POSOCO (Detailed Procedure for Estimation of the Requirement of SRAS & TRAS at Regional Level), 2022 [Draft]

POSOCO on 24th May 2022 notified the draft Detailed Procedure for Estimation of the Requirement of Secondary Reserve Ancillary Services (SRAS) & Tertiary Reserve Ancillary Services (TRAS) at Regional Level. The key highlights of the draft are mentioned below,

Methodology for assessment of the SRAS & TRAS reserves include:-

- 99 Percentile of the Area Control Error (ACE) of the respective control area
- Net demand forecast error
- Variability in Net demand forecast error
- Variability in Net demand

Amongst these methods, interimly NLDC has considered the *'99 Percentile of ACE of the respective control areas'* method for the assessment of SRAS & TRAS reserves. NLDC is also exploring other methodologies parallelly and any improved methodology would be incorporated subject to approval by CERC. Required quantum estimation of SRAS & TRAS has to be done by NLDC in coordination with the RLDCs and SLDCs as per the methods specified in the draft Guidelines. This data must be furnished by the SLDCs which must maintain reserves as estimated by NLDC.

$$\text{Area Control Error (ACE)} = (I_a - I_s) - 10 * B_f * (F_a - F_s) + \text{Offset}$$

Where,
I_a & I_s are the actual and scheduled net interchange in MW respectively (+ve value for export)
B_f = Frequency Bias Coefficient in MW/0.1 Hz (negative value)
F_a & F_s are the actual and schedule system frequency respectively (default = 0)
Offset = Provision for compensating errors such as measurement error; default value zero

Table 1: Type of the reserves as specified in the IEGC and AS Regulations for frequency control, regulating Area control error and their Deployment

Reserve	Start of activation	Full deployment	Ability to sustain the full deployment
Primary Response	Instantaneous	<= 30 sec	Up to 5 min
Secondary control reserve	>= 30 sec	<= 15 min	Up to 30 min or till replaced by tertiary reserves
Tertiary control Reserve	Usually > 15 min to 1 hour		

Estimation of the reserves: The most credible reference contingency for maintaining primary reserve is the outage of the largest power plant or sudden load throw-off of 4500 MW.

For the capacity requirement of SRAS & TRAS, the data is to be furnished by the SLDCs to the NLDC for year ahead and quarter ahead basis within the timelines specified in the draft in the format as given by the Nodal Agency.

For week-ahead, reserve required for the next week shall be computed from the data of past 4 weeks and the same week of the past year; day-ahead reserve estimation, last seven days' data to be used; and for real time estimation, the day-ahead requirement, availability of reserves on day ahead basis, real time system conditions, load/RE forecast, load generation balance, weather contingencies, congestion and other related parameters shall be used.

Secondary Reserves: The 99 percentile values of each state scaled using the 99 percentiles of the regional ACE values shall be used for inter-state and intra-state requirement of the reserves. The all India total of positive and negative secondary requirement shall be equal to the reference contingency or the aggregated state level and regional level requirement, whichever is higher.

Tertiary reserves:-
For regional level,
Tertiary reserve requirement = secondary reserve requirement.

At state level,
Tertiary reserve requirement = secondary reserve requirement at state level + 50% of the largest unit size in the respective control area.

❖ Information Dissemination: The requirement of SRAS and TRAS reserves on year ahead, quarterly and week ahead basis shall be declared by the NLDC in the specified format and within the timelines specified for each format.

❖ Revision of the Procedures: The NLDA/RLDCs may take decisions in the interest of the system operation under intimation of CERC and the procedure shall be modified/ amended with proper approval.

The draft regulation can be accessed here.

