

# **CENTRAL ELECTRICITY REGULATORY COMMISSION**

## **NEW DELHI**

New Delhi, 29<sup>th</sup> May, 2021

### **PREAMBLE**

Whereas it is necessary to provide for a regulatory mechanism for ancillary services in the interest of reliability, safety and security of the grid, it is hereby specified as follows:

### **NOTIFICATION (DRAFT)**

**No. RA-14026(11)/3/2019-CERC.-** In exercise of the powers conferred under Section 178 read with clauses (h) and (i) of sub-section (1) of Section 79 of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, and after previous publication, the Central Electricity Regulatory Commission hereby makes the following regulations, namely:

#### **1. Short title and commencement**

- (1) These regulations may be called the Central Electricity Regulatory Commission (Ancillary Services) Regulations, 2021.
- (2) These regulations shall come into force with effect from such date as may be notified by the Commission.

#### **2. Objective**

These regulations aim to provide mechanisms for procurement, through administered as well as market-based mechanisms, deployment and payment of Ancillary Services for maintaining the grid frequency close to 50 Hz, and restoring the grid frequency within the allowable band as specified in the Grid Code and for relieving congestion in the transmission network, to ensure smooth operation of the power system, and safety and security of the grid.

#### **3. Definitions and Interpretation**

- (1) In these regulations, unless the context otherwise requires,

- a. “Act” means the Electricity Act, 2003 (36 of 2003);
- b. “AGC signal” means automated signal generated from the Nodal Agency through which the generation of an SRAS Provider is adjusted;
- c. “Ancillary Service” or “AS” in relation to power system operation, means the service necessary to support the grid operation in maintaining power quality, reliability and security of the grid and includes Primary Reserve Ancillary Service, Secondary Reserve Ancillary Service, Tertiary Reserve Ancillary Service, active power support for load following, reactive power support, black start and such other services as defined in the Grid Code;
- d. “Area Control Error” or “ACE” means the instantaneous difference between a control area’s net actual interchange and net scheduled interchange, taking into account the effects of frequency bias and correction of metering and measurement errors;
- e. “AS capacity obligation” is the capacity signalled for despatch by the Nodal Agency under SRAS or the capacity procured by the Nodal Agency under TRAS;
- f. “Automatic Generation Control” or “AGC” means a mechanism through which the generation of the SRAS Provider in a control area is automatically adjusted in response to the Secondary Control Signal;
- g. “Commission” means the Central Electricity Regulatory Commission referred to in sub-section (1) of Section 76 of the Act;
- h. “Commitment charge” means the amount payable to the TRAS Provider for the quantum of TRAS-Up cleared in the Day Ahead Market or the Real Time Market, as the case may be, but not instructed for despatch.
- i. “Compensation charge” means the price declared by an SRAS Provider other than a generating station for participation in SRAS;
- j. “Demand Response” means variation in electricity consumption by end consumers or drawal by a control area, as per system requirement identified by the Nodal Agency;
- k. “Deviation and Ancillary Service Pool Account” means the Regional Deviation Pool Account Fund referred to in the DSM Regulations, or any such Account as may be

specified by the Commission;

l. “DSM Regulations” means the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014;

m. “Energy-Down bid” means the bid in Rs./MWh for the offered quantum submitted by the TRAS-Down Provider to pay to the concerned Deviation and Ancillary Service Pool Account;

n. “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;

o. “Energy-Up bid” means the bid in Rs./MWh for the offered quantum submitted by the TRAS-Up Provider;

p. “Frequency Response Characteristics” means automatic, sustained change in the power consumption by load or output of the generators that occurs immediately after a change in the load-generation balance of a control area and which is in a direction to oppose a change in frequency;

q. “Grid Code” means the Grid Code specified by the Commission under clause (h) of sub-section (1) of Section 79 of the Act;

r. “Nodal Agency” means the National Load Despatch Centre which shall be responsible for implementation of the Ancillary Services at the inter-State level through the Regional Load Despatch Centres;

s. “Primary Reserve Ancillary Service” or “PRAS” means the Ancillary Service which immediately comes into service through governor action of the generator or through any other resource in the event of sudden change in frequency;

t. “Secondary Control Signal” means automated signal generated from the Nodal Agency through which injection or drawal or consumption of an SRAS provider is adjusted, and includes AGC signal;

u. “Secondary Reserve Ancillary Service” or “SRAS” means the Ancillary Service comprising SRAS-Up and SRAS-Down, which is activated and deployed through

secondary control signal;

v. "Secondary Reserve Ancillary Service Provider" or "SRAS Provider" means an entity which provides SRAS-Up or SRAS-Down in accordance with these regulations;

w. "SRAS-Down" means an SRAS that reduces active power injection or increases drawal or consumption, as the case may be, in response to secondary control signal from the Nodal Agency;

x. "SRAS-Up" means an SRAS that increases active power injection or decreases drawal or consumption, as the case may be, in response to secondary control signal from the Nodal Agency;

