Date: 03 April 2025

Minutes of the Meeting (MoM) of the 1st Demand Flexibility & Demand Side Management- Consultation Committee (1st DF/DSM-CC) Meeting, held on 21 February 2025, at 11: 00 Hrs, under the provisions of MERC (Demand Flexibility and Demand Side Management – Implementation Framework, Cost-effectiveness Assessment; and Evaluation, Measurement, and Verification) Regulations, 2024.

The 1st meeting of the DF/DSM-CC was held on 21 February 2025 at 11:00 Hrs in a hybrid mode at the Office of the Commission, under the leadership of Dr. Rajendra G. Ambekar, Secretary, MERC.

Dr. Rajendra G. Ambekar, Secretary, MERC briefly explained the provisions of the DF/DSM Regulations and the applicable penalties for non-compliance. Additionally, he emphasis on the role of the DSM-CC for implementation of DSM Regulations. He points out that for storing surplus power from RE sources, solutions such as Battery Energy Storage Systems (BESS) and Pumped Storage are costly. Therefore, Demand Side Management (DSM) must be evaluated as a cost-effective alternative for absorbing such RE which requires nearly half the investment compared to storage systems. He also emphasised that consumer awareness programs are necessary to achieve the objectives of the Regulations.

Dr. Prafulla S. Varhade, Executive Director, MERC, explained the role of aggregators as intermediaries between end-users and distribution companies (Discoms) to ensure the effective implementation of programs with continuous monitoring. It was further elaborated that the Qualified Coordinating Agency (QCA) plays a crucial role in managing all wind and solar power plants collectively, similar role can be played by aggregators recognised under DSM Regulations. This approach resembles a power exchange/platform for demand-side management, requiring careful portfolio management to achieve various objectives.

Shri. G. D. Patil, Executive Director, MERC outlined the agenda for the meeting and stressed upon the importance of robust planning and implementation of DF/DSM schemes. In his presentation, he outlines Maharashtra's regulatory framework for Demand Flexibility (DF) and Demand Side Management (DSM). The Regulations notified in 2024 introduces "Demand Flexibility Portfolio Obligations (DFPO)" with a five-year target with associate incentives/penalties for achievement of DFPO.

Dr. Mahesh Patankar, MP Ensystems Advisory Pvt. Ltd., briefly explained six common programs that can help reduce electricity consumption. He proposed six key programs: (1) shifting public water works operations to solar hours, (2) managing EV charging to align with solar generation, (3) promoting energy-efficient BLDC fans for residential consumers, (4) integrating thermal energy storage in commercial and public buildings, (5) using heat pumps for efficient water heating, and (6) deploying battery storage systems under the PM Surya Ghar Yojana. Each program aims to reduce peak demand, optimize power procurement costs, and enhance grid stability. New MERC DF/DSM Regulations, 2024 encourage utilities to work with aggregators and third-party verification agencies to ensure program effectiveness. The Program Design Documents (PDDs) provide detailed strategies, consumer targeting, and

expected impacts, addressing key barriers such as underutilization of solar power, high procurement costs, and lack of consumer awareness.

Prof. Dr. F. S. Kazi, V.J.T.I., highlighted the necessity of maintaining demand-supply balance and discussed how academic researchers and students can contribute to exploring additional possibilities for energy savings and demand flexibility.

Shri Abhishek Gupta, Head (Internation Strategy), EESL, provided insights into the role of aggregators, citing achievements such as the distribution of 10 million energy-efficient fans and another successful scheme in Andhra Pradesh. He elaborated on how aggregators function as intermediaries while addressing both technical and financial aspects.

Shri. Ashok G. Kanase, Superintending Engineer, CEI Office, depicted a scheme implemented at Vidhan Bhavan, Mumbai, based on the Heat Pump concept, which remains operational. He further emphasized the need to integrate market inputs from the US and EU, along with directives from organizations such as MEP and BEE, to develop national-level schemes. Given the limitations of the islanding scheme for Mumbai, support from various energy efficiency initiatives was deemed essential.

Smt. Mayura Shindekar, GM (EC), MEDA, highlighted multiple ongoing urban development schemes. It was suggested that energy efficiency initiatives be integrated into these schemes (e.g., the AMRUT scheme) to enhance participation. The Committee acknowledged and accepted this recommendation.

Shri. Pankaj Tagalpallewar CE (SPD), MSEDCL emphasized the necessity of shifting pump system operation times. Using an example from Kerala, it was demonstrated how a balance could be achieved between the import and export of renewable energy generated from wind and solar systems.

Shri. Madhukar Rane, DCE, BEST reaffirmed its commitment to exploring all possible measures for the effective implementation of DF/DSM schemes.

Shri. Sanjiv Sharma, GM, AEML-D proposed the implementation of large-scale programs to encourage the adoption of multi-door refrigerators instead of single-door models, as tail-end consumers can significantly contribute to load shifting.

Shri. P. Devanand, (Chief- TS & PSCC), TPC-D, referred the challenges related to "duck curve" and peak generation periods, emphasizing the need for viable solutions. It was also noted that demand flexibility mechanisms could impact long-term and medium-term Power Purchase Agreements (PPAs), necessitating further analysis. Additionally, the potential benefits of small-scale air conditioning systems were discussed, given their substantial aggregate impact.

Smt. Shweta Kulkarni, Prayas, Pune (through VC) commended the incorporation of demand flexibility in the regulations and shared details about its ongoing consumer awareness initiatives. However, concerns were raised over the lack of concrete financial provisions for

DF/DSM implementation in the Multi-Year Tariff (MYT) petitions of most Discoms, except for TPC-D. She also emphasis importance of load survey exercise for implementation of DSM Regulations.

Shri. Milind Singh Bist, (Dy. Manager), AEML-SEEPZ shared achievements in reducing air-conditioning power consumption at the Borivali Adani Office. Additionally, it was clarified that a 3x17 = 51 MW grid-level BESS would become available in the coming months to manage ramp-up and ramp-down processes efficiently.

Shri. Vaibhav Gawas, DGM Power, KRC reported that 40% of its current load is managed through RE sources. While efforts are underway to shift medium-term power procurement to pumped storage treatment plants, the high cost of BESS remains a concern, requiring alternative solutions.

Shri. Nisar Shaikh (GM-Power), EON stated that it maintains a constant load profile, with peak demand occurring during solar hours. The company is actively pursuing additional PPAs for renewable energy by coordinating with consumers.

Shri. Rahul Borikar (DGM), MITL (Shendra & Bidkin), informed the Committee that it has not yet commenced operations and, therefore, had no specific suggestions at this stage.

Shri. Pramod Burle (Dy Manager), NULLP explained that its IT infrastructure, designed for Tier-4 level consumers, relies on servers requiring 40-50% cooling systems. Opportunities for energy savings in this area will be explored.

Shri. Vijay Pardhi (Consultant Power) MADC reported that it has initiated the implementation of demand flexibility schemes in its buildings but emphasized the need for a detailed study to optimize their execution.

In concluding remarks, it was discussed that, apart from TPC, no other Discoms, had submitted an action plan. All other entities were instructed to submit a comprehensive action plan, including a DF-DSM block estimate. Additionally, it was directed that a load research study be conducted to determine which schemes would be most effective for each utility.

Dr. Prafulla S. Varhade, ED, MERC, concluded the meeting with a vote of thanks.

List of the persons who attended the 1st DF/DSM -CC meeting:

Sr. No	Name and Designation	Organization
1.	Dr. Rajendra G. Ambekar, Secretary	MERC
2.	Dr. Prafulla S. Varhade, Executive Director	MERC
3.	Shri. Ghanashyam D. Patil, Executive Director	MERC
4.	Shri. B. L. Ugale, Additional Director (Tech)	MERC
5.	Dr. F. S. Kazi, Professor	V.J.T.I, Matunga
6.	Shri. Abhishek Gupta, Head (International Strategy),	EESL, Delhi
7.	Shri. Ashok G. Kanase, Superintending Engineer	CEI Office, Chembur
8.	Smt. Mayura Shindekar, GM (EC)	MEDA, Pune
9.	Shri. Pankaj Tagalpallewar, CE (SPD)	MSEDCL
10.	Shri. Madhukar Rane, DCE	BEST
11.	Shri. Sanjiv Sharma, GM	AEML-D
12.	Shri. P. Devanand, (Chief- TS & PSCC)	TPC-D
13.	Smt. Shweta Kulkarni (Joined through VC)	Prayas, Pune
14.	Shri. Anil T. Chopade (DGM)	JNPA
15.	Shri. Vijay Pardhi (Consultant Power)	MADC
16.	Smt. Sujata Guruji (Head-DSM)	Tata Power
17.	Shri. Deepak K. Kajrolkar (DGM)	AEML
18.	Shri. Milind Singh Bist (Dy. Manager)	AEML-SEEPZ
19.	Shri. Vaibhav Gawas (DGM- Power)	KRC
20.	Shri. Nisar Shaikh (GM-Power)	EON SEZ Biotech
21.	Shri. Rahul Borikar (DGM)	MITL
22.	Shri. Pramod Burle (Dy Manager)	NUPLLP
23.	Shri. M.K. Reddy	NUPLLP
24.	Smt. Prajakta Aphale (Senior Executive-Legal)	EON1 and EON2 SEZ Biotech
25.	Shri. Jaywant Shivbhate (DGM)	EON SEZ Biotech
26.	Shri. Jitendra Patil (Senior Manager-Power)	KRC
27.	Shri. A. Sharma (Senior Manager-Power)	KRC
28.	Smt. Hawwa Inamdar (Group Head-Regulatory	Tata Power
29.	Shri. Ajay S. Nikale (AE-Power Purchase)	MSEDCL
30.	Smt. Vishakha P. Borkar (AE- DCEDSM)	BEST

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महाराष्ट्र विद्युत नियामक आयोग

Maharashtra Electricity Regulatory Commission

MERC/ Tech/DF-DSM / 2025/0094 **Date:- 25 January, 2025**

Subject: Constitution of DF/DSM Consultation Committee – request for nomination of senior Representative

Ref:- MERC Notification dated 17 January 2025

Sir/Madam,

The Electricity Act 2003 mandates framing of Regulations which encourage efficiency and economical use of resources. Accordingly, the Maharashtra Electricity Regulatory Commission (MERC / Commission) has notified MERC (Demand Flexibility and Demand Side Management – Implementation Framework, Cost effectiveness Assessment; and Evaluation, Measurement and Verification) Regulations, 2024 [MERC DF & DSM Regulations, 2024] on 19 November 2024. Copy of the said Regulations is available on MERC website.

