-owned solar installation located at a third-party location in the same discom territory.[9] The implementation of community models requires the adoption of virtual net metering by the state. Delhi and Uttarakhand have notified the virtual net metering regulation enabling consumers to adopt this model. Delhi policy also includes the provision of a digital platform under the state solar portal. This platform matches rooftop owners willing to install RTS with those who do not have access to a roof. State policies incentivise the community solar business model. As mentioned earlier, Delhi provides GBI to consumers adopting community solar. Uttarakhand offers a capital subsidy of INR 8,000 per kW for community solar projects (5–500 kW).

An additional business model promoted is the P2P energy trading model, as seen in Delhi, Karnataka, Uttarakhand, and Uttar Pradesh. As depicted in Figure 18, the P2P model allows consumers to purchase electricity in real-time from RTS consumers through a digital energy trading platform[10]. States have issued enabling guidelines and regulations. In April 2023, the Uttar Pradesh Electricity Regulatory Commission prepared guidelines for P2P transactions through a blockchain-based platform. In July 2024, the Delhi Electricity Regulatory Commission (DERC) notified the Peer to Peer Energy Transaction Guidelines, 2024. In August 2024, the Karnataka State Electricity Regulatory Commission (KERC) notified the regulations on the Implementation of Peer-to-Peer Solar Energy Transaction. The KERC regulation defines P2P solar energy trading as the sale of surplus power by a prosumer to another consumer at an agreed tariff through an electronic platform. Additional details of the KERC's guidelines are provided in Box 4.

Figure 17 Rooftop solar financing requires policy support



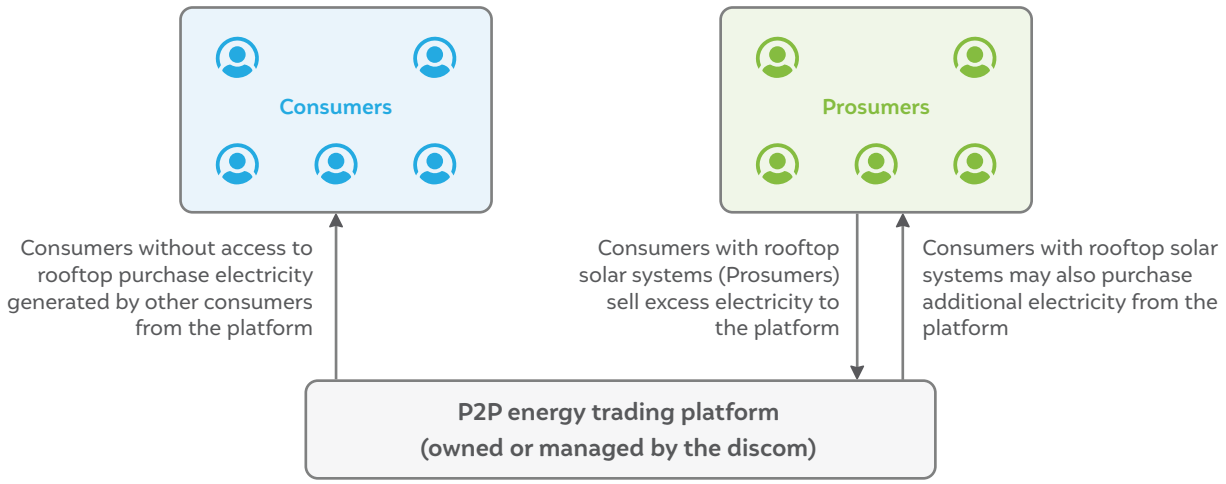
Source: Authors' analysis of state policy documents as listed in Annexure - Table A3

Note: For Andaman & Nicobar and Lakshadweep, the same RTS scheme has been reviewed.