y. "Tariff Regulations" means the Regulations specified by the Commission from time to time under Section 178 read with Section 61 of the Act;

z. "Tertiary Reserve Ancillary Service" or "TRAS" means the Ancillary Service comprising TRAS-Up and TRAS-Down and consists of spinning reserve or non-spinning reserve, which responds to despatch instructions from the Nodal Agency;

aa. "TRAS-Down" means a TRAS that reduces active power injection or increases drawal or consumption, as the case may be, in response to despatch instructions of the Nodal Agency;

ab. "TRAS-Down Provider" means an entity which provides TRAS-Down in accordance with these regulations;

ac. "TRAS-Up" means a TRAS that increases active power injection or decreases drawal or consumption, as the case may be, in response to despatch instructions of the Nodal Agency;

ad. "TRAS-Up Provider" means an entity which provides TRAS-Up in accordance with these regulations;

ae. "Un-Requisitioned Surplus" or "URS" 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.

(2) Save as aforesaid and unless repugnant to the context or the subject-matter otherwise requires, words and expressions used in these regulations and not defined, but defined in the Act, or the Grid Code or any other regulation of the Commission shall have the meaning assigned to them respectively in the Act or the Grid Code or such other regulation.

(3) Reference to any Act, Rules and Regulations shall include amendments or consolidation or re-enactment thereof.

#### **4. Scope**

These regulations shall be applicable to regional entities, including entities having energy storage resources and demand side resources qualified to provide Ancillary Services and other entities as provided in these regulations.

#### **5. Types of Ancillary Services**

(1) There shall be the following types of Ancillary Services, namely:

- (a) Primary Reserve Ancillary Service (PRAS);
- (b) Secondary Reserve Ancillary Service (SRAS);
- (c) Tertiary Reserve Ancillary Service (TRAS); and
- (d) Such other Ancillary Services as specified in the Grid Code

(2) The mechanism of procurement, deployment and payment of SRAS and TRAS as referred to in sub-clauses (b) and (c) of clause (1) of this Regulation shall be as specified in these regulations.

(3) The mechanism of procurement, deployment and payment of Ancillary Services, referred to in sub-clauses (a) and (d) of clause (1) of this Regulation, shall be as specified in the Grid Code or under these regulations to be specified separately, as the case may be.

#### **6. Estimation of Reserves by the Nodal Agency**

(1) The Nodal Agency shall, in coordination with RLDCs and SLDCs, estimate the quantum of requirement of SRAS and TRAS for such period and based on such methodology as specified in the Grid Code.

(2) The Nodal Agency shall re-assess the quantum of requirement of SRAS and TRAS on day-ahead basis and incremental requirement, if any, on real time basis.

- (3) The requirement of SRAS shall be estimated on regional basis.

## **Part I**

### **Secondary Reserve Ancillary Service (SRAS)**

#### **7. Eligibility for an SRAS Provider**

- (1) A generating station or an entity having energy storage resource or demand side resource, connected to inter-State transmission system or intra-State transmission system, shall be eligible to provide Secondary Reserve Ancillary Service, as an SRAS Provider, if it
- (a) has bi-directional communication system with NLDC or RLDC, as per the requirements stipulated in the Detailed Procedure by the Nodal Agency;
  - (b) is AGC-enabled, in case of a generating station;
  - (c) can provide minimum response of 1 MW;
  - (d) has metering and SCADA telemetry in place for monitoring and measurement of energy delivered under SRAS, as stipulated in the Detailed Procedure by the Nodal Agency;
  - (e) is capable of responding to SRAS signal within 30 seconds and providing the entire SRAS capacity obligation within fifteen (15) minutes and sustaining at least for the next thirty (30) minutes;

#### **8. Activation and Deployment of SRAS**

- (1) SRAS shall be activated and deployed by the Nodal Agency on account of the following events to maintain or restore grid frequency within the allowable band as specified in the Grid Code and replenish primary reserves:
- (a) Area Control Error (ACE) of the region deviating from zero (0) and going beyond the minimum threshold limit of  $\pm 10$  MW;
  - (b) Such other events as specified in the Grid Code.
- (2) The Area Control Error (ACE) for each region would be auto-calculated at the control centre of the Nodal Agency based on telemetered values, and the external inputs referred to in clauses (3) and (4) of this regulation, as per the following formula:

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

Where,

$I_a$  = Actual net interchange in MW (positive value for export)

$I_s$  = Scheduled net interchange in MW (positive value for export)

$B_f$  = Frequency Bias Coefficient in MW/0.1 Hz (negative value)

$F_a$  = Actual system frequency in Hz

$F_s$  = Schedule system frequency in Hz

Offset = Provision for compensating for metering and measurement error

(3) Frequency Bias Coefficient ( $B_f$ ) shall normally be based on median Frequency Response Characteristic during previous financial year of each region and refined from time to time.

(4) Offset shall be used to account for metering errors and shall be decided by the Nodal Agency for the respective region.

(5) Nodal Agency may operate SRAS in any of the three control modes viz., tie-line bias, flat frequency or flat tie-line depending on grid requirements.

