

CSE NATIONAL ROUNDTABLE · SCALING RENEWABLES WITHOUT BREAKING THE GRID

Grid Over-Injection

Financial Liability, Regulatory Disputes and Lessons from Recent Cases

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FRAMING

The RE transition is not only a generation-side story



It rewrites the load curve

Solar concentrated in a handful of states has hollowed out morning demand for thermal capacity.



It rewrites who schedules what

Beneficiaries now schedule around solar availability and price, not around a plant's technical limits.



It rewrites who bears the risk

The financial and regulatory fallout is landing on thermal generators and the system operator — not on those making the scheduling choices.

Grid operators worldwide report the same underlying problem — rising frequency and voltage volatility as intermittent renewables displace the conventional generation that used to provide stabilising inertia. (McKinsey & Company, 2023)

WHY NOW, NOT BEFORE

This dispute surfaces only once India stopped being power-deficit

THE POWER-DEFICIT DECADES

Demand outstripped supply

Thermal stations were dispatched as base-load plants — run at or near full capacity almost continuously.

A “technical minimum” for partial loading had no real place in the grid code — schedules were rarely low enough to need one.



THE POWER-SURPLUS, RE-RICH PRESENT

Beneficiaries gained a choice

Capacity addition — thermal and renewable — turned India power-surplus, giving beneficiaries real choice in where and when to draw power from.

Technical minimum scheduling became a live regulatory question only once that choice existed — first addressed in 2016, then reworked again under IEGC 2023.

The dispute comes from a change in the whole system: a grid with enough power and more renewables lets beneficiaries choose — a grid short of power never did.

WHY NOW, CONTINUED

Three policy signals point the same way

On one reading, thermal is being asked to become the system's flexible layer — without shedding a base-load plant's obligations.

CEA Flexible Operation Regulations, 2023

Coal-based thermal plants must be retrofitted to operate flexibly, down to 40% of capacity, under a CEA phasing plan running to 2030 — built explicitly to make room for renewable variability.

Ministry of Power has done away with allocation orders

Going forward, beneficiaries are no longer tied to central generating stations by allocation — they are free to source power where they choose.

Must-run status for renewables

Solar and wind generation is treated as must-run and given scheduling priority, while thermal is left to absorb the balancing.

Put together, these read as a policy tilt away from thermal as the anchor resource — one this session's mandate, tracking governance gaps, may want to name explicitly.

