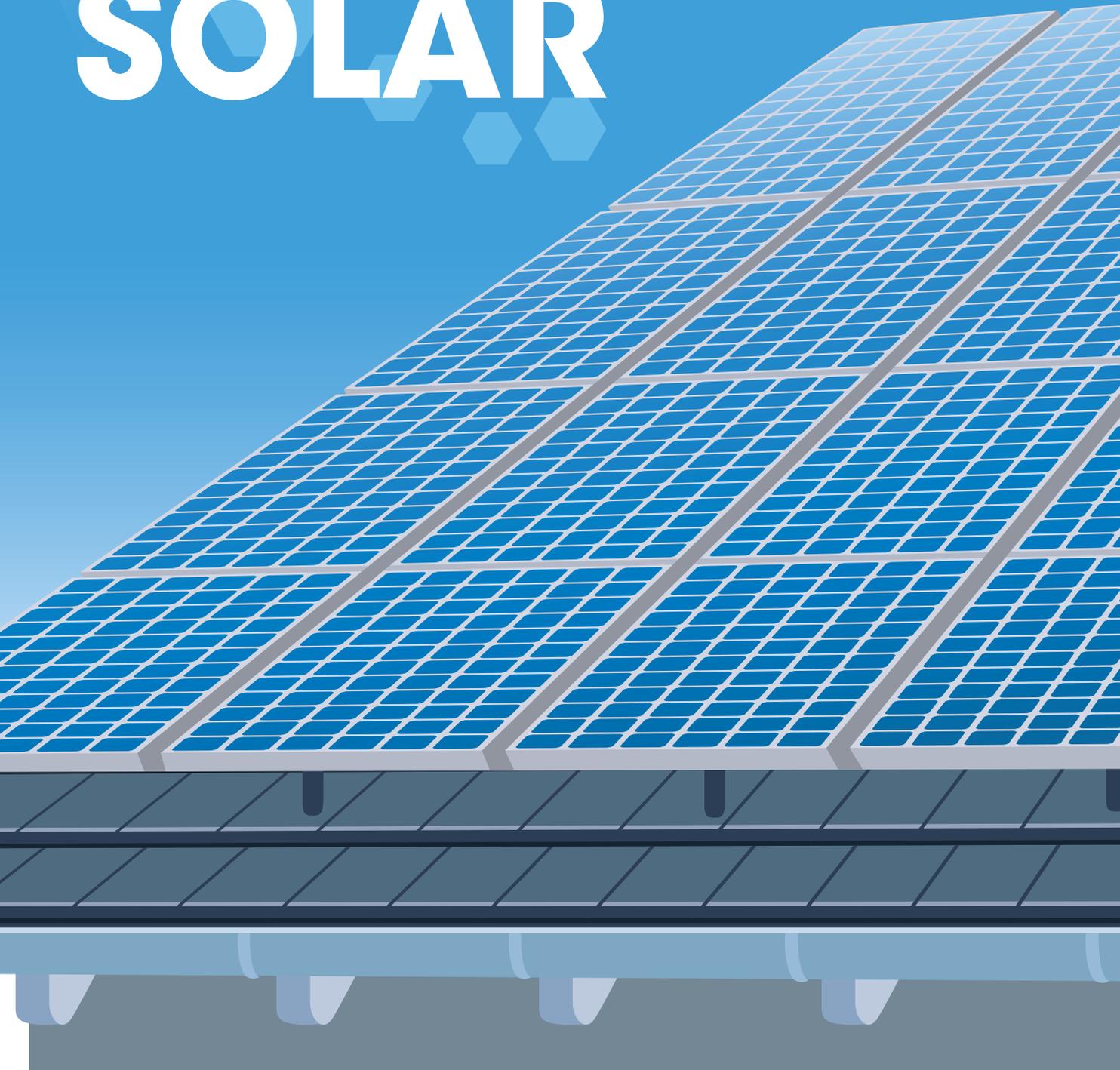




FACTSHEET

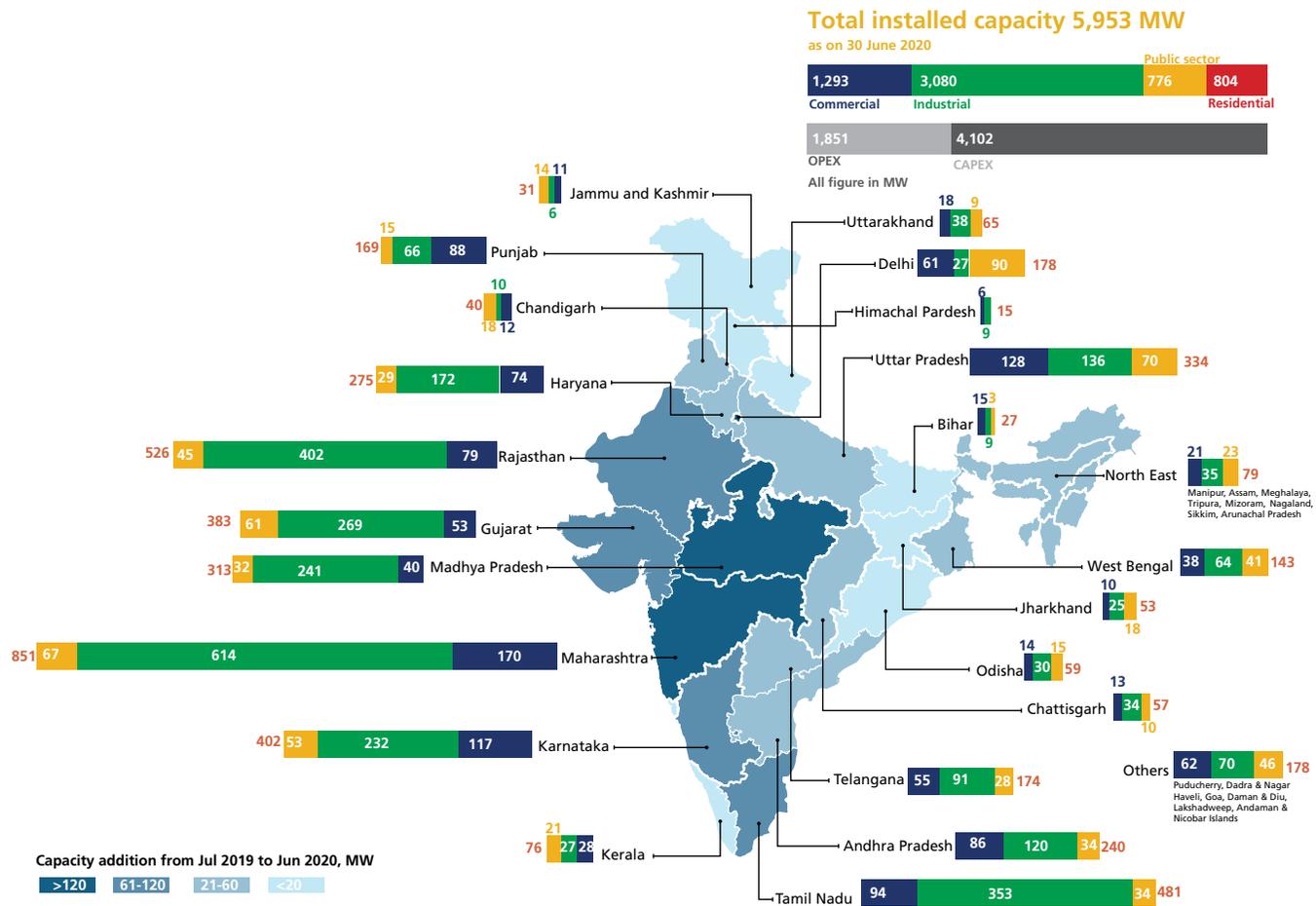
ROOFTOP SOLAR



INTRODUCTION

- The market potential of rooftop solar is estimated at 124 GW. The official target is to reach 40 GW by 2022.¹ However, energy produced by rooftop solar is close to 6 GW today.²
- Residential rooftop solar accounts for only about 13 per cent within the 6 GW of current installed capacity.³
- A slump is expected in distributed PV deployment due to COVID-19 disruptions. Capacity additions in 2020 will be lower, with the deficit continuing until 2022.³

