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Power Chronicle

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Editorial

Resource Adequacy (RA) planning attains greater relevance with rising electricity demand amidst increasing share of Variable Renewable Energy (VRE). After the issue of guidelines for RA by the Central Electricity Authority, SERCs have issued draft regulations for the same. Previous work at CER-EAL has emphasised the need for such Long-term (LT) load forecasting and power procurement planning to optimize cost of power procurement while ensuring the adequacy of supply.

Given the uncertainty associated with electricity demand as well as VRE generation, 15-minute block-wise, against the proposed hourly, granularity of time remains key to a reliable forecast of electricity and planning for resources to address the same. An explicit role of demand response as well as Time of Day pricing needs to be integrated in the assessment of resources, else this would lead to higher assessment of the resources ultimately adding to the cost to be paid by the final consumers. The prescriptive nature of the regulations that seems to nudge the discoms to tie-up capacity for generation or storage, should instead emphasise the techno-economic basis of such a decision based on an in-depth study for the planning horizon.

The timeline for meeting the contractual requirements for the very first year of implementation may be a strenuous task as this leaves limited time for a thorough analysis, and planning to tie-up the required capacity, if any. This desires that the implementation plan for the first year for implementation of the regulation be differentiated to allow the discoms sufficient time to develop processes and ensure compliance thereof.

The timeline for tying up capacity for Short-term (ST) requirements, for an upcoming financial year, by the end of November of the ongoing year would not technically be feasible due to unavailability of 'ST contracts' that can address the demand for more than 12 months away from such a deadline. Furthermore, provision to 'contract' out such capacity through Term Ahead Market, once 11 months products are available, should also be permissible.

A comprehensive analysis of LT electricity demand and power procurement planning undertaken by CER-EAL for Uttar Pradesh and Chhattisgarh, and discom level demand forecast for Rajasthan has provided insightful experience in planning for the same. In addition to improving data collection and visibility of behind-the-meter solar installations, developing in-house capabilities within discoms through trained personnel will enhance the country's readiness to meet increasing electricity demands reliably and cost-effectively.

Anoop Singh (Editor)
Founder & Coordinator, Energy Analytics Lab

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UK Government

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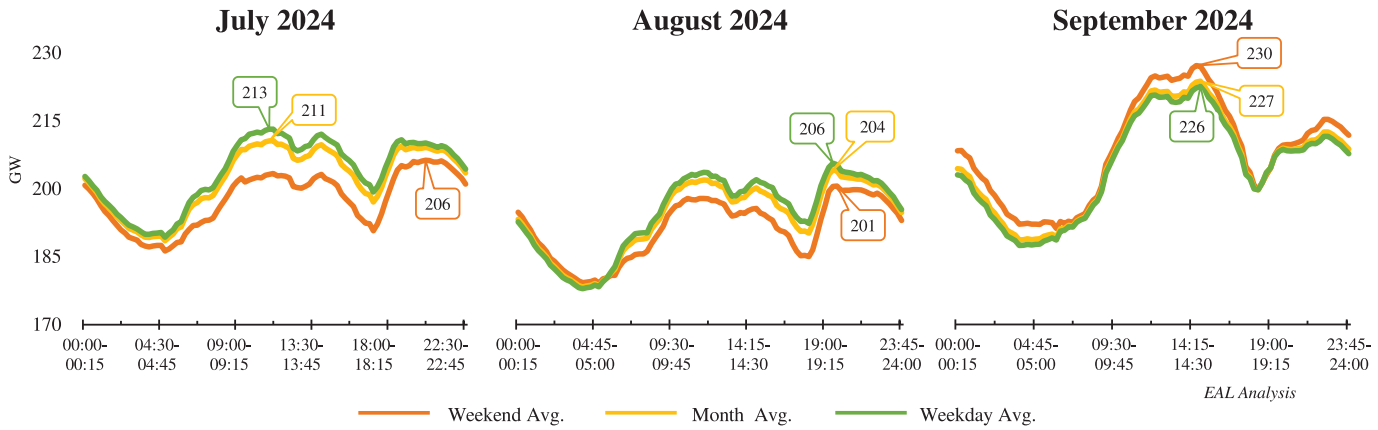
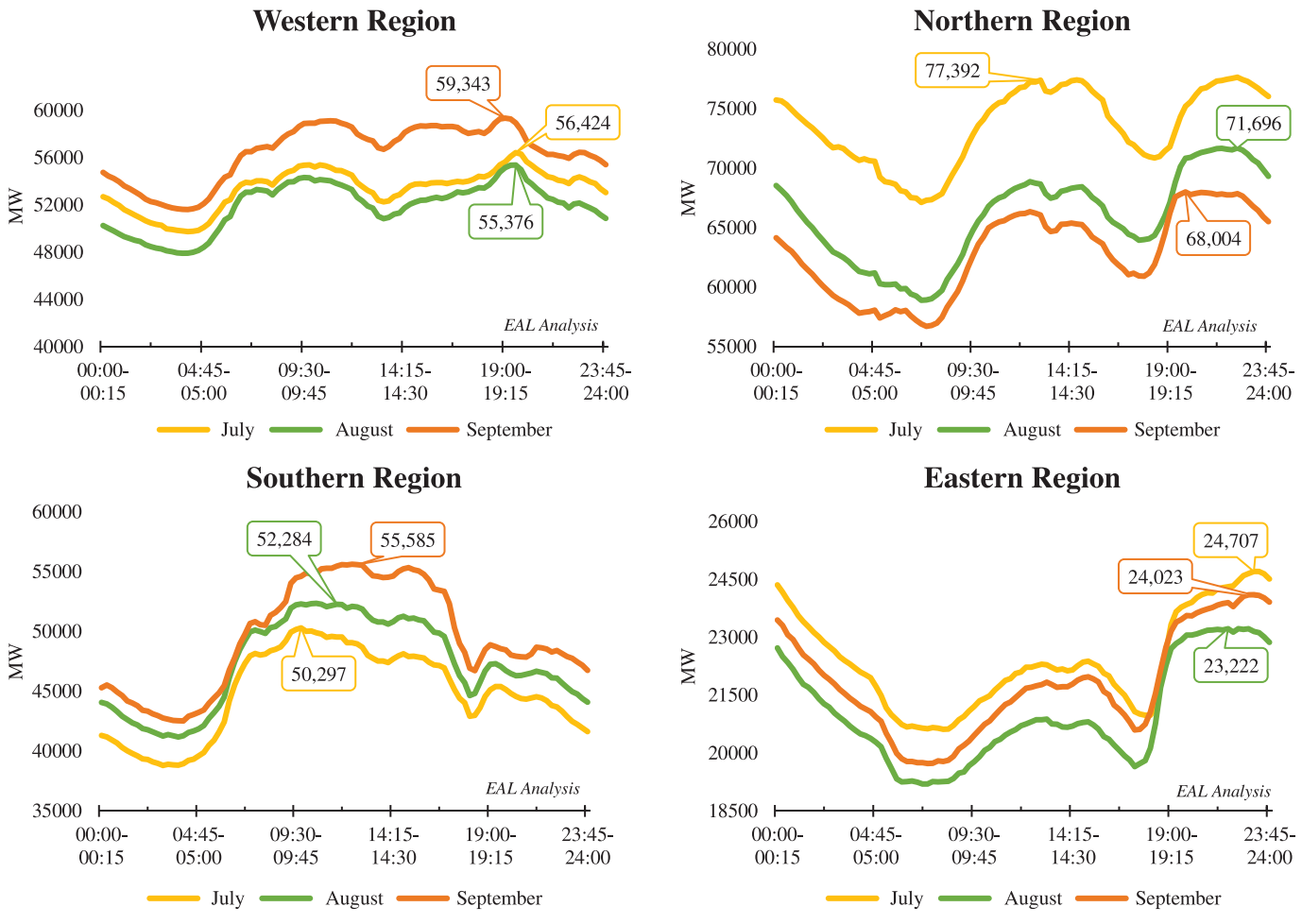
Power System Overview & Analysis