Regulation 5 of the MERC DF & DSM Regulations, 2024 provides for setting up of a separate DF / DSM Consultation Committee (DSM-CC) through a specific notification of the Commission with a stated tenure and terms of reference. Accordingly, the Commission vide its notification dated 17 January 2025 has constituted DSM-CC stipulating its composition, terms of reference, tenure etc. Copy of the said notification is available on MERC website and also attached herewith for ready reference.

DSM-CC is having important role in implementation of MERC DF & DSM Regulations, 2024. Hence, you are requested to nominate senior official who is dealing with Demand Flexibility and Demand Side Management in your organisation as a Member on DSM-CC.

First Meeting of the DSM-CC is proposed to be schedule in the month of February 2025. Therefore, you are requested to convey name of official from your organisation, before 7 February 2025. Thereafter, date and agenda for the Meeting and will be intimated in advance.

Thanking You

Yours faithfully

(Dr. Rajendra G. Ambekar)
Secretary, MERC

Encl. MERC Notification dated 17 January 2025

१३वा मजला, केंद्र क्र. १, जागतिक व्यापार केंद्र, कफ परेड, कुलाबा, मुंबई - ४०० ००५.
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To,

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2. **The General Manager**
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3. **The Chief Executive Officer**
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7. **The Chief Electrical Inspector**
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9. **The Chief Executive Officer**
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Before the
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Constitution of DF / DSM Consultation Committee under Regulation 5 of MERC (Demand Flexibility and Demand Side Management – Implementation Framework, Cost effectiveness Assessment; and Evaluation, Measurement and Verification) Regulations, 2024

NOTIFICATION

Date:17 January 2025

1. Regulation 5 of the MERC (Demand Flexibility and Demand Side Management – Implementation Framework, Cost effectiveness Assessment; and Evaluation, Measurement and Verification) Regulations, 2024 [MERC DF & DSM Regulations, 2024] provides for setting up of a separate DF / DSM Consultation Committee (DSM-CC) through a specific notification of the Commission with a stated tenure and terms of reference.

2. Accordingly, the Commission hereby constitute DF/DSM Consultation Committee as follows:

i.	The Secretary, MERC	- Head of the Committee
ii.	Representative of MSEDCL	- Member
iii.	Representative of BEST Undertaking	- Member
iv.	Representative of AEML-D	- Member
v.	Representative of TPC-D	- Member
vi.	Representative of MEDA	- Member
vii.	Representative of Bureau of Energy Efficiency	- Member
viii.	Representative of Electrical Inspector, GoM	- Member
ix.	Representative of Electrical Dept. VJTI, Mumbai	- Member
x.	Representative of Energy Efficiency Services Ltd.	- Member
xi.	Representative of Prayas Energy Group	- Member

In addition to above, the Convenor of the above Committee may request other experts in this sector to attend the meeting as a Special Invitee.

This Committee can also invite representative of Organisations/Institutions with whom MERC has signed MoU for knowledge exchange and capacity building.

3. Terms of Reference of DF/DSM Consultation Committee:

3.1. To review and provide suggestions and objections on the DF / DSM programme portfolio submitted by the distribution licensees and recommend its findings on DF / DSM Programmes to the Commission for approval.

3.2. Provide guidelines to conduct robust load research activities by the licensees.

3.3. Evaluate the "DF / DSM Programme Portfolio and Implementation Plan" submitted by the distribution licensees and provide its recommendations to the Commission.

3.4. Evaluation of the "Status report on DF / DSM implementation" submitted by licensees.

3.5. Creation of sectoral expertise in the stakeholder groups to actively guide, design, implementation and evaluation of DF/DSM programmes.

3.6. Any other works on subject matter as directed by the Commission from time to time.

4. Meetings of the DF/DSM Consultation Committee:

4.1. The DF / DSM Committee shall meet as and when required but at least once in six months.

4.2. Proceedings of the DF / DSM Consultation Committee shall be uploaded on website of the Commission.

5. The DF/DSM Consultation Committee may call for the records, data, documents, information, copies of proposal, etc. from the concerned Licensees and may also seek suggestions/submissions for improvement in the DSM proposals.

6. Tenure of the DF/DSM Consultation Committee constituted through this notification shall be 5 years from date of this notification.

Sd/-	**Sd/-**	**Sd/-**
(Surendra J. Biyani)	**(Anand M. Limaye)**	**(Sanjay Kumar)**
Member	**Member**	**Chairperson**

महाराष्ट्र विद्युत नियामक आयोग
Maharashtra Electricity Regulatory Commission

सत्यमेव जयते

MERC/ Tech/DF-DSM / 2025/०११ ४ **Date:- 14 February, 2025**

Subject: Meeting of DF/DSM Consultation Committee – scheduled on 21 February 2025

Sir/Madam,

I am directed to inform you that 1st Meeting of the DF/DSM Consultation Committee setup under MERC (Demand Flexibility and Demand Side Management – Implementation Framework, Cost effectiveness Assessment; and Evaluation, Measurement and Verification) Regulations, 2024 is scheduled on 21 February 2025 at 11.00 am in the Office of the Maharashtra Electricity Regulatory Commission.

Agenda for the DF/DSM-CC Meeting is as follows:

a. Overview of DF/DSM Regulation 2024

b. Presentation on Demand Flexibility /Demand Side Management Programs

- Demand flexibility in public water pumping schemes
- Energy Efficiency through BLDC Fan

c. Any other issues with permission of Chair

Considering issues on Agenda, in addition to regular Members of the DF/DSM Coordination Committee, it is decided to invite following persons/representatives of organisations as a special invitee:

a. Dr. Mahesh Patankar, MP Ensystems Advisory Pvt. Ltd.

b. Representative of Global Energy Alliance for People and Plant

c. Representative of SEZ based Distribution Licensees in Maharashtra

Members of DF/DSM Coordination Committee and above Special Invitees are requested to attend above meeting scheduled on 21 February 2025 at 11.00 am at MERC, 13th Floor, World Trade Center, Cuffe Parade, Mumbai

(Ghanashyam D. Patil)
Executive Director, MERC

१३वा मजला, केंद्र क्र. १, जागतिक व्यापार केंद्र, कफ परेड, कुलाबा, मुंबई - ४०० ००५.
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Demand Flexibility & Demand Side Management Regulations

Maharashtra Electricity Regulatory Commission

DSM Regulations 2010 – Objectives

- MERC (Demand Side Management Implementation Framework) Regulations, 2010 and MERC (DSM Measures and Programmes' Cost Effectiveness Assessment) Regulations, 2010 **notified on 26 April 2010**
- DSM Regulations in April 2010 – 1st in India

- **Objectives:**
  - **Discom shall make DSM an integral part of their day-to-day operations**, and undertake planning, designing and implementation of appropriate DSM programmes on a sustained basis.
  - **Discom may recover** all justifiable **costs** incurred by them **in any DSM related activity**, including planning, designing, implementing, monitoring and evaluating DSM programmes, **through ARR** to enable their funding through tariff

- **DSM related activity/ programmes undertaken by the Distribution Licensees**:
  a. N**eed to be cost effective** for the consumers as well as to the Distribution Licensees themselves;
  b. Shall **protect** the **interest of consumers** and be **implemented** in an **equitable manner**;
  c. Result in **overall tariff reductions** for all the consumers of the licensees.

DSM Regulations 2010 – DSM Schemes implemented by Discoms

Appliances	Installed quantity	Energy saved (MU)
Large scale refrigerator program	2,898	3.34
Large scale ceiling fan program	1,746	0.664
Five star refrigerator (Residential)	6,500	13
Five star fans (Residential)	25,000	12.4
Five star split AC (Commercial)	1,500	1.9
Automation in AC (Commercial and Industrial)	1000 TR	0.9
Five star split AC (Residential)	1,515	3.5
Detailed energy audit	57	158
Domestic efficient lighting program	2,50,000	5
BLDC fan	14,647	12.94

Opportunities & Rational for revising DSM Regulations

- Energy conservation and energy efficiency are embedded in the market transformation efforts by the Bureau of Energy Efficiency (labelling and standards program, public buildings initiatives)
- Current power system is facing challenges of higher levels of renewable energy sources
- Load-shape objectives (peaking and non-peaking hours) are changing substantially
- Active load management with demand-supply side positions; as well as behind-the-meter and utility-level renewable energy opportunities are now more important
- **Active load management using demand-response and demand-flexibility are now important attributes of demand-side management efforts globally.**
- **Thus, continuing efforts on energy efficiency to reduce demand and tapping demand flexibility opportunity to support green transition is main objective**

Salient feature of new DSM Regulations

- New regulations renamed as "**Demand Flexibility** and Demand Side Management – Implementation Framework, Cost-effectiveness Assessment; and Evaluation, Measurement and Verification Regulations, 2024"
  - Part A Implementation framework
  - Part B Cost effectiveness assessment test
  - Part C Evaluation, measurement and verification

- Discom to undertake detailed **Load Research study** and **published** the detailed Report on **website**

- DF/DSM Implementation **Action Plan** to be **approved in MYT Order**. Then **Annual Review** of **implementation status**.

