TNERC: TNERC (Framework for Resource Adequacy) Regulations, 2024 [Draft]

TNERC notified draft **Tamil Nadu Electricity Regulatory Commission (Framework for Resource Adequacy) Regulations, 2024** on **13th June, 2024** for providing framework for resource adequacy. The key highlights of this draft is mentioned below:

Objectives:

The overall objective of the Resource Adequacy (RA) framework is found a cost- effective approach to meet forecasted demand at all the times with a mechanism of sharing of resources among distribution licensee (DL) and states to maximize utilization, while ensuring the system security and reliability at a national level. This involves enhancing the accuracy of long-term demand forecasting and power procurement planning. The framework emphasizes the necessity for distribution licensees to focus on adequate contracting through long-term contracts (at least 70%) to maintain system reliability and manage costs effectively. Additionally, it talks about the capacity crediting of various renewable energy sources and its capacity to meet peak load and increased system ramping and balancing needs.

The documents can be accessed here

CER Opinions:

1. **Necessity of resource adequacy framework**: The ongoing challenge of catering to the peak demand reliably is currently being faced by the utilities in India. Sufficient amount of power supply coupled with demand response framework and sharing of inter-state and inter-region power should be adopted to meet the peak demand reliably. The overall objective of Resource Adequacy (RA) framework is to avoid demand-supply mismatch, ensure system security and reliability at the national level.

   Optimisation of power procurement cost while assuring reliability of supply is the main objective of a RA study. Power procurement plans and contracts typically have a long-term horizon and, hence, need to be worked out well in advance, based on reliable and dependable forecast. CER, IIT Kanpur highlighting the need for a regulatory framework for the same[1]. CER and EAL IITK have also worked on numerous similar assignments[2], and have shared opinion, amongst others, on "Power Purchase and Procurement Process Regulations"[3], and "Terms and Conditions for short-term procurement/sale of power Regulation, 2021"[4].

   Given the experience of CER and EAL in carrying out Long-term Demand Forecasting and Power Procurement Planning for the states of Uttar Pradesh and Chhattisgarh, we reinforce the need for

a robust regulatory framework for the same. **From these studies, it was inferred that significant economic benefits in terms of reduced private and social costs is possible through RA.**

2. **Capacity Credit Factor Method for VRE:** Proposed Clause 10.2.f states that *"Resultant CC factor is (Total Generation for top load 250 hours)/(Installed RE Capacity for top load 250 hours), as per formula below:*
CC factor = Sum of RE Generator in Top x hours / Sum of RE Capacity in Top x hours"

Choice of top x hours of demand (250 hours, as proposed in the given clause) should be based analysis peak demand data. A larger value of x would include RE generation across wider set of hours, reducing the reliability of the capacity factor. In contrast, a smaller value of x would be aligned to a lower value of LOLP and NENS (discussed later).

The choice of 'x' hours should thus be in consonance with the target value for LOLP and NENS. Furthermore, the above formula should consider **'lower of the availability and generation' across time blocks (for the top x hours) for the numerator value**. This would ensure that the due account is taken for the forecasting error, as lower RE availability in short-run would lead the discom to make procurement of ST power.

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[1] Singh et al. (2019), *Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning,* CER Monograph, Book ISBN:978-93-5321-969-7, https://cer.iitk.ac.in/assets/downloads/CER_Monograph.pdf

[2] Detailed studies have been undertaken for the states of Uttar Pradesh and Chhattisgarh, incorporating long-term demand forecasting as well as power procurement panning. Furthermore, demand forecasting was carried out for the discoms of Rajasthan, and, a long-term demand forecast was done for incorporation in a study on RE integration for the state of Gujarat.

