“Draft Regulation on Framework for Resource Adequacy”

The Assam Electricity Regulatory Commission notified Draft Regulation on **(Framework for Resource Adequacy)** Regulations, 2024.

Objective: The objective of these Regulations is to enable the implementation of Resource Adequacy framework by outlining a mechanism for planning of generation, transmission resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with an optimum generation mix.

a) Demand assessment and forecasting
b) Generation resource planning
c) Procurement planning
d) Monitoring and compliance
e) Optimization of Resource Utilization

The draft document can be accessed here:

CER Opinion

1) **The Role of Resource Adequacy (RA) Framework:** Utilities in India are facing the challenge of reliably meeting peak demand. To tackle this, a combination of adequate power supply, a demand response framework, and the sharing of power across states and regions is crucial. The key objective of the Resource Adequacy (RA) framework is to ensure availability of adequacy capacity to meet the forecasted demand, ensuring system security and reliability. Power procurement costs are a critical factor in the RA analysis. Since power procurement plans and contracts are typically long-term, they need to be developed well in advance, relying on dependable forecasts.

   With the experience of CER and the Energy Analytics Lab (EAL) in conducting long-term demand forecasting and power procurement planning for the states of Uttar Pradesh and Chhattisgarh, the necessity for a robust regulatory framework for the same was emphasised. This culminated into publication of a book titled "Regulatory Framework for Long-term Demand Forecasting and Power Procurement”.[1] And opinion on CEA’s resource adequacy

[1] Singh, A. (ed). (2019), Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning, Centre for Energy Regulation (CER), Indian Institute of Technology Kanpur, Book ISBN:978-93-5321-969-7, https://cer.iitk.ac.in/assets/downloads/CER_Monograph.pdf

guidelines[2] and, draft regulations by ERCs[3] [4] would provide further insights into the design of regulations and implementation thereof.

2) **Necessity of 15-Minute Block-Wise Demand Forecast and Planning for RA: Draft clause no. 6.1** *states that* "*It shall entail shall entail at least hourly, or sub-hourly assessment and forecasting of demand within the distribution area of the Distribution Licensee for multiple horizons…..*"
Draft clause no. 7.2 *states that "For the purpose of ascertaining* ***hourly load profile*** *and for assessment of contribution of various consumer categories to peak demand, load research analysis shall be conducted and influence of demand….."*
Draft clause no. 7.1 and 7.4 *states that* "*mentions hourly, or sub-hourly assessment and forecasting of demand within the distribution area."*
Draft clause no. 10.2(a) and 10.2(b) *states that* "*For each year, the hourly recorded Gross Load for 8760 hours (or time-block) shall be arranged in descending order. And for each hour, the Net Load is calculated by subtracting the actual wind or solar generation corresponding to that load for 8760 hours (or time-block)."…*
The terms "hourly" and "sub-hourly" and time block are used interchangeably in several instances. It's recommended to maintain consistent terminology throughout the draft for better understanding.

Scheduling as well as market operation are undertaken on a 15-minute time block basis. With increasing share of variable renewable energy, forecasting as well as power procurement planning for shorter time granularity gains further relevance. Emphasizing block-wise planning would not only enhance forecast accuracy but also improve power procurement planning for the discom. Even if the final regulations mandate hourly forecasts and planning for resource adequacy thereof, the Commission should mandate compiling and archival of 15-minute time block data and its availability in public domain so as to assist research and development of better forecasting and planning tools in future.

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[2] Singh, A. (ed). (2022), Opinion on CEA (Resource Adequacy Framework for India), 2022[Draft], In Power Chronicle, (Volume 5, Issue 3, pp. 6-11), Energy Analytics Lab (EAL), Indian Institute of Technology Kanpur. https://eal.iitk.ac.in/assets/docs/power_chronicle_vol_5_issue_3.pdf

[3] Singh, A. (ed). (2022), Opinion on MPERC (Power Purchase and Procurement Process) Regulations [Draft], Revision-II, 2022 (RG-19(2) of 2022), In Regulatory Insight (Vol. 05, Issue 02, pp. 2-3), Centre for Energy Regulation (CER), Indian Institute of Technology Kanpur. https://cer.iitk.ac.in/odf_assets/upload_files/blog/Revision_2_2022_Power_Procurement_Draft_Regulation.pdf

[4] Singh, A. (ed). (2021), Opinion on APERC (Terms and Conditions for Short-term Procurement/sale of power) Regulation, 2021 [Draft], In Regulatory Insight (Vol. 04, Issue 03, pp. 7-10), Centre for Energy Regulation (CER), Indian Institute of Technology Kanpur. https://cer.iitk.ac.in/odf_assets/upload_files/Draft_APERC_Terms_and_Conditions_for_short_term_procurement_sale_of_power_Regulation_2021.pdf