- Discom can appoint **Aggregator** (technically & financially competent) to implement DF-DSM Program

- All **prudent expenses** on activities undertaken under this Regulations are **passthrough in ARR**

Salient feature of new DSM Regulations

- Introduces clear targets termed as the “Demand Flexibility Portfolio Obligations (DFPO)” with a 5-years trajectory as follows:

Year	DFPO Target (% of previous year Peak Demand
FY 2025-26	1.50%
FY 2026-27	1.50%
FY 2027-28	2.00%
FY 2028-29	2.50%
FY 2029-30	3.50%

- Discom has to carryout at least one DF/DR event in a year to demonstrate achievement of above target
- Incentives/penalty of INR 0.20 crores / MW of exceeded or deficit targets
- 3 types of evaluations proposed (impact, process and market-effect)
- Introduces third-party Independent Verification Agencies

Expected Programs under new DSM Regulations

- For FY25 MSEDCL is having peak demand of 25,840 MW (as on 16.01.2025)
- As per the DFPO, Discom needs 1.5% as a flexible demand which is ~387 MW
- Connected load from certain public sector HT consumers and HT agriculture irrigation consumers are:

Consumer category	Connected Load/ Contract Demand (MVA) (FY25 Projections)
HT IV-PWW	343
HT V Agriculture	497
HT VI Bulk Supply (Housing Complex)	55
HT-VIII Public services	325
Total	**1,220**

- Discoms are expected to create program which can focus on these consumers to achieve DFPO target

DF/DSM Coordination Committee – Constitution

- Regulation 5 of MERC DF & DSM Regulations, 2024 provides for setting up of a separate DF / DSM Consultation Committee (DF/DSM-CC) .

- Vide notification dated 17 January 2025, the Commission constituted DF/DSM CC with following Members:

➢ The Secretary, MERC	- Head of the Committee
➢ Representatives of MSEDCL/BEST/AEML/TPC	- Member
➢ Representatives of MEDA/Electrical Inspector, GoM	- Member
➢ Representatives of BEE/EESL	- Member
➢ Representative of Electrical Dept. VJTI, Mumbai	- Member
➢ Representative of Prayas Energy Group	- Member

  - ➢ Other Experts and Organizations can be included as Special Invitee.

- Above Constitution in valid for 5 years

- DF/DSM CC to meet at least once in a six months.

DF/DSM Coordination Committee – Role

- **ToR for DF/DSM Coordination Committee.**

  - To review and provide suggestions and objections on the DF / DSM programme portfolio submitted by Discom and recommend its findings to the Commission for approval.
  - Provide guidelines to conduct robust load research activities by the licensees.
  - Evaluate the “DF / DSM Programme Portfolio and Implementation Plan” submitted by the Discom and provide its recommendations to the Commission.
  - Evaluation of the “Status report on DF / DSM implementation” submitted by Discom.
  - Creation of sectoral expertise in the stakeholder groups to actively guide, design, implementation and evaluation of DF/DSM programmes.
  - Any other works on subject matter as directed by the Commission from time to time.

Thank You

MP ENSYSTEMS

Program Design Document

Suggestive PDD for DF and EE for the state of Maharashtra

Maharashtra Electricity Regulatory Commission

21 February 2025

Program Design Document

1. Public Water works

Shifting pumping load to solar hours from peak hours

Consumer category: HT PWW/Public services

2. Managed EV charging station

Managing the charging stations to shift its load to solar generation

Consumer category: LT and HT EV charging stations

3. Energy efficient BLDC fan

Shifting residential consumers from non-BLDC fans to BLDC fans

Consumer category: Residential

4. Thermal energy storage

Managing TES charging during solar generation periods, helps utilities to optimize their power purchase costs.

Consumer category: HT and LT commercial and public buildings.

5. Heat Pump

Shifting heat pump load to solar hour from peak hours

Consumer category: Public buildings and residential complex

6. Battery storage system

Shifting PEAK load hour with the help of battery storage system under PM Surya Ghar Yojana

Consumer category: Residential

PDD 1: Public Water works(1/2)

Summary:

- Program is designed to demonstrate the utilisation public water pumping load as flexible demand, shifting to solar generation period and help utility to optimise the power purchase cost

Target consumer base:

- Public Water Pumping category (PWW/Public services)

Rationale:

- Solar power is available at lower rates to utility, shifting HT-PWW/Public services loads to solar generation period can help in absorbing solar power efficiently and reduce the power purchase cost to utility.
- Generally large water pumping stations in HT category have storage facility.
- There operation is need based or as per predefined protocols.
- Some of the pumping operation can be shifted to solar generation period to avail the benefit of lower power cost.

PDD 1: Public Water works(2/2)

Program objectives:

- Aggregate HT PWW/Public services consumers for providing demand flexibility.
- Create Network operating centres and communication infrastructure to control demand from aggregated HT PWW/Public services load.
- Monitor and evaluate the benefits of load shifting to solar hours

Program impacts:

- With a target of aggregation of 100 consumers (100 MVA connected load), total annual shifting of 50 MUs in solar hours is anticipated.

Key barriers addressed:

- Underutilisation of solar generation

PDD 2: Managed EV charging station (1/2)

Summary:

- Program is designed to demonstrate the utilization of EV charging stations' load as flexible demand, by managing the charging stations to shift its load to solar generation period to help utility to optimize the power purchase cost.

Target consumer base:

- HT EV charging stations and LT EV charging stations.

Rationale:

- **Cost Efficiency:** Utilities can lower power purchase costs by using cheaper solar power and scheduling EV charging during solar generation periods.
- **Optimized Charging Schedules:** Managing EV charging optimizes schedules for both charging stations and utilities, using software to communicate between the charging station, EV, and grid.
- **Controlled Charging:**
  - Charging can be controlled by adjusting tariff, timing, and power levels.
  - Flexibility allows shifting charging load away from peak demand periods, integrating more solar energy, and improving grid stability.

PDD 2: Managed EV charging station (2/2)

Program objectives:

- Aggregate EV (HT, LT) charging stations consumers for providing demand flexibility,
- Create Network operating centers and communication infrastructure to control demand from aggregated EV charging loads.
- Monitor and evaluate the benefits of load shifting to solar hours

Program impacts:

- With a target of aggregation of 100 consumers (___ MVA connected load), total annual shifting of ___MUs in solar hours is anticipated.

Key barriers addressed:

- Underutilization of solar generation.
- Current limited share of EV charging stations in total load.

PDD 3: EE BLDC fan(1/2)

Summary:

- Program is designed to demonstrate the utilization of EV charging stations' load as flexible demand, by managing the charging stations to shift its load to solar generation period to help utility to optimize the power purchase cost.

Target consumer base:

- Residential

Rationale:

- BLDC fans consume 60% less energy as compared to non-BLDC fans.
- Generally, each LT I: LT - Residential consumer in Maharashtra has 1.6 fans
- Shifting can save Approx Rs. 2,000 a year, which also helps to reduce the power purchase cost of the utility and consumers both

PDD 3: EE BLDC fan(2/2)

Program objectives:

- Aggregate Residential consumers for using BLDC fans.
- Create a program to help Residential switch from non-BLDC fans to BLDC fans.
- Monitor and evaluate the benefits of shifting to use BLDC fans.

Program impacts:

- Consumer will save 229 kWh every year by replacing regular fan with BLDC fan Considering 14 hours of daily use

Key barriers addressed:

- Underutilisation of using energy efficiency fans.

PDD 4: Thermal energy storage (TES) (1/2)

Target consumer base:

The program is designed to showcase the use of Thermal Energy Storage (TES) in unlocking flexible demand for HVAC systems in commercial and public buildings. By managing the charging of TES during periods of solar generation and discharging in peak period, the program aims to help utilities optimize their power purchase costs

Target consumer base:

- HT and LT Commercial buildings
- HT and LT Public buildings

Rationale:

- Installation of TES enables shifting of HVAC load as per grid requirement and tariff structure to minimise the cost of power to consumer. Utility can leverage this energy storage opportunity at consumer end by providing incentives to shift this demand to low power procurement cost periods to minimise the total power procurement cost.
- With the increased integration of renewable energy (RE) in the generation mix, DISCOM can incentivize consumers during RE generation periods to shift their demand and optimise its generation cost. And on the other hand consumers can lower their energy costs by earning incentives.

PDD 4: Thermal energy storage (2/2)

Objective:

- Aggregate commercial and public building (HT, LT) consumers for providing demand flexibility.
- Install and integrate TES with HVAC load at consumer site
- Create Network operating centres and communication infrastructure to control demand from aggregated HVAC load through TES.
- Monitor and evaluate the benefits of shifting HVAC load to solar hours using TES

Program impacts:

- Aggregation of N consumers for providing demand flexibility from TES
- Energy shifting in solar hours
- Annual saving in power purchase cost

Key barriers addressed:

- Underutilization of solar generation
- High peak hours power procurement cost reduction

PDD 5: Heat Pump(1/2)

Summary:

- Program is designed to demonstrate the utilization of EV charging stations' load as flexible demand, by managing the charging stations to shift its load to solar generation period to help utility to optimize the power purchase cost.

