



How Can India Scale-up Electricity Demand Side Management?

Insights from a multi-state assessment of DSM Regulations and Discoms' action

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Impacting sustainable development at scale with data, integrated analysis, and strategic outreach

TRANSFORMATIONS

Low-carbon Economy

Energy Transitions

Power Markets

Industrial Sustainability

Sustainable Livelihoods

QUALITY OF LIFE

Clean Air

Sustainable Water

Sustainable Food Systems

Sustainable Cooling

Sustainable Mobility

ENABLERS

Sustainable Finance

Technology Futures

Circular Economy

Climate Resilience

International Cooperation

250+

Multidisciplinary team

380+

Peer-reviewed publications

190+

Instances of increased data transparency

540+

Roundtables & conferences

20+

Indian states engaged

130+

Bilateral & multilateral initiatives promoted

SPECIAL INITIATIVES

CEEW Centre for Energy Finance

Powering Livelihoods

Emerging Economies

UP State Office

Meeting clean energy goals requires energy efficiency, and more

Over

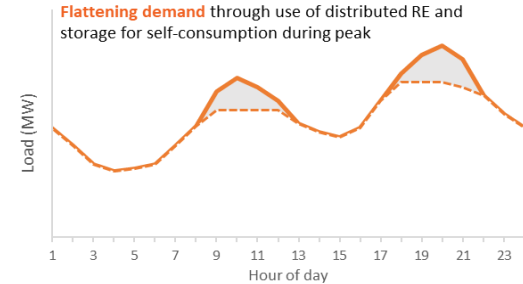
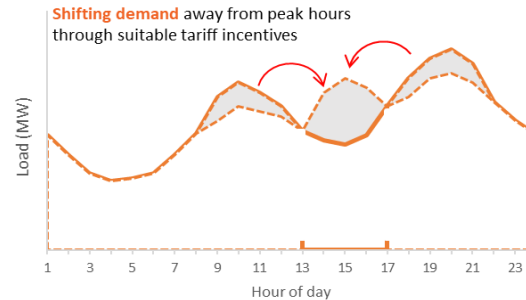
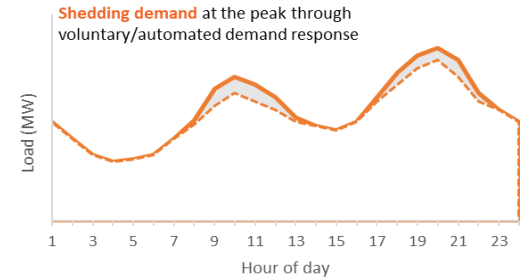
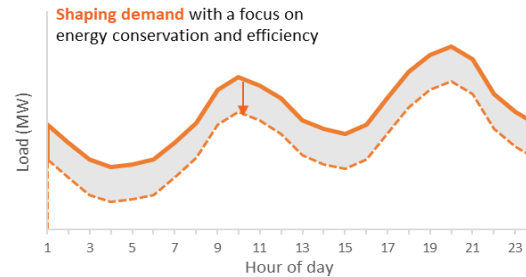
3 times

increase in India's installed
VRE between 2024 and
2030

Research questions:

1. How effective have the Regulations been so far?
2. What are the challenges that limit DSM implementation by discoms?
3. What measures can help strengthen the regulatory framework and its enforcement?

Demand shifting and flexibility can help **meet RE targets cost-effectively**²



Research methodology

1 Literature review

To identify regulations' role in stimulating utility DSM in a changing technological landscape

3 Keyword analysis

Of tariff orders for FY21-24 to gauge effectiveness of DSM Regulations.

Keywords: demand-side management, energy efficiency, demand response, time-of-day tariffs.

5 Global case studies

To identify regulatory innovations.