9. As defined in the Delhi Solar Policy 2023

10. *ibid*

Figure 18 Illustration of a P2P model from the *Delhi Solar Policy 2023*



Source: Authors' adaptation from policy documents as listed in the Annexure - Table A3

BOX 4 Examining the KERC peer-to-peer guidelines: Exchange arrangements, participants' role, and energy accounting and settlement

Arrangements for the buying and selling of electricity as defined by the regulation -

- In cases of preferential trading prosumers, the prosumers have the choice of determining their preferred off-taker and offering to sell a percentage of their excess energy at a specific price or a mutually negotiated tariff.
- In the dynamic trading option, prosumers and consumers trade with each other by setting their prices. The cleared price is determined by using one of several methodologies: the highest price offered by the buyer; the lowest price offered by the seller; an average of buyer-seller price.
- Where excess electricity is not available, or if no buyer is available, the discom will have to buy or sell electricity to meet the requirements.

The regulation defines the conditions and the roles of the P2P participants, service providers, and distribution licensees -

- The P2P participants are the eligible consumers or prosumers with the RTS plant with a postpaid smart meter under net or gross metering with an installed capacity as specified by SERC regulations. The regulation requires that P2P participants do not engage in anti-competitive practices such as price fixing, etc. The P2P participants have to submit their schedule for energy to be transacted on the n^{th} day, by 17:00 hours on $(n-1)^{th}$ day in the case of the day ahead transaction and the schedule has to be submitted at least four time blocks before the commencement of the schedule in the case of intraday transactions.
- The service provider is registered with a distribution licensee and provides the P2P transaction services on the blockchain platform or any other technology-based platform. The service provider should provide training on the P2P platform to the participants and the distribution licensee.
- The distribution licensee should work with the service provider to integrate their systems and ensure that the metering is in order by replacing defective meters. The regulation specifies clear timelines for registration on the P2P platform.

Energy accounting and settlement process under the P2P mechanism -

- The billing cycle for the P2P platform will be in sync with the discom's billing cycle.
- The distribution licensee will generate the bills of the P2P participants based on the transaction price mutually determined by the prosumers and consumers and as per KERC retail supply tariff order.
- The bill will be raised for total demand, i.e. including both the P2P transaction and the electricity purchased from the distribution licensee.
- The energy accounting and settlement in cases of under- or over-injection by P2P prosumers and underdrawal or overdrawal by P2P consumers is detailed in the regulation.
- The transaction charges to the service provider will be prescribed by the KERC and will be paid by the distribution licensee after settlement with P2P participants.

Chandigarh rolled out the RESCO build-operate-transfer (BOT) model for the residential segment for 5–10 kW systems. The BOT model will include a quadripartite agreement between the consumer; discom; the implementation and project performance monitoring agency Chandigarh Renewal Energy and Science & Technology Promotion Society (CREST); and the RESCO. The RESCO will bear the cost of installing an RTS system on the consumer's premises and sell the electricity to the discom under a gross metering arrangement.

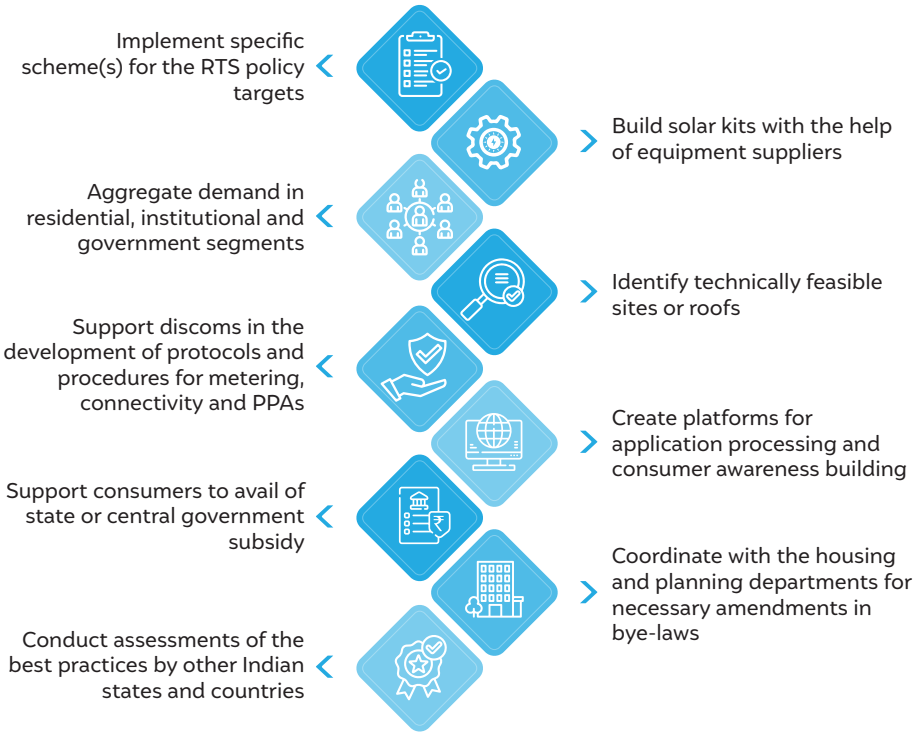
The electricity will be sold to the discom at a fixed tariff, the APPC of the current or previous financial year, whichever is published latest, minus the facilitation charge (0.07 INR per kWh) for the BOT period. After the BOT period, ownership will be transferred to the consumer. The RESCO will be responsible for system O&M for the BOT period.

