

# RENEWABLE ENERGY



## ROUNDTABLE REPORT 6

# ROOFTOP SOLAR

LESSONS FROM STATE POLICIES AND PERFORMANCE

# ROOFTOP SOLAR

## Overview

India has set an ambitious target of 40 gigawatts (GW) of rooftop solar capacity by 2022. There have been improvements in the rooftop solar sector in terms of quality and performance of solar panels; policy and regulatory support; and greater options for financing. However, as of today, the country still lags behind significantly on intended targets of installation capacity, as rooftop solar installations add up to only around 6 GW. Within this, residential rooftop solar accounts for only about 14 per cent (~ 840 MW). Technical, institutional, and financial barriers are responsible for poor uptake of solar power. Rooftop solar projects are distinct from large-scale solar projects in their requirements and meeting the 40 GW rooftop solar target requires the active participation of distribution companies and residential consumers.

Due to higher installation costs, small-sized components, lower economies of scale, and a smaller base over which to spread fixed costs, it costs more to produce a unit of electricity through rooftop solar PV systems than it does through large-scale PV systems. 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 the corresponding costs in large-scale PV systems. 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 point of connection (PoC) and state transmission utility (STU) losses in serving load, and easing of renewable purchase obligations (RPO). The Central Electricity Authority (CEA) notes that about 22 per cent of every unit of electricity generated is wasted due to transmission and distribution (T&D) losses. Rooftop solar can reduce the financial stress and cash loss of distribution utilities.



# The roundtable

The work Centre for Science and Environment (CSE)'s renewable energy (RE) programme has been focused on shaping policies and building public awareness to accelerate RE deployment, strengthen energy access for the poor, and facilitate creation of opportunities for people for making the best use of RE technologies. As part of its continuing efforts to highlight important issues concerning energy security and sustainability in India, CSE planned a series of stakeholder roundtables.

This roundtable, the sixth in the series, was organized on 12th February 2021 and brought together representatives of think tanks, rooftop solar developers and distribution utilities to deliberate on reasons behind the slow growth of rooftop solar in the residential sector, and to reflect on the current mood and state of affairs with suggestions on medium- and long-term strategies to help realize the potential of rooftop solar in a manner benefiting all stakeholders—consumers, distribution utilities and governments at both the Central and state levels.

## Mr Samrat Sengupta

**Director, Climate Change and Renewable Energy, CSE**

Samrat is a development and operations management professional with 24 years of experience in sustainable energy and climate change cross-sectoral domains. His specific interests include renewable energy power projects, low carbon development and mainstreaming climate change in developmental planning. He has worked with power producers (solar, onshore and offshore wind, and hydro), management and engineering consulting houses, international trade associations for renewable energy promotion, national and international civil society organizations, and government research institutions. Samrat holds an MBA with a specialization in energy management from the Indian Institute of Social Welfare and Business Management (IISW and BM), Calcutta. He has also represented Indian and South Asian civil society in various multilateral forums like the UNFCCC, IPCC and G8.



Mr Sengupta moderated the Roundtable.

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## Ms Ritu Lal

**Senior Vice President and Head of External and Institutional Relations at Amplus Solar**

Ritu has over 20 years of experience across various fields. She has worked in Europe, Asia Pacific, Middle East and Africa. She has been with Amplus from its early days and previously headed its business development portfolio. She represents Amplus at industry bodies like CII, FICCI, ASSOCHAM, IGEF, trade associations, media, government agencies, policy think tanks and various other platforms and events in India and internationally.

In addition to her business role, she mentors young solar professionals and trains industry start-ups at National Institute of Solar Energy (NISE) and International Solar Alliance (ISA). She trains energy professionals and government officials from various countries on how to make solar commercially viable. She is also a part of various industry initiatives aimed at increasing the participation of women in RE.