THE OTHER SIDE

Thermal is asked to make space — yet thermal capacity is set to grow

₹5.5 lakh cr+

planned thermal investment — over 50 GW of new capacity by 2032

Economic Times, Oct 2025

~97 GW

more coal and lignite capacity needed by 2034–35; ~39.5 GW under construction

Ministry of Power, Rajya Sabha, Feb 2026

Renewables keep growing



Thermal keeps growing



More supply chasing the same demand

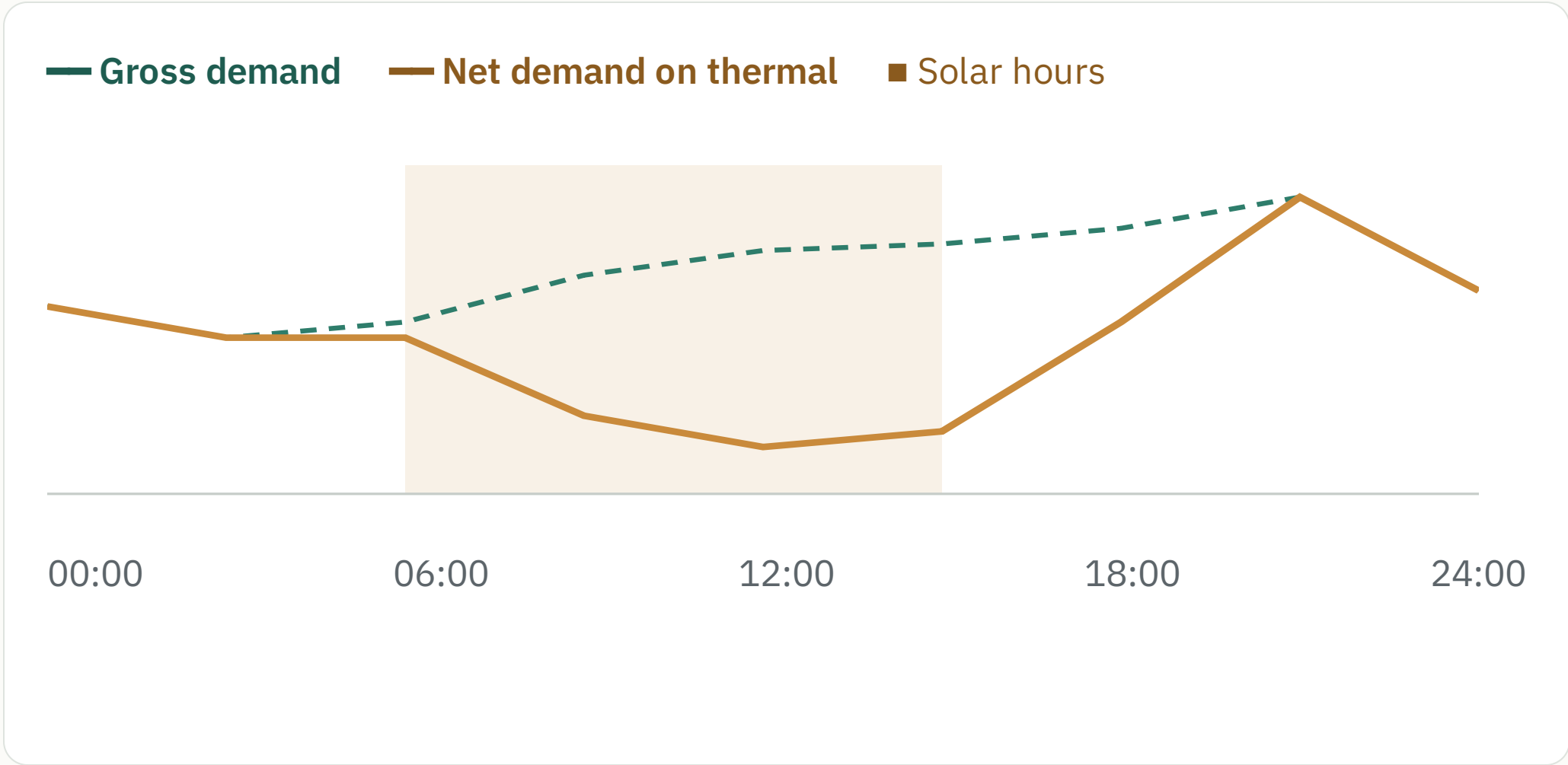


Sharper disputes over who gets scheduled

Disputes will grow: as supply rises on both fronts, the fight to win demand — who runs, who is backed down, who pays — will get sharper, not go away.

THE MECHANISM, IN ONE PICTURE

Solar hollows out the very hours thermal plants need to stay on bar



~10,000 MW
support needed on 25 May 2025 because
schedules fell below technical minimum

18 days
in May 2025 with frequency above 50.05 Hz for
more than 20% of the day

Not new in 2023: technical minimum was already the rule — the 2016 IEGC amendment fixed it at 55% of MCR, backed by Reserve Shut Down and compensation for part-load operation.

THE MECHANICS

Below Minimum Turndown Level, a generator has two paths

OPTION A

Stay on bar at technical minimum

The unit keeps running above the schedule it was given — it over-injects into the grid.

→ **DSM penalty for deviation, plus frequency / grid-security risk**



OPTION B

Declare Unit Shut Down

A station receiving a schedule below 50% of MCR, and not committed under SCUC, may declare shutdown by 2000 hrs on D-1 day.

→ **Beneficiaries continue paying capacity charges on the off-bar capacity; the D-day schedule is restricted to on-bar units only**

WHAT CHANGED IN THE GRID CODE

IEGC 2023 tightened the obligation on generators — without a matching one on beneficiaries

Aspect	IEGC 2010 (as amended, 2016)	IEGC 2023
Technical minimum	55% of MCR, settled through the 2016 Fourth Amendment	Retained as “MTL”, but not backed by a scheduling floor
Below-minimum schedule	Reserve Shut Down — station keeps billing fixed charges	Reserve Shut Down removed; replaced with Unit Shut Down
On shutdown	No further supply obligation once declared capacity is retained	Initially, generator had to arrange supply to beneficiaries even on shutdown (eased by CERC in Oct 2025)
On beneficiaries	Expectation of “operationally reasonable” scheduling	No explicit minimum requisition / offtake obligation
Who bears the cost	Entity causing sub-minimum operation pays compensation	Generator bears the DSM charges for resulting over/under-injection



“...states are requisitioning zero power during solar hours and full entitlement during evening hours.”

“...if they need power in the peak evening hours, they should give operationally reasonable schedules to the generating station...”

— CERC, Order in Petition No. 9/SM/2024, 5 October 2025, paras 51 and 56

CASE STUDY I · A RECURRING PATTERN BEFORE CERC

When beneficiaries schedule around solar, generators are left over-injecting — and paying for it

More than one central generating station has reported beneficiaries requisitioning full schedules in peak hours, but near-zero schedules in solar hours — well below the 55% technical minimum.

To protect their machines and stay ready for the evening peak, these units have stayed on bar — over-injecting into the grid every time the schedule undershot MTL.