The BOT period,[11] less than 25 years, will be defined through the competitive bidding process undertaken by CREST. The rationale for the model is that the levelised tariffs for solar PV with subsidy under the JERC tariff order range from 3.9 INR per kWh to 4.1 INR per kWh for 5–10 kW systems. These levelised tariffs are higher than the fixed tariff under the BOT model – INR 3.29 per kWh (APPC for FY 2023–24). This fixed tariff is lower than the retail electricity tariff for certain consumer slabs, for instance, the retail tariff is 4.25 INR per kWh for 151–400 kWh and 4.65 INR per kWh for greater than 400 kWh.

3.4 State policies define the governance framework for implementation

Effective implementation requires defining the governance framework and making stakeholder roles and responsibilities clear. The roles assigned to SNAs are compiled in Figure 19. Assam, Delhi, Jharkhand, Sikkim, Telangana, and Uttarakhand have established a solar or RTS cell and defined their roles and responsibilities. As mentioned in the role of SNAs, it is important to create an application processing platform that makes the installation process easy. Most state policies have adopted a single-window clearance system that helps consumers obtain all clearances at a single office (as seen in Figure 20).

Figure 19 State nodal agencies with well-defined roles can play an important role in the creation of an enabling environment for rooftop solar



Source: Authors' compilation based on state policy documents as listed in Annexure - Table A3

11. The bidding parameter for this competitive bidding process will be the BOT period in number of days instead of the tariff.

Figure 20 States have adopted single-window clearance and rooftop solar cells

Source: Authors' analysis of state policy documents as listed in Annexure - Table A3

Note: For Andaman & Nicobar and Lakshadweep, the same RTS scheme has been reviewed.

3.5 Additional innovative measures to streamline processes and monitor performance

States are tracking aspects such as the processing of net metering applications. Delhi, Jharkhand, and Tamil Nadu require their discom to maintain a database of net metering applications received, their approval status, and information on installation and commissioning. Tamil Nadu policy extends this to other metering regimes such as gross metering. The policies require this data to be submitted periodically to the state authority (SNA, state government, or solar cell). As seen in the case of the Energy Efficiency & Renewable Energy Management Centre, the Delhi SNA, which provides consumers with a step-by-step process for net metering applications, SNAs provide information on the steps for net metering applications.

Bihar, Madhya Pradesh, Punjab, and Sikkim require the monitoring of parameters like system performance, electricity generated, electricity injected into the grid and self-consumed, and climate parameters. Certain policies recommend that the monitoring report be submitted through an online portal.

Assam policy states that the discom will develop an IT application to monitor the policy target and sanctioned RTS capacity and expedite the commissioning of the state-wise RTS capacity allotted by the MNRE. Similarly, the Rajasthan policy includes the development of consumer-friendly IT application by discoms to facilitate the timely approvals and monitoring of RTS projects. The Delhi policy provides on-demand rooftop assessment to increase consumer awareness regarding the benefits of the RTS system and its potential to reduce electricity bills. This assessment can be requested by the consumers via the state portal or helpline. After the assessment, the consumer will be issued a solar report card, which includes the potential solar generation capacity based on the rooftop area available, and the associated annual electricity bill savings.