CER Opinion

1. **Evolution of Market for Ancillary Services:** CERC's Ancillary Services Regulations, 2021 laid down framework for rollout of ancillary services in the country[1]. Evolution from charges for Unscheduled Interchange to market based Deviation Settlement Charges was based on the premise that there were shortages of power in general and the discoms avoided power procurement and pushed the deviations to the system. While most discoms have increasingly been active in the short-term market making short-term purchases and balancing their short- term portfolio, rising RE penetration are also contributing to the system deviations. The market design goal should aims at settling deviations through the ancillary services, once the options for market procurement are closed. The detailed procedure for estimation of SRAS and TRAS aims to put forward a methodology. Implementation of the same would also require capacity building at the level of SLDC, additional telemetry and standardization of data protocols, if required. The procedure provides for the interim

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[1] For a discussion and comments on the same refer to Power Chronicle (EAL's Newsletter) Volume 4 No 1, July 2021 (eal.iitk.ac.in)

mechanism in case of unavailability of dataor suspect data quality.

2. **Day Ahead Reserve Estimation (Clause No. 8.4.2):** Draft procedure suggests that *"For the day ahead reserve estimation, last seven days data shall be used"*. Given the demand profileand the relative contribution of variable renewable energy, reserve needs for a high demand (high VRE) day would be different from a low demand (low VRE) day. It is suggested that for the calculation of day ahead reserve estimation for a weekday (weekend day), past 7 days weekday (weekend day)data of the weekends may be excluded while considering the last seven days, and vice versa for a non-working day.
Illustration: In case an estimate is made for a Friday of Week 'Wn', the last seven days data may be taken into consideration by excluding the Saturday of Week 'Wn-1' and the Sunday of Week 'Wn'. Instead, the Thursday and Friday of Week 'Wn-1' maybe considered in the calculation.

3. **Observed Reading of the Frequency Sample (Clause No. 2 of Annexure I):** Draft clause states, *"Hence it should suffice that the system frequency signal is captured using a sampling time of a few seconds for calculation of ACE. Suggested sampling time for frequency: 4seconds, i.e., take a fresh frequency data point every four seconds."* It is suggest that the data collection/ sampling rate should be equal for every parameter for the calculation of ACE, which is not clarified in the current draft. The solution to the challenge of low rate of data acquisition by the SCADA system (**Clause No. 3.1 of Annexure I**) needs to be explored as it might cause data discrepancy.

   In case the frequency is measured every 4 seconds, a sample set S1 having huge variation levels and a sample set S2 having very low variation levels may have the same average Frequency. Itis not clear that whether average, high percentile, or low percentile frequency within the sample set would be used while recording the readings of sample sets.

4. **Inclusion of RRAS (Clause No. 2 (b) of Annexure I):** Draft clause states, *"Tertiary frequencycontrol through RRAS"*. It may be clarified in these Guidelines if RRAS will be continued tobe carried on, or will it be replaced by TRAS, as specified in the *'CERC (Ancillary Services) Regulations, 2022'*. Given that there are couple of references to RRAS in the document, a clarification would be desirable.

5. **Selection of Stations as Redundant Frequency Sources (Clause No. 2.1 of Annexure I):** Draft clause states, *"Choose 10 such stations to act as redundant frequency sources in ACE calculation"*. It may be clarified in these Guidelines whether the 10 stations taken into consideration will be ISGS/ SGS/ IPP. The basis of consideration of these 10 stations as the redundant frequency sources may be specified in these Guidelines and whether these 10 stations will be taken for each SLDC. It is important to clarify this from an SLDCs point ofview so that the respective SLDC would compile data related to the events recorded (from the list shared by the NLDC) within the state or even otherwise.

6. **Electromagnetic Transients in the System (Clause No. 2.2 of Annexure I):** Draft clause states *"Typically, in time frame of a few seconds, all the electromagnetic transients and mostof the electromechanical transients usually get damped and settled. Hence, stations from different geographic locations can be chosen as redundant frequency sources".* The transients in the system may be created at any instance of the observation. Thus, in case the observerwaits for a transient to get damped and settled, a new transient may have arisen, and system may not have settled in the meanwhile.