3) **Techno-Economic Parameters: Draft clause no. 6.9** *states that "The Distribution Licensee may modify the load obtained ……. separate trajectory should be developed for each customer category." (emphasis added)*

Demand Side Management (DSM) efforts, including load management actions taken by discoms, have significantly impacted historical load profiles. **Draft clause no. 6.9(d)** highlights the importance of considering past DSM practices. However, in the absence of historical data on DSM practices, it is challenging to incorporate these insights into future predictions. The discoms should begin compilation of granular data on various demand side management actions for its utilisation in future RA planning exercises.

Additionally, visibility of behind the meter generation from solar rooftop is vital for reliable demand forecast in future. Integration of data from smart metering systems will also yield important insights into customer demand behaviour and energy usage trends, assisting more reliable estimate of granular demand forecasts.[5]

4) **Role of Deviation Settlement Mechanism in Load Forecast: Draft clause no. 6.9 (g)** *states that Deviation Settlement Mechanism* is mentioned as part of the forecasting process. It is a real-time mechanism designed to address deviations between scheduled and actual generation and consumption. It cannot be predicted or forecasted in advance it challenges for long-term planning. Additionally, tightening of frequency band and introduction of ancillary services market is expected to mitigate its impact in future. As a result, Deviation Settlement Mechanism cannot be not be used as a factor affecting long-term demand forecasting.

5) **Changes in Specific Energy Consumption: Draft clause no. 6.9 (j)** *states that* "*Changes in specific energy consumption"* is to be considered as a factor for demand forecasting. Demand forecasting is an exercise to predict the same. It seems that this is in the context of partial end of use approach to load forecast that uses expected change in specific energy consumption. This would not be relevant in the context of econometric forecasting, and may be clarified so.

6) **Load Forecast given in MWh: Draft clause no. 6.12** *states that "The summation of energy forecast (MWh) for various consumer categories upon adjusting for captive, prosumer, and open access load forecast, as obtained as per* ***clauses 6.5 to clause 6.11****, as the case may be, shall be the load forecast for the Distribution Licensee."(emphasis added)*

Load forecasts and energy forecasts should be differentiated in units as they are different concepts, load forecast should be expressed in megawatts (MW). However, the **Draft clause no. 6.13 and 6.14** mention load forecast in megawatt-hours (MWh). The same be corrected with appropriate context differentiating the two.

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[5] Singh, A. (ed). (2024) Opinion on OERC (Framework for Resource Adequacy), Regulations 2024 [Draft], In Power Chronicle, (Volume 7, Issue 2, pp. 7-10) Energy Analytics Lab (EAL), Indian Institute of Technology Kanpur. https://eal.iitk.ac.in/assets/docs/power_chronicle_vol_7_issue_2.pdf

7) **Regulatory Framework For Grid Management And Environmental Compliance** : **Draft clause no. 9.4** *states that " Constraints such as penalties for unmet demand, forced outages, spinning reserve requirements, and system* ***emission limits*** *as defined in State and Central electricity grid codes, planning criteria of CEA and* ***emission norms*** *specified by the Ministry of Environment and Forest shall be identified and enlisted."(emphasis added)*

This regulation's emphasis on identifying constraints like penalties for unmet demand, forced outages, spinning reserve requirements, and emission limits is crucial for effective grid management. Aligning with State and Central Grid codes, CEA planning criteria, and Ministry of Environment and Forest norms ensures a comprehensive framework for reliability and environmental compliance, supporting better planning and operational decisions in the energy sector.

Emissions limits are not specified, and would not likely be, as a part of state or central grid code. Such emission limits may be specified for an individual unit or sector as a whole, and may likely be an outcome of India's commitments to limits emission of greenhouse gases (GHGs) if implemented in future. The emission norms (concentration), for example in terms of PM, SOx or NOx (see Table 1 below) are specified for the respective generating units and also depend on the quality of fuel used. (Table 1).

