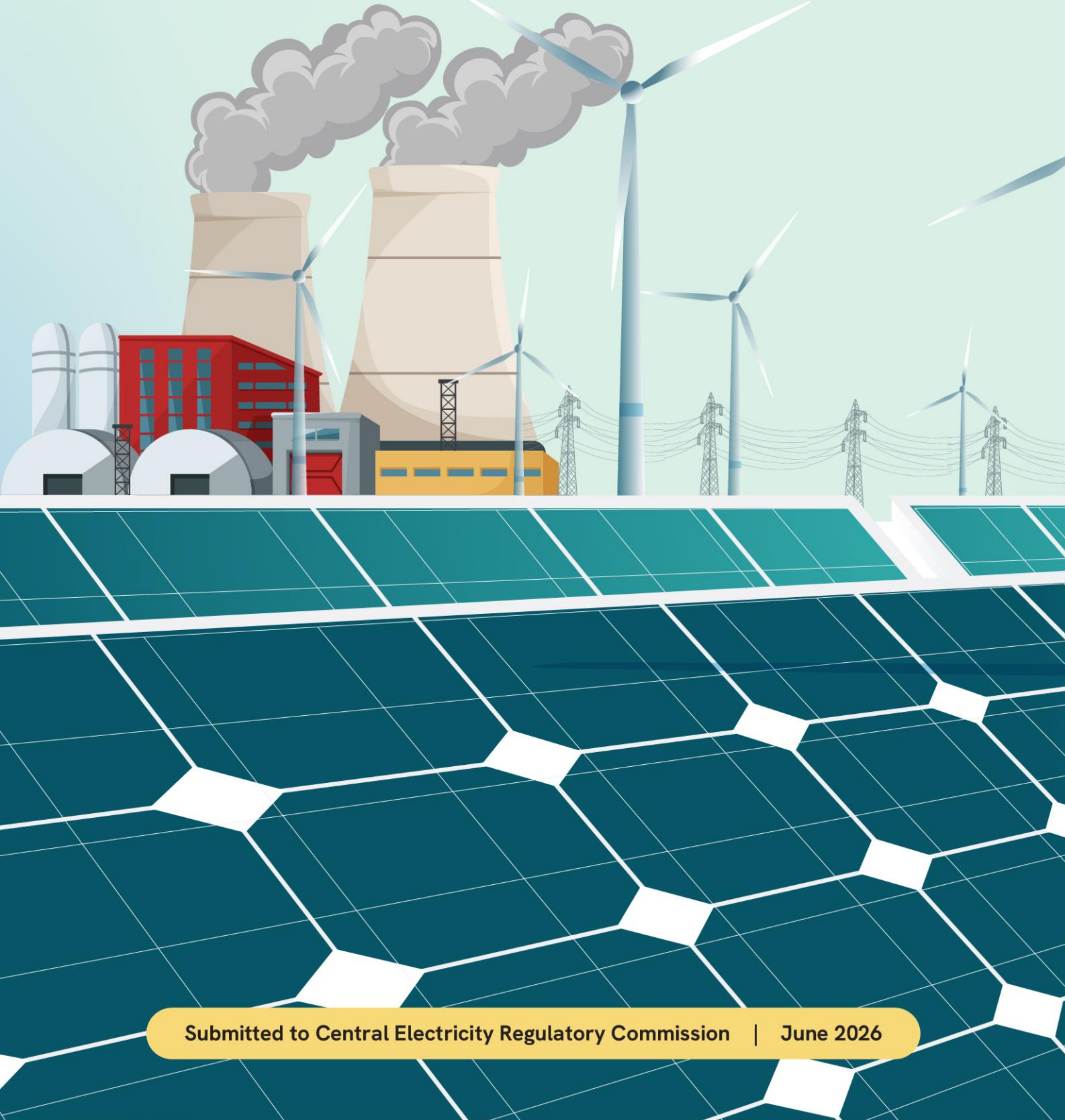
CENTRE FOR ENERGY, ENVIRONMENT & PEOPLE

Submission on Staff Paper on "Capacity Market for Electricity in India"



Submitted to Central Electricity Regulatory Commission | June 2026

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1. Introduction

The Central Electricity Regulatory Commission published Staff Paper on "Capacity Market for Electricity in India", and invited comments from stakeholders on the same. In response to said invitation, Centre for Energy, Environment and People, Jaipur (RJ) is submitting its comments and requests that the comments be taken on record.