4. Recommendations

This section provides recommendations to strengthen and streamline the development of the rooftop solar sector in India. We have highlighted the proposed intervention, and the envisioned impact and identified the key actors.

- **Set clear, time-bound targets to establish the state's vision for rooftop solar**
  - » **Proposed intervention**: Based on estimates of the technical potential of consumer segments, states should set comprehensive, measurable, time-bound targets; disaggregate these by consumer category (residential and MSME, for instance); and roll out schemes for each category. To plot the RTS deployment trajectory, states can set targets by year or phase. A policy can introduce promotional targets for new, enabling technologies like battery storage systems, hybrid systems, and agrophotovoltaics.
  - » **Impact**: Target-setting communicates the state's vision and enables tracking and monitoring of progress.
  - » **Key actors**: SNAs, state energy departments
- **Mandate solarisation of government buildings**
  - » **Proposed intervention**: State implementation agencies can mandate that state government buildings be solarised; and SNAs can set mandates consistent with national and state building performance standards, codes, and thresholds (Energy Conservation Building Code, the Energy Conservation and Sustainability Building Code). Based on the availability of rooftop area, sanctioned load, or electricity requirement, state implementation agencies can extend the mandate to other sectors.
  - » **Impact**: Increase the visibility of the solarisation initiative and enhance the trust in the technology.
  - » **Key actors**: SNAs, state energy departments
- **Standardise the installation processes**
  - » **Proposed intervention**: State implementation agencies can conduct benchmarking exercises to determine the time required for processing applications, inspection, and metering on average. They can use these exercises to prepare standard operating procedures for each process. State electricity regulatory commissions can set reasonable timelines for each process based on the

State implementation agencies can extend solarisation mandates to buildings based on their rooftop area, sanctioned load, and electricity requirements.

benchmarks and set actions or penalties in case these timelines are not met. Alternatively, states can adopt the timelines specified in the Electricity (Rights of Consumers) Amendment Rules, 2024.

» **Impact**: Smoothen the implementation process by benchmarking the timelines for the application process, performance monitoring, and subsidy disbursal.

» **Key actors**: State implementation agencies, SERCs

- **Create the right set of economic incentives for the consumers**

  » **Proposed intervention**: Low-income and middle-income households and MSMEs require support to install RTS and so, financial incentives and regulations should target them. The state energy department should work with the finance department to ensure the necessary budgetary allocation and timely disbursal of incentives. The regulations should provide more beneficial aspects such as longer settlement periods and higher compensation rates for these consumers.

  » **Impact**: Efficient utilisation of public funds to unlock new consumer segments and creative conduction ecosystem for RTS adoption.

  » **Key actors**: State energy and finance departments, SERCs

- **Align the metering arrangement with state objectives**

  » **Proposed intervention**: States should align metering regimes – net metering, gross metering, or net billing – with their objectives and the maturity of their market. Where penetration is low, states may offer net metering, at attractive feed-in tariff rates, to incentivise certain consumer segments to adopt RTS. Where the market is mature, states can transition to net billing, with time-of-day tariff rates, to ensure that the long-term impact of RTS adoption is equitable for adopters, non-adopters, and discoms.

  » **Impact**: Effective sharing of economic benefits of rooftop solar based on state objectives.

  » **Key actors**: SERCs

- **Enact regulations to enable innovative business models**

  » **Proposed intervention**: To enable novel business models (community solar, P2P energy trading), SNAs should work with SERCs to periodically update regulations or introduce new regulations. For states to adopt new metering regimes – group net metering, VNM, or net billing – the MoP must ensure that the definitions are harmonised in line with their guidelines.

  » **Impact**: Tap into the RTS potential in new consumer segments.