[3] *Draft Detailed Procedure for Madhya Pradesh Electricity Regulatory Commission (Power Purchase and Procurement Process) Regulations*, Revision-II, 2022 (RG-19(2) of 2022), https://cer.iitk.ac.in/odf_assets/upload_files/blog/Revision_2_2022_Power_Procurement_Draft_Regulation.pdf

[4] *APERC (Terms and Conditions for short-term procurement/sale of power) Regulation*, 2021, 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. **Contribution of Long-term, Medium-term and Short-term Contracts in System Peak**

Proposed Clause 12.10 states that *"The distribution licensee shall keep minimum **70% Long-term contracts**, minimum 20% Medium–term contracts, and the rest to be met through Short-term contracts"(emphasis added).*

It is suggested that the proportion of the contracts (LT/MT/ST) should be based on the expected contribution of such contracts at the time of the system peak (or the top x hours). Figure 1 illustrates a hypothetical scenario wherein a system peak of 100 MW is occurring at 15:30 – 15:45 hrs. All long-term contracts, which would include RE (solar) contracts, that can't provide support during the system peak (or top x hours of demand). **Clause 12.10 should thus be applicable with respect to the peak hours (top x hours of demand).**

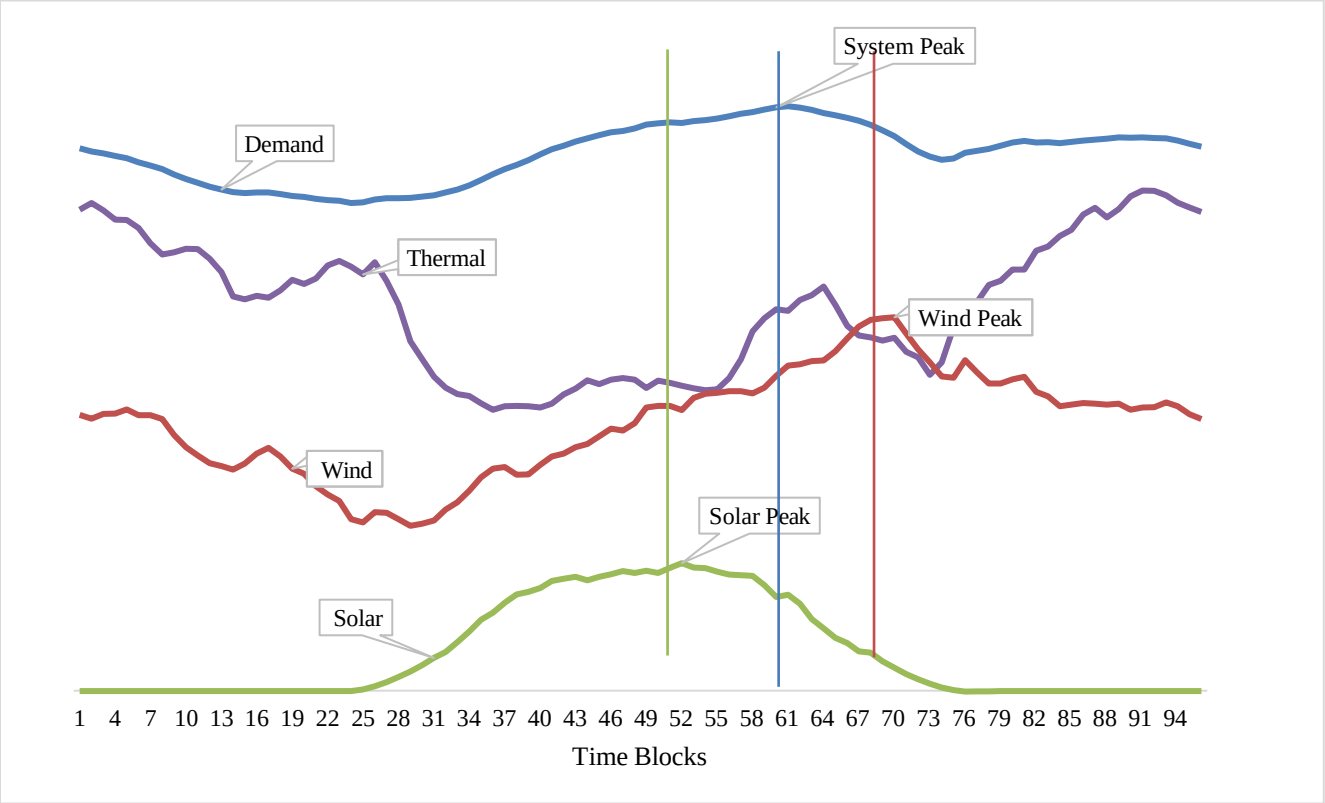

Figure 1: Share of technology-wise generation in system peak

4. **Correction in definition of Normalized Energy Not Served (NENS)** In the clause 4.1.q. *"Normalized Energy Not Served" or "NENS" is normalization of the EENS by dividing it by the total system load."* The definition given here is seems to be incorrect as the numerous refers to energy, whereas the denominator refers to load. Unit of NENS should be in percentage terms. The correct definition is clearly specified in the CEA's "Guidelines for Resource Adequacy Planning Framework for India" (CEA, 2023) as '*total expected load shed due to supply shortages (MWh) as a percent (%) of the* ***total system energy'***. The Commission may adopt the same.