## **9. Procurement of SRAS**

(1) SRAS shall be procured on regional basis by the Nodal Agency through the mechanism as specified in this Regulation:

Provided that the Commission, based on review of the operation of SRAS, may direct procurement of SRAS through market-based bidding mechanism to be specified separately.

(2) An SRAS Provider willing to participate in SRAS shall be required to provide standing consent to the Nodal Agency for participation, which shall remain valid till it is modified or withdrawn:

Provided that standing consent cannot be modified or withdrawn without giving notice of at least forty-eight hours.

(3) The SRAS Providers that are generating stations, shall be required to declare in such time interval as may be stipulated in the Detailed Procedure, the technical parameters as required by

the Nodal Agency, including but not limited to installed capacity, Technical Minimum, Ramp up and Ramp down capability.

(4) The SRAS Providers other than the generating stations, shall be required to declare the technical requirements as may be stipulated in the Detailed Procedure.

(5) The SRAS Providers that are generating stations, shall declare their variable charge upfront on monthly basis in the manner as stipulated in the Detailed Procedure.

(6) The SRAS Provider other than the generating stations, shall be required to declare the compensation charges upfront on monthly basis in the manner as stipulated in the Detailed Procedure.

(7) The Nodal Agency, based on the estimate of the SRAS requirement as per Regulation 6 of these regulations, shall ascertain availability of adequate reserves on day-ahead basis and on real-time basis before the gate closure of the Real Time Market.

(8) In case of the generating stations whose tariff is determined by the Commission under Section 62 of the Act , the Nodal Agency shall identify the generating stations for providing SRAS,

(a) on day-ahead basis, based on the capacity available after the schedule has been communicated at 2300 hrs for the next day; and

(b) on real-time basis before the gate closure for incremental SRAS requirement.

## **10. Selection of SRAS Providers and Despatch of SRAS**

(1) SRAS Provider shall be selected on regional basis by the Nodal Agency for providing SRAS-Up or SRAS-Down based on the Custom Participation Factor.

(2) The Custom Participation Factor for each SRAS Provider shall be determined by the Nodal Agency based on the following criteria:

(a) Rate Participation Factor (Ramping capability in MW/min); and

(b) Cost Factor (variable charge or compensation charge, as the case may be).

(3) The Custom Participation Factor for SRAS-Up shall be directly proportional to the



normalised Rate Participation Factor and inversely proportional to the normalised Cost Factor. The Custom Participation Factor for SRAS-Down shall be directly proportional to the product of the normalised Rate Participation Factor and normalised Cost Factor.

(4) Based on the above principle, Custom Participation Factor shall be calculated which shall be normalised to determine the participation of each SRAS Provider.

(5) SRAS signal shall be allocated among the SRAS Providers on regional basis to meet the SRAS requirement of the system based on the normalised Custom Participation Factor subject to the ramp limited resources available with the SRAS Provider(s).

(6) The Custom Participation Factor shall be calculated as specified in **Appendix-I** of these regulations.

(7) SRAS shall be despatched on regional basis through secondary control signals by the Nodal Agency.

(8) Secondary control signal for SRAS-Up and SRAS-Down shall be sent to the control centre of the SRAS Provider every 4 seconds by the Nodal agency. SRAS Provider shall allow its control centre to follow the secondary control signal for SRAS-Up or SRAS-Down automatically without manual intervention.

(9) The SRAS Provider shall increase or decrease active power injection or increase or decrease drawal or consumption, as the case may be, as per the automatic signal from the Nodal Agency.

(10) The SRAS Provider shall share real-time data with NLDC and the concerned RLDCs as stipulated in the Detailed Procedure.

(11) Average of SRAS-Up and SRAS-Down MW data shall be calculated by the Nodal Agency for every 5 minutes in absolute terms using archived SCADA data at the Nodal Agency and reconciled with the data received at the control centre of the SRAS Provider and shall be used for payment of incentive as per Regulation 12 of these regulations.

(12) Average of SRAS-Up and SRAS-Down MW data shall be calculated for every 15 minutes time block in MWh for every SRAS Provider by the Nodal Agency using the archived SCADA data at the Nodal Agency and reconciled with the data received at control centre of the SRAS Provider and shall be used for payment of variable charge or compensation charge, as the case

may be, to the SRAS Provider as per Regulation 11 of these regulations.

## **11. Payment for SRAS**

(1) SRAS Provider shall be paid from the Deviation and Ancillary Service Pool Account, at the rate of their variable charge or compensation charge, as declared by the SRAS Provider, as the case may be, for the SRAS-Up MW quantum despatched for every 15 minutes time block, calculated as per clause (12) of Regulation 10 of these regulations.

(2) SRAS Provider shall pay back to the Deviation and Ancillary Service Pool Account , at the rate of their variable charge or compensation charge, as the case may be, for the SRAS-Down MW quantum despatched for every 15 minutes time block, calculated as per clause (12) of Regulation 10 of these regulations.

(3) SRAS Provider shall be eligible for incentive based on performance as per Regulation 12 of these regulations.