- Revenue = Incentives + Innovation + Outputs
- Demand Response Auction Mechanism
- Efficiency Vermont
- Shared Savings

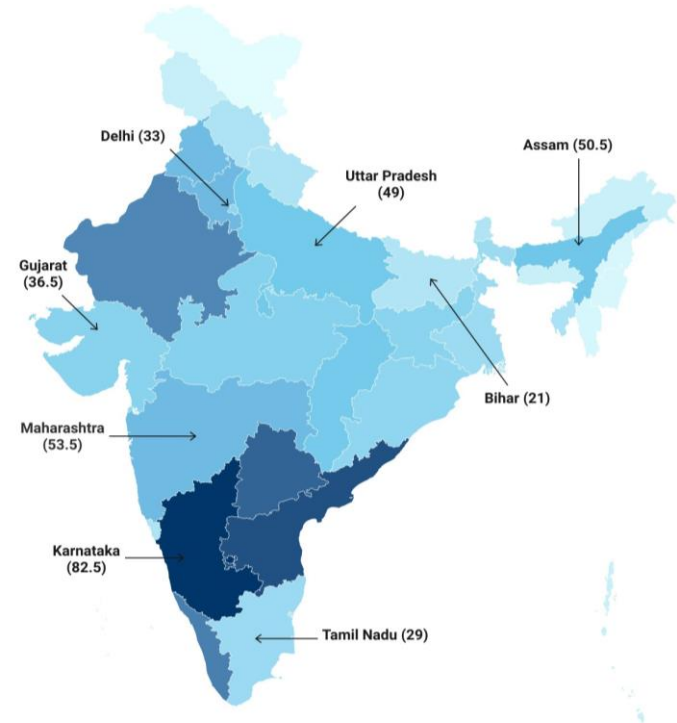
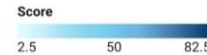
2 Comparative analysis

Model vs. 8 states' regulations to identify progressive provisions

4 Semi-structured interviews

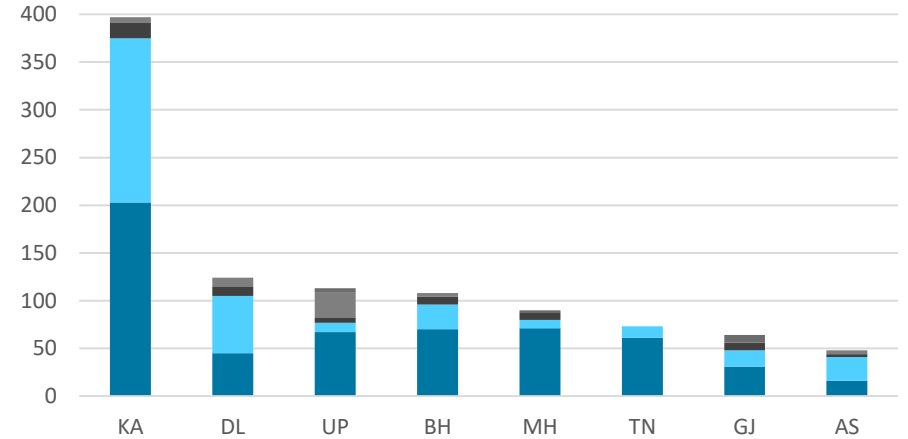
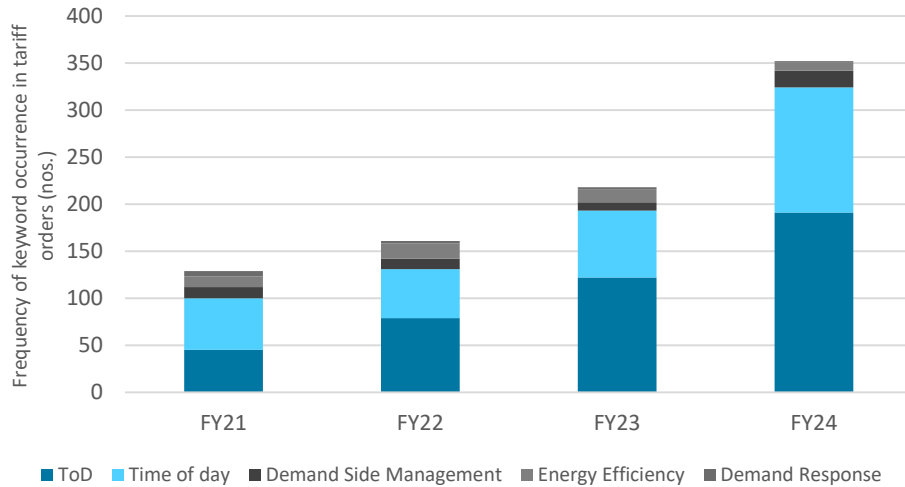
With 14 key informants from regulatory commissions, discoms, research institutions and service providers to understand implementation challenges