All India Demand Met Profile

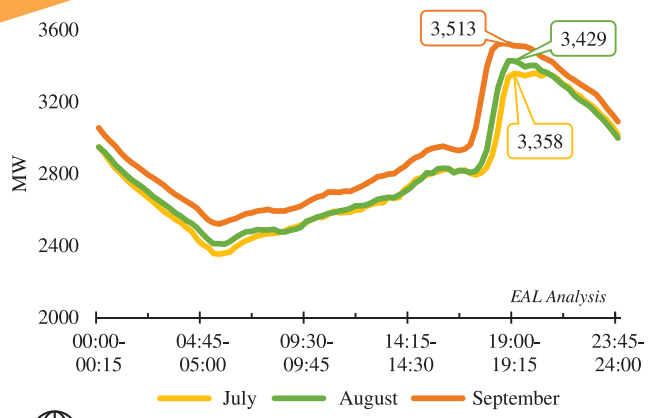


From July to September quarter, all India peak demand reached 238 GW (12:00 - 12:15) on 07th September, 2024, about 4% lower than the previous year's peak demand recorded at 248 GW (11:30 - 11:45) on 01st September, 2023, during the same quarter.

Region-wise Demand Met Profile



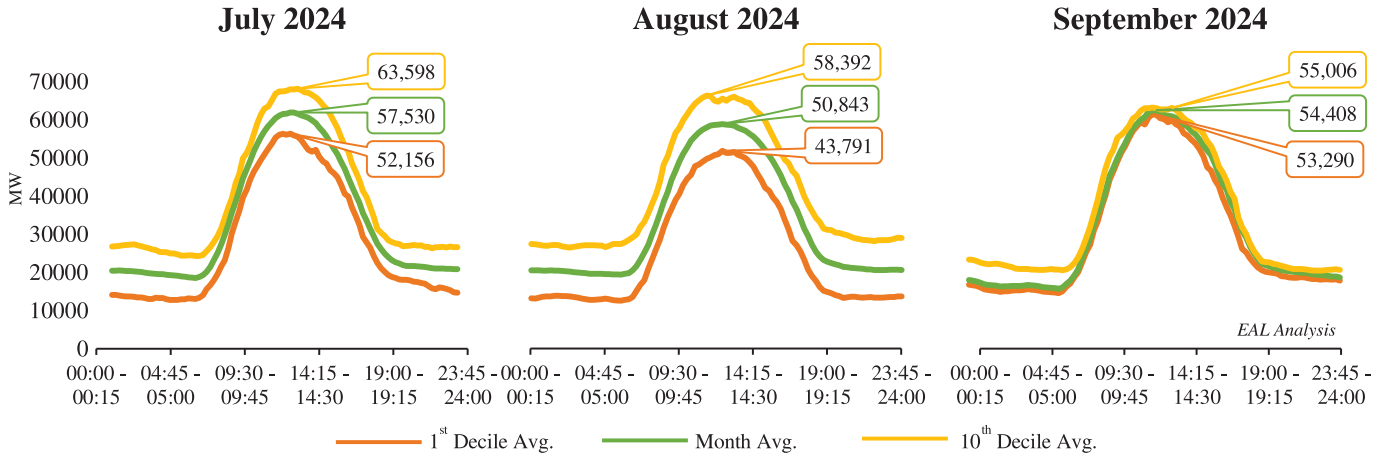
North Eastern Region



- Significant increase in demand can be observed for Eastern region from 19:00 to 21:00 and Northern region from 09:15 to 12:00 hrs in all the three months.
- Gradual increase in demand can be observed for Northern Eastern regions from 17:00 to 18:45 hrs in all the three months respectively.
- Average demand is found to be higher for Northern region as compared to the other regions in the month of September.

Demand and generation profiles at National, Regional and State-level can be accessed on EAL's web portal.

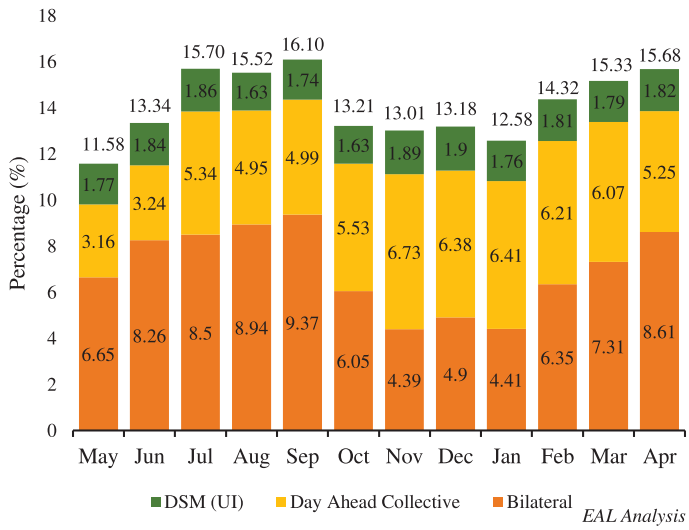
All India Renewable Energy (RE) Generation Profile



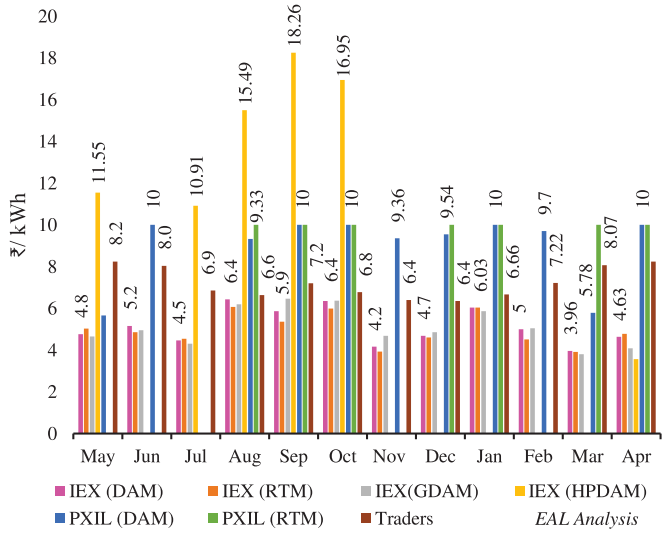
All India peak RE generation reached 66.22 GW (12:45-01:00) on 26th August, 2024, about 12.3% higher than the previous year's peak of 58.85 GW (12:45 - 13:00) on 02nd August, 2023.

