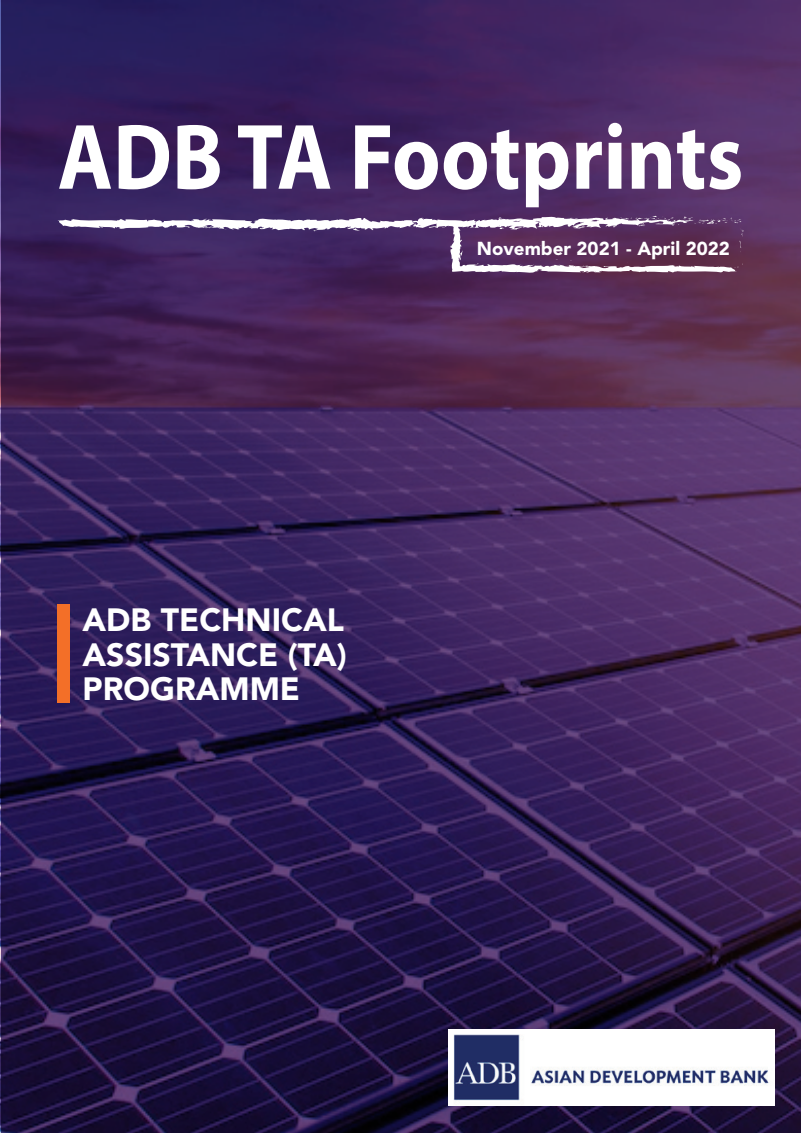
ADB TA Footprints

November 2021 - April 2022



ADB TECHNICAL ASSISTANCE (TA) PROGRAMME

ADB ASIAN DEVELOPMENT BANK

Dear Colleague,

We are witnessing multiple geopolitical realignments along with worldwide energy crunch because of shortage in supply of conventional energy sources. The COVID-19 pandemic earlier brought with it disruptions in global supply chains resulting in shortage of various resources. There is an increasing case for scaling up renewable energy capacity, especially solar energy in the backdrop of such uncertain global events.

The Rooftop Solar (RTS) remains a high potential but highly untapped category within the solar sector in India, with a cumulative capacity of 6.185 GW out of the 40 GW targeted by the government. The Ministry of New and Renewable Energy, Government of India (MNRE) has recently announced a new simplified procedure under Rooftop Solar Programme Phase-II wherein the residential consumers will get flexibility to get the rooftop solar plant installed by themselves or through any vendor of their choice. This accompanied with other measures initiated by the government especially on capacity building and awareness creation is expected to create a spurt in demand and installations of residential rooftop solar systems.