SEEI categories (score range):
Aspirant (<30), Contender (30-49.5), Achiever (50-60), Front Runner (>60)



Source: Based on Bakre et al. (2023) • Map data: © OSM • Created with Datawrapper

ToD tariffs and energy efficiency are the primary focus of DSM



DSM objectives: “power shortage mitigation, seasonal peak reduction, cost effective energy savings, lowering the cost of electricity, reduction in emissions of greenhouse gases etc.”

- States’ objectives follow the Model Regulations.
- Objectives reflect the policy imperative of mitigating supply shortages

DSM objectives must be aligned with the transition’s evolving needs on clean energy and supply reliability.

Overall performance of the analysed states

	Maharashtra	Delhi	Karnataka	Gujarat	Tamil Nadu	Uttar Pradesh	Bihar	Assam
Performance targets								
Programme design study methodologies	Only state to have notified cost-effectiveness guidelines.							
Compliances	All states have conducted load research studies and created DSM Action plans independently or with BEE's support.							
Evaluation and monitoring reports	Maharashtra has Monitoring & Reporting (M&R) guidelines in the public domain but not Evaluation & Verification (EMV) guidelines. Delhi and Karnataka provided some quantitative impact of DSM but the methodology is not provided.							
Funding and cost recovery								
Performance incentives for discoms								

Energy saving targets are notified under the Maharashtra Energy Conservation Policy 2017 and Karnataka Energy Conservation and Energy Efficiency Policy, 2022, respectively.

No methodologies or studies in the public domain.

Only Karnataka and Tamil Nadu have any Action Plan in the public domain.

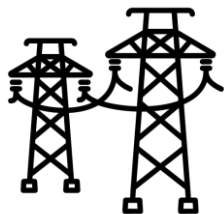
DSM expenses/budgets accounted for in the tariff orders.

Most state regulations allow for performance incentives for discoms for meeting/surpassing approved DSM targets. However, in the absence of target-setting and detailed M&R reports, none of states have allowed incentives.

Note: Colour coding: Dark green: Provision present/implemented; Light green: Provision present/partially implemented; Blue: Provision mentioned without explanation; Orange: No publicly available details on the provision.

Recommendations on strengthening the DSM policy framework

1. SERCs must update DSM regulations to expand its definition and objectives



Cost-effectively
enhance supply
reliability



Integrate clean energy



Facilitate new tech and
business models

Objective: A stronger legal footing for discoms and SERCs to pursue novel DSM methods



DELHI

As per DERC's DSM Regulations

The additional objectives of DSM include:

- Amending time and level of consumption
- Avoiding/postponing/reducing capacity and power purchase costs



TAMIL
NADU

As per TNERC's DSM Regulations

The additional objectives of DSM include:

- Reducing fixed cost and fossil fuel dependence
- Avoiding/postponing generation, transmission, and distribution network extension, and overall electricity costs

2. SERCs must adopt performance-based regulations & resource adequacy

- SERCs should consider:
 - a) Providing additional reliability-based incentives
 - b) Enforcing automatic credits to consumers for poor supply reliability
 - c) Enhancing their independent monitoring and enforcement of Standards of Performance¹



As per GERC's draft MYT Regulations

An additional 0.5% RoE is allowed on any performance parameter specified by the commission



Case study: UK's Revenue = Incentives + Innovation + Output (RIIO) regulatory framework

Six outputs including reliability. Regulator provides financial and non-financial incentives for meeting targets.

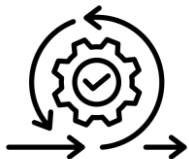
- Discoms must include DSM in Integrated Resource Planning exercises



As per CEA's Resource Adequacy Guidelines

DR including load shifting and constraints such as periods, the maximum total and hourly quantum that can be shifted can be included in IRP.