(4) Methodology of computation under clauses (1) to (3) of this Regulation shall be stipulated in the Detailed Procedure.

## **12. Performance of SRAS Provider and incentive**

(1) The actual response of SRAS Provider against the secondary control signals from the Nodal Agency to the control centre of the SRAS Provider shall be monitored by the Nodal Agency, as per the procedure stipulated in the Detailed Procedure.

(2) All measurements of secondary control signals from the Nodal Agency to the control centre of the SRAS Provider and actual response of SRAS Provider shall be carried out on post-facto basis using SCADA data. Performance of the SRAS Provider shall be measured by the Nodal Agency by comparing the actual response measured against the secondary control signals for SRAS-Up and SRAS-Down sent every 4 seconds to the control centre of the SRAS Provider. The methodology for measurement of performance of SRAS Provider shall be as specified in **Appendix-II** of these regulations.

(3) SRAS Provider shall be eligible for incentive based on the performance measured as per

clause (2) of this Regulation and the 5-minute MWh data calculated for SRAS-Up and SRAS-Down as per clause (11) of Regulation 10 of these regulations and aggregated over a day, as under:

<b>Actual performance vis-à-vis secondary control signal for an SRAS Provider</b>	<b>Incentive Rate (paise/kWh)</b>
<b>Above 95%</b>	(+) 40
<b>70-95 %</b>	(+) 30
<b>45-70%</b>	(+) 20
<b>20-45%</b>	(+) 10
<b>Below 20%</b>	0

### **13. Failure in performance of SRAS Provider**

(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.

(2) Violation of directions of the Nodal Agency for SRAS under these Regulations shall make the SRAS Providers liable for penalties as per the provision of the Act.

## **Part II**

### **Tertiary Reserves Ancillary Services (TRAS)**

### **14. Eligibility for a TRAS Provider**

A generating station or energy storage resource or demand side resource connected to inter-State transmission system or intra-State transmission system shall be eligible for participation as TRAS Provider, if

- (a) it is capable of varying its active power output or drawl or consumption, as the case may be, on receipt of despatch instructions from the Nodal Agency; and
- (b) it is capable of providing TRAS within 15 minutes and sustaining the service for at least next 60 minutes.

## **15. Activation and Deployment of TRAS**

TRAS shall be activated and deployed by the Nodal Agency on account of the following events:

- (a) In case the secondary reserve has been deployed continuously in one direction for fifteen (15) minutes for more than 100 MW, in order to replenish the secondary reserve;
- (b) Such other events as specified in the Grid Code.

## **16. Procurement of TRAS**

(1) Buy Bid: The Nodal Agency shall communicate to the power exchange(s), the quantum of requirement of TRAS-Up and TRAS-Down on day-ahead basis before commencement of the Day Ahead Market and incremental requirement, if any, over and above the procurement in the Day Ahead Market, on real-time basis, before the commencement of the Real Time Market:

Provided that the quantum of requirement on day-ahead basis shall be communicated after considering the TRAS resources likely to be available on real-time basis.

(2) Sell Bid: The TRAS Providers shall submit bids in the following manner:

- (a) Bids for TRAS-Up and TRAS-Down shall be submitted for each time block or for a minimum of two consecutive time blocks in the Day Ahead Market or in the Real Time Market.
- (b) For TRAS-Up, Energy-Up bid in Rs./MWh shall be submitted for the offer volume in MW.
- (c) For TRAS-Down, Energy-Down bid in Rs./MWh shall be submitted for the offer volume in MW.

(3) The capacity offered, as a sell bid in power exchange(s) for providing TRAS-Up or TRAS-Down from a resource in the same time-block, shall be separate and non-overlapping.

(4) The power exchanges shall collect the bids for TRAS-Up and TRAS-Down and share the same with the Nodal agency for price discovery in terms of Regulation 17 of these regulations.

(5) TRAS Provider cleared in the Day Ahead Market may place incremental bids in the Real Time Market. TRAS Provider not cleared in the Day Ahead Market or which has not participated

in the Day Ahead Market, may also place bids in the Real Time Market.

## **17. Price Discovery of TRAS**

### *Price Discovery for TRAS-Up*

(1) The price discovery for TRAS-Up shall be based on the principle of Uniform Market Clearing Price.

(2) The highest Energy-Up bid corresponding to the requirement for TRAS-Up as intimated under clause (1) of Regulation 16 of these regulations, shall be the Market Clearing price for Energy-Up in the Day Ahead Market (MCP-Energy-Up-DAM) or in the Real Time Market (MCP-Energy-Up-RTM), as the case may be.

### *Price Discovery for TRAS-Down*

(3) The price discovery for TRAS-Down shall be based on the principle of Pay-as-bid.

(4) The Energy-Down bids shall be stacked in a descending order from the highest Energy-Down bid to the lowest Energy-Down bid and the Nodal Agency shall select the TRAS-Down Providers to meet the estimated TRAS requirement in that order.