The ADB TA programme continues to provide support to partner states and Union Territories (UTs) in their scaling up efforts through support in the areas of policy and regulatory advocacy, market assessment and development of business model, bid process management, capacity building & training measures, demand aggregation and awareness creation & outreach. Through the ADB TA portal, we aim to provide easy access to information and data to various stakeholders to facilitate rooftop solar development in India. The TA programme has already trained more than 1000 officials across multiple states/UTs on diverse aspects related to RTS deployment. The programme has also supported landmark schemes such as Soura Scheme in Kerala, which was one of the largest schemes for RTS deployment in India.

In the period from November 2021- April 2022, the ADB TA programme conducted online training for 112 grid engineers from Northern Power Distribution Company of Telangana Limited (TSNPDCL). A Rooftop Solar Portal for the state of Goa was deployed and made live for accepting applications for implementation of solar rooftop projects under CFA and Non-CFA scheme in the month of March 2022. The TA programme also conducted a one-day study tour cum knowledge building workshop for MNRE officials regarding performance evaluation of rooftop solar systems. Finally, four guidebooks on demand aggregation, utility led business models, solarizing government buildings and performance evaluation of RTS systems have been developed and are in final stages of publication.

Through the continued support provided under the ADB TA programme, sufficient capacities are being built amongst the states and UTs for advancing the deployment of RTS and make it a self-sustaining and booming sector. With support from various quarters, I am confident that we will soon reach this stage where rooftop solar will no longer remain a novelty but will rather transform into a basic necessity for all end-consumers.

Jigar Arvindbhai Bhatt
Senior Project Officer
ADB TA Programme

What is the ADB Technical Assistance (TA) Programme?

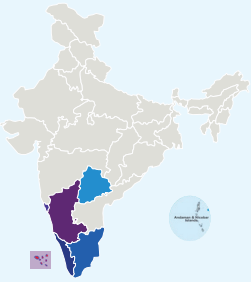
ADB's Technical Assistance (TA) Programme is an initiative under the able guidance of MNRE that aims to remove identified barriers to large-scale adoption of Rooftop Solar (RTS) through enhancement of the institutional capacity of DISCOMs and other RTS stakeholders. The programme is currently being implemented in India across Kerala, Karnataka, Goa, Tamil Nadu, Puducherry, Andaman & Nicobar Islands, Lakshadweep, and Telangana.

This covers DISCOMs, SNAs, State Power Departments, and SERCs. Activities include support to streamline tendering and applications for grid-connection of rooftop PV systems, to implement net metering/gross-metering policies in the country, aggregate demand and to increase consumer awareness about RTS, as well as to assist with the creation of large numbers of trained and accredited rooftop PV certification agents. This is aimed to facilitate the market development of RTS and make it possible to deploy RTS systems, at the scale and pace envisioned by MNRE for meeting its targets. For enabling rapid rollout and scale of solar rooftop implementations, development of a single window clearance mechanism through development of DISCOM specific rooftop solar portals connecting customers with DISCOMs and SNA is undertaken.

Support provided under the ADB TA Programme

Traninings & Study Tours (1000+ trained)

- A&N: RTS Training (28 participants)
- GOA: RTS Training (130 Participants)
- KERALA: RTS Training (150 Participants)
- PUDUCHERRY: RTS Training (35 Participants)
- TAMIL NADU: RTS Training (170 officials)
- TELANGANA: RTS Training (332 officials)
- KARNATAKA: RTS Training (175 officials)
- KARNATAKA: Study tour on Utility driven business models
- KERALA: Study tour to a Centralised monitoring centre



Rooftop Solar Portals Deployed

- Andaman & Nicobar
- Puducherry
- Tamil Nadu
- Telangana
- Kerala
- Karnataka (BESCOM), GESCOM)
- Goa