Short-term Energy Transactions

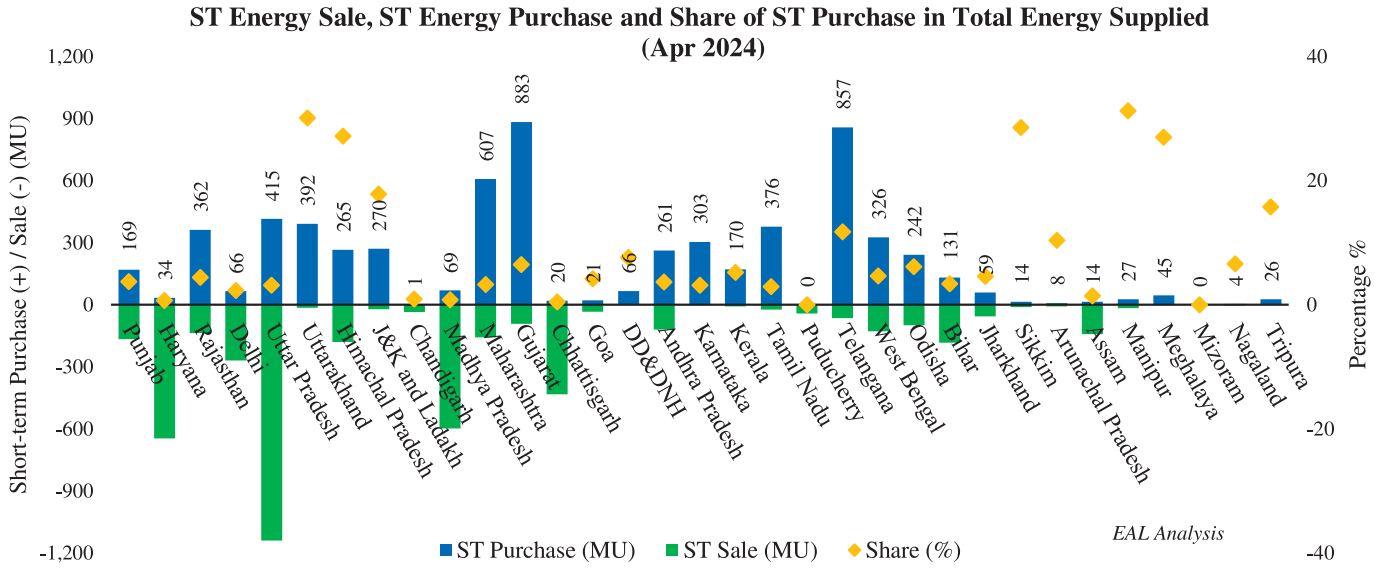
Share of Short-term Energy Transaction of Total Electricity Generation (2023-24)



Weighted Average Prices of Short-term Transactions (2023-24)

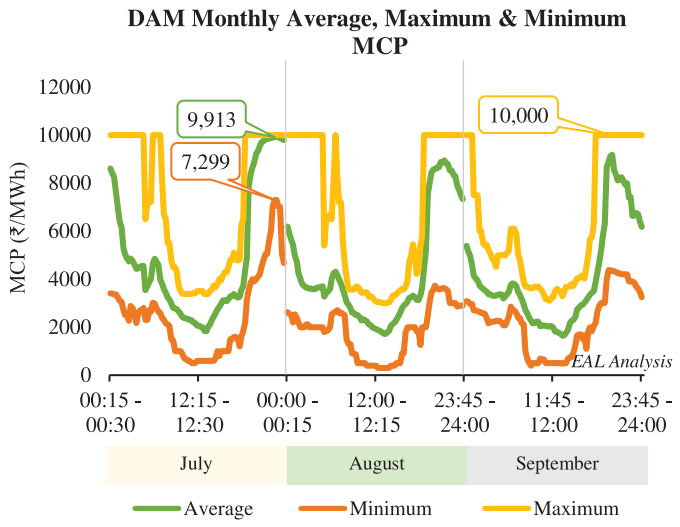


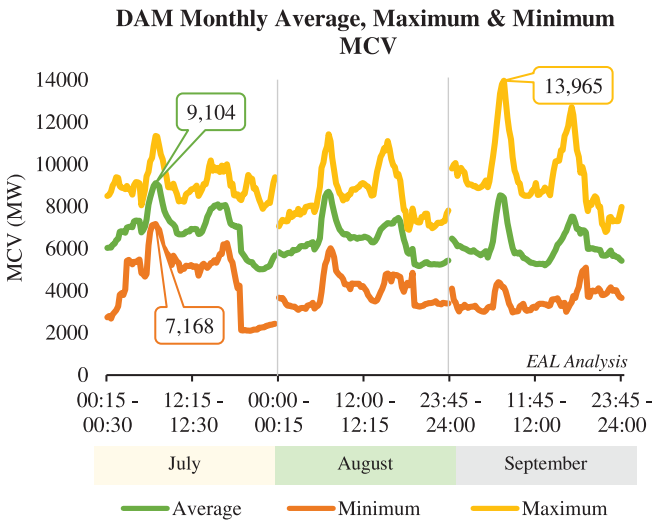
Monthly Power Purchase and Sale Quantum through Power Exchange across States



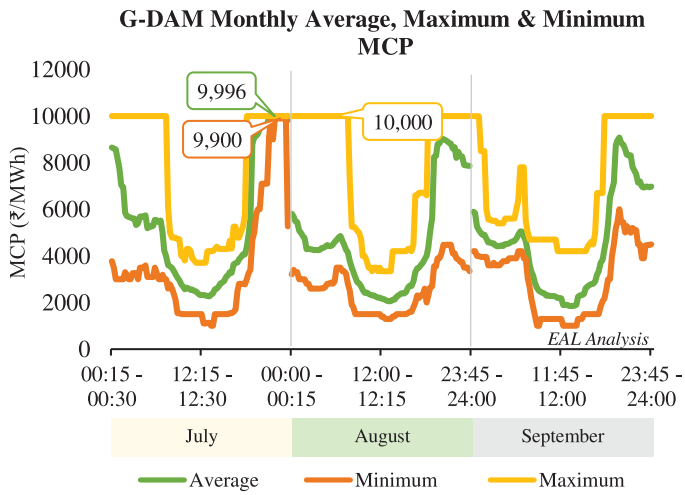
Power Market Overview & Analysis

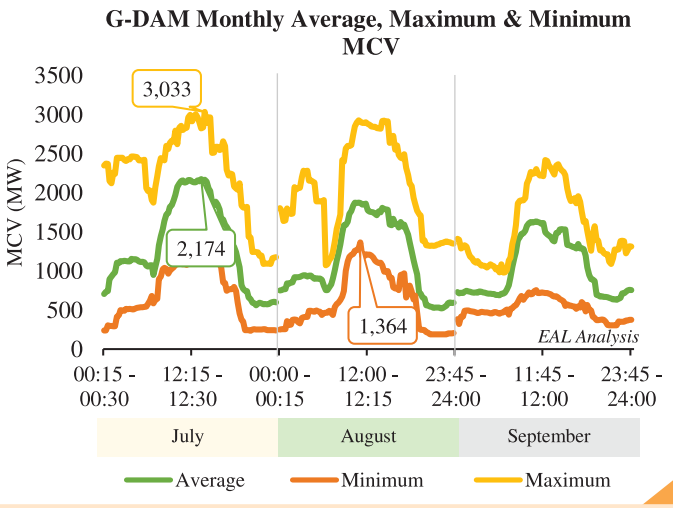
DAM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)