Target consumer base:

- Public buildings and residential complex

Rationale:

- Water heating load is one of the residential load which can be shifted if it has enough storage capacity and incorporating centralised system will also reduce overall demand of water heating.
- Both of the objective can be addressed by using heat pumps as a flexible load and energy efficient load

PDD 5: Heat Pump(2/2)

Program objectives:

- Aggregate residential and public building consumers to provide demand flexibility.
- Modulate the usage of heat pumps by shifting in off-peak period
- Monitor and evaluate the benefits of load shifting to solar hours.

Program impacts:

- Installing heat pump and modulating heat pump operations will help utilities to shift water heating demand to non peak and solar hours to save power purchase cost which will eventually reduce consumer tariff.

Key barriers addressed:

- Underutilisation of solar generation by utility.

PDD 6: Battery Storage System (1/2)

Summary:

- The program aims to integrate battery storage systems with solar energy to enable better management of peak demand and optimize power procurement costs.
- DISCOM will control the charging and discharging of behind-the-meter battery storage, providing incentives to consumers for participating in demand flexibility events. Additionally, DISCOM will offer a 50% rebate on the capital cost of the battery system.

Target consumer base:

- Residential

Rationale:

- Efficient utilization of surplus solar energy, reducing reliance on grid power.
- Reduction of electricity costs for consumers by leveraging stored energy.
- Enhancement of local grid stability and power procurement cost optimization.
- Supporting large-scale solar energy adoption through demand flexibility.

PDD 6: Battery Storage System (2/2)

Program objectives:

- Deploy 500 MWh of battery storage capacity in residential consumer homes.
- Enroll 70,000 consumers with a minimum 3 kW solar rooftop capacity.
- Provide 50% CAPEX support for consumers installing battery storage.
- Allow DISCOM to manage charging/discharging of the battery storage system.

Program impacts:

- 500 MWh of battery storage will support peak demand management in the morning and evening.
- Optimized power procurement costs by leveraging demand flexibility.
- Improved grid reliability by absorbing excess solar generation.

Key barriers addressed:

- Underutilization of solar generation and battery storage systems
- Consumer hesitancy due to upfront costs
- Lack of awareness of demand flexibility benefits.

Maharashtra consumer overview (1/2)

Consumer category	Discom	Tariff	No of consumers	Contracted demand (kWA/Kw)	Energy sales (MUs)
Public water works	MSEDCL	HT: INR 7.76, LT: 4.09 (0-20), 6.33 (20-40), 8.40 (above 40)	57226	488.54	2739.23
Residential		HT: Group housing: INR 7.16, LT: INR 4.71(0-100), 10.29(101-300), 14.55 (301-500), 16.64 (above 500)	20913281	25695	24,908.16
Public buildings		HT(Govt.): INR 10.03, (other): 10.93, LT (Govt.): INR 6.18 (0-20), 9.78 (20-50), 10.13 (above 50)	132153	1814	1842.58
EV charging stations		HT: INR 7.40, LT: INR 6.58	939	11560	66
Commercial		HT: INR 13.21, LT: INR 8.52 (0-20), 13.01 (20-50), 15.38 (above 50)	2041715	5311.8	9844.71
Public water works	AEML	HT (other) 7.74 LT (other) 6.60,	5610 (combined)		578.6 (combined with public building)
Residential		HT: grp housing: INR 6.05 LT: INR 3.15 (0-100), 5.40 (100-300), 7.10 (301-500), 8.15 (above 500)	2115214		4908.2
Public buildings		HT(govt.) INR 6.80, (other) 7.74 LT(govt.): INR 6.20, (other) 6.60,	5610 (combined)		578.6 (combined with public building)
EV charging stations		LT: INR 5.15, HT: INR 6.86	22		73.7
Commercial		HT: INR 6.70, LT: INR 5.75 (0-20), 6.00 (20-50), 6.20 (above 50)	441416		3672.2

Maharashtra consumer overview (2/2)

Consumer category	Discom	Tariff	No of consumers	Contracted demand (kWA/kW)	Energy sales (MUs)
Public water works	Tata power mumbai	HT:(others): INR 8.60, LT: (others): INR 7.75	Public service others = 597	22760	280.3 (combined)
Residential		HT: grp housing: INR 7.34 LT: INR 2.18 (0-100), 5.36 (100-300), 11.62 (301-500), 12.56 (above 500)	Grp housing = 19, LT Residential = 7,60,357		2268.02
Public buildings		HT (Govt.): 6.40, (others): 8.60 LT(govt.): INR 7.40, (others): 7.75	167	11740	280.3 (combined)
EV charging stations		HT: INR 6.60, LT: INR 4.60	776	20970	29.5
Commercial		HT: INR 8.84 LT: INR 6.50 (0-20), 6.55 (20-50), 6.70 (above 50)	44925	324000	1126.46
Public water works	BEST	HT: (others): INR 8.25, LT: (others): INR 7.16	7724 (combined)		474.1 (combined)
Residential		HT: grp housing: INR 7.59, LT: INR 1.87 (0-100), 5.46 (101-300), 9.56 (301-500), 11.73 (above 500)	773547		2199
Public buildings		HT (Govt.): 7.43, (others): 8.25 LT(govt.): INR 7.15, (others): 7.16	7724 (combined)		474.1 (combined)
EV charging stations		HT: INR 7.24, LT: INR 5.78	28		20.9
Commercial		HT: INR 8.04, LT: INR 7.08 (<20), 5.88 (20-50), 5.25 (>50kw)	262884		1699.8

Payback Calculation for PDD 1: Public Water works

Particulars	Unit	Value	Sorce/Assumption
Energy shifted to solar period calculations			
Total annual sales in HT PWW category	MWh	<DISCOM SPECIFIC>	Tariff order
Total connected load	MVA	<DISCOM SPECIFIC>	Tariff order
Average operating hours	Hrs	<DISCOM SPECIFIC>	Calculated
Total aggregated consumers		100	Calculated
Average connected load per consumer	MVA	1	Assumption
Total aggregated load	MVA	100	Calculated
Number of hour load shifted in solar generation period	Hrs	2	Assumption
Number of solar generation days	Days	250	Assumption
Annual energy shifted	MWh	50000	Calculated
Capex calculation			
Network upgradation cost per consumer site	INR	50,000	Assumption
Network operating centre cost	INR	1,00,00,000	Assumption
total number of consumer		100	
Total netweork upgradation cost	INR	5000000	Calculated
Total capital cost	INR Cr.	1.5	Calculated
Opex calculation			
Incentive given to the consumer for shifting demand in solar period	INR/kWh	0.5	Assumption
Total energy shifted in solar period	MWh	50000	Calculated
Total annual incentive	INR Cr.	2.5	Calculated
Savings in Power purchase cost			
APPC for solar power	INR/kWh	<DISCOM SPECIFIC>	Tariff order
APPC for non solar power	INR/kWh	<DISCOM SPECIFIC>	Tariff order
Total energy shifted in solar period	MWh	50000	Calculated
% losses	%	<DISCOM SPECIFIC>	Tariff order
Total savings in APPC	INR Cr.	<DISCOM SPECIFIC>	Calculated

Payback Calculation for PDD 2: Managed EV charging station

Particulars	unit	Value	Sorce/Assumption
Energy shifted to solar period calculations			
Total annual sales in HT EV charging stations	MWh	<DISCOM SPECIFIC>	Tariff order
Total connected load	MVA	<DISCOM SPECIFIC>	Tariff order
Average operating hours	Hrs	<DISCOM SPECIFIC>	Calculated
Total aggregated consumers		100	Assumption
Average connected load per consumer	MVA	<DISCOM SPECIFIC>	Assumption
Total aggregated load	MVA	<DISCOM SPECIFIC>	Calculated
Number of hour load shifted in solar generation period	Hrs	2	Assumption
Number of solar generation days	Days	250	Assumption
Annual energy shifted	MWh	<DISCOM SPECIFIC>	Calculated
Capex calculation			
Network upgradation cost per consumer site	INR	2,500	Assumption
Network operating centre cost	INR	1,00,00,000	Assumption
total number of consumer		100	
Total netweork upgradation cost	INR	250000	Calculated
Total capital cost	INR Cr.	1.0	Calculated
Opex calculation			
Incentive given to the consumer for shifting demand in solar period	INR/kWh	0.5	Assumption
Total energy shifted in solar period	MWh	<DISCOM SPECIFIC>	Calculated
Total annual incentive	INR Cr.	<DISCOM SPECIFIC>	Calculated
Savings in Power purchase cost			
APPC for solar power	INR/kWh	3.44	Tariff order
APPC for non solar power	INR/kWh	5.4	Tariff order
Total energy shifted in solar period	MWh	<DISCOM SPECIFIC>	Calculated
% losses	%	0%	Assumption
Total savings in APPC	INR Cr.	<DISCOM SPECIFIC>	Calculated

Payback Calculation for PDD 3: EE BLDC fan

Description	Unit	Value	Source
No of fans per household	nos	1.6	Prayas Energy
No of Consumer	nos	<DISCOM SPECIFIC>	Tariff Order
Existing no of ceiling fan	nos	<DISCOM SPECIFIC>	Calculated
Days considered	days	365	Assumption
Running hours	hrs	14.00	Assumption
Power consumed by ceiling fan	w	75.00	Ministry of Consumer Affairs- BLDC Ceiling Fans: Choosing Efficiency!
Power consumed by BLDC fan	w	30.00	Ministry of Consumer Affairs- BLDC Ceiling Fans: Choosing Efficiency!
Energy consumed by ceiling fan	kWh	383.25	Calculated
Energy consumed by BLDC fan	kWh	153.30	Calculated
Energy saving per due to BLDC	kWh	229.95	Calculated
EB unit charges	per unit	<DISCOM SPECIFIC>	Tariff Order
Total energy consumed by ceiling fans	Rs.	<DISCOM SPECIFIC>	Calculated
Total energy charges saved through BLDC fans	Rs.	<DISCOM SPECIFIC>	Calculated
Cost of 1 nos of normal fan	Rs.	1,500.00	Calculated
Cost of 1 nos of BLDC fan	Rs.	3,000.00	Calculated
Payback period for the BLDC retrofit	Year	<DISCOM SPECIFIC>	Calculated