Communication & Outreach

- Testimonial videos
- Animation videos
- Radio jingles
- Bidders meet
- Webinars
- Newsletters
- Brochures & Pamphlets

Scaling Utility Driven Models

- Proposed RTS Business Models for:
- Andman & Nicobar
- Puducherry
- Tamil Nadu
- Telangana
- Kerala
- Karnataka
- Goa
- Lakshadweep

New capacity allocations for FY 2021-22

- Telangana: 50 MW
- Karnataka: 33 MW
- Kerala: 40 MW

- Tender issued for more than **745 MW** RTS capacity of which **271 MW** have been awarded
- Organized/Supported **11 bidders meet covering more than 1000 stakeholders**
- Supported KSEBL in **conceptualization, development, regulatory approvals and implementation of innovative Utility driven business models**
- **Supported KSEBL in development of Project Management Portal**
- Carried out **demand aggregation for more than 418 MW RTS capacity**
- **Developed 4 Knowledge Products –** Utility led Business models, Demand Aggregation, Solarizing Government Buildings and Performance Evaluation
- Carried out **Performance Evaluation of 50 sites** under RTS scheme in **Telangana and Kerala** and prepared a consolidated report
- **Developed ADB TA website** to serve as a one stop platform for knowledge sharing and dissemination of various activities under ADB TA programme

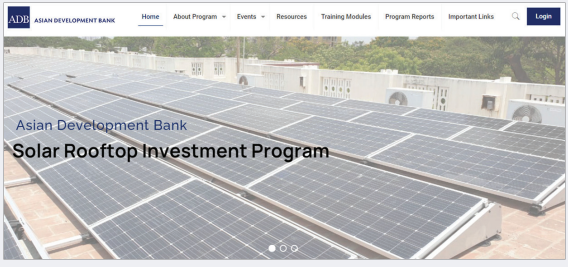
Key Highlights

1. Website

The ADB TA Team has designed and developed a website for knowledge dissemination to various stakeholders. For the website, the team developed a beta version, conducted user-acceptance testing along with a security audit, and made it live on 22nd September 2021. The website provides details of the program and highlights the key achievements in the states/UTs regarding RTS installations. It also provides a one stop platform for accessing various documents, data and information related to ADB TA program. This includes:

- Training reports
- Bid documents
- Business models for RTS
- Guidebooks
- Quarterly progress reports
- Other documents

The website is accessible at: https://adbsrip.org/



Home page of ADB website

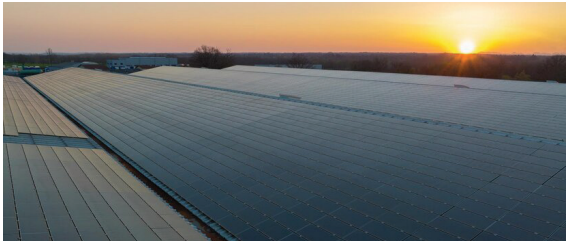
2. Online training: Telangana

As part of the ADB TA programme, the ADB TA team conducted a 2-day online training workshop for The Northern Power Distribution Company of Telangana Limited (TSNPDCL). The training workshop was held on 17th and 18th November 2021 and was attended by 112 grid engineers in a single batch from TSNPDCL. Key guests included Mr. Jigar Bhatt, Senior Project Officer, ADB, and Mr. T. Madhusudan, Chief General Manager- IPC and RAC, TSNPDCL. The training was conducted by solar rooftop and capacity building specialists Mr. Arvind Karandikar and Mr. Francis Suresh Balan.