(5) The Commission may, if considered necessary, provide for a price cap for TRAS.

## **18. Scheduling and Despatch of TRAS**

(1) Scheduling and despatch of TRAS shall be according to the provisions of the Grid Code.

(2) Information in respect of the TRAS-Up and TRAS-Down cleared for the Day Ahead Market and the Real Time Market shall be published on the website of the Nodal Agency, and shall be simultaneously communicated to the concerned power exchanges for onward communication to the selected TRAS providers.

(3) The schedule for TRAS shall become effective from the time block starting 15 minutes after issue of the despatch instruction by the Nodal Agency:

Provided that the Nodal Agency may issue despatch instruction from any time block after the above-mentioned time block, if required, based on the anticipated system conditions.

(4) The Nodal Agency shall deploy the cleared TRAS-Up as under:

(a) In case the actual requirement for deployment of TRAS-Up is equal to the total TRAS-Up cleared in the market, the Nodal Agency shall issue despatch instructions to all such TRAS-Up Providers.

(b) In case the actual requirement for deployment of TRAS-Up is less than the total TRAS-Up cleared in the market, the Nodal Agency shall issue despatch instructions to the TRAS Providers in the following manner:

(i) In the event of the MCP-Energy-Up-DAM being equal to the MCP-Energy-Up-RTM, TRAS-Up shall be despatched on pro-rata basis;

(ii) In event of the MCP-Energy-Up-DAM and MCP-Energy-Up-RTM not being equal, TRAS-Up with lower MCP-Energy-Up shall be despatched first followed by the TRAS-Up with higher MCP-Energy-Up:

Provided that if the actual requirement of deployment of TRAS-Up is less than the cleared volume in the market with lower MCP-Energy-Up, TRAS-Up cleared in the said market shall be despatched on pro-rata basis:

Provided further that if the actual requirement of deployment of TRAS-Up is more than the cleared volume in the market with lower MCP-Energy-Up, TRAS-Up cleared in the market with lower MCP-Energy-Up shall be despatched in full and the TRAS-Up cleared in the market with higher MCP-Energy-Up shall be despatched on pro-rata basis.

(5) The Nodal Agency shall deploy the cleared TRAS-Down as under:

(a) In case the actual requirement for deployment of TRAS-Down is equal to the total TRAS-Down cleared in the market, the Nodal Agency shall issue despatch instructions to all such TRAS-Down Providers.

(b) In case the actual requirement for deployment of TRAS-Down is less than the total TRAS-Down cleared in the market, the Nodal Agency shall issue despatch instructions to the TRAS-Down Providers in the descending order of their Energy-Down bids, so that the selected TRAS-Down Provider with the highest Energy-Down bid shall be despatched

first, followed by the TRAS-Down Provider with the next highest Energy-Down bid and so on.

## **19. Payment for TRAS**

(1) TRAS-Up Provider shall receive MCP-Energy-Up, as discovered in the Day Ahead Market or the Real Time Market, as the case may be, for the quantum of energy instructed to be despatched by the Nodal Agency.

(2) TRAS-Up Provider shall receive commitment charges at the rate of ten percent of the MCP-Energy-Up-DAM or the MCP-Energy-Up-RTM, as the case may be, subject to the ceiling of 20 paise/kWh for the quantum of TRAS-Up cleared in the Day Ahead Market or the Real Time Market as the case may be, but not instructed to be despatched by the Nodal Agency.

(3) The TRAS-Down Provider shall pay back to the Deviation and Ancillary Service Pool Account at the rate of their Energy-Down bid in the Day Ahead Market or the Real Time Market, as the case may be, for the capacity instructed to be despatched by the Nodal Agency.

## **Part III**

### **Shortfall in Procurement of SRAS and TRAS or Emergency Conditions**

## **20. Shortfall in Procurement of SRAS and TRAS or Emergency Conditions**

### ***In case of shortfall***

(1) All generating stations, whose tariff is determined by the Commission under Section 62 of the Act and having URS power after Gate Closure, shall be deemed to be available for use by the Nodal Agency for SRAS-Up or SRAS-Down or TRAS-Up or TRAS-Down, subject to technical constraints of such generating stations.

(2) The generating stations as referred to in clause (1) of this Regulation, whose URS is despatched as SRAS-Up shall be paid their variable charge in terms of clause (1) of Regulation 11 and incentive in terms of Regulation 12 of these regulations.

(3) The generating stations as referred to in clause (1) of this Regulation, whose URS is despatched as SRAS-Down shall pay back to the Deviation and Ancillary Service Pool Account in terms of clause (2) of Regulation 11 and shall be paid incentive in terms of Regulation 12 of

these regulations.

(4) The generating stations as referred to in clause (1) of this Regulation, whose URS is despatched for TRAS-Up, in the event of short-fall in procurement of TRAS-Up through the Market, shall be paid at the rate of their variable charges for the quantum of TRAS-Up despatched.

(5) The generating stations as referred to in clause (1) of this Regulation, if despatched for TRAS-Down, shall pay back at the rate of their variable charges, corresponding to the quantum of TRAS-Down despatched.