5. **Consideration of Power Exchange Product for Resource Adequacy Requirement (RAR):** As per clause 12.12, *"Provided that power procurement through Day-Ahead Market (DAM), shall not be considered towards the contribution for meeting RAR."*.Power exchange provide a variety of products of varying maturity for power procurement. While near-term products like RTM and DAM may not be able to provide certainty of availability of power required in advance, some of the Term Ahead Market (TAM) products offer a choice of procurement up to 3 months in advance (which may likely be enhanced further). The RA framework allows for ST products, which are to be procured by a discom, either in a previous year or within a year**. Inclusion of some of the TAM products towards RA of a discom may thus also be permitted.**

   In light of the above argument presented in the previous para, the clause may specifically provide for exclusion of DAM and RTM and other similar low maturity products, which do not offer certainty of procurement in advance. Depending on liquidity of some of the TAM products, advance procurement of at least for the first six months of the following year (which are generally high demand months) may be feasible**. Given that T-GNA is available up to a period of 11 months, at the time of submission of Resource Adequacy plan in Sep/Oct, the DISCOM may be in a position to procure some of its requirements through such market products.**

   Similarly, as per draft clause 14.8, role of procurement through DEEP and PUShP portal would only be relevant if it has adequate horizon for procurement of power i.e. it should exclude any procurement to be undertaken for a period of less than 3 months in advance and for a minimum period to be specified by the Commission.

6. **Demand Assessment and Forecasting:** Proposed clause 5.4 states that **"***The distribution licensee shall develop and prepare Medium-Term Distribution Resource Adequacy Plan (MT-DRAP) and Short-Term Distribution Resource Adequacy Plan (ST-DRAP) in accordance with the conditions outlined under these Regulation*s".

The draft document primarily focuses on medium-term and short-term resource adequacy planning. However, it does not explicitly outline a framework for long-term planning for resource adequacy. *Distribution licensees, State Transmission Utility and State Load Despatch Centre shall provide requisite information and data including demand forecasts for period up to 10 years to various Agencies to enable Central Electricity Authority and Grid India/NLDC to undertake LT-NRAP and ST-NRAP studies, respectively, as per CEA RA Guidelines*. Long-term resource adequacy may entail addition of thermal/hydro capacity with an investment horizon beyond the medium-term. Since addition of such thermal/hydro capacity often required lead-time of 5-8 years or more, the absence of long-term resource adequacy planning would leave vacuum for assuring long-term resource adequacy.

7. **Storage Capacity:** Proposed Clause 14.6 states, *"The distribution licensee shall contract storage capacity corresponding to the results of MT- DRAP capacity addition requirement for future years from Battery Energy Storage System (BESS) and Pump Storage Projects (PSP) as per the guidelines for tariff based competitive bidding process notified by the Ministry of Power"*.

   An optimal power procurement strategy should be based on the forecasted demand over long/medium/short-term basis, while considering a basket of long-term/medium-term/short-term power procurement options and be purely based on the economic/commercial considerations. The sizing requirement for storage capacity should be determined on the basis of such techno-economic modelling. The draft clause 14.6 does not clarify how 'optimal' storage capacity requirement would be determined. Clarity with respect to the same needs to be included.

8. **Banking arrangement to be included in separate Clause:** Proposed Clause 14.7 states that *"The distribution licensee may contract power through Central Agencies / Intermediaries / Traders / Aggregators / Power Exchanges or through agreements / **Banking arrangements** with other distribution licensees in compliance with **competitive bidding guidelines**"* (emphasis added). It is suggested that provision for banking arrangement may be include separate clause, because banking arrangement does not involve any competitive bidding process. Such arrangements are usually agreed upon mutually between two parties/Discoms.