The following key modules were covered under the training workshop:

- Overview of solar PV sector
- Major components of PV system
- Site feasibility and due diligence
- Grid interconnection, inspection, and settlement

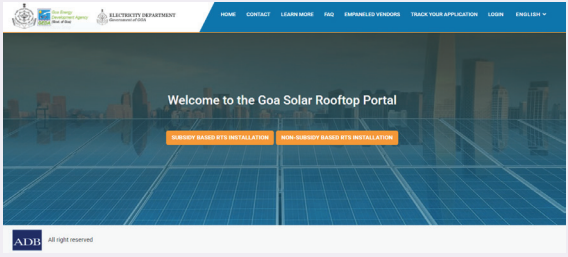
Mr. Karandikar giving the training to TSNPDCL officials



3. Portals launched and deployed:

A Rooftop Solar Portal for the state of Goa was deployed and made live for accepting applications for implementation of solar rooftop projects under CFA and Non-CFA scheme in the month of March 2022.

The portal is accessible at: https://solar.goa.gov.in/



Home page of RTS portal for Goa

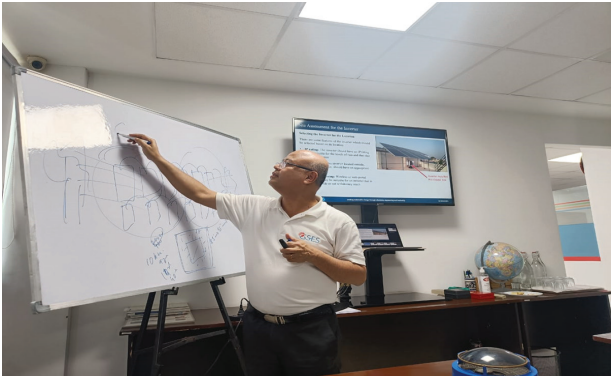
4. Study Tour on Performance Evaluation for MNRE

As part of the ADB TA activities, MNRE requested ADB for conducting performance evaluation and site assessment for 50 solar rooftop sites in the states of Kerala and Telangana. The ADB TA team, with support from Global Sustainable Energy Solutions India (GSES), conducted the study and prepared a report which documented the key outcomes and learnings with an aim to serve as a guiding document for improvement of implementation process for future solar rooftop programmes.

To further build upon the findings of the study and disseminate the process used for performance evaluation of solar rooftop systems, a one-day study tour cum knowledge building workshop was organized for MNRE officials on 29th March 2022 at the GSES Solar Training Centre in New Delhi. Five officials from MNRE participated in the study tour, which was coordinated by the ADB TA team and facilitated by the technical team from GSES.

The tour consisted of the following sessions:

- Introduction
- Classroom session on performance evaluation
- Equipment demonstration
- Site visit



Mr. Dwipen Boruah taking the classroom session

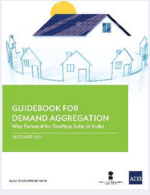
Group photo comprising participants from MNRE, ADB TA Team, and facilitators from GSES India

5. Guidebooks for knowledge dissemination

As part of the ADB TA activities, four guidebooks on topics relevant to the Solar Rooftop sector in India have been developed. These knowledge products will assist with knowledge dissemination and increased awareness about various aspects related to Rooftop Solar sector in India. The topics covered in the guidebooks are as follows:

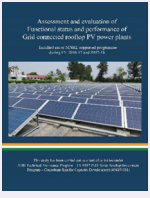
a) Guidebook for Demand Aggregation: Way Forward for Rooftop Solar in India

The guidebook aims to assist distribution companies (DISCOMs) or utilities interested in undertaking demand aggregation activities in their license area. It describes the approaches to program implementation and lists the important parameters that any utility should consider before designing a demand aggregation program and also provides step-by step guidance on undertaking such an initiative.



b) Assessment and evaluation of functional status and performance of Grid connected rooftop PV power plants

The guidebook documents the assessment of selected grid connected rooftop PV power plants installed under MNRE supported programmes during FY 2016-17 and FY 2017-18 and evaluates the functional status and performance of these systems. The outcomes and learnings from the study may be applied to measure success of the implemented rooftop PV programmes as well as for improvement of the implementation process for future rooftop programmes.