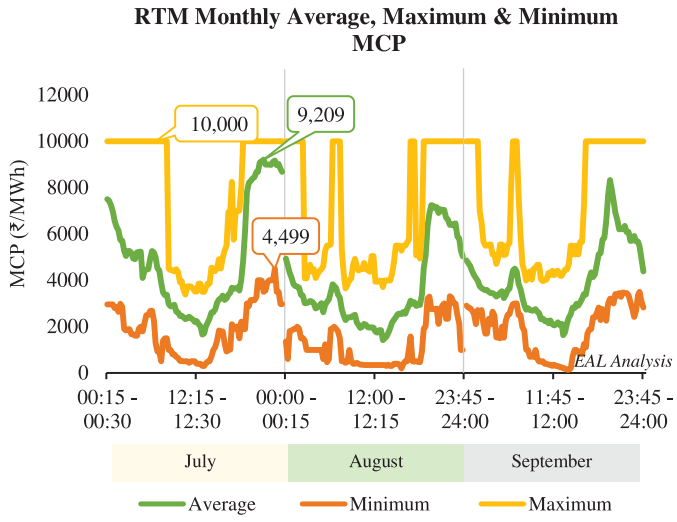


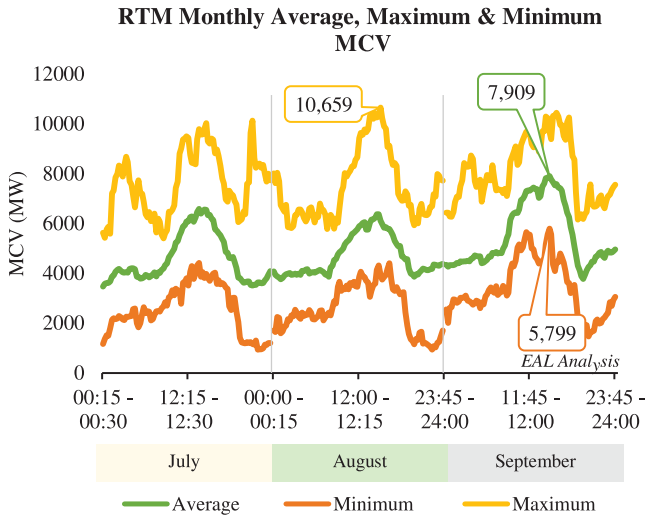
G-DAM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)



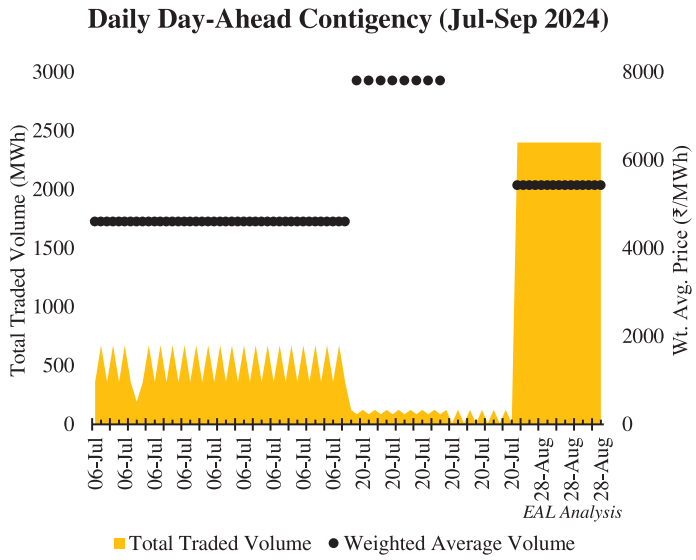


RTM -Market Clearing Price (MCP) & Market Clearing Volume (MCV)

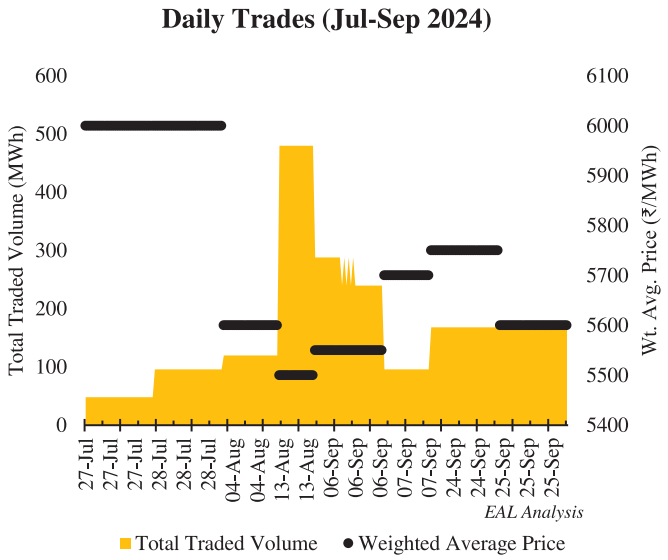




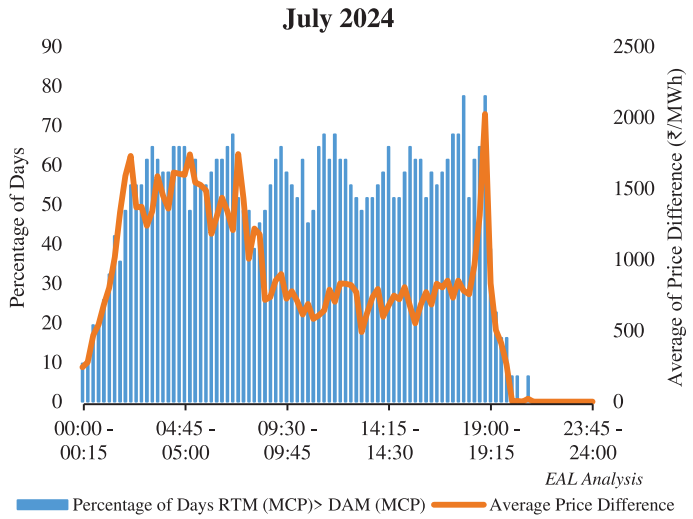
Term-Ahead Market (TAM)

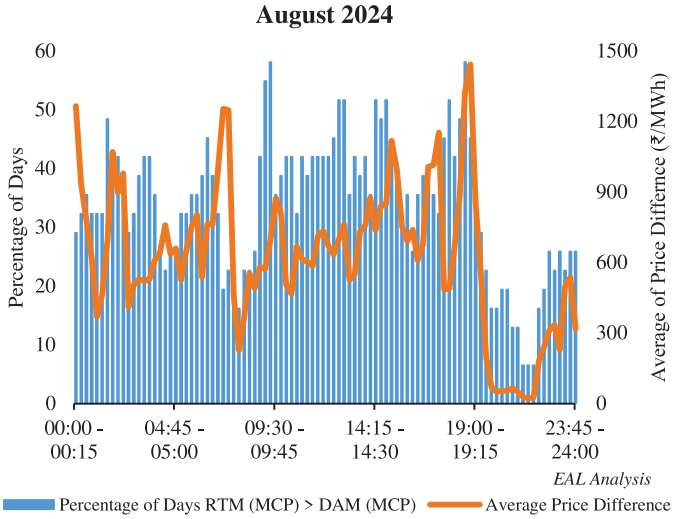


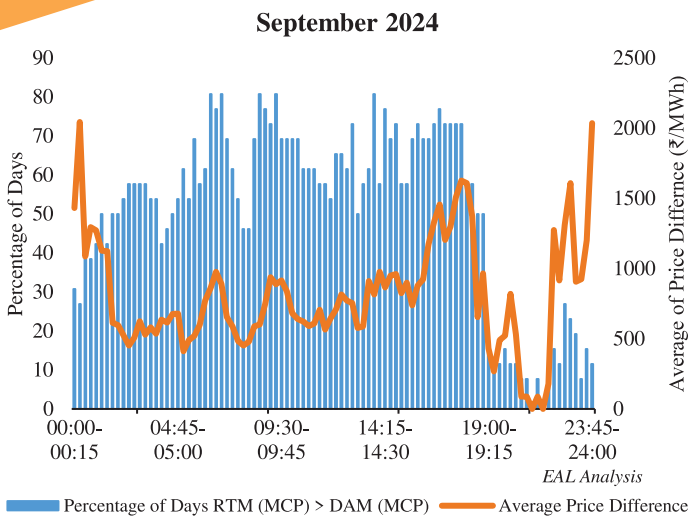
Green Term-Ahead Market (G-TAM)