7. **Good Quality Tag (Clause No. 2.3 of Annexure I):** Draft clause states *"In case the qualityof the primary frequency source becomes 'suspect', then the next signal with 'good quality tag' shall be selected as the primary frequency source automatically".* It is suggested that the frequency of upgradation of the *'good quality tag'* and their standards may be further clarified
/specified in these Guidelines.

8. **Clock calibration & synchronization (Clause No. 3.1 of Annexure I):** Draft clause states *"Actual tie-line flows shall be sampled every 4 seconds similar to frequency and shall be usedin the ACE calculation. Say, the data is acquired only every 12s by the SCADA because of delays, the ACE calculation program shall repeat the data thrice in those 12s".* It should be ensured that the clock synchronization across all the stations taken into consideration by the respective LDC and it calibration to be done more frequently in order to ensure the synchronicity of time stamping of the collected data.

9. **Seasonality effect on Occurrence of Events (Clause No. 4 of Annexure I):** Draft clause states *"FRC shall be computed for every control area for all events involving a sudden 1000 MW or more load/generation loss or a step change in frequency by 0.10 Hz. All these FRC values shall be archived along with date, time and reasons of the event."* It is suggested thatthe distribution of these events be plotted for the previous year on a yearly, quarterly, monthly and weekly basis. This will enable the LDC to analyse the variation of demand, generation and occurrence of events depending upon the seasonal and festive changes. It is suggested that the events should be taken for the analogous period of estimation.

10. **Calculation of Frequency Bias Coefficient (Clause No. 4.1 of Annexure I):** Draft clause states *"In the calculation of ACE, the value of Frequency Bias Coefficient in MW/0.1 Hz (negative value) shall be based on median Frequency Response Characteristic during previous financial year of each region".*
It is suggested that for the calculation of ACE, Frequency Bias Coefficient should be based on the median Frequency Response Characteristic (FRC) according to the below given list,

1. Day Ahead1 (Working Day): FRC of Previous Working Day
2. Day Ahead2 (Non-working Day): FRC of Previous Non-working Day
3. Week Ahead: FRC of Previous Week
4. Month Ahead: FRC of Same Month of Previous Financial Year, i.e., Month-on-Monthbasis

5. Quarter Ahead: FRC of Same Quarter of Previous Financial Year, i.e., Quarter-on-Quarter basis
6. Year Ahead: FRC of Previous Financial Year, i.e., Year-on-Year basis

11. **Discrepancy between Clause No. 4.1 & Clause No. 4.2 of Annexure I:** Draft clause no. 4.2 states *"The Bias (Bf) value may be updated in the ACE calculations at the LDCs, once in every quarter on the 24th day of the month after the completion of the previous quarter"*.
Clause No. 4.1 suggests the upgradation of the ACE calculations *"based on median Frequency Response Characteristic during previous financial year of each region"*, contrarily Clause No.4.2 suggests the upgradation *"once in every quarter"*. Although footnote 12 clarifies the reason for updating the Bf value on a quarterly basis, the draft Guidelines may clarify the same.

Although Clause No. 4.1 suggests the upgradation of the ACE calculations on a yearly basis,but Clause No. 4.2 suggests the upgradation on a quarterly basis, which seems like the timescale given in Clause 4.1 is not fixed for the financial year, rather it's initially fixed for 1 year, and then updated to a rolling 1 year basis. In the current draft, Clause Nos. 4.1 and 4.2 do not have parity with each other, as such there is a need of further clarification.

12. **Data Format for Estimation of Reserves (RAS1 & RAS2):** NLDC at the National level will consider all events that have occurred in the past year in the country. It may be possible that a specific SLDC may not consider the events of other states and may say that no "event" has occurred in its control area. Thus, it is suggested that the selection of "events" may be specified clearly for filling the data by the states in the format RAS1 & RAS2 for Estimation of Reserves. It is suggested that the SLDCs should consider all events in the nation irrespective whether the event has occurred in it control area, as the Regional Grids in now connected in synchronicity with each other.