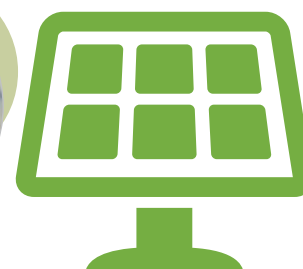


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## Mr Ashwin Gambhir

**Fellow at Prayas (Energy Group)**

Ashwin Gambhir is a Fellow at Prayas (Energy Group), where he has been since 2009 and coordinates work on RE policy and regulatory research and advocacy. He also works on power sector modelling, looking at long-term capacity expansion planning with associated production cost simulations. He has been closely involved with various RE policy and regulatory processes with state governments, SECS as well as MNRE and Niti Aayog. He has a masters in mechanical engineering from University of Massachusetts, Amherst.



# ROOFTOP SOLAR

## Ms Nithya Balakrishnan

### Head of Marketing & Communication, Fourth Partner Energy

Nithya Balakrishnan leads MarCom and Policy initiatives at Fourth Partner Energy. She is responsible for driving brand strategy and positioning, media management, PR and government relations for the firm. She carries out all external communication with various stakeholders, industry associations, think tanks and sectoral publications. She drives internal and external marketing campaigns, primarily ideating and creating content—while mentoring and guiding her team towards executing the same.

Prior to 4PEL, Nithya was a business journalist and news anchor with CNBC and Economic Times TV in New Delhi for nearly a decade where she tracked corporate policy for the energy and retail sectors. She was a finalist for the Best TV Journalists (under 25) by the Indian Broadcasters Association in 2012.



## Mr Ramesh Naledath

### Chief Operating Officer, Orb Energy

Ramesh Naledath is the co-founder and COO of Orb Energy. Ramesh brings in more than 28 years of experience in the consumer electronics and solar photovoltaic industry in India and many parts of Asia. At Orb, Ramesh oversees sales and business operations, addressing the commercial and industrial, and residential segments. Prior to launching Orb in 2006, Ramesh worked for Shell Solar from 1998 to 2006, as head of operations for India and Sri Lanka.