Price Difference between RTM & DAM



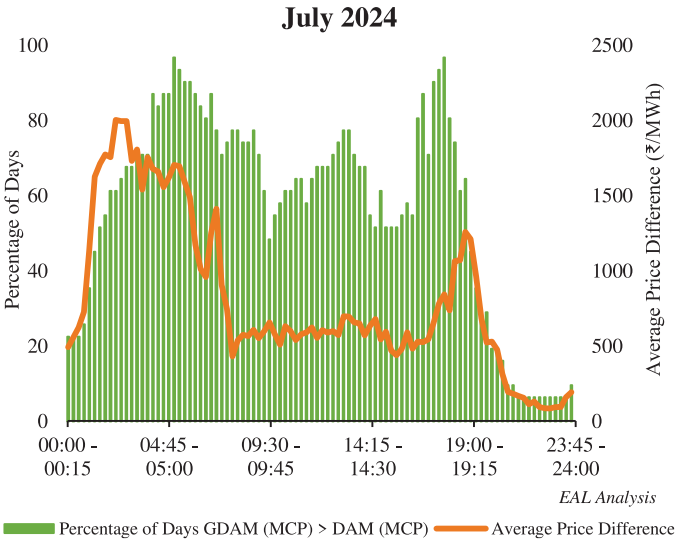


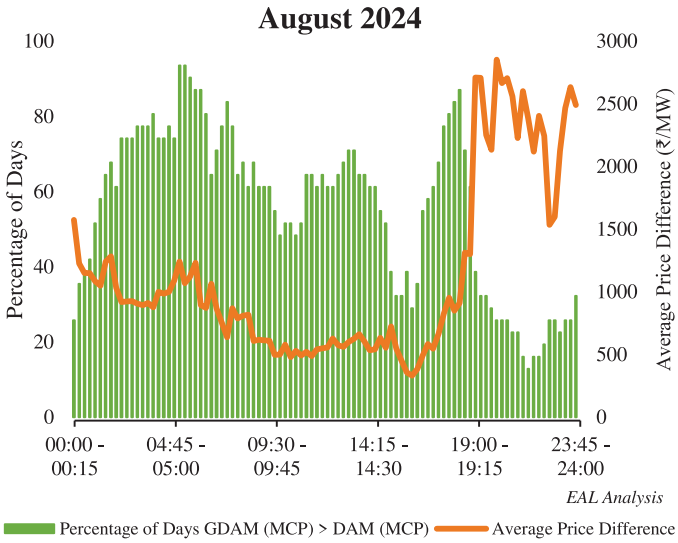


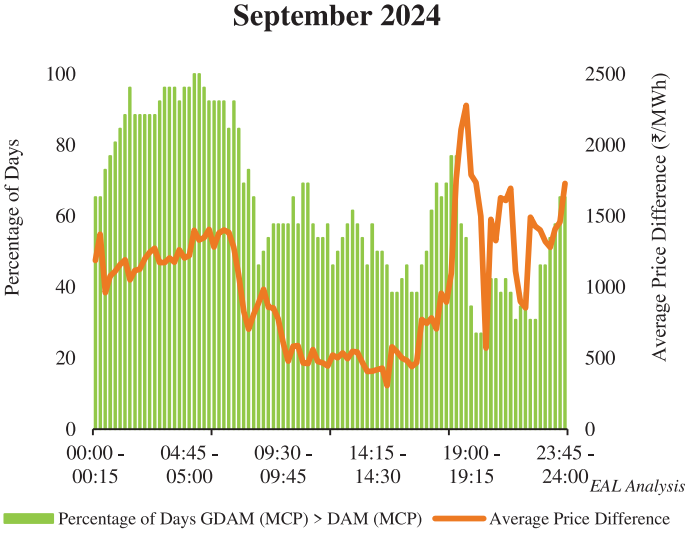
EAL Analysis

- The analysis is based on comparison between the average price difference of RTM and DAM, when MCP of RTM is greater than DAM for the second quarter of year 2024-25.
- The graph shows the percentage of days, price for RTM is greater than DAM on the primary axis and the average price difference between the two on secondary axis.
- It has been observed that in 22:00-23:45 time blocks 20% of the days average MCP for RTM is greater than DAM for the month of September, 2024.
- The average price difference between RTM and DAM is Rs. 0.73/ kWh for the quarter.

Price Difference b/w G-DAM & DAM







EAL Analysis

- The analysis is based on comparison between the average price difference of G-DAM and DAM, when MCP of G-DAM is greater than DAM for the second quarter of year 2024-25.
- The graph shows the percentage of days, price for G-DAM is greater than DAM on the primary axis and the average price difference between the two on secondary axis.
- The maximum price difference between G-DAM and DAM has been observed in the 19:00-22:00 blocks almost 20% of the days in August, 2024.
- The average price difference between G-DAM and DAM is observed to be Rs. 0.92/ kWh.

Regulatory & Policy Perspective

Opinion on OERC (Framework for Resource Adequacy) Regulations, 2024 [Draft]

Cite

Odisha Electricity Regulatory Commission notified draft regulations on June 2024 on "Framework for Resource Adequacy" (RA). The key highlights of this draft document is mentioned below:

- **Objective:** The sole objective of Resource Adequacy framework is the reliable fulfilment of the peak demand with the help of adequate supply of generation and demand response.

  The Resource Adequacy framework will cover the following important aspects:

  a) Availability of adequate generation capacities to reliably serve demand under multiple scenarios.
  b) Optimal capacity mix based on minimization of overall system cost.
  c) Time horizon for the implementation of the framework should be 5 – 10 years.
  d) Energy storage, other flexible resources, and short-term sale/purchase under bilateral contracts will be incorporated into the resource adequacy framework.

EAL Opinion

- **Need of Resource Adequacy Framework:** Utilities in India are currently grappling with the challenge of reliably meeting peak demand. To address this, a combination of sufficient power supply, a demand response framework, and the sharing of inter-state and inter-region power is essential. The primary aim of the RA framework is to prevent a mismatch between demand and supply, and to ensure system security and reliability on a national scale. Power procurement cost plays a significant role in the RA study. Given that power procurement plans and contracts generally have a long-term perspective, they must be developed well in advance based on reliable and accurate forecasts. The Centre for Energy Regulation (CER) at IIT Kanpur has conducted research on these aspects, culminating in the publication of a book titled "Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning[1]". Additionally, IITK has provided insights on "Power Purchase and Procurement Process Regulations[2]" and the "Terms and Conditions for Short-term Procurement/Sale of Power Regulation, 2021[3]".

  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, we emphasize the necessity for a robust regulatory framework. Studies have shown that significant economic benefits, in terms of reduced private and social costs, can be achieved through RA[4].