***In case of emergency conditions***

(6) In case the Nodal Agency requires any generating station to provide Ancillary Services to meet the emergency conditions for reasons of grid security as per the provisions of the Grid Code, such generating station shall be compensated at the rate of the energy charge as determined under Section 62 of the Act or adopted under Section 63 of the Act, or at the rate of the compensation charge declared by the AS provider, as the case may be.

**Part IV**

**Accounting and Settlement of SRAS and TRAS**

**21. Accounting and Settlement of SRAS and TRAS**

(1) Accounting of SRAS shall be done by the Regional Power Committee on a weekly basis, based on SCADA data.

(2) Accounting of TRAS shall be done by the Regional Power Committee on a weekly basis, based on interface meter data and schedules.

(3) Deviation of AS Provider in every 15 minutes time block shall be calculated as under and settled as per the procedure of DSM Regulations:

$$\text{MWh Deviation for AS Provider} = (\text{Actual MWh of AS Provider}) - (\text{Scheduled MWh of AS Provider including TRAS MWh}) - (\text{SRAS MWh of AS Provider})$$

Provided that deviation from schedule by the AS Provider shall be settled first against the Ancillary Services schedule.



(4) The Deviation and Ancillary Service Pool Account shall be charged for:

(a) the full cost of despatched SRAS-Up including the variable charge or the energy charge or the compensation charge, as the case may be, for every time-block on a regional basis as well as the incentive for SRAS, payable to the concerned SRAS Provider; and

(b) the full cost towards TRAS-Up including the charges for the quantum cleared and despatched and the commitment charge for the quantum cleared but not despatched.

(5) The Deviation and Ancillary Service Pool Account shall receive credits for:

(a) payments made by SRAS Provider for the SRAS-Down despatched; and

(b) payments made by TRAS Provider for the TRAS-Down despatched.

(6) The net of the charges and the credits under clauses (4) and (5) of this Regulation shall be settled through the charges collected under the DSM Regulations.

(7) Settlement of payment liabilities in respect of the AS providers shall be done directly by the Nodal Agency on a weekly basis based on the accounts prepared by the Regional Power Committee.

(8) In case of deficit in the Deviation and Ancillary Service Pool Account for payment to SRAS Providers and TRAS Providers, surplus amount available in other Deviation and Ancillary Service Pool Account shall be used for such payment, as per the methodology stipulated in the Detailed Procedure.

(9) No retrospective settlement of variable charge or compensation charge, as the case may be, shall be undertaken.

## **22. Transmission charges and losses for SRAS Provider and TRAS Provider**

No transmission charges or transmission losses or transmission deviation charges shall be payable for SRAS and TRAS.

### **Part V**

#### **Miscellaneous**

## **23. Detailed Procedure**

- (1) The Nodal Agency shall issue the Detailed Procedure after stakeholders' consultation within a period of 3 months of notification of these regulations and submit the same for information to the Commission.
- (2) The Detailed Procedure shall contain the operational aspects of SRAS and TRAS including, but not limited to,
- (a) bi-directional communication system as referred to in sub-clause (a) of clause (1) of Regulation 7 of these regulations;
  - (b) metering and SCADA telemetry for monitoring and measurement of energy delivered under SRAS as referred to in sub-clause (d) of clause (1) of Regulation 7 of these regulations;
  - (c) details regarding declaration of technical parameters as referred to in clause (3) of Regulation 9 of these regulations;
  - (d) technical requirements for SRAS provider as referred to in clause (4) of Regulation 9 of these regulations;
  - (e) manner of declaration of the variable charge and the compensation charge, respectively as referred to in clauses (5) and (6) of Regulation 9 of these regulations;
  - (f) methodology of sharing of real time data as referred to in clause (8) of Regulation 10 of these regulations;
  - (g) methodology of computation for SRAS as referred to in clause (4) of Regulation 11 of these regulations;
  - (h) details regarding monitoring of actual response of SRAS providers as referred to in clause (1) of Regulation 12 of these regulations;
  - (i) methodology of payment to SRAS and TRAS providers in case of deficit in the concerned Deviation and Ancillary Service Pool Account as referred to in clause (5) of Regulation 21 of these regulations;
  - (j) details regarding Custom Participation Factor as referred to in clause (4) of Appendix-I of these regulations;

- (k) performance measurement for SRAS Providers referred to in clause (4) of Appendix-II of these regulations;
- (l) details of information in respect of the TRAS cleared in the market as referred in the clause (2) of the Regulation (18) of these regulations, and such other information as may be directed by the Commission;
- (m) other related and incidental matters.

#### **24. Power to Relax**

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected, may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

#### **25. Power to issue directions and Removal of Difficulties**

If any difficulty arises in giving effect to these regulations, the Commission may on its own motion or on an application filed by any affected party, issue any general or specific directions as may be considered necessary in furtherance of the objective and purpose of these regulations.