3. Enable programme design through standard methods and end-use surveys



- FoR could draft standard methodologies and data reporting formats under MYT, and make it public
- DSM Consultative Committees could assist SERCs in strengthening these
- CEA could assist data collection via Regional Power Survey Offices for IRP, Electric Power Survey exercises



- SERCs must commission independent end-use surveys that can assist DSM programme design/overall system planning



Case study: California Energy Commission's Residential Appliance Saturation Study in 2003, 2009, 2019¹

The 2019 survey collected data from nearly 40,000 households on appliances, equipment, consumption patterns, EV charging, presence of decentralized energy resources and energy-efficient appliances.

4. Create a funding pool for innovation and enforce transparency



- Multiple funding sources available to discoms: State Energy Conservation Fund, Power System Development Fund, RDSS
- Absence of pipeline of funding-ready projects limited the utilisation of available funds
- Tax-funded studies should be transparent and publicly available to accelerate learning across discoms



Case study: Strategic Innovation Fund and Network Innovation Allowance under RIIO¹

Set up by Ofgem to fund pilots that would not be conducted without stimulus; learnings are shared across utilities.

5. Mandate DSM via policies and create a market for monetization

- RPO-like obligations can be extended for DSM/demand flexibility services
- Ancillary Services Regulations allow demand response providers to provide secondary and tertiary ancillary services¹



Case study: California's Demand Response Auction mechanism²

Each utility has a minimum target for obtaining DRAM resources; Capacity acquired by utilities gets counted towards their resource adequacy but they have no claim on revenues the winning bidders may receive from the CAISO energy market.

- PAT should be reformed to provide a cost-reflective value for ESCerts
- Expand State Designated Agencies' remit and resources to work with discoms on designing/implementing DSM programmes



Case study: Efficiency Vermont³

Dedicated utility for energy efficiency; targets and funding sources governed by the Vermont Public Utilities Commission.

Thank you

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Annexure I: Literature review on regulations' evolving role in DSM

1. Addressing the utility business model conflict

Utilities lose revenue for every kWh conserved

EE/demand response mandates an option but poor experience on compliance with RPOs in Indian context

Revenue decoupling: estimate the efficient level of revenues, make good for foregone revenue

Consider demand as a resource towards meeting reliability

2. Defining targets and monitoring progress

Some consumers may be free-riders + market-driven technologies may not be the ones that benefit grid operation

Target technologies which would not grow without stimulus and consumers who would not adopt without incentives

3. Evaluating cost-effectiveness

Costs and benefits vary widely based on methodology used, nature of intervention, target consumers, etc.

Poor financial health of discoms leads to high discount rates and option value of not investing

Need better/consistent tools and methodologies to evaluate costs (including foregone revenue) and benefits of DSM