- **Necessity of 15-minute Time Block-wise Demand Forecast:** Draft clause 6.1 states "*It shall entail hourly assessment and forecasting of demand within the distribution area of the Distribution Licensee for multiple horizons…..*"

  The scheduling in the Indian electricity market framework is based on 15-minute time block basis. Forecasts for RA carried out on block-wise basis, rather than hourly demand forecasts, would be more desirable especially as demand as well as supply variations have variability recorded on time-block basis. Higher RE penetration would make this even more desirable. Furthermore, once the institutional setup is tuned to hourly forecasts, there would be little attention paid to block-wise data leading to loss of data and reduced reliability of the forecast itself.

To cite this article, please click Cite

[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] 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

[3] Draft APERC (Terms and Conditions for Short-term Procurement/sale of power) Regulations, 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

[4] Anoop Singh, "Comments on CEA (Resource Adequacy Framework for India), 2022 [Draft]" Power Chronicle, Volume 5, Issue 3 (Jan 2023) https://eal.iitk.ac.in/assets/docs/power_chronicle_vol_5_issue_3.pdf

- **Suggested Changes in Techno-economic Parameters:** Draft clause 6.8 *states that "The Distribution Licensee may modify the load obtained* ***……. separate trajectory should be developed for each customer category****."*(emphasis added)

  Demand Side Management including load management, initiatives undertaken by the Discoms would have influenced their historical load profile. Draft clause 6.8 (a) mentions consideration of past Demand Side Management practices. Unless such historical data is available, it would not be feasible to incorporate the same. To enable the Discoms to incorporate these in future load forecasting excercises, such data should now be archived in usable form.

  Additionally, visibility of RE generation connected through net/gross metering is important to ensure that these are appropriately accounted for in future. The integration of data from smart metering systems would also provide valuable insights into customer behavior and energy usage patterns, thereby enhancing the accuracy of load forecasts.

- **Role of Deviation Settlement Mechanism in Load Forecast?:** Draft clause 6.8 (d) Deviation Settlement Mechanism is mentioned as part of the forecasting process. Deviation Settlement Mechanism is a real-time mechanism designed to address deviations between scheduled and actual generation/drawal. It cannot be predicted or forecasted in advance. Furthermore, tightening of frequency band and introduction of Ancillary Services market is expected to reduce its impact in future. Therefore, in the context of Resource Adequacy and Deviation Settlement Mechanism should not be used for long-term demand forecasting.

- **Changes in Specific Energy Consumption:** As per draft clause 6.8 (g), the "*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.

  In the context of econometric forecast, this is related to the output variable. How should and output variable be used as an input variable while using such an approach? Differentiation for the same should be incorporated. Additionally, there is no clarification on how the necessary data for these changes will be collected from a bottom up approach.

- **Separate Trajectory for Each Customer Category:** In the draft clause 6.8, it is mentioned that a separate demand trajectory should be developed for each customer category. In the absence of category-wise load profile data, this would not be feasible. RA exercise is based on forecasted load profile rather than energy forecasts[5]. Translation of category-wise energy forecasts to a peak demand or load profile forecast would require that peak demand forecast for each category and also the coincidental factor for the same. Necessary clarification may be incorporated so that the regulation is agnostic to the methodological approach, else the regulation would indirectly end up nudging choice of forecasting methodology.

- **Load Forecast given in MWh:** Draft clause 6.11 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 6.4 to clause 6.10, 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. should be expressed in megawatts (MW). The draft clause 6.11 mentions load forecast in megawatt-hours (MWh). The same be corrected with appropriate context differentiating the two.

- **Explicit role of Demand Response and Time-of-Day (ToD) tariff:** The draft regulations proposes RA largely through increased generation capacity and power procurement planning, but does not take into account the role of demand response and demand shift caused by the implementation of ToD tariffs. The Discom should be allowed flexibility to consider impact of such programs.

[5]Previous studies by Energy Analytics Lab (EAL), IIT Kanpur for Uttar Pradesh and Chhattisgarh had developed forecasts for the load profile and used the same for power procurement planning (in the context of resource adequacy).

- **Separate Sections for Timelines/Methodology of Medium-term and Long-term Demand Forecasting:** Draft clause 7.4 "*The Distribution Licensee shall produce hourly, 1-year Short-Term (ST), 5-year Medium-Term (MT) and 10-years Long-Term (LT) forecasts on a rolling basis and submit to SLDC by 30th April of each year for the ensuing year(s).*"

  The draft clause 7 is titled to address short-term demand forecast. However, its sub-clause 7.4 discusses MT and LT demand forecasts. It is recommended either to include MT and LT demand forecasting in the title of clause 7 or create separate sections for medium-term and long-term demand forecasting.

- **Storage Capacity:** Draft clause 14.6 states, *"GRIDCO 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.

- **Banking Arrangement to be Included in a Separate Clause:** Draft clause 14.7 states that *"GRIDCO 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 included in a separate clause, because banking arrangement does not involve any competitive bidding process. Such arrangements are usually agreed upon mutually between two parties/Discoms.

- **Long-term Distribution Licensee RA Plan (LT-DRAP):** Draft clause 15.3 *"In its overall power procurement planning approach, GRIDCO shall lay greater emphasis on adequate contracting through Long and Medium-Term arrangements."*

  The above clause should incorporate 'including impact of other measures such as Demand Response Program and ToD tariffs. Previous studies conducted by CER-EAL at IIT Kanpur for long-term demand forecasting and power procurement planning (spanning a ten-year horizon) have shown that such analysis enables discoms to make timely decisions about contracting capacity, considering the long-term demand trajectory and associated economic factors. The power procurement planning approach should thus consider optimal capacity contracting so as to achieve resource adequacy at an optimal cost without burdening final consumers with capacity charges.

- **Rolling Plan for Incremental Capacity:** Draft clause 15.4, "*Assessment through Annual Rolling Plan shall ascertain incremental capacity addition requirement through Long-Term/ Medium-Term/ Short-Term upon factoring in existing and planned procurement initiatives of GRIDCO"* 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 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. This would help the Discom to make optimal investment /contracting choice as feasible.

- **Flexibility regarding Contract Capacity Timeline**: Draft clause 15.5 *"GRIDCO shall contract capacities by 30th November of each year and submit the Annual Rolling Plan to the Commission and SLDC & STU by 31st December of each year for ensuring year(s)."*

  By November 30th of each year, it may not be feasible to contract all short-term requirements, which have better visibility in near term. Furthermore, procurement for some of the months of the next FY would not qualify as shortterm power procurement. For example, any procurement for the month of March 2026, which falls in the next FY, and would be 16 months away (from Nov. 2024) and thus would not be qualified as short term power procurement. The RA framework aims for such contracts to be in place by the cut-off date. However, short-term

contracts, which can be arranged from a few hours to several months in advance, are not available through competitive platforms like power exchanges. The dynamic nature of the power market significantly impacts the pricing of these shortterm contracts. Distribution licensees should have some flexibility to arrange short-term procurement over a period. This would avoid a rush to enter into short-term power procurement around the month of November as most of the Discoms have similar provisions. This flexibility also allows Discoms to fine-tune their projections and adjust power procurement needs as necessary. **Quarterly updates should be provided for fine-tuning short-term needs and reported to the Commission within two weeks of the end of each quarter.**

- **Procurement Planning:** Draft clause 15.6 states "*GRIDCO shall also demonstrate to the Commission 100% tieup 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 that gestation period for setting up new capacity is long, 100% tie-up of long-term 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.**

- **Techno-economic Flexibility Assessment for State Generating Resources:** The Commission may initiate the study for assessment of flexibility of the state generating stations so as to identify technological solutions to improve system flexibility. Any approval of investment clause for flexibility enhancement of existing power stations should solely be based on economic benefits of such investment over the investment horizon. Investment to reduce technical minimum or to enhance ramping of thermal generating stations would be economically fruitful if this exercise is undertaken only for the marginal plants (high variable cost plants) which often face the challenge of technical minimum and ramping. EAL Power Chronicle Vol. 5 Iss. 2 (Oct 2022) highlighted the importance of 'Selection of TPPs for Investment to Enhance Flexible Operation'[6].