## Mr Ashish George

### Programme Manager, Renewable Energy, CSE

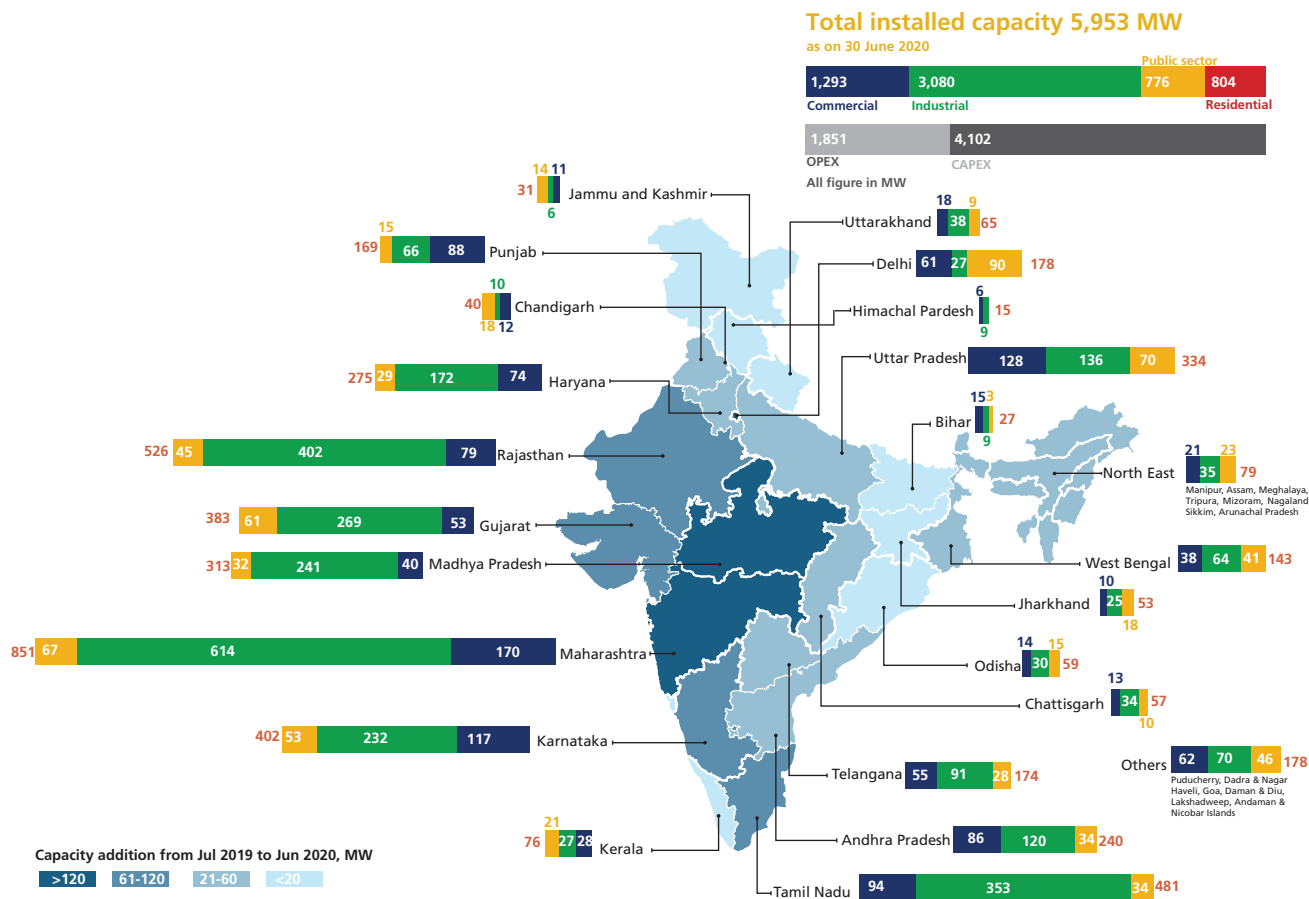
Ashish has over ten years of professional experience in the fields of renewable energy and energy access. His work has focused on providing analytical and strategic support, project development and programme management. He has worked on evaluating policies and regulations, preparing feasibility studies, strategy papers, roadmaps and policy briefs for state and national governments in India. He holds a BSc in physics from Loyola College, Chennai, and an MSc in environmental management from the Yale School of Environment, New Haven, Connecticut, US.



# Agenda and discussion

Rooftop solar in India grew from 623 MW in 2015 to 5,953 MW in 2020. During this time, there have been improvements in the quality and performance of solar panels, with generally improving financing, policy, and regulatory ecosystems. But these ecosystems need to improve faster as rooftop solar is still critically behind the targets set by the government.

## Total installed capacity of rooftop solar in India



Source: Bridge to India

Two common types of business models are available for rooftop solar in India. 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. The bar chart shows a dip in capacity additions in 2020 which can be attributed to the effect of Covid-19. CAPEX or self-financing models are most common, especially for non-commercial and non-industrial users such as the residential sector due to lack of debt financing. The share of the OPEX model, however, has been increasing, from 13 per cent in 2016 to about 40 per cent in 2020.

As of today, rooftop solar capacity is close to 6 GW but residential rooftop solar accounts for only about 14 per cent of it (~840 MW). The poor uptake is due to challenges in navigating the complex and non-uniform policy and regulatory framework along with implementation challenges and lack of bank financing especially for residential and MSME sectors. There are widely differential growth rates of rooftop solar among states in India and the five largest states by installed rooftop solar are



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Today, consumers need options to purchase power from. Discoms should not enforce higher cost thermal power

**Mr Ramesh Naledath**



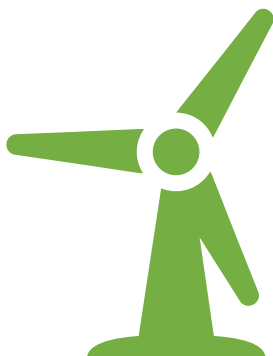
Discoms need to consider a longer time frame for planning. They were not sufficiently involved in the initial stages of rooftop solar planning but as prices of solar crashed, they are reacting (in a hostile manner) to increasing migration to solar power