Generators facing this pattern have approached CERC seeking relaxation of the supply obligation under Regulation 47 of IEGC 2023, and recovery of the resulting DSM charges from beneficiaries or the DSM pool.

- ⚠ Not a one-off — the national load despatch centre, in its own petition, has also reported this difficulty
- 🕒 The exposure has continued even after an initial regulatory fix — it did not resolve on its own
- 🔧 The relief sought: relax the supply obligation, and let generators recover DSM charges caused by infeasible scheduling

Four suo motu orders and one amendment — all on one problem: scheduling below technical minimum

Sep 2023 • 14/SM/2023

Supply obligation continues if DC is retained

Dec 2023 • 18/SM/2023

D-day revisions cannot go below MTL share

Oct 2024 • IEGC First Amendment

SCED support up to MTL, where reserves allow

Mar 2025 • 2/SM/2025

Over-injection a cause of high frequency; two-shift pilot

Oct 2025 • 9/SM/2024

Shutdown below 50% MCR — supply obligation lifted

The obligation was in the Grid Code

IEGC 2023 imposed the supply obligation. The natural way to remove it was to amend the Code itself.

It was lifted by a suo motu order

After generators' complaints and petitions, CERC effectively did away with it through an order, not an amendment.

Petitions, or complaints to the regulator?

They seek what the regulations do not provide — in substance, a challenge to CERC's own regulations. Even the system operator's petition sought amendments.

When the grid operator itself asks for obligations on both sides

By 2025, the national load despatch centre — the apex body for grid security — moved CERC on its own, seeking amendments to the Grid Code, Ancillary Services and DSM Regulations. Its own case:

Minimum requisition obligation Beneficiaries drawing power in peak hours should carry a minimum requisition in lean/solar hours too.	NLDC-directed shutdown Give the system operator — not the generator alone — the call on taking units under shutdown and reviving them.
Sharper DSM at high frequency Higher deviation charges for over-injection / under-drawal once frequency crosses 50.10 Hz — for RE and non-RE entities alike.	Restrict schedules to on-bar capacity Stop the “fictitious schedule” problem — beneficiaries requisitioning power from units that are off-bar.

Plants built to run for their whole life are now asked to switch off every day

Designed for full recovery

A thermal station, like any expensive infrastructure, is designed to run for its whole life so that it recovers its entire cost.

25-year PPAs are built to ensure that recovery.



Asked to shut off by day

Shutting such plants down in solar hours to accommodate renewables leaves costs unrecovered.

Every unrecovered cost becomes a new dispute.



One such instance

A central generating station has moved CERC to allow recovery of auxiliary power consumed during shutdowns.

Its shutdowns rose from **17 to 118** in a year — a result of the accommodation given to renewables.

WHERE THE RECORD STANDS

A CEA committee confirmed the diagnosis — the problem still hasn't gone away

“There is a need to create equitable balance between the supply obligation of generators... as well as offtake obligation of... beneficiaries.”

CEA Committee Report, June 2025

Recommended: a minimum requisition ratio for beneficiaries during lean hours, and a de-commitment mechanism so unsupported units can come off SCUC cleanly.

25–35

stations a day still receiving infeasible schedules

Even after the committee report and a further CERC order

THE CENTRE-STATE DIMENSION

The CEA committee found state-level protection is a patchwork

CENTRAL / ISGS GENERATORS

One uniform regime under IEGC 2023: 55% MTL, Unit Shut Down, supply obligation and DSM exposure.

STATE GENERATORS

“Regulatory provisions for 55% MTL and compensation mechanism at the intra-state level are present only in some states.”

State	Technical minimum
Haryana, Maharashtra, MP, Karnataka	55%, with part-load compensation
Uttar Pradesh	55%
Telangana, Andhra Pradesh	In line with IEGC
Odisha	55–60%
Tamil Nadu	60–80%
West Bengal	70%

A question for this panel: where state floors sit higher, or state units are compensated, is the midday dip being pushed onto central stations — and is that a centre-state tracking gap?

TAKEAWAYS

Four lessons for grid-code design in a high-RE system

1

Obligations must run both ways

A supply obligation on generators needs a matching offtake obligation on beneficiaries.

2

Risk should follow control

Whoever decides the schedule should bear the deviation cost that choice creates.

3

Paper fixes need capacity behind them

SCED-based MTL support only helps where down reserves actually exist.

4

Centre and states must move together

Uneven state MTL and compensation rules leave a coordination gap the RE transition keeps exposing.

Over to the panel

Three questions I'd put to today's panel:

- Should offtake obligations on beneficiaries be codified in the Grid Code, not left to committee recommendations?
- Who should hold the discretion to call Unit Shut Down — the generator, or the system operator?
- Should state MTL floors and compensation be brought in line with IEGC 2023, so the burden of the solar hours is shared evenly?