The Comments are organised in two sections:

a. Seeking clarification on the objectives of Staff Paper
b. Suggestions on incorporating requirement of flexibility in capacity markets

2. Clarifications on Objectives and Viability of Capacity Markets

The public notice on release of Staff Paper sets out a two-fold objective of the capacity markets (CM) in India:

a. **Resource adequacy:** Ensure 'adequate capacity in the power system' by allowing separate contracting of capacity and;
b. **Recovery of 'missing money':** 'guaranteeing recovery of capacity remuneration' for the capacity holders.

The notice goes on to mention that India currently has a power purchase agreement (PPA) based regime. As per the notice, PPAs are effectively capacity contracts with a two-part cost recovery mechanism – an annual availability-based fixed cost and an actual energy dispatched based energy cost. Along with the capacity rights, the load serving entities (LSEs) generally hold scheduling and dispatch rights.

In the following sub-section, we submit how above-mentioned objectives are appropriately met by the existing regime, and hence a clarification on the instant proposal is needed.

2.1. Uncertainties surrounding objectives and viability of CM

Under the current regulatory regime, majority LSEs such as Discoms and large consumers enter long-term PPAs with capacity holders (primarily Gencos) for meeting a large part of their long-term resource adequacy requirement. Additionally, the Resource Adequacy Guidelines[1], introduced by the Ministry of Power vide Rule 16 of the Electricity (Amendment) Rules, 2022, mandate the state Discoms to conduct rigorous demand assessment for short-, medium- and long-term planning horizon and ensure that majority of the identified gap in resource adequacy be met through long-term contracts.[2]

[1] Ministry of Power (2023), Guidelines for Resource Adequacy Planning Framework for India.

[2] Each state has been given the authority to determine the share of resource adequacy requirement which must be contracted in advance, subject to such other conditions including maintaining a minimum planning reserve margin. For example, Regulation 11.9 of the Rajasthan Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2026 mandates the Discoms of Rajasthan to procure 75-80% of their resource adequacy requirement through long-term contracts.

Furthermore, it is observed that the PPA-based mechanism has been effective in ensuring that capacity holders are effectively remunerated for their fixed cost component; the public notice and the Staff Paper confirm this in no uncertain terms.[3]

Thus, under the existing PPA-based regime, the Discoms are regulatorily mandated to adopt long-term contracts, and these contracts ensure adequate fixed cost remuneration to the capacity holders (*a privilege that capacity holders do not have in a CM regime*[4]) – thereby meaning that both the objectives[5] that a new capacity market aims to fulfil appear to have been met by the current regime. This understanding, therefore, puts to question the reasons behind the proposal of introducing CM.

An inverse of the aforementioned premise is that an entirely market-based CM is not viable or possible due to the prevalence of long-term PPAs.

2.2. Clarifications Sought from the Commission

And against this backdrop, we seek a clarification on:

a. Rationale for introducing capacity markets and intended objectives;
b. Clarification on the manner of treating already existing long-term PPAs for a viable way forward for the introduction of viable CMs.

It must be noted that any proposal of discontinuing PPAs would involve significant legal and logistical challenges, resulting in heavy penalties for LSEs through contractual liabilities and an overhaul of rules and regulations on resource adequacy – all of which risk bringing about a certain uncertainty in the resource adequacy exercises.

3. Building a Reliable and Resilient Grid through Capacity Markets

The power system landscape has been undergoing a turbulent change in the last decade. These changes have re-defined conventional meanings of concepts such as 'stress periods' and 'capacity'. Conventional belief that resource adequacy and avoiding 'stress periods' can be guaranteed by simply projecting demand and adding more 'capacity' no longer holds true – for a truly resource adequate grid now required 'reliability' and also 'resilience'. This section proposes additions to the CM that will ensure that the grid is not just resource adequate but is also operationally reliable and resilient.

3.1. Evolving Resource Adequacy Challenges in the Modern Power System

Historically, resource adequacy was principally concerned with ensuring that sufficient generation capacity existed to meet anticipated demand. Stress periods were therefore understood primarily as periods during which available supply was insufficient to serve load,

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[3] Para 2 of CERC Public Notice No. RA-14027(12)/1/2026-CERC dated 26.04.2026 on Staff Paper on 'Capacity Market for Electricity in India': "*…capacity holders are afforded the comfort of longer-duration contracts and are guaranteed the recovery of full fixed costs based on their availability….*" (*emphasis supplied by author*).

[4] Section 1 (page 3) of Staff Paper on 'Capacity Market for Electricity in India': "*…capacity markets…does not necessarily guarantee full recovery of the capacity charge for capacity holders…*" (*emphasis supplied by author*).

[5] Long-term resource adequacy and guaranteed recovery of capacity remuneration.

and adequacy could be addressed through forecasting future demand and procuring sufficient installed capacity.