Table1: Emissions limits for Thermal Power Plants in India[6]

Date of Installation	Particulate Matter (PM)	SO_2	NO_x	Mercury (Hg)
Before 31-12-2003	100mg/Nm^3	600 mg/Nm3 for <500MW 200 mg/Nm3 for >=500MW	600mg/Nm^3	0.03 mg/Nm3 for >=500MW
After 01-01-2004 & Up to 31-12-2016	50mg/Nm^3	600 mg/Nm3 for <500MW 200 mg/Nm3 for >=500MW	300mg/Nm^3	0.03 mg/Nm^3
On or after 01-01-2017	30mg/Nm3	100mg/Nm3	100mg/Nm3	0.03 mg/Nm3

8) **Evaluation of Power Exchange Products for Resource Adequacy Requirements (RAR): Draft clause no. 11.9** states that *"Provided that power procurement through Day-Ahead Market (DAM), shall not be considered towards the contribution for meeting RAR".*

Power exchanges offer a range of products with different maturities for power procurement. While near-term products like RTM and DAM may not guarantee availability of power in advance, some of the Term Ahead Market (TAM) products allow procurement choices up to 3 months ahead.[7] The Resource Adequacy (RA) framework permits short-term products to be

[6] CEA (2022), Report on Emission Norms, pp. 2,.
https://cea.nic.in/wpcontent/uploads/tprm/2022/07/Report_on_Emission_norms.pdf

procured by a distribution company (discom) either in the previous year or within the current year. A parity in line with ST power procurement through traders should be offered for such PX products as well.

Given the liquidity of some TAM products, it may be feasible to procure for at least the first six months of the following year, which are typically high-demand months. Since T-GNA is available for up to 11 months, at the time of submitting the Resource Adequacy plan in September/October, the discom may be able to meet some of its needs through these market products. Additionally, according to draft clause 14.8, the role of procurement via the DEEP and PUSHP portals would only be relevant if there is a sufficient procurement horizon, meaning it should exclude any procurement planned for less than three months in advance, with a minimum period to be specified by the Commission.

9) **Procurement Planning**: **Draft clause no. 15.3** states that **"***GRIDCO shall also demonstrate to the Commission 100% tie-up for the first year and a minimum 90% tie-up for the second year (on rolling basis) to meet the requirement of their contribution towards meeting national peak. Only resources with long / Medium /Short-Term contracts shall be considered to contribute to the RA*".

   Given the significant time required to establish new capacity, achieving 100% long-term capacity tie-up in the initial years, and that too across all discoms across the nation, may not be feasible. A phased approach could be utilized for the first three years year following the issue of these regulation, gradually increasing capacity adequacy requirements to 95%, 98%, and ultimately 100% across the first three years respectively. A mandate to ensure 100% capacity procurement could lead the power market to become a sellers' market providing significant market power to generators with merchant capacity at hand. This may force discoms to enter into less favourable short- or medium-term contracts. Thus, it's essential that the rollout of the RA plan allows reasonable time for utilities to ensure compliance during the initial three years. This also underscores the significance of demand response, which has a much shorter gestation period and should be considered as a tangible means to ensure resource adequacy.[5]

   Moreover, securing capacity for short-term (ST) needs for the upcoming financial year by the end of November of the current year is not technically feasible due to the lack of ST contracts that can meet demand more than 12 months in advance. It should also be permissible to contract this capacity through the Term Ahead Market once 11-month products are available. This may necessitate planning for short-term contracts within the year of RA planning.

10) **Ensuring Adequate Transmission in Resource Adequacy Planning:** Draft Clause no. 2.1 states *"The objective of these Regulations is to enable the implementation of Resource Adequacy framework by outlining a mechanism for planning of generation,* ***transmission*** *resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with an optimum generation mix."*

Need for suitable transmission facilities becomes a key constraint in Resource Adequacy exercise. While the draft document mention this as one of its objectives, it doesn't not seem to translate into actionable steps. This regulation should ideally lead to more focused planning of generation at the state level or focusing on an optimal generation mix promoting sustainability with improve reliability, the resultant transmission constraints should be identified be addressed through the transmission planning exercise undertaken in coordination with the national electricity plan.

11) **Institutional Challenges to Implement of Resource Adequacy Regulations:** Meeting the contractual requirements for the initial year of implementation may be a discouraging task, as the limited timeframe delays comprehensive analysis and planning to secure the essential capacity. Lack of institutional capacity with the discoms, particularly the power procurement/planning cell may lead to sub-optimal decision-making due to lack of time and in-house human resources. The regulations should emphasise on developing institutional capacity of the discoms to enable them to develop a RA plan with limited dependency on external resources.

    A detailed analysis of long-term electricity demand and power procurement planning, conducted by CER-EAL for Uttar Pradesh and Chhattisgarh, along with demand forecasts at the discom level for Rajasthan, has offered valuable insights. Enhancing data collection and visibility of behind-the-meter solar installations, coupled with developing in-house expertise through trained staff, will better prepare the country to reliably and cost-effectively meet growing electricity demands.