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

Cite

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

- **Objective:** 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 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.

EAL Opinion

- **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

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[6] Singh (2022), 'Comments on CEA (Flexible Operation of Thermal Power Plants) https://eal.iitk.ac.in/assets/docs/power_chronicle_vol_5_issue_2.pdf

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 short-term power.

- **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).**

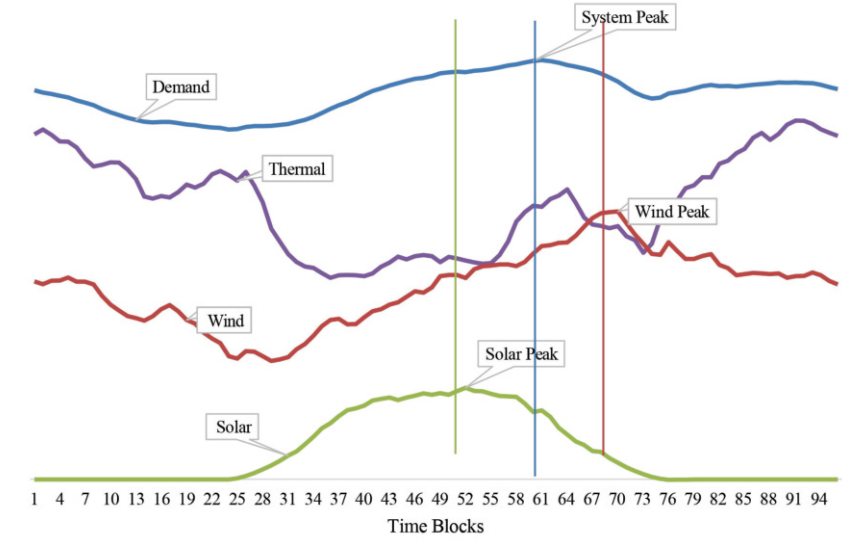

Figure 1: Share of technology-wise generation in system peak

- **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 numerator 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 Central Electrcity Authority (CEA) "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**.**

- **Consideration of Power Exchange Product for Resource Adequacy Requirement:** 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 Real-Time Market (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 short-term 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.

- **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 Regulations".*

  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 CEA 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.

- **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.

- **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 :

Table 1: Stratified Sampling Model

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%

Opinion on MPERC (Ancillary Services) Regulations, 2024 [Draft]

Cite

Madhya Pradesh Electricity Regulatory Commission issued draft "Ancillary Services" Regulations, 2024 on 08th August, 2024. The key highlights of this draft document is mentioned below:

- **Objective:** The Ancillary Services (AS) mechanism are designed to establish procedures for the procurement, deployment and payment to service providers at state level. The goal is to support SLDC in maintaining gird frequency, alleviate congestion in intra-state transmission network and ensuring smooth operation, safety and security of the state power grid.
- **Key Highlights:**
  - The regulations provides operational directions for Secondary Reserve Ancillary Services (SRAS).
  - MP-SLDC will act as nodal agency providing Automatic Generation Control signal to call up on supply of electricity.
  - An SRAS Provider willing to participate are required to provide standing consent for a minimum period time of 7 days to the Nodal Agency.
  - Selection of provider will be based on merit order of variable cost as well as compensation charges.
  - No incentive is provided to SRAS Provider during the introductory stage of SRAS implementation.

EAL Opinion

- **Suggestion for Definition of Energy Storage:** The definition of energy storage in clause 3.1 (10) *"Energy Storage" in relation to the electricity system, means a facility where electrical energy is converted into any form of energy which can be stored, and subsequently reconverted into electrical energy;"*

  It is prayed to the Commission to consider the following definition suggested for adaptation *"Energy Storage in relation to the electricity system, means a facility where electrical energy is converted into any other form of energy which can be stored, and subsequently reconverted into electrical energy which is injected* ***back to the grid.****"* (emphasis added)

  The updated definition brings clarity that a storage technology should convert electricity into other forms of energy and vice versa.

- **Definition of Un-requisitioned Surplus (URS):** In the proposed definition clause 3.1 (30) *"means the capacity in a generating station that has not been requisitioned and is available for despatch, and is computed as the difference between the declared capacity of the generating station and its total schedule."*

  Un-requisitioned surplus means the surplus capacity of a generating plant that has not been requisitioned by the beneficiaries and is available for despatch. It should be computed as the difference between the declared capacity of the generating station and its total schedule by the respective beneficiaries. It is suggested that the calculation must be based on calculation 'prior to scheduling and despatch of the respective ancillary services'.

- **Determination of Frequency Bias Coefficient (Bf):** In the draft clause 8.3 *"Frequency Bias Coefficient (Bf) shall be assessed and declared by the Nodal Agency as per the Detailed Procedure."*

  The Bf is declared by Grid India for each region on a quarterly basis. The same may be utilised at the state level as well.

- **Data Reporting and Archiving:** It is suggested that the SRAS report should be published on weekly as well as monthly basis outlining the block-wise SRAS requisitioned and supplied, as well as performance of the entities participating in the provision of SRAS. These reports, in machine readable format, should be archived on the State Load Dispatch Centre website and be accessible in public domain.

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- **Timeline Clarification on Release of Power Plant from SRAS Commitment:** As per the proviso 2 of clause 9.2 *"Provided that in case the capacity earmarked for SRAS is not called for and at the same time there is a requirement of power by the beneficiary, the same may be released by the nodal agency at its sole discretion based on a written requisition for benefit of the beneficiary."*

  The above would be applicable only if recall is exercised before gate closure. A clarification to that affect may be included.

- **Typo in Clause 11 (Payment for SRAS):** The draft clause 11.1 states *"SRAS Provider shall be paid from the State DSM Pool Account at the rate of their energy charge of compensation charge, as declared by the SRAS Provider, as the case may be, for the SRAS-Up MW quantum despatched for every 15-minute time block, calculated as per Clause 10.6 of Regulation 10 of these Regulations."*

  The above clause lacks clarity for a potential typo. The same can be redrafted as *"SRAS Provider shall be paid from the State DSM Pool Account at the rate of their energy charge or compensation charge,…."*

- **Incentive Mechanism for SRAS Provider:** In the proposed clause 11.3 *"No incentive shall be provided to SRAS Provider during the introductory stage of SRAS implementation. However, the Commission after the introduction of SRAS in the State and after analyzing the financial impact therein, may introduce the incentive at a later stage through a separate order."*

  The generators are going to be paid for the services provided under SRAS as per the energy charge or compensation charge. Any incentive over and above the same should only be relevant if it incentives the SRAS provided for their extra effort, else this would be a windfall gain without any additional effort by the SRAS providers. The incentive, if any, can be linked to the efficiency of response by the SRAS provider i.e. how much percentage of time the call for SRAS service was adhered to by the service provider. Performance over 95% or above may attract limited graduated incentive i.e. one level of incentive for performance between 95-98% in a month, and additional incentive for performance above 98%.