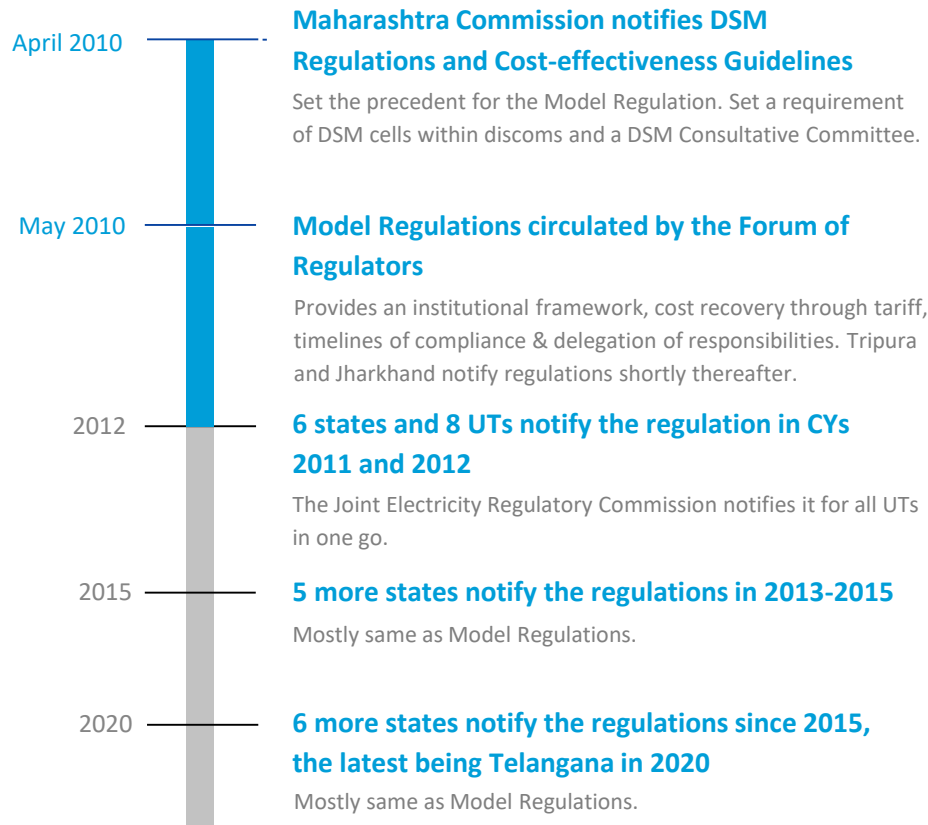
4. Accounting for externalities

Increasing evidence that DSM measures adopted by some consumers can increase reliability for all

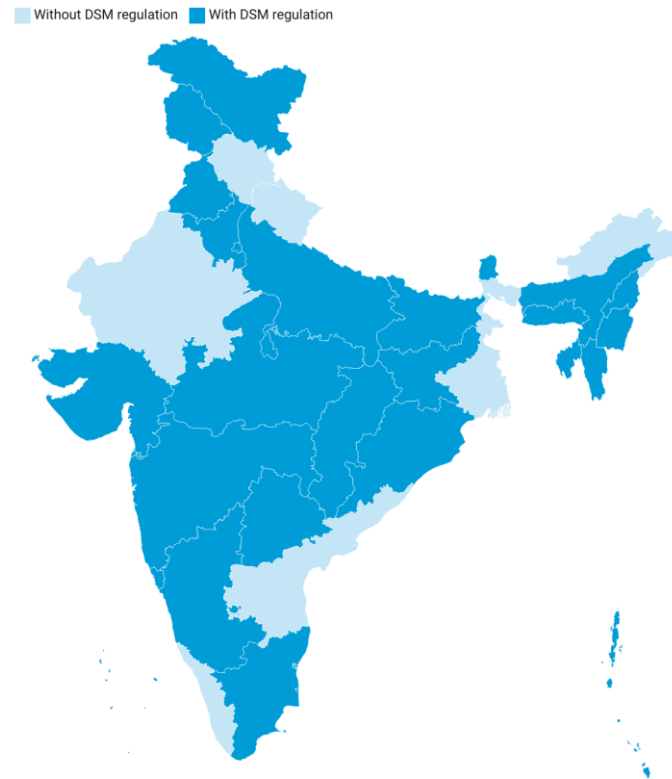
Learnings from pilots in one discom can help reduce future costs for everyone

Regulations and policies should tap such positive externalities + treat DSM as a public good where feasible

Annexure II: Implementation timeline of DSM Regulations



30 states/UTs have notified DSM regulations since 2010



Source: Authors' analysis • Map data: © OSM • Created with Datawrapper

Reflection questions for participants

Linking DSM with reliability and ensuring the enforceability of reliability standards

Including DSM in IRP and resource adequacy exercises

Standard DSM methodologies and formats

Innovation Fund

Mandating and monetizing DSM

- How can reliability be enforced by SERCs and in what way?
- Can performance-based incentives for reliability help in motivating discoms to undertake DSM?
- What challenges do discoms foresee in implementing this?
- What support do they need for this?
- What have been the learnings and challenges faced by discoms from implementing and monitoring DSM activities?
- Would an appliance survey benefit DSM programme design, and who would undertake it?
- Who can contribute to and host this fund?
- What are the prerequisites for creating a market where private players participate as demand response aggregators?
- Can RPO-like obligations for demand flexibility help in the creation of such a market? Who should the target consumers be?
- Should energy efficiency functions be taken out of discom's purview?