Payback Calculation for PDD 4: Thermal energy storage

	Particulars	unit	Value	Sorce/Assumption
	Energy shifted to solar period calculations			
a	Total annual sales in commercial buildings (HT + LT commercial)	MWh	<DISCOM SPECIFIC>	Input
b	Total annual sales in public buildings (HT + LT public services)	MWh	<DISCOM SPECIFIC>	Input
c	Total number of consumers in commercial building category		<DISCOM SPECIFIC>	Input
d	Total number of consumers in public building category		<DISCOM SPECIFIC>	Input
e	Total aggregated commercial consumers		<DISCOM SPECIFIC>	Input
f	Total aggregated public building consumers		<DISCOM SPECIFIC>	Input
g	Total annual consumption from aggregated consumers (LT+HT commercial and public builings)	MWh	(e*(a/c))+(f*(b/d)	Calculated
h	% of load cattered by Thermal Energy Storage (TES)	MVA	0.2	Input
i	Annual energy shifted	MWh	g*h	Calculated
	Capex calculation			
j	TES capacity required	MWh	i/365	Calculated
k	TES cost per MWh	INR	<TECHONOLOGY SPECIFIC>	Input
l	**Total cost of TES systems to consumer**	INR Cr.	j*k/10^7	Calculated
m	O&M cost of TES per MWh capacity	INR/MWh	<TECHONOLOGY SPECIFIC>	Input
n	**Total O&M cost to consumer**	INR Cr.	m*j/10^7	Calculated
o	Network upgradation cost per consumer site	INR	2500.0	Input
p	Network operating centre cost	INR	10000000.0	Input
q	Total number of consumer		e+f	Calculated
r	Total netweork upgradation cost	INR	o*q	Calculated
s	**Total capital cost to utility**	INR Cr.	**(p+r)/10^7**	Calculated
	Opex calculation			
t	Incentive given to the consumer for shifting demand in solar period	INR/kWh	0.5	Input
u	Total energy shifted in solar period	MWh	g*h	Calculated
v	Total annual incentive	INR Cr.	t*u*1000/10^7	Calculated
	Savings in Power purchase cost			
w	APPC for solar power	INR/kWh	<DISCOM SPECIFIC>	Input
x	APPC for non solar power	INR/kWh	<DISCOM SPECIFIC>	Input
y	Total energy shifted in solar period	MWh	g*h	Calculated
z	% losses	%	<DISCOM SPECIFIC>	Input
aa	Total savings in APPC	INR Cr.	y*1000*(x-w)/(1-z)/10^7	Calculated
ab	**Net annual profit to utility**	INR Cr.	**aa-v**	Calculated
ac	**Simple payback period for consumer**	Years	**i/(v-m)**	Calculated

Payback Calculation for PDD 5: Heat Pump

Sr. No.	Particulars	Value
1	Cost of new heat pump [1.36 kW, 200 L] (Rs)	125000
2	Cost of electric water heater [4.5 kW, 1L] (Rs)	3950
3	Water requirement per household (l/hr)	100
4	Operation in hours/day	5
5	Hot water generation (Liters/day)	500
8	Temp. difference	35
9	Electric Energy required for electric geyser (kWh)	20
10	Coefficient of Performance of heat pump	4
11	Energy required for heat pump (kWh)	5
12	No. of days hot water is to be used in year	150
13	Energy consumption of water geyser for each house (Units/year)	3053
14	Energy consumption of heat pump for each house (Units/year)	763
15	Energy saved for each house (Units/year)	**2290**
16	Residential tariff (Rs/units)	7.21
17	Saving for a consumer (Rs/year)	**16,500**
18	Total saving by from one heat pump (Rs/year)	**82,500**
19	Simple payback period (years)	**1.3**
20	Saving in GHG emission (tons CO2/year)	**9**

Assumption- The replacement of five electric water heaters can be replaced by single heat pump water heater

Cost of heat pump - https://www.indiamart.com/proddetail/racold-300-l-com-racold-300-l-commercial-heat-pump-water-heater-2849112265297.html?pos=1
Cost of water heater- https://www.jaquar.com/en/instant-01-ltr-geyser-45kw?Id=4052

Payback Calculation for PDD 6: Battery Storage System

Particulars	unit	Value	Sorce/Assumption
Energy shifted to solar period calculations			
Average solar rooftop capacity	kW	3	Input
Average solar generation	kWh/day/kW	4	Input
Total energy generated from solar rooftop per consumer	kWh	12	Calculated
% of consumers demand in solar hours	%	0	Input
Excess solar generation during solar hours per consumer	kWh	7	Calculated
Target battery capacity	MWh	500	Input
Number of consumers	MWh	69444	Calculated
Capex calculation			
Battery cost	INR/kWh	5000	Input
Total battery cost	INR Cr.	250	Calculated
Rebate given by utility to consumer	%	1	Input
Cost of battery to consumer	INR Cr.	125	Calculated
Network upgradation cost per consumer site	INR	1000	Input
Network operating centre cost	INR	10000000	Input
Total netweork upgradation cost	INR	69444444	Calculated
Total capital cost to utility	INR Cr.	**133**	Calculated
Opex calculation			
Incentive given to the consumer for shifting demand in solar period	INR/kWh	2	Input
Total energy shifted in solar period	MWh	182500	Calculated
Total annual incentive	INR Cr.	37	Calculated
Savings in Power purchase cost			
APPC for solar power	INR/kWh	3	Input
APPC for non solar power	INR/kWh	6	Input
Total energy shifted in solar period	MWh	182500	Calculated
% losses	%	0	Input
Total savings in APPC	INR Cr.	55	Calculated
Net annual profit to consumer	INR Cr.	**37**	Calculated
Net annual profit to utility	INR Cr.	**18**	Calculated
Simple payback period for consumer	Years	**3**	Calculated
Simple payback period for utility	Years	7	Calculated

Thank you

Suggestive program design document (PDD) for demand flexibility, battery storage and energy efficiency in the state of Maharashtra

February 2025

Table of Contents

PDD 1: Flexible demand capture in public water pumping stations 3
PDD 2: Flexing the demand with managed electric vehicle charging stations 6
PDD 3: Energy Efficiency by using BLDC fans 9
PDD 4: Flexible demand capture by heat pump installation 11
PDD 5: Flexing the demand with Thermal Energy Storage (TES) systems 14
PDD 6: Flexible demand capture in battery storage system in PM Surya Ghar Yojana 18
Consumer details of targeted consumers of PDDs 22

PDD 1: Flexible demand capture in public water pumping stations

Project title	**Program for Flexible demand capture in public water pumping stations to increase the solar generation utilisation**
Summary	Program is designed to demonstrate the utilisation public water pumping load as flexible demand, shifting to solar generation period and help utility to optimise the power purchase cost.
Target consumer base	Public Water Pumping category (PWW/Public services)
Background	Generally large water pumping stations in HT category have storage facility. Their operation is need based or as per predefined protocols. Some of the pumping operation can be shifted to solar generation period to avail the benefit of lower power cost.
Rationale	• Solar power is available at lower rates to utility, shifting HT-PWW/Public services loads to solar generation period can help in absorbing solar power efficiently and reduce the power purchase cost to utility. • ABR for PWW/Public service category is usually below ACOS or similar to ACOS. So, shifting their operations to cheaper power purchase hours will be beneficial. • These pumping stations have water storage facility which will be utilised for modulating pumping operation while maintaining required supply of water.
Program objectives	• Aggregate HT PWW/Public services consumers for providing demand flexibility. • Create Network operating centres and communication infrastructure to control demand from aggregated HT PWW/Public services load. • Monitor and evaluate the benefits of load shifting to solar hours.
Program impacts	With a target of aggregation of 100 consumers (100 MVA connected load), total annual shifting of 50 MUs in solar hours is anticipated.
Program design Selection of aggregator Aggregation of consumers Service delivery	Selection of aggregator: • Technology provider/aggregator will be selected through competitive bidding process by DISCOMs Aggregation of consumers: • Enrolment of 100 HT PWW/Public services consumers for the program

	• Upgradation of communication infrastructure at consumer site and creation of network operating centre for control, Measurement and verification. Service delivery: • Disbursement of incentives for demand shifting to consumers • Sharing of savings achieved between utility and aggregator
Rebates (if any)	Tariff incentive for shifting of demand in solar hours (10:00 to 16:00)
Target market segment	Public Water Pumping category/Public services (HT PWW/Public services)
End-uses targeted	Public Water Pumping
Key barriers addressed	Underutilisation of solar generation.
Marketing strategy	Direct mailers to consumers along with the monthly bills, advertisement of tender in daily newspaper and tendering websites
Program schedule	• PDD submission to MERC by Discom (T = Day 0) • DISCOM approval (T + 15 Days) • Declaration of tender for competitive bidding (T + 30 Days) • Completion of Competitive bidding (T + 60 Days) • Completion of consumer aggregation by aggregator (T + 90 Days) • Upgradation of communication, metering infrastructure at consumer site (T + 120 Days) • Creation of Network Operating Centre (T + 140 Days) • Start of PWW demand shifting program (T + 180 Days)
Program implementation process	• Competitive bidding for selection of technology provider/ aggregator for project implementation • Send communication along with the electricity bills to all target consumers (inform program features, utility rebates, expected savings, indicative investments, M&V requirement) • Receipt of expression to participate in the program within 15 days of final electricity bill dispatch • Aggregator to communicate with consumers willing to participate, and aggregate consumers with minimum 100 MVA total connected demand. • Agreement to be singed between aggregator, consumer and utility clarifying responsibilities and incentive structure for each stakeholder • Upgradation of metering and communication infrastructure at consumer site as per requirement