- **Percentage of Failure Allowed:** In the proposed clause 13.1 *"Performance below 20% for two consecutive days by an SRAS Provider shall make the SRAS provider liable for disqualification for participation in SRAS for a week by the Nodal Agency"*

  A minimum level of performance should be set higher, say 40-50% in place of the proposed 20%. Such a low benchmark could affectively leave the most crucial hours of the need for AS and thus defeating the very purpose for its introduction. Consistent under-performance should be investigated to identify potential areas for gaming the system and jeopardizing the system stability. Appropriate measure may then accordingly be identified to correct the same. The LDC should publish weekly as well as monthly SRAS reports with identification of such underperformance and investigations of reasons thereof.

- **Role of Renewable Energy (RE) Generators in SRAS:** In future, the RE sources are expected to provide a range of ancillary services[1]. For example, the inherent nature of synthetic inertial control from the large wind generators enables reliable primary support to the frequency. Solar power plant provides reactive power absorption with increase in active power production.

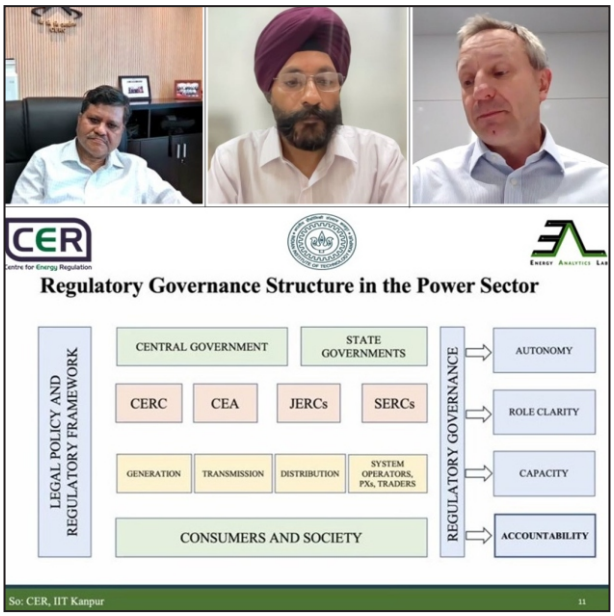
  A well-developed document/discussion paper must be put forward in order to increase participation of RE power plants. A study needs to be conducted to understand the implication of RE power plant used as SRAS provider. It will also facilitate in removing the barriers that may be faced by RE generators entering ancillary services market[2].

[1] Anoop, T. Bharath, "Ancillary services in the Indian power sector – A look at recent developments and prospects:", 2020, https://doi.org/10.1016/j.enpol.2020.112020

[2] AEMO, "Horndale Windfarm FCAS trail", 2017, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Strategic-Partnerships/2018/HWF2-FCAS-trial-paper.pdf

EAL News

3rd Regulatory Conclave on "Regulatory Governance in the Indian Power Sector: Reporting and Accounting Framework for ERCs"



CER organized the 3rd Regulatory Conclave on 17th July, 2024 to discuss **"Regulatory Governance in the Indian Power Sector: Reporting and Accounting Framework for ERCs"**. The conclave began with a warm welcome and an insightful presentation by Prof. Anoop Singh (Founder and Coordinator, CER and EAL), who highlighted the extensive research undertaken by CER on the subject. The panel of esteemed speakers included Mr. Jishnu Barua (Chairperson, CERC), Mr. Arvind Kumar (Chairman, UPERC), Dr. R. S. Sharma (Ex-Chairman, TRAI), and Mr. Jonathan Brearley (CEO, Ofgem). Key issues discussed during the conclave centered around regulatory developments in the power sector, the importance of data availability in the public domain, and the adoption of best practices within government bodies, in India and worldwide. A strong emphasis on the role of internal audits in enhancing accountability within organizations. The panelists from TRAI and Ofgem shared in-depth presentations detailing their respective organizations' experiences in improving accountability and transparency in day-to-day operations. Their insights provided valuable lessons for Indian regulators on enhancing governance in the power sector. The event saw active participation from over 60 individuals, including representatives from various SERCs across India, making it a significant platform for dialogue and exchange of ideas on regulatory governance.

4th Regulatory Conclave on "Role of Women in Power Sector Regulation"

The CER hosted a virtual mode 4th Regulatory Conclave titled **"Role of Women in Power Sector Regulation"** on 07th September, 2024. The event brought together key stakeholders across power sector covering electricity regulatory commissions, Discoms, Gencos, NGOs, as well as academic institutions. The conclave hosted a panel discussion with leading national and international experts, Ms. Parminder Chopra (Chairman & MD, PFC), Ms. Audrey Zibelman (Ex-Chairperson, NYPUC and Ex-CEO, AEMO), Mr. V.P. Raja (Ex-Chairman, MERC) and Ms. Anjuli Chandra (Ex-Member, PSERC). Dr. Aprajita Salgotra and Prof. Anoop Singh (Founder and Coordinator, CER and EAL) presented the study which focussed on highlighting the role of women in society and the regulatory governance of the power sector. The study involved a detailed analysis of the regulatory commissions working in India and nine other countries, including a comprehensive online survey. The analysis revealed that the cultural and social norms are the most common barrier to women's participation in the sector. The conclusive recommendations lean towards providing women equal access to capacity building programs, adoption of equal opportunities in workplace, a doctrine of preference in recruitment, mentoring/male sensitization of colleagues and introducing new gender specific policies.

Prof. Singh announced the CER would offer **an additional discount for the individual female participants** for its upcoming Regulatory Certification Programs (RCPs). These online programs offer greater flexibility to the participants offering greater opportunities for expanding their knowledge base. For more information please click here.

Registration for eMasters on "Power Sector Regulation, Economics and Finance"

The classes for **Cohort IV of eMasters Degree Program on "Power Sector Regulation, Economics and Finance"** will be open for registration. It is a multidisciplinary online program, approved by Senate, IIT Kanpur. It focuses on developing insights into the development of electricity markets in India and discussing the challenges and way ahead. The program content explains the Regulatory process considering the applicable engineering, economics, legal and environmental viewpoints. Apart from faculty from relevant departments of IIT Kanpur, the sessions for the program would be contributed by leading national and international experts. The program is suited for officials/employees of Regulatory Commissions, Government, Generation Companies (Thermal, Hydro and RE), Licensees (Transmission, Distribution and Trading), Equipment Manufacturers, Consultants, Academicians, Pension & Investment funds and other energy sector stakeholders including Green Hydrogen, Storage, EV, Coal, Oil & Gas etc. The Regulatory Capstone Projects will help the students to apply the concepts and devise solutions for real-life challenges. To know about the program, click here.

Brochure

WebPage

The industrial visit was organized for the participants of Cohort III of eMasters batch on 14th and 15th June, 2024 at Grid India Ltd. New Delhi, IEX - Noida, NPCL - Noida for enhancing the learning experience as part of the course.

Regulatory Certification Program

The registration for the 3rd RCP on **"Power Market Economics and Operation"** is open for individuals. The program was designed to understand the evolution, economic operation, regulatory structure of power market and its role in the Indian power sector. This program is conducted under the aegis of the Centre for Continuing Education, IIT Kanpur. For more information please click here.

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