#### **26. Repeal and Savings**

- (1) Save as otherwise provided in these regulations, Central Electricity Regulatory Commission (Ancillary Services Operations) Regulations, 2015 and all subsequent amendments thereof shall stand repealed from the date of commencement of these Regulations.
- (2) Notwithstanding such repeal, anything done or any action taken or purported to have been done or taken including any procedure, minutes, reports, confirmation or declaration of any instrument executed under the repealed regulations shall be deemed to have been done or taken under the relevant provisions of these regulations.

**(Sanoj Kumar Jha)**

**Secretary**

## **Appendix-I**

### **Custom Participation Factor for SRAS Provider**

- (1) The Custom Participation Factor for each SRAS Provider shall be determined by the Nodal Agency based on the following criteria:
  - (a) Rate Participation Factor (Ramping capability in MW/min); and
  - (b) Cost Factor (variable charge or compensation charge, as the case may be).
- (2) The Custom Participation Factor for SRAS-Up shall be directly proportional to the normalised Rate Participation Factor and inversely proportional to the normalised Cost Factor. The Custom Participation Factor for SRAS-Down shall be directly proportional to the product of the normalised Rate Participation Factor and normalised Cost Factor.
- (3) Based on the above principles, Custom Participation Factor shall be calculated which shall be normalised to determine the participation of each SRAS Provider.
- (4) SRAS signal shall be allocated among the SRAS Providers to meet SRAS requirement of the system based on the normalised Custom Participation Factor subject to the ramp limited resources available with the SRAS Provider(s). A sample illustration with five (5) SRAS Providers (A, B, C, D and E) for calculation of Custom Participation Factor has been shown in Table-1 and Table-2.

**Table-1**

**Methodology for calculation of  
Custom Participation Factor and Allocation of Secondary Control Signal  
among SRAS-Up Providers**

SRAS Provider	Declared Capacity Pmax (MW)	Schedule (MW)	SRAS-Up Reserve (Range) (MW)	Rate Factor (MW/min)	Cost Factor (paise/kWh)	Normalized Rate Participation Factor	Normalized Cost Factor	Custom Participation Factor (CPF)	Normalised Custom Participation Factor (NCPF)	Ramp limited SRAS-Up Reserve	SRAS-Up Requirement (MW) <i>(assumed)</i>	SRAS-UP Capacity with NCPF	SRAS Control Signal
	(a)	(b)	(c) = [(a)-(b)]	(d)	(e)	(f) = [(d)/sum(d)]	(g) = [(e)/sum(e)]	(h) = [(f)/(g)]	(i) = [(h)/sum(h)]	(j) = Min [(c),(d)x15]	(k)	(l) = (i)x(k)	(m) = (l) subject to (j)
A	4150	4000	150	41.5	194	0.16	0.15	1.03	0.19	150	340	66	66
B	400	250	150	100	231	0.38	0.18	2.08	0.39	150		133	149 <sup>*</sup>
C	1050	950	100	10.5	264	0.04	0.21	0.19	0.04	100		12	12
D	1000	900	100	100	265	0.38	0.21	1.81	0.34	100		116	100 <sup>#</sup>
E	1320	1200	120	13.2	321	0.05	0.25	0.20	0.04	120		13	13

**Note:**

- (i) ‘#’ SRAS signal of 16 MW clipped from SRAS Provider D, considering the ramp limited SRAS-Up reserves available with SRAS Provider D.
- (ii) ‘\*’ SRAS signal of 16 MW clipped from SRAS Provider D is allocated to the SRAS Provider with the highest normalised Custom Participation Factor first and so on - in this case, it is allocated to SRAS Provider B.

**Table-2**

**Methodology for calculation of  
Custom Participation Factor and Allocation of Secondary Control Signal  
among SRAS-Down Providers**

SRAS Provider	Technical Minimum Pmin (MW)	Schedule (MW)	SRAS-Down Reserve (Range) (MW)	Rate Factor (MW/min)	Cost Factor (paise/kWh)	Normalized Rate Participation Factor	Normalized Cost Factor	Custom Participation Factor (CPF)	Normalized Custom Participation Factor (NCPF)	Ramp Limited SRAS-Down Reserve	SRAS-Down Requirement (MW) <i>(assumed)</i>	SRAS-Down Capacity with NCPF	SRAS Control Signal
	(a)	(b)	(c) = [(b)-(a)]	(d)	(e)	(f) = [(d)/sum(d)]	(g) = [(e)/sum(e)]	(h) = [(f)x(g)]	(i) = [(h)/sum(h)]	(j)= Min [(c),(d) x15]	(k)	(l) = [(i)x(k)]	(m) = (l) subject to (j)
A	2300	3000	700	41.5	194	0.16	0.15	0.02	0.12	622.5	600	75	255 <sup>*</sup>
B	220	350	130	100	231	0.38	0.18	0.07	0.36	130		214	130 <sup>#</sup>
C	578	800	222.5	10.5	264	0.04	0.21	0.01	0.04	157.5		26	26
D	550	700	150	100	265	0.38	0.21	0.08	0.41	150		246	150 <sup>#</sup>
E	726	850	124	13.2	321	0.05	0.25	0.01	0.07	124		39	39

**Note:**

- (i) ‘#’ SRAS signal of 84 MW and 96 MW clipped from SRAS Providers B and D, respectively considering ramp limited SRAS-Up reserves available with SRAS Providers B and D.
- (ii) ‘\*’ SRAS signal of 180 MW [(84+96) MW] clipped from SRAS Providers B and D is allocated to the SRAS Provider with the highest normalised Custom Participation Factor first and so on - in this case it is allocated to SRAS Provider A.