  » **Key actors**: SNAs, SERCs, MoP

- **Re-evaluate the minimum capacity restrictions of a rooftop solar system**

  » **Proposed intervention**: The minimum size restriction of an RTS system, 1 kW, should be relaxed, especially for residential consumers. Typically, low-consumption households are subsidised by either the state government, through an electricity subsidy, or by C&I consumers, through a cross-subsidy. Allowing residential consumers to install RTS systems smaller than 1 kW can reduce the subsidy expenditure. The size limits linked to sanctioned load and DT capacity are not always fixed on the basis of maximum technical feasibility. Some earlier regulations had fixed limits earlier, but these may not have been updated based on new infrastructure or the learning from other states. The size restriction needs to be technically evaluated and reset accordingly, or the Forum of Regulators can formulate a framework to determine the technical limit.

  » **Impact**: Unlock the solarisation opportunity for small residential consumers and shift the market away from electricity subsidies.

  » **Key actors**: SERCs (with technical support from the CEA), Forum of Regulators

> **Targeted economic incentives, innovative business models, and enabling metering regulations can help unlock India's rooftop solar potential.**

- **Create a rooftop solar data registry**
  - » **Proposed intervention**: State implementation agencies can build and maintain a registry of RTS installations. Currently, information on installed capacity is available at the state level. In Delhi, Jharkhand, and Tamil Nadu, state policy recommends that discoms maintain a database of metering applications. In Bihar, Madhya Pradesh, Punjab, and Sikkim, state policy is to monitor system performance data and climatic parameters. State implementation agencies can collect data on installed capacity and electricity generation across consumer categories and metering regimes.
  - » **Impact**: Policymakers and state implementation agencies can make better decisions using disaggregated data on installations, metering applications, and electricity generation.
  - » **Key actors**: State implementation agencies, state energy departments
- **Review policy mid-term and course-correct**
  - » **Proposed intervention**: States should ensure that policy provides for mid-term reviews. Such reviews should incorporate stakeholder consultations and reporting on parameters (target achievements, metering applications, subsidy disbursal (if applicable), and performance of installed RTS systems). Based on the progress identified in the review, the targets and deployment trajectory should be revised.
  - » **Impact**: A state can amend its policy to course correct.
  - » **Key actors**: SNAs, state energy departments
- **Synchronise national and state interventions for rooftop solar**
  - » **Proposed intervention**: States should align policy and regulatory interventions with national programmes and initiatives by, for instance, incorporating MNRE guidelines. In terms of incentives, states could complement national subsidies and focus on their specific needs. The Forum of Regulators can help SERCs learn from one another and align regulatory provisions to incorporate best practices.
  - » **Impact**: A state can translate vision into action and facilitate the implementation of national programmes.
  - » **Key actors**: SNAs, SERCs, MNRE, Forum of Regulators

Rooftop solar provides an opportunity for the states to fastrack their energy transition. Some states are already embracing the transition through innovative policies and regulatory interventions while others are just beginning to realise the potential of RTS. The issue brief provides learnings from these success stories and can help to inform strategies for other states. These strategic interventions can work in tandem with national-level initiatives and are needed to accelerate RTS deployment.

Acronyms

APPC	average power purchase cost
BOT	build-operate-transfer
CEA	Central Electricity Authority
CFA	central financial assistance
C&I	commercial and industrial
CREST	Chandigarh Renewable Energy and Science & Technology Promotion Society
DT	distribution transformer
GBI	generation-based incentive
GEDA	Goa Energy Development Agency
GEOA	green energy open access
GERMI	Gujarat Energy Research and Management Institute
GST	goods and services tax
GW	gigawatt
HT	high tension
JERC	Joint Electricity Regulatory Commission
KERC	Karnataka Electricity Regulatory Commission
KSEBL	Kerala State Electricity Board Limited
LT	low tension
MNRE	Ministry of New and Renewable Energy
MoP	Ministry of Power
MSME	micro, small, and medium enterprises
MW	megawatt
O&M	operations and maintenance
PPA	power purchase agreement
P2P	peer-to-peer
PV	photovoltaics
RE	renewable energy
RESCO	renewable energy service company
RTS	rooftop solar
SERC	State Electricity Regulatory Commission
SGST	State Goods and Services Tax
SNA	state nodal agency
T&D	transmission and distribution
UERC	Uttarakhand Electricity Regulatory Commission
UT	union territories
VAT	value-added tax
VGRS	valuing grid-connected rooftop solar
VNM	virtual net metering

Scan to view the annexures

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