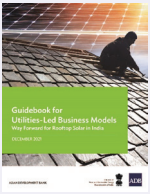


c) Solarizing Government Buildings to Optimize Energy Costs and Fight Climate Change

The report has been prepared as a guide for implementing agencies in solarizing government buildings, utilizing analysis and learnings from recent large-scale programs for solarizing government buildings in India. The report also suggests the sequence of key steps for successfully driving the solarization of government buildings program, including some of the best practices for streamlined implementation.

d) Guidebook for Utilities-Led Business Models: Way Forward for Rooftop Solar in India

The guidebook discusses four business models based on which a utility can evaluate and target its Rooftop Solar deployment programs according to prevailing conditions. The guidebook will assist utilities interested in undertaking RTS implementation in their license area. It describes the models in detail, presents a framework for cost–benefit analysis, and identifies the roles and responsibilities of various stakeholders.



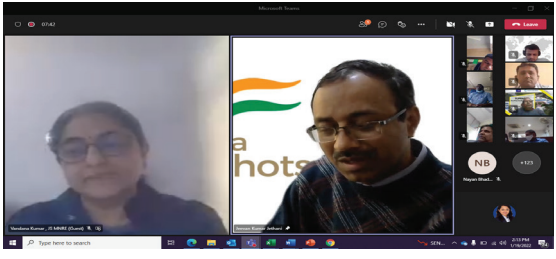
6. Support for the National Workshop

MNRE organizes National Workshop once in every quarter to share the best practices, challenges, as well as new initiatives in the field of Rooftop Solar. The ADB TA Team supported MNRE in organizing the 3rd and 4th National Workshop on review of implementation progress under Rooftop Solar Phase II Programme. The 3rd National workshop was held in a virtual manner on 19th January 2022 and was attended by more than 100 DISCOMs, as well as TA agencies including ADB, World Bank and GIZ.

Key guest speakers included Dr. Vandana Kumar, Additional Secretary, MNRE and Mr. J.K. Jethani, Scientist F, MNRE. The other speakers for the event included Mr. Hiren Chandra Borah, Scientist D, MNRE, Mr. R J Vala, Chief Engineer, GUVNL, and Mr. Pulkit Dhingra, AHA Solar.

The key discussion points of the workshop included:

- Status of rooftop solar programme and solar cities
- Lessons learnt from the large-scale implementation of RTS in Gujarat
- Brief about the online training platform – Solar Pathshala
- Review of progress of RTS scheme in various states and UTs



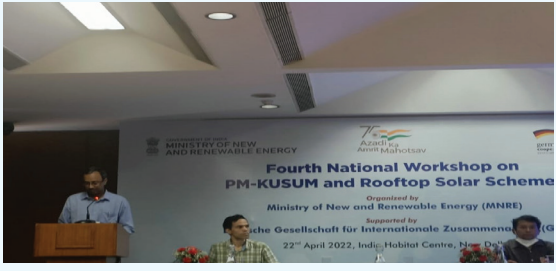
Ms. Vandana Kumar (AS, MNRE) and Mr J.K. Jethani (Scientist F, MNRE) addressing the participants in 3rd National Workshop

The 4th National Workshop was organized in-person on 22nd April 2022 and was attended by more than 20 DISCOMs as well as TA agencies including ADB, World Bank and GIZ.

Key guest speakers included Mr. Lalit Bohra, Joint Secretary, MNRE and Mr. J.K. Jethani, Scientist F, MNRE. The other speakers for the event included Mr. Hiren Chandra Borah, Scientist D, MNRE, Mr. R J Vala, Chief Engineer, GUVNL, Mr. Dwipen Boruah, Managing Director, GSES, Mr. Pallav Gandhi, HKRP Innovations, and Dr. Veepin Kumar, Deputy Director, MNRE.