	• Creation of network operating centre by aggregator • Consumer to shift their loads at solar period • Calculation of consumer incentive and utility profit based on M&V done at Network operating centre • Disbursement of incentives to consumer and profit sharing to aggregator by utility
Financing approach	Infrastructure and network operating centre cost to be paid by Utility to Aggregator
Anticipated results	• Awareness among consumers about load shifting in solar hours • Evaluation of benefits through field monitoring • Acceptance on measurement and verification protocol • Energy shifting of 50 MUs in solar hours
M&V methodology	• Installation of AMR meter at consumer site if not already installed • Creation of network operating centre to analyse the data collected from consumer AMR meter to calculate demand shifting by each consumer in solar hours
Program costs	• Utility incentive annual: to be based on tariff rebate for shifted to solar hours • Infrastructure cost for network operating centre and metering at consumer sites: to be considered • Research for project: 3.5% of Infrastructure cost • Admin cost: 5% of Infrastructure cost
Program benefits	• Awareness among consumers/ municipal corporation about shifting water pumping demand to solar hours • Acceptance on measurement and verification protocol • Energy shifting of 50 MUs in solar hours
Implementation responsibilities	Aggregator to drive the entire program, Utility will monitor the implementation
Key action steps	Program approval, launch, identification of aggregator for program implementation, measurement & verification, disbursement of incentives to consumer, post-implementation surveys and documentation of learning through the program
Funds	Program will be funded from: Demand side management fund-DISCOM.

PDD 2: Flexing the demand with managed electric vehicle charging stations

Project title	**Program for flexible demand capture in electric vehicle charging stations to increase solar generation utilization**
Summary	Program is designed to demonstrate the utilization of EV charging stations' load as flexible demand, by managing the charging stations to shift its load to solar generation period to help utility to optimize the power purchase cost.
Target consumer base	HT EV charging stations and LT EV charging stations.
Background	• The growth of electric vehicle (EV) charging stations in India's power sector is notable. The number of consumers utilizing both LT and HT EV charging stations has risen sharply. • Nature of the load is concentrated and fluctuating but can be controllable to leverage this opportunity of increasing load share in DISCOM's total load, by managing this load according to peak demand and solar energy generation. • By managing EV charging load will not only help to accommodate EV load growth but also contribute to more cost-effective energy mix.
Rationale	• Solar power is available at lower rates to utility, shifting EV charging loads to solar generation period can help in absorbing solar power efficiently and reduce the power purchase cost to utility. • By managing EV charging optimizes charging schedules to benefit both EV charging stations and the utilities. It will work by establishing communication between charging station, EV, and grid through EV charging management software. • Charging can be controlled by adjusting tariff, timing, and power levels, so at the time of peak event charging can be controlled according to the need, this flexibility will allow to shift charging load away from peak demand periods, integrate more solar energy, and improve grid stability, reducing the need for costly infrastructure upgrades.
Program objectives	• Aggregate EV (HT, LT) charging stations consumers for providing demand flexibility, • Create Network operating centres and communication infrastructure to control demand from aggregated EV charging loads. • Monitor and evaluate the benefits of load shifting to solar hours.

Program impacts	With a target of aggregation of ___[1] charging stations (___[1] MVA connected load), total annual shifting of ___[1] MUs in solar hours from peak hours is anticipated.
Program design	Selection of aggregator: • Technology provider/aggregator will be selected through a competitive bidding process by DISCOM. Aggregation of consumers: • Enrolment of ____[1] LT, HT EV charging stations consumers for the program. • Upgradation of communication infrastructure at consumer site and creation of network operating centre for control, Measurement and verification. Service Delivery: • Disbursement of incentives for demand shifting to consumers. • Sharing of savings achieved between utility and aggregator.
Rebates (if any)	Tariff rebate for shifting of demand in solar hours (10:00 to 16:00)
Target market segment	Electric vehicle charging stations LT, HT
End-user targeted	EV charging stations
Key barriers addressed	Underutilization of solar generation, current limited share of EV charging stations in total load.
Marketing strategy	Direct mailers to consumers along with the monthly bills, Advertisement of tender in daily newspapers and tendering websites.
Program Schedule	• PDD submission to MERC by Discom (T = Day 0) • DISCOM approval (T + 15 Days) • Declaration of tender for competitive bidding (T + 30 Days) • Completion of Competitive bidding (T + 60 Days) • Completion of consumer aggregation by aggregator (T + 90 Days) • Upgradation of communication, metering infrastructure at consumer site (T + 120 Days) • Creation of Network Operating Centre (T + 140 Days) • Start of managed EV charging station program (T + 180 Days)
Program implementation process	• Competitive bidding for selection of technology provider/aggregator for project implementation

[1] Data to be entered by distribution licensee

	• Send communication along with the electricity bills to all target consumers (inform program features, utility rebates, expected savings, indicative investments, M&V requirement) • Receipt of expression to participate in the program within 15 days of final electricity bill dispatch • Aggregator to communicate with consumers willing to participate, and aggregate consumers with minimum ____[1] MVA total connected demand. • Agreement to be singed between aggregator, consumer and utility clarifying responsibilities and incentive structure for each stakeholder • Upgradation of metering and communication infrastructure at consumer site as per requirement • Creation of network operating centre by aggregator • Consumer to shift their loads at solar period • Calculation of consumer incentive and utility profit based on M&V done at Network operating center • Disbursement of incentives to consumer and profit sharing to aggregator by utility.
Financing Approach	Infrastructure (EV charging management software, chargers upgradations) and network operating centre cost to be paid by Utility to Aggregator.
Anticipated results	• Awareness among consumers/charging station about load shifting in solar hours • Evaluation of benefits through field monitoring • Acceptance on measurement and verification protocol • Energy shifting of ___[1] MUs in solar hours
M&V methodology	• Installation of smart/AMR meter at consumer site if not already installed • Creation of network operating centre to analyse the data collected from consumer smart meter to calculate demand shifting by each consumer in solar hours.
Program cost:	• Cost of the program include cost for setting up of network operating center and tariff incentive provided to consumer based on the event when load shift is required
Program benefits	• Awareness among consumers about shifting charging their EV to solar hours • Evaluation of benefits through field monitoring • Acceptance on measurement and verification protocol • Energy shifting of ___[1] MUs in solar hours

	• Annual saving in power purchase cost of INR ____[1] Crore to utility
Implementation responsibilities	Aggregator to drive the entire program, Utility will monitor the implementation.
Key action steps	Program approval, launch, identification of aggregator for program implementation, measurement & verification, disbursement of incentives to consumer, post-implementation surveys and documentation of learning through the program.
Funds	Program will be funded from: Demand side management fund-DISCOM.

PDD 3: Energy Efficiency by using BLDC fans

Project title	**Program for Energy Efficiency by using BLDC fans to increase the solar generation utilisation**
Summary	Program is designed to demonstrate the utilisation of BLDC fans as energy efficient space conditioning appliances, shifting from regular fans help the utility to save energy
Target consumer base	Residential
Background	• In many parts of our country, the scorching summer heat makes ceiling fans essential. In the residential sector, fans are the largest end-use appliance, typically consuming 50-80 watts. • The introduction of BLDC (brushless direct-current) motor technology has enabled fans to use less energy while maintaining air delivery. BLDC motors feature permanent magnets instead of the electromagnets found in conventional induction motors, offering benefits such as lower electricity consumption, reduced noise, and a longer lifespan. Power Consumption: Ordinary Fans vs. BLDC Fans • Regular Fan: 75 Watts • BLDC Fan: 30 Watts
Rationale	• BLDC fans consume 60% less energy as compared to non-BLDC fans. • Generally, each Residential consumer in Maharashtra has 1.6[2] fans • Shifting can save Approx Rs. 2,000 a year, which also helps to reduce the power purchase cost of the utility and consumers both
Program objectives	• Aggregate Residential consumers for using BLDC fans.

[2] Space-conditioning: Focus on fans and air-coolers for efficiency

	• Create a program to help Residential switch from non-BLDC fans to BLDC fans. • Monitor and evaluate the benefits of shifting to use BLDC fans.
Program impacts	Consumer will save 229[3] kWh every year by replacing regular fan with BLDC fan
Rebates (if any)	Interest rebate with on bill financing
Target market segment	Residential
End-uses targeted	Ceiling fans
Key barriers addressed	Underutilisation of energy efficient fans
Marketing strategy	Direct mailers to consumers along with the monthly bills, Advertisement of tender in daily newspaper and tendering websites
Program schedule	• PDD submission to MERC by Discom (T = Day 0) • DISCOM approval (T + 15 Days) • Declaration of tender for empanelment of BLDC fan vendors (T + 30 Days) • Technical and financial verification of vendors and empanelment (T + 60 Days) • Disbursement of BLDC fans (T+90)
Program implementation process	• Competitive bidding for selection of BLDC fans technology provider for project implementation • Send communication along with the electricity bills to all target consumers (inform program features, utility rebates, expected savings, indicative investments) • Empanelment of BLDC fan vendors • Disbursement of BLDC fans to consumer • Accounting Interest rebate with on bill financing
Financing approach	• Bulk procurement of the BLDC fans will be done by Utility or appointed distributor
Anticipated results	• Awareness among consumers about load shifting to use BLDC fans • Evaluation of benefits through energy consumption bill. • Acceptance on measurement and verification protocol • Energy shifting saves 229 kWh annually per consumers.