This paradigm reflected the characteristics of a power system dominated by dispatchable generation and relatively predictable demand patterns. As generation capacity expanded, instances of conventional supply inadequacy became increasingly infrequent. According to the CEA's Long-term National Resource Adequacy Plan FY27-FY36, the top 10 per cent of India's peak demand occurred during only 6 per cent of time blocks in FY25 and 4 per cent of time blocks in FY26.[6]

However, structural changes on both the supply and demand sides of the power system have altered the nature of resource adequacy challenges.

On the supply side, increasing penetration of variable renewable energy sources has introduced greater variability and uncertainty into system operations. Large-scale solar deployment, for example, reduces net demand during daylight hours but requires substantial ramping capability as solar output declines during evening periods. The resulting 'duck curve' phenomenon illustrates how operational stress may arise even where aggregate installed capacity is sufficient.[7]

Simultaneously, developments on the demand side have increased uncertainty regarding the magnitude and timing of grid demand. The growing prevalence of prosumers, supported by distributed renewable generation, has made demand forecasting more complex. Emerging categories of electricity consumption, including large-scale data centres, may further contribute to operational challenges by introducing highly concentrated and reliability-sensitive loads.[8]

As a result, stress periods can no longer be understood solely as periods of insufficient installed capacity. They increasingly include situations in which the power system must respond to rapid changes in generation output, sudden shifts in demand, or other operational disturbances that threaten system stability. Correspondingly, the concept of capacity can no longer be viewed exclusively in terms of installed megawatts. The operational characteristics of resources — including flexibility, dispatchability, ramping capability and availability during system stress — have become increasingly relevant to maintaining reliable system operation.

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[6] As per CEA's Long-term National Resource Adequacy Plan FY27-FY36, India observed top 10% of its peak demand in only 6% of total time blocks in FY25 and 4% of total time blocks in FY26 (*page 18 and 19*).

[7] Jones-Albertus, B. (2017, October 12). Confronting the Duck Curve: How to Address Over-Generation of Solar Energy. U.S. Department of Energy. https://www.energy.gov/cmei/solar/articles/confronting-duck-curve-how-address-over-generation-solar-energy. From the article: *In 2013, the California Independent System Operator published a chart that is now commonplace in conversations about large-scale deployment of solar photovoltaic (PV) power. The duck curve—named after its resemblance to a duck—shows the difference in electricity demand and the amount of available solar energy throughout the day. When the sun is shining, solar floods the market and then drops off as electricity demand peaks in the evening.*

[8] Gooding, M. (2025, March 20). *Virginia narrowly avoided power cuts when 60 data centers dropped off the grid at once*. Data Center Dynamics. https://www.datacenterdynamics.com/en/news/virginia-narrowly-avoided-power-cuts-when-60-data-centers-dropped-off-the-grid-at-once/.

These developments indicate that resource adequacy in the modern power system depends not only on the quantity of installed capacity but also on the capability of available resources to respond effectively to variability, uncertainty and changing operating conditions.

3.2. Need for Capacity Market that Incentivises Reliability and Resilience

The above discussion demonstrates that the challenges facing the modern power system extend beyond the traditional objective of ensuring sufficient installed capacity. Increasing variability in generation, uncertainty in demand, and evolving operational requirements necessitate a broader approach to resource adequacy, one that incorporates considerations of reliability and resilience alongside capacity sufficiency.

In this context, we suggest that the proposed Capacity Market (CM) should be designed to incorporate mechanisms that address the variability, intermittency and unpredictability arising from these developments on both the supply and demand sides of the power system. Such considerations should not be treated as ancillary design features but should instead be integrated into the CM framework from the conceptualisation stage.

To this end, we suggest that the CM should ensure the availability of a minimum share of capacity that is flexible and dispatchable, such that the system remains capable of responding to operational stress arising from rapid changes in generation output, demand patterns, or other system conditions. While the precise quantum of such capacity would require detailed assessment, the CM should contain appropriate provisions to ensure that these reliability attributes are adequately represented within the resource mix procured through the market.

A range of policy and market design tools may be employed to achieve this objective, including financial incentives, market-structuring measures, or regulatory mandates. Each of these approaches would have distinct implications for market outcomes, investment signals and system reliability. Accordingly, studies evaluating the suitability and effectiveness of these mechanisms in the context of the proposed CM should be undertaken prior to finalisation of the market design.

In our view, incorporating such measures within the CM framework would better align the market with evolving requirements of the power system and help ensure that future resource adequacy is supported by the reliability and resilience necessary for secure grid operation.