The key discussion points of the workshop included:

- Overview of achievements under RTS scheme and key focus areas for further development
- Experience sharing of GUVNL for RTS implementation
- Key steps to be followed for inspection and audit of RTS systems, best practices seen, and lessons learnt from inspection of various sites across states
- RESCO model for residential sector in Chandigarh
- Virtual Net Metering and Group Net Metering
- Overview of Solar Energy Data Management (SEDM)
- Issues faced by various states regarding RTS scheme implementation and way forward



Mr. J.K. Jethani addressing the participants of 4th National Workshop

In the 2nd National Workshop organized on 24th September 2021, ADB TA Team had also presented on "Demand Aggregation under the TA Programme", which highlighted the need for conducting demand aggregation activities.

7. Tenders issued

a) **Telangana State Renewable Energy Development Corporation Limited (Telangana)** issued tender for 50 MW; 10 MW for The Northern Power Distribution Company of Telangana Limited (TSNPDCL) and 40 MW for The Southern Power Distribution Company of Telangana (TSSPDCL). The tender was released on 10th February 2022

Tender outcome: Telangana State Renewable Energy Development Corporation Limited (TSREDCO) undertook empanelment of vendors for both the DISCOMs (TSSPDCL and TSNPDCL). 54 vendors were empaneled for implementing rooftop solar systems for residential consumers. The order stating finalized prices was issued on 4th April 2022. The below table highlights the prices discovered:

Capacity of the system	Cost per kWp (INR)
1 kWp	53,300
2 kWp	49,000
3 kWp	47,800
4 -10 kWp	46,600
11 - 100 kWp	43,500
Above 100 kWp	40,800

b) **Kerala State Electricity Board Limited (KSEBL) (Kerala)** issued a second tender on 10th September 2022 for 100 MW specifically for 1 kWp to 3 kWp capacity.

Tender outcome: KSEBL empaneled 30 vendors for implementing rooftop solar systems under this tender. The finalized prices were issued on 17th November 2021 by a separate board order. The below table highlights the prices discovered:

Capacity of the system	Cost per kWp (INR)
1 kWp	75,500
>1 to 2 kWp	67,500
>2 to 3 kWp	63,500

c) **Bangalore Electricity Supply Company Ltd (BESCOM) (Karnataka)** issued a tender for the empanelment of vendors for installation of 50 MW grid connected rooftop solar system on 17th January 2022. The tender was floated for 3 LOTs consisting of 4 parts in each LOT. The details of LOTs and parts are mentioned below:

LOT	Name of Zone
LOT 1	Bangalore North and South (Comprising only of Bangalore City)
LOT 2	Bangalore Rural (Comprising only of Bangalore Rural, Ramanagar, Chikkaballapura and Kolar districts)
LOT 3	Chitradurga (Comprising of Tumkur, Chitradurga and Davanagere districts)

Tender outcome: 4 vendors have been empaneled by BESCOM for implementing rooftop solar systems under this programme. The finalized prices were issued on 6th May 2021 through office memorandum. The below table highlights the prices discovered for each of the LOTs:

Capacity of the system	Cost per kWp (INR)		
	LOT 1	LOT 2	LOT 3
1 kWp to 3 kWp	53,344	59,200	59,200
Above 3 kWp to 10 kWp	51,353	54,000	54,000
Above 10 kWp to 100 kWp	48,990	61,964	61,964
Above 100 kWp to 500 kWp	60,312	60,312	60,312

d) **Chamundeshwari Electricity Supply Corporation Limited (CESC) (Karnataka)** issued a tender for the empanelment of vendors for the installation of 15 MW grid connected rooftop solar system on 19th January 2022.

Tender outcome: Only 1 vendor has been empaneled by CESC Mysuru for implementing rooftop solar systems under this programme. The finalized rates are tabulated below:

Capacity of the system	Cost per kWp (INR)
1 kWp to 3 kWp	60,000
Above 3 kWp to 10 kWp	55,000
Above 10 kWp to 100 kWp	50,000
Above 100 kWp to 500 kWp	45,000

e. **Hubli Electricity Supply Company Limited (HESCOM) (Karnataka)** issued a tender for the empanelment of vendors for the installation of 20 MW grid connected rooftop solar system on 25th January 2022.