[3] Considering 14 hours of daily use

M&V methodology	• Reduction in energy consumption between non-BLDC and BLDC fan consumers
Program costs	No capital investment is needed. To provide on bill financing. Utility has to collaborate with financial institutions to provide low interest loan. And interest payment can be done through DSM fund.
Program benefits	• Awareness among consumers about shifting non- BLDC consumers to BLDC fan consumers • Evaluation of benefits through field monitoring • Annual saving in in electricity bill of INR 2,000 to consumer.
Implementation responsibilities	Utility to drive the entire program, and will monitor the implementation
Key action steps	Program approval, launch, measurement & verification, disbursement of incentives to consumer, post-implementation surveys and documentation of learning through the program
Funds	Program will be funded from: Demand side management fund-DISCOMs

PDD 4: Flexible demand capture by heat pump installation

Project title	**Program for Flexible demand capture in residential and public buildings by installing heat pumps to increase solar generation utilization**
Summary	The program is designed to demonstrate the utilization of flexible demand for residential and public buildings by installing heat pumps, shifting the demand to solar generation period, and helping utilities optimize the power purchase cost.
Target consumer base	Public buildings and residential complex
Background	• Heat pump are more energy efficient than electric geysers and centralised heat pumps can reduce overall energy requirement and power requirement. • Heat pumps can be effectively utilized in demand flexibility by shifting electricity consumption from peak hours to off-peak hours through their ability to store thermal energy, allowing them to be turned on and off based on grid conditions. • Heat pumps can be programmed to be used in off-peak periods to avail the benefit of lower power cost
Rationale	Water heating load is one of the residential load which can be shifted if it has enough storage capacity. Additionally, using heat pumps, which are more energy-efficient than traditional geysers, can further decrease the electricity demand associated with water heating.

	Both of the objective can be addressed by using heat pumps as a flexible load and energy efficient load
Program objectives	• Aggregate residential and public building consumers to provide demand flexibility. • Modulate the usage of heat pumps by shifting in off-peak period. • Monitor and evaluate the benefits of load shifting to solar hours.
Program impacts	With a target of aggregation of ____[1] consumers (___[1]MVA connected load), a total annual shifting of ___[1] MUs is anticipated.
Program design Selection of technology Aggregation of consumers Service delivery	Selection of technology: • Technology providers will be selected through a competitive bidding process by the utility. Aggregation of consumers: • Enrolment of ____[1] residential and public building consumers for the program. • Site survey and acceptance of quantity of installations Service delivery: • Work execution (installations and commissioning) • Submission of bill by consumers • Confirmation of bill reduction • Rebate to the consumers
Rebates (if any)	Subsidy to consumers on heat pump capital cost Tariff incentive for shifting of demand in solar hours (10:00 to 16:00)
Target market segment	Residential and public buildings category
End-uses targeted	Water heating in Residential and public buildings
Key barriers addressed	Underutilisation of solar generation Contribution of water heating load to peak demand
Marketing strategy	Direct mailers to consumers along with the monthly bills, Advertisement of tender in daily newspapers, and tendering websites
Program Schedule	• PDD submission to MERC by Discom (T = Day 0) • DISCOM approval (T + 15 Days) • Declaration of tender for competitive bidding (T + 30 Days) • Completion of Competitive bidding (T + 60 Days) • Completion of consumer aggregation by aggregator (T + 90 Days)

	• Upgradation of communication, metering infrastructure at consumer site (T + 120 Days) • Creation of Network Operating Centre (T + 140 Days) • Installation of heat pumps at consumer sites (T+150 Days) • Start of Heat pump demand shifting program (T + 180 Days)
Program implementation process	• Competitive bidding for selection of technology provider for project implementation • Send communication along with the electricity bills to all target consumers (inform program features, utility rebates, expected savings, indicative investments, M&V requirement) • Receipt of expression to participate in the program within 15 days of final electricity bill dispatch • Utility to communicate with consumers willing to participate, and aggregate consumers with minimum _____[1] MVA total connected demand. • Agreement to be signed between consumer and utility clarifying responsibilities and incentive structure • Site survey and acceptance of quantity • Installations and commissioning • Consumer to shift their loads at solar period • Calculation of consumer incentive and utility profit based on M&V • Disbursement of incentives to consumers by utility
Financing approach	• Infrastructure and installations cost to be paid by Aggregator/ technology providers
Anticipated results	• Awareness among consumers about load shifting in solar hours • Evaluation of benefits through billing evaluation. • Acceptance of measurement and verification protocol • Energy shifting of ___[1] MUs in solar hours
M&V methodology	• Analyse the billing data collected from the consumer smart meter to calculate demand shifting by each consumer in off-peak hours.
Program costs	• Tariff incentive by distribution licensee to consumers • Capital costs like infrastructure cost and network operating centre cost

	• Operational costs like admin cost, aggregator fee and server maintenance
Program benefits	• Awareness among consumers about shifting the load to off-peak hours by heat pump installations • Evaluation of benefits through data collected from billing • Acceptance of measurement and verification protocol • Energy shifting of _____[1] in off-peak hours • Annual saving in the power purchase cost of INR _____[1] Crore to utility
Implementation responsibilities	Aggregator to drive the entire program, Utility will monitor the implementation
Key action steps	Program approval, launch, identification of technology provider for program implementation, measurement & verification, disbursement of incentives to consumers, post-implementation surveys, and documentation of learning through the program
Funds	Program will be funded from: Demand side management fund

PDD 5: Flexing the demand with Thermal Energy Storage (TES) systems

Project title	**Program for Flexible demand capture in HVAC loads from commercial and public buildings with TES**
Summary	The program is designed to showcase the use of Thermal Energy Storage (TES) in unlocking flexible demand for HVAC systems. By managing the charging of TES during periods of solar generation, the program aims to help utilities optimize their power purchase costs.
Target consumer base	HT and LT commercial and public buildings.
Background	The increasing HVAC load is significantly contributing to the total load from commercial and public buildings, indicating a substantial rise in demand within this category. To mitigate the total power procurement cost for DISCOM, shifting HVAC load to low energy cost periods can be a viable solution. Thermal Energy Storage (TES) can store energy in the form of ice or chilled water during periods with lower Average Power Procurement Cost (APPC) and supply HVAC during periods with higher APPC. This approach helps DISCOM minimize their total power procurement costs while allowing consumers to earn benefits through incentives provided by DISCOM during low APPC periods. With the increasing installation of solar power plants, APPC during solar periods is decreasing and is expected to decline further. To effectively integrate the high solar capacities, DISCOM will need

	additional load during solar periods. TES can facilitate the shifting of HVAC load to solar periods, helping utilities cost-effectively integrate higher solar capacities.
Rationale	• Solar power is available at lower rates to utility, shifting HVAC loads to solar generation period can help in absorbing solar power efficiently and reduce the power purchase cost to utility. • By managing charging of TES to benefit both consumers and the utilities. It will work by establishing communication between the TES, Building Management System (BMS), and the grid through Network Operating centre (NOC). • Charging of TES can be controlled by adjusting tariff, timing, and energy levels of TES, this flexibility will allow to shift HVAC load away from peak demand periods to solar period, integrate more solar energy, and improve grid stability, reducing the need for costly infrastructure upgrades.
Program objectives	• Aggregate commercial and public building (HT, LT) consumers for providing demand flexibility, • Create Network operating centers and communication infrastructure to control demand from aggregated HVAC load through TES. • Monitor and evaluate the benefits of load shifting to solar hours.
Program impacts	With a target of aggregation of ___[1] buildings (___[1] MVA connected load), total annual shifting of ___[1] MUs in solar hours from peak hours is anticipated.
Program design	Selection of aggregator: • Technology provider/aggregator will be selected through a competitive bidding process by DISCOM. Aggregation of consumers: • Enrolment of ____[1] LT and HT commercial and public buildings consumers for the program. • Installation of TES at enrolled consumers. • Upgradation of communication infrastructure at consumer site and creation of network operating centre for control, Measurement and verification. Service Delivery: • Disbursement of incentives for demand shifting to consumers. • Sharing of savings achieved between utility and aggregator.
Rebates (if any)	Tariff rebate for shifting of demand in solar hours (10:00 to 16:00)
Target market segment	Commercial and Public buildings (HT and LT)
End-user targeted	HVAC load in Commercial and Public buildings
Key barriers addressed	Underutilization of solar generation, high peak hours power procurement cost

Marketing strategy	Direct mailers to consumers along with the monthly bills, advertisement of tender in daily newspapers and tendering websites.
Program schedule	• PDD submission to MERC by Discom (T = Day 0) • DISCOM approval (T + 15 Days) • Declaration of tender for competitive bidding (T + 30 Days) • Completion of Competitive bidding (T + 60 Days) • Completion of consumer aggregation by aggregator (T + 90 Days) • Upgradation of communication, metering infrastructure at consumer site (T + 120 Days) • Creation of Network Operating Centre (T + 140 Days) • Start of PWW demand shifting program (T + 180 Days)
Program implementation process	• Competitive bidding for selection of technology provider/aggregator for project implementation • Send communication along with the electricity bills to all target consumers (inform program features, utility rebates, expected savings, indicative investments, M&V requirement) • Receipt of expression to participate in the program within 15 days of final electricity bill dispatch • Aggregator to communicate with consumers willing to participate, and aggregate consumers with minimum ____[1] MVA total connected demand. • Agreement to be singed between aggregator, consumer and utility clarifying responsibilities and incentive structure for each stakeholder • Upgradation of metering and communication infrastructure at consumer site as per requirement • Installation and integration of TES with HVAC system at consumer site • Creation of network operating centre by aggregator • Consumer to shift their loads at solar period • Calculation of consumer incentive and utility profit based on M&V done at Network operating center • Disbursement of incentives to consumer and profit sharing to aggregator by utility.
Financing Approach	TES Infrastructure cost to be paid by consumer to aggregator/technology provider. Utility to pay subsidy on TES infra to consumer.
Anticipated results	• Awareness among consumers about load shifting in solar hours • Energy shifting of ___[1] MUs in solar hours • Reduction in APPC to DISCOM by ___[1] INR • Reduction in consumer energy cost by ___[1] INR
M&V methodology	• Installation of smart/AMR meter at consumer site if not already installed