Map: Installed rooftop solar capacity across India



Source: India Solar Rooftop Map—Bridge to India, June 2020, <https://bridgetoindia.com/backend/uploads/2020/09/BRIDGE-TO-INDIA-India-solar-rooftop-map-June-2020.pdf>

- The per megawatt capital cost of rooftop solar PV systems is higher than that of large-scale PV systems.⁴
 - o This is due to higher installation costs, small-sized components, lower economies of scale, and a smaller base on which to spread fixed costs. Additionally, the cost of leasing rooftops, including developmental charges, or the opportunity cost in case of self-owned rooftops in urban areas is higher than for large-scale PV.
- Central Electricity Authority (CEA) notes that about 22 per cent of every unit of electricity generated is lost due to transmission and distribution (T&D) losses, putting excessive financial burden on distribution utilities.⁵
- The benefits of rooftop solar to distribution utilities include peak shaving and power purchase cost optimization, network congestion relief, network upgrade CAPEX deferral, reactive power and voltage control opportunities, avoidance of POC and STU losses in serving load, and RPO benefits.

INTERFACING WITH DISTRIBUTION UTILITIES

- Distribution utilities view the development of rooftop PV as a challenge because self-consumption reduces revenues from profitable industrial, commercial, and high-tier residential customers.
- Electricity T&D subsidies have grown from Rs 41,252 crore (US \$6.9 billion) in 2014 to Rs 79,671 crore (US \$11.9 billion) in 2019, benefitting residential and agricultural users.⁶
- Power surplus—fixed charge lock-in and backing down of capacity
 - o A power surplus situation is a disincentive for adopting rooftop solar as surplus can have a significant financial burden on distribution companies. Most power procurement by distribution companies is done through long-term contracts with binding fixed-cost commitments. Fixed cost payments to power generators due to backing down are as high as 15 per cent to 35 per cent.⁷
 - o The situation is exacerbated by generation planning on faulty premises, such as:
 - Lower demand growth than anticipated due to unrealistically high estimation of future demand
 - Capacity addition in the recent past based on unrealistic expectation of growth in demand
 - Reduction in demand for power due to increased sales migration to open access, captive options

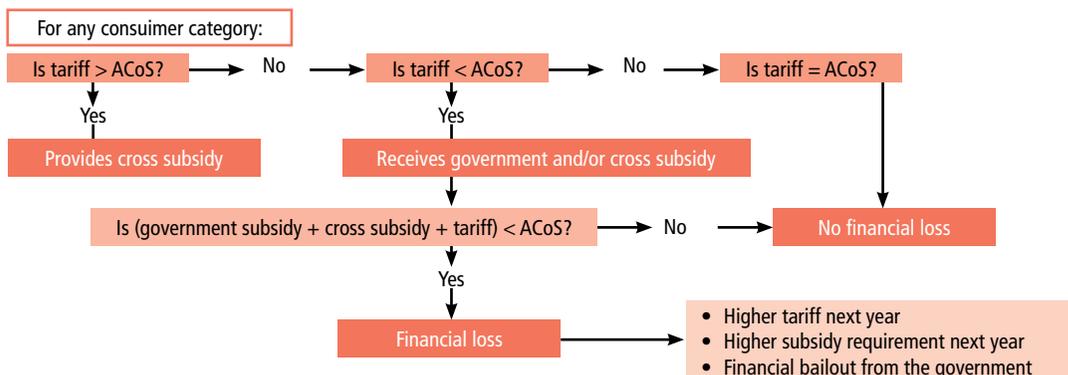
Table: Cost of backing down power generation

State DISCOM	Rajasthan	Punjab	Maharashtra	Madhya Pradesh	Gujarat
Backing down (MW)	1,798	3,457	4,231	2,444	5,525
Backing down as % of contracted capacity	14%	27%	19%	17%	30%
Backing down payments as % of total fixed cost payments to generators	16%	33%	21%	28%	36%
Backing down payments as % of state government electricity subsidies	59%	51%	59%	40%	348%

Note: Data for the year 2015–16 except for Maharashtra which is for 2016–17
 Source: The Prince of Plenty: Insights from surplus power in Indian cities. Prayas (Energy Group).