Tender outcome: HESCOM has finalized 6 vendors after technical and financial bid evaluation. Final negotiation is under process and expected to be completed soon.

f. **Gulbarga Electricity Supply Company Limited (GESCOM) (Karnataka)** issued a tender for the empanelment of vendors for the installation of 3 MW grid connected rooftop solar system on 8th April 2022.

Tender outcome: GESCOM has opened the tender and vendor empanelment is under progress

g. **Thrissur Corporation Electricity Department (TCED), Kerala:** MNRE provided in-principle approval for allocation of 10 MW capacity to TCED via email dated on 19th April 2022. MNRE also directed TCED to start the tendering process as well as development of online portal. Assistance is being provided by the ADB TA Team for the tendering process.

8. Industry updates

1. Solar (both grid connected and rooftop) accounted for 90% of India's installed renewable energy capacity in FY 2021-22, with 13.9 GW installed. Out of this, Solar Rooftop capacity addition stood at 2.3 GW for FY 2021-22, as compared to 1.9 GW in FY 2020-21. This corresponds to a ~21% increase in rooftop solar annual capacity additions.

   Source: https://cef.ceew.in/solutions-factory/market-handbook (Annual Issue FY 2021-22)

2. India's first portable solar rooftop system was inaugurated at Swaminarayan Akshardham temple complex in Gandhinagar on 18th April 2022. The PV Port systems are standard plug and play photovoltaic systems with an output of 2.4 kWp each and will complement the existing solar system of 400 kW installed at the temple.

   Unlike other conventional solar PV systems, the design of the PV Port system allows the space below the panels to be utilized as storage units for battery packs. Said to have a shelf life of 25-30 years, the PV Port system can be easily installed by a single person, is ideal for Indian climate, and is designed for 100% self-consumption with no power fed into the grid.

   Source: https://mercomindia.com/indias-first-portable-rooftop-solar-systems-akshardham-temple/

3. In January 2022, MNRE announced that residential consumers could install rooftop solar systems through vendors of their choice. Interested consumers can now inform their DISCOM about the installation along with a photograph of the installed system and do not have to go with listed vendors for RTS system installations. Residential consumers may also select the solar module and inverter of their choice. The CFA, which is 40% for rooftop capacity up to 3 kW and 20% beyond that up to 10 kW, shall be directly credited into consumers' accounts within 30 days of installation.

   Source: https://mercomindia.com/mnre-offers-residential-consumers-freedom/

4. On 15th May 2022, MNRE announced that Odisha Electricity Regulatory Commission (OERC) has allowed provisions of Virtual Net Metering and Group Net Metering in the state. This step would facilitate the uptake for roof top solar systems in Odisha.

   MNRE has requested all State Electricity Regulatory Commissions/Joint Electricity Regulatory Commissions to consider issuing similar guidelines facilitating Group Net Metering and Virtual Net Metering for promotion of rooftop solar and hence promotion of renewable energy.

   Source: Ministry of New and Renewable Energy (MNRE): Posts | LinkedIn

5. In order to realize green energy objectives and the government's efforts towards a carbon-neutral economy, a Memorandum of Understanding (MoU) has been signed between Ministry of Home Affairs (MHA) and Solar Energy Corporation of India Limited (SECI) for setting up rooftop solar establishments in all Central Armed Police Forces (CAPFs) establishments. On the basis of available data, the SECI has estimated a total solar power potential of 71.68 MW in the campuses of the CAPFs and the NSG. SECI will either directly or through an agency will support the home ministry in implementing rooftop solar systems.

   Source: https://economictimes.indiatimes.com/industry/renewables/rooftop-solar-energy-panels-to-be-set-up-in-all-capf-establishments/articleshow/91394836.cms