**Ms Ritu Lal**

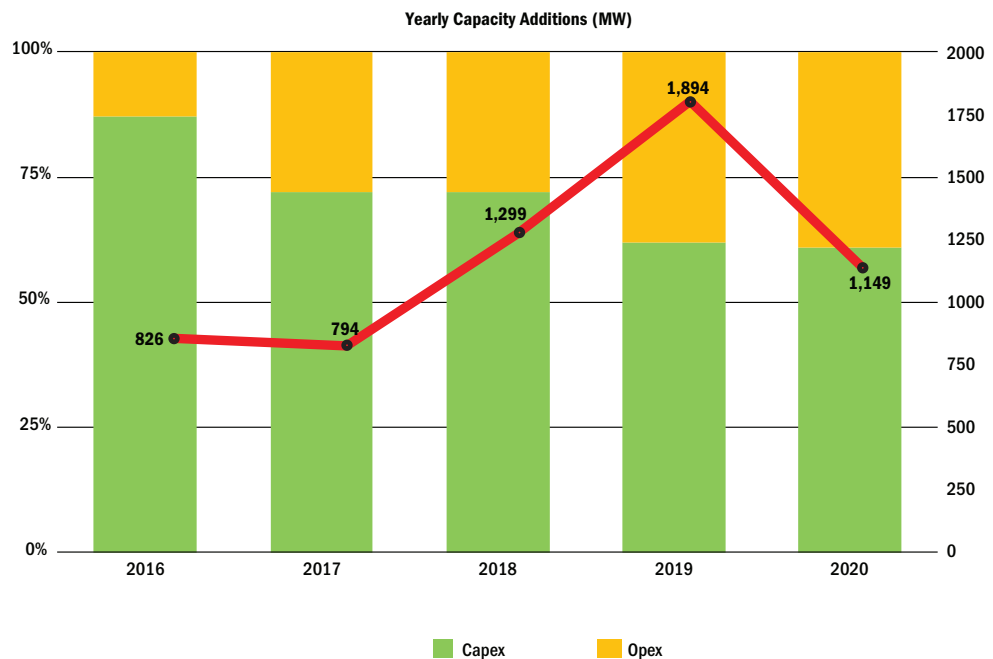


The best arguments for rooftop solar are job creation at the state level, post-pandemic growth and reskilling

**Ashwin Gambhir**



## Yearly capacity additions of rooftop solar since 2016



Source: CSE data visualization

Maharashtra, Rajasthan, Tamil Nadu, Karnataka, and Gujarat, making up close to 50 per cent of total capacity. The Central government's Phase II of the rooftop solar programme takes a new approach by making distribution companies (discoms) the nodal points for implementation of rooftop solar. This includes activities like vendor management and empanelment and subsidy disbursement. The rationale, as mentioned in the MNRE policy document, is to reduce coordination challenges between multiple agencies, lack of uniform and mandatory regulations, and low consumer awareness. However, due to the concurrent nature of the electricity sector in India, MNRE has only a limited role in controlling the outcome of its 40 GW target as the implementation authority is in the hands of state bodies.

It is not clear how the move of the MNRE to make distribution utilities the nodal point will play out in the outcome for rooftop solar in the future—it could be a good move if it increases communication and collaboration with developers and 'prosumers' or it could backfire if sufficient care is not taken to bring all parties on board, for constructive discussions to find a middle ground.

Ministry of Power (MoP) has issued the Electricity (Rights of Consumers) Rules, 2020 covering rights of consumers and underlining obligations of distribution licensees, such as new connections and modifications in existing ones, metering arrangements, billing and payment, disconnection and reconnection, and reliability of supply. The Rules mandate net metering for loads up to 10 kW and gross metering for loads greater than 10 kW, addressing the rights of consumers as prosumers.