- Subsidies—need to improve targeting and rationalization
 - o Subsidies to distribution utilities are 10 per cent to 30 per cent of the aggregate revenue.⁸
 - o Subsidies are not targeted to agricultural consumers alone; many domestic and non-domestic consumers receive subsidized power.
 - o Delay in subsidy disbursement substantially aggravates the financial burden of distribution utilities and will necessitate periodic bailouts in the future.⁹
- Distribution utilities need to balance the Average Cost of Supply (ACoS) with the tariff charged. However, this is often not the case as commercial and industrial (C&I) customers pay higher than ACoS (thus providing cross-subsidy) and subsidized customers pay less than ACoS. In many cases the tariff paid by subsidized customers is lower than the ACoS despite the existence of cross-subsidy and government subsidy, hence resulting in a loss to the distribution utility.

Figure: Schematic on cost recovery through tariff



Source: Elephant in the Room: Implications of subsidy practices on DISCOM finances. Prayas (Energy Group), May 2019

POLICIES

- Current policies and regulations in India prescribe parameters such as permitted system size, sanctioned load, transformer capacity, and metering and billing. Every state in India has come up with a net metering policy or a rooftop solar policy indicating modalities of installing a grid-connected rooftop solar PV system and to determine how consumers are to be compensated for the electricity produced. So far, 19 states offer both net metering and gross metering (subject to conditions) while 17 states permit only net metering. The allowed limit of the system size lies between 1 kW and 1 MW for most states.¹⁰
- Phase II of the rooftop solar programme takes a new approach by making distribution utilities and their local offices the nodal points for implementation, including for vendor management and subsidy disbursement. The policy has assured a capital subsidy for 4 GW of residential rooftop solar capacity and cash incentives to distribution utilities for facilitating 18 GW of solar rooftop capacity.¹¹
- Metering regulations can be of quite some importance. For rooftop solar consumers with high electricity tariffs, net metering regulations are of more value than gross metering. Net metering allows a consumer to offset electricity purchases from the grid by exporting electricity from rooftop solar while gross metering allows the user to sell what is generated at a lower price (average power purchase cost).

FINANCING

- Two common types of business models are available in India for rooftop solar. In the CAPEX model, the user of the rooftop owns the assets, consisting primarily of solar panels, and the upfront cost must be paid entirely by the user. In the RESCO or OPEX model, the assets are owned by developers or investors but installed at the customer's premises. The customer pays a pre-determined price per unit generated as defined in a power purchase agreement (PPA) over a specified period, normally 15 to 20 years.
- Rooftop solar sector has been financed by the public sector, private sector commercial banks, and non-banking financial companies. State Bank of India and Punjab National Bank are prominent financiers of rooftop solar projects through access to lines of credit from CTF-World Bank, CTF-Asian Development Bank, and GCF-NABARD worth US \$1.3 billion in total. The Green Climate Fund has also provided a US \$250 million fund via Tata Cleantech Capital and NABARD.¹²
- Among private sector banks, Yes Bank and Axis Bank have a strong presence in the rooftop solar market.
- NBFCs such as IREDA, PFC, REC, and L&T Financial Services also have a prominent presence in the solar lending space. IREDA has lines of credit with several bilateral and multilateral agencies, such as KfW, JICA, ADB, EIB, and AfD, for financing renewable energy projects.
 - o IREDA has a loan scheme for financing rooftop solar PV grid-connected projects for commercial, industrial, and institutional consumers. IREDA provides financing ranging from 1,000 kWp for standalone projects and for aggregated projects with each sub-project having a capacity of at least 20 kWp.¹³
- Challenges in financing arise largely due to the general lack of a formal credit history of MSMEs and households, business uncertainty, and unattractive project sizes for lenders and developers. Financing has benefited large and well-established developers to implement projects mostly at large C&I establishments due to good credit profiles and high rooftop solar capacities.

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