9. **Procurement Planning:** Proposed Clause 15.3 states **"***The distribution licensee shall demonstrate to the Commission 100% tie-up for the first year and a minimum 90% tie-up for the second year to meet the requirement of their contribution towards meeting state peak. Only*

resources with long / medium / short-term contracts shall be considered to contribute to the RAR".

Given that gestation period for setting up new capacity is long, 100% tie-up of capacity may not be feasible for the first few years of its implementation. A graduated approach may be adopted for the first three years with the capacity adequacy requirement to the extent of 95%, 98 % and 100 % be applied for the first year (to be applicable for the first three years post notification of the regulation). Rush for 100% capacity requirement may force the discom to enter into sub-optimal short-/medium-term contracts. **It is proposed that the rollout of the RA** plan should have sufficient time for the utilities to ensure compliance for the first year of implementation, to the least.

This further highlights the importance of demand response, which would have relatively much shorter gestation period.

10. **Rolling Plan for Incremental Capacity**: As per the proposed Clause 15.7, "*Assessment through Annual Rolling Plan shall ascertain incremental capacity addition requirement through MT/ST upon factoring in existing and planned procurement initiatives of the distribution licensee".*

Year-on year 'addition' of the incremental capacity as determined by the RA plan, say 200 MW, may not be a practical and cost efficient. However, addition of 500 MW capacity (say, thermal capacity or large RE with storage) may offer economics of capacity addition[5] on the incremental requirement may present a feasible option. Thus, it is suggested that the assessment may be done for five-year period on a rolling basis (instead of an annual rolling plan) and be submitted annually to the Commission[6]. This would help the discom to make optimal investment / contracting choice as feasible.

[5] To be determined on the basis of economic modelling though.
[6] Singh et al. (2019), *Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning*, CER Monograph, Book ISBN:978-93-5321-969-7, https://cer.iitk.ac.in/assets/downloads/CER_Monograph.pdf

11. **Demand response as important component of RAR calculation:** Demand Response offers a low cost option to ensure that the projected peak demand can be met without additional capacity investment. While adequate importance is given to the supply side options, role of demand response remains undermined. It is suggested that the Commission should direct the disco to design and implement a demand response program and incorporate the avoided 'peak capacity' requirement in its resource adequacy plan.

12. **Forecasting of Electricity Generation from Roof Top Solar and Capacity Credit for the same**: Any solar rooftop capacity created through Solar Rooftop programs for example PM-Surya Ghar Muft Bijli Yojana and other similar schemes as well as the rooftop capacityvoluntarily installed by the consumers may also play an important role in influencing the overall resource adequacy. Behind-the-meter generation would add significantly to the ramping requirement of the non-RE capacity and thus may necessitate adequate investment in flexibility/ storage services. Thus, forecast of the contribution of solar rooftop would provide a key inputs to the discom in its planning exercise.

    To enable such a forecast, the DISCOM should aim to collect block-wise data for electricity generation and consumption thereof by the respective consumers. This will assist the DISCOM in forecasting the electricity generation in the near future and, help evaluate its role in influencing the estimate of adequacy and quality of resources. Given the feasibility and overall economics for implementation of appropriate metering and communication technology, a scheme for capturing data from existing as well as upcoming rooftop solar plants (if not already provided for) should be introduced. This may be implemented through stratified sampling basis as suggested below

S. No.	Rooftop Capacity	Sampling coverage for data collection
1	Up to 2 kW	2%
2	> 2 to 5 kW	5%
3	> 5 to 10 kW	10%
4	> 10 to 20 kW	20%
5	More than 20 kW	30%

13. **Thermal Generator Flexibility:** In order to meet the growing demand of the electricity in future with increasing share of renewables, flexibilisation of thermal capacities would gains importance. Such investment for enhancing flexibility would not be required for all thermal generation. Based on the merit order of Thermal Generating Stations, study for improvement

of flexibility of thermal generating stations, particularly those of high variable cost should be undertaken.

A modelling framework for Resource Adequacy should also analyse the impact of enhanced power system flexibility, that for high variable cost thermal power plants in ensuring reliability of supply under increasing share of renewables.