It is believed that the new net metering rules create regulatory uncertainty and may lead to shrinking of the market and its movement away from C&I consumers. The residential sector alone cannot bear the weight of rooftop solar aspirations. The ambitious 40 GW target has also attracted many MSMEs into the sector, but the draft norms will be detrimental to growth of rooftop solar in this sector as net metering is one of its unique selling points. Panellists in the discussion repeatedly stated in unison that putting such limits on capacity is not the right approach by the government to address the problems faced by discoms. All facilities, including net-metering, gross-metering and behind-the-meter and electricity banking should be available and without any caps or limits of capacity to those installing rooftop solar. Distribution utilities are free to charge reasonable fees for these grid services that it provides to connected loads and customers.

The Union budget of 2021 states that the government is working on a framework that will give electricity consumers the ability to choose between service providers and discoms. Discoms should recognize the advent of the prosumer revolution for their own sake. Customers will always prefer low-cost power options and discoms should enforce higher costs on thermal power as the customer today has options. The gap between cost of discom power and solar power is large and customers will not mind paying grid support charges and banking charges if they are reasonably determined.

The panel also reflected on the earlier stages of solar development in India when grid parity was yet to be achieved. Policies for rooftop solar were being formulated at that point; however, discoms may not have taken them seriously due to the large cost difference. But as prices for panels crashed and their quality improved, many commercial and industrial customers started installing rooftop solar plants and reducing the power purchased from discoms. This created a distress with cash-strapped discoms as these commercial and industrial customers were among its most profitable and promptly paying customers. To stem these losses, discoms in various states are deciding to put limits and caps on the regulations such as limiting the size of net-metering to 10 kW only. These C&I customers form a profitable base for discoms where they recover subsidies that are given out to residential and agricultural customers. The woes of discoms relate to under-recovery of these subsidies, infrastructure-related losses in the electricity transmitted and collection inefficiencies. In this regard, there is a need for policy makers to address the pain points of discoms in a manner that doesn't require capping or limiting of rooftop solar in the country.

India's regulatory environment for rooftop solar is also quite inconsistent. These inconsistencies are currently the biggest challenge for rooftop installers and customers. Depending on the state, policies can restrict the development of rooftop solar-based on system size, connection type, metering type, developer model (OPEX or CAPEX), and approval time and procedure.



Land is a precious resource and rooftop solar addresses power generation objectives with lesser use of land

**Nithya Balakrishnan**



## The way forward

Industry representatives (of rooftop solar companies) need to come together and forward to put up a unified proposal to state governments suggesting the lifting of caps and limits but at the same time making it clear that there are no objections to reasonable grid support charges decided by state regulators for distribution utilities. MNRE targets have limited enforceability as the concurrent structure of electricity in India leads to conflicting objectives between Center and states. In all this, there is a need to recognize that the problems for discoms are deep and vast and the struggle to manage daily cash flows will remain a primary driving force behind all decisions that are taken by discoms.

In this situation, one of the best ways to align rooftop solar with interests and priorities of discoms is by emphasizing on the efficiency gains (distribution loss reduction, cost of supply reduction, etc.) and the high potential for employment that rooftop solar creates. According to industry experience, rooftop solar can create jobs in a 7:1 ratio as compared to large-scale solar with the additional benefit of freeing developers from the tough task of land acquisition. Rooftop solar can sustain itself on its own economic potential and does not need concession, waivers, or subsidies anymore, which would be better directed towards discoms to reduce their losses.

The Ujjwal Discom Assurance Yojana brought out by the government sought to address the root of the malaise facing discoms by implementing a financial turnaround and revival package for electricity distribution companies of India with the intention of finding a permanent solution to the financial woes of the power distribution sector. Although such interventions and bailout packages are expensive, they point to the urgent need to increase efficiency and stem losses occurring in this sector.