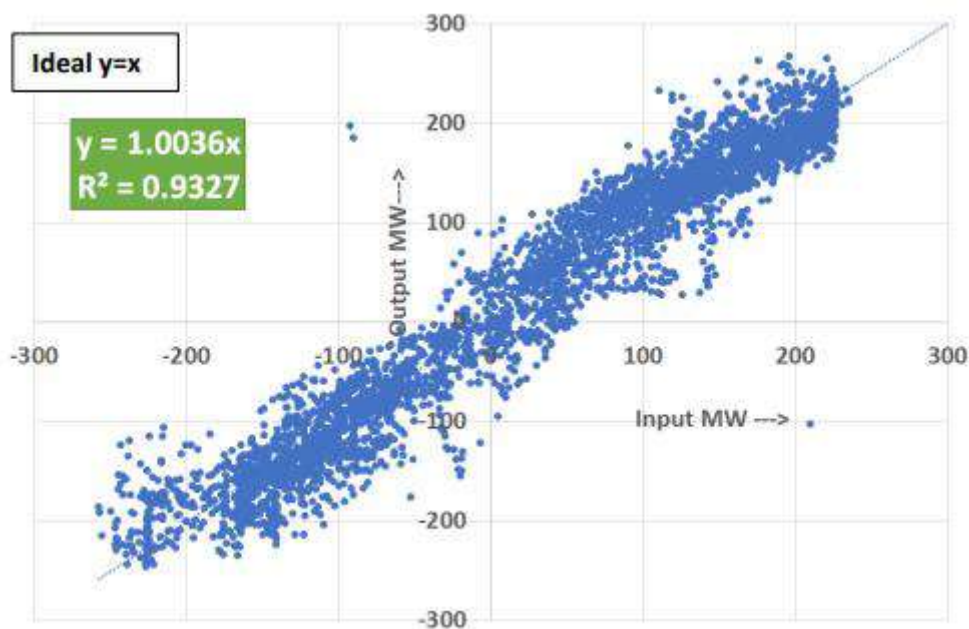
## Appendix-II

### Methodology for Measurement of Performance of SRAS Provider

(1) A scatter X-Y plot shall be plotted for each SRAS Provider for comparing the actual response provided by the SRAS Provider against the secondary control signal sent every 4 seconds by the Nodal Agency on post-facto basis using SCADA data for each day. A statistical performance matrix shall be considered for measuring the performance level of SRAS Provider as illustrated below.

#### **Illustration:**

*The actual response of SRAS Provider for the secondary control signal from the Nodal Agency shall be plotted as a scatter X-Y plot.*



*X-axis shows the secondary signal sent from Nodal Agency for every 4 seconds to the SRAS Provider, which is passed onward to the unit DCS, based on sharing algorithm between the units for SRAS Provider. These values are stored at the SRAS Provider and also communicated to the Nodal Agency and archived. Y-axis shows the actual output of the unit of SRAS Provider which is also communicated to the Nodal Agency and is archived. The relationship between the SRAS signal and actual response shall be determined for measuring performance of the SRAS Provider.*

(2) SRAS Provider shall be eligible for incentive based on the performance measured as above and the 5-minute MWh data calculated for SRAS-Up and SRAS-Down as per clause (9) of Regulation 10 of these regulations and aggregated over a day, as under:

<b>Actual performance vis-à-vis SRAS signal for an SRAS Provider</b>	<b>Incentive Rate (+) (paise/ kWh)</b>
<b>Above 95%</b>	(+) 40
<b>70-95 %</b>	(+) 30
<b>45-70%</b>	(+) 20
<b>20-45%</b>	(+) 10
<b>Below 20%</b>	0

(3) Incentive payments shall be calculated for each SRAS Provider for energy supplied for a day as follows:

$$\text{Incentive for SRAS Provider} = \text{Actual Response (MWh)} \times (1 - \text{NAC}) \times \text{Incentive Rate}$$

Where,

(a) **Actual Response** is the actual energy output (in MWh) of the SRAS Provider communicated to the Nodal Agency aggregated over 5 minutes in absolute terms and then summed for a day.

(b) **NAC** is percentage Normative Auxiliary Energy Consumption for similar class of generating stations, as specified in the Tariff Regulations.

(c) **Incentive Rate** in Paise/kWh is the incentive rate applicable based on the performance assessment of SRAS Provider.

(4) Detailed Procedure by the Nodal Agency shall cover the details of performance measurement, which shall be published on its website for every week.