	• Creation of network operating centre to analyse the data collected from consumer smart meter to calculate demand shifting by each consumer in solar hours.
Program cost:	• Cost of the program include cost for installation of TES, setting up of network operating center and tariff incentive provided to consumer based on the event when load shift is required
Program benefits	• Awareness among consumers about shifting water pumping demand to solar hours • Acceptance on measurement and verification protocol • Energy shifting of ___[1] MUs in solar hours • Annual saving in power purchase cost of INR ____[1] Crore to utility • Annual savings in energy cost of INR ___[1] crore to consumers
Implementation responsibilities	Aggregator to drive the entire program, Utility will monitor the implementation.
Key action steps	Program approval, launch, identification of aggregator for program implementation, measurement & verification, disbursement of incentives to consumer, post-implementation surveys and documentation of learning through the program.
Funds	Program will be funded from: Demand side management fund

PDD 6: Flexible demand capture in battery storage system in PM Surya Ghar Yojana

Project title	**Program for Integration of Battery Storage with Solar System under PM Surya Ghar**
Summary	• The program aims to integrate battery storage systems with solar energy to enable better management of peak demand and optimize power procurement costs. • DISCOM will control the charging and discharging of behind-the-meter battery storage, providing incentives to consumers for participating in demand flexibility events. Additionally, DISCOM will offer a 50% rebate on the capital cost of the battery system.
Target consumer base	Residential consumers under PM Surya Ghar Yojana
Background	• Solar generation under PM Surya Ghar Yojana often exceeds immediate residential consumption. • Battery storage allows for storing excess solar energy and using it during peak demand periods. • Effective battery storage management can help reduce power procurement costs and improve grid stability.
Rationale	• Efficient utilization of surplus solar energy, reducing reliance on grid power. • Reduction of electricity costs for consumers by leveraging stored energy. • Enhancement of local grid stability and power procurement cost optimization. • Supporting large-scale solar energy adoption through demand flexibility.
Program objectives	• Deploy 500 MWh of battery storage capacity in residential consumer homes. • Enroll 70,000 consumers with a minimum 3 kW solar rooftop capacity. • Provide 50% CAPEX support for consumers installing battery storage. • Allow DISCOM to manage charging/discharging of the battery storage system. • Establish Network Operating Centers (NOCs) for real-time monitoring and demand flexibility management. • Assess program benefits through continuous evaluation and documentation.
Program impacts	• 500 MWh of battery storage will support peak demand management in the morning and evening. • Optimized power procurement costs by leveraging demand flexibility.

	• Improved grid reliability by absorbing excess solar generation.
Program design Selection of aggregator Aggregation of consumers Service delivery	**Selection of Aggregator** • DISCOMs will select an aggregator through a transparent bidding process based on technical expertise, financial strength, and experience in battery storage management. • The aggregator will manage consumer enrollment, infrastructure deployment, real-time monitoring, and incentive distribution. **Aggregation of Consumers** • 70,000 residential consumers with a minimum 3 kW solar capacity will be onboarded to achieve 500 MWh battery storage. • Consumers will receive necessary metering and communication enhancements to allow remote demand management. • DISCOM will provide a 50% rebate on the capital cost of battery storage. **Service Delivery** • Consumers will receive incentives for each event where DISCOM controls battery charging and discharging. • A network operating center will track, measure, and verify demand flexibility in real time.
Rebates (if any)	• **Consumer Incentive:** Consumers will be compensated for each event where DISCOM manages battery charging/discharging. • **Capital Cost Rebate:** 50% rebate on battery system capital cost, provided by DISCOM.
Target market segment	Residential
End-uses targeted	Residential consumer under PM Shaurya Ghar Yojana
Key barriers addressed	• Underutilization of solar generation and battery storage systems • Consumer hesitancy due to upfront costs • Lack of awareness of demand flexibility benefits.
Marketing strategy	• Direct mailers with electricity bills • Advertisements in newspapers and tendering websites • Awareness campaigns on battery storage benefits

Program schedule	• **Day 0:** PDD submission to MERC by DISCOM • **T + 15 Days:** DISCOM approval • **T + 30 Days:** Declaration of tender for competitive bidding • **T + 60 Days:** Completion of competitive bidding • **T + 90 Days:** Aggregator completes consumer aggregation • **T + 110 Days:** Installation of battery storage at consumer sites • **T + 120 Days:** Upgrading communication and metering infrastructure • **T + 140 Days:** Creation of Network Operating Center • **T + 180 Days:** Start of battery storage demand shifting program.
Program implementation process	• Competitive bidding for aggregator selection • Consumer communication via electricity bills • Consumer enrollment and agreement signing • Metering and communication infrastructure upgrades • Network Operating Center establishment • Battery charge/discharge control by DISCOM • Incentive disbursement to consumers
Financing approach	• DISCOM will cover the cost of infrastructure and Network Operating Centers • Incentives funded through Demand Side Management (DSM) funds.
Anticipated results	• Increased consumer participation in load shifting • Enhanced solar energy utilization • Improved grid stability through managed demand flexibility
M&V methodology	• Smart metering installation at consumer sites • Network Operating Center for real-time data analysis • Tracking energy shifting and incentive calculations
Program costs	• Consumer Incentives: Based on participation in demand flexibility events • Infrastructure Costs: Includes network operating center and smart metering • Research & Development: 3.5% of infrastructure cost • Administrative Costs: 5% of infrastructure cost
Program benefits	• Reduced power procurement costs for DISCOM • Incentives and rebates for consumers • Improved reliability of local grid operations • Enhanced consumer awareness and adoption of energy storage solutions • Energy shifting of 500MW in solar hours
Implementation responsibilities	• Aggregator will drive the program execution

	• DISCOM will oversee implementation, monitoring, and evaluation
Key action steps	• Program approval and launch • Aggregator selection and consumer enrollment • Battery storage installation and system upgrades • Measurement, verification, and incentive disbursement • Post-implementation review and program refinement
Funds	Program will be funded from: Demand side management fund- DISCOM.

Consumer details of targeted consumers of PDDs

Consumer category	Discom	Tariff	No of consumers	Contracted demand (kWA/Kw)	Energy sales (MUs)
Public water works	MSEDCL	HT: INR 7.76, LT: 4.09 (0-20), 6.33 (20-40), 8.40 (above 40)	57226	488.54	2739.23
Residential		HT: Group housing: INR 7.16, LT: INR 4.71(0-100), 10.29(101-300), 14.55 (301-500), 16.64 (above 500)	20913281	25695	24,908.16
Public buildings		HT(Govt.): INR 10.03, (other): 10.93, LT (Govt.): INR 6.18 (0-20), 9.78 (20-50), 10.13 (above 50)	132153	1814	1842.58
EV charging stations		HT: INR 7.40, LT: INR 6.58	939	11560	66
Commercial		HT: INR 13.21, LT: INR 8.52 (0-20), 13.01 (20-50), 15.38 (above 50)	2041715	5311.8	9844.71
Public water works	AEML	HT (other) 7.74 LT (other) 6.60,	5610 (combined)		578.6 (combined with public building)
Residential		HT: grp housing: INR 6.05 LT: INR 3.15 (0-100), 5.40 (100-300), 7.10 (301-500), 8.15 (above 500)	2115214		4908.2
Public buildings		HT(govt.) INR 6.80, (other) 7.74 LT(govt.): INR 6.20, (other) 6.60,	5610 (combined)		578.6 (combined with public building)
EV charging stations		LT: INR 5.15, HT: INR 6.86	22		73.7

Commercial		HT: INR 6.70, LT: INR 5.75 (0-20), 6.00 (20-50), 6.20 (above 50)	441416		3672.2
Public water works	Tata power Mumbai	HT:(others): INR 8.60, LT: (others): INR 7.75	public service others = 597	22760	280.3 (combined)
Residential		HT: grp housing: INR 7.34 LT: INR 2.18 (0-100), 5.36 (100-300), 11.62 (301-500), 12.56 (above 500)	grp housing = 19, LT resdential = 7,60,357		2268.02
Public buildings		HT (Govt.): 6.40, (others): 8.60 LT(govt.): INR 7.40, (others): 7.75	167	11740	280.3 (combined)
EV charging stations		HT: INR 6.60, LT: INR 4.60	776	20970	29.5
Commercial		HT: INR 8.84 LT: INR 6.50 (0-20), 6.55 (20-50), 6.70 (above 50)	44925	324000	1126.46
Public water works	BEST	HT: (others): INR 8.25, LT: (others): INR 7.16	7724 (combined)		474.1 (combined)
Residential		HT: grp housing: INR 7.59, LT: INR 1.87 (0-100), 5.46 (101-300), 9.56 (301-500), 11.73 (above 500)	773547		2199
Public buildings		HT (Govt.): 7.43, (others): 8.25 LT(govt.): INR 7.15, (others): 7.16	7724 (combined)		474.1 (combined)
EV charging stations		HT: INR 7.24, LT: INR 5.78	28		20.9
Commercial		HT: INR 8.04, LT: INR 7.08 (<20), 5.88 (20-50), 5.25 (>50kw)	262884		1699.8