



ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड  
(भारत सरकार का उद्यम)  
GRID CONTROLLER OF INDIA LIMITED  
(A Government of India Enterprise)  
[formerly Power System Operation Corporation Limited (POSOCO)]



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संदर्भ संख्या: एनएलडीसी/आरपीसी/2022

दिनांक: 12<sup>nd</sup> दिसंबर, 2022

सेवा मे,

1. Member Secretary, NRPC, 18/A, SJSS Marg, Katwaria Sarai, New Delhi-110016
2. Member Secretary, WRPC, F-3, MIDC Area, Andheri (East), Mumbai-400093
3. Member Secretary, SRPC, 29, Race Course Cross Road, Bangalore-560009.
4. Member Secretary, ERPC, 14, Golf Club Road, Kolkata-700033
5. Member Secretary, NERPC, Lapalang, Shillong, Meghalaya 793006

- संदर्भ: 1. एनएलडीसी/आरपीसी/2022 dated 28<sup>th</sup> November'2022  
2. एनएलडीसी/आरपीसी/2022 dated 02<sup>nd</sup> December'2022

विषय: Revised Methodology for computation & declaration of Normal Rate for Deviation

महोदय,

A draft methodology for computation and declaration of normal rate for deviations was circulated vide NLDC communication dated एनएलडीसी/आरपीसी/2022 dated 28<sup>th</sup> November'2022. Feedback on the draft methodology was received, further an online consultation was held on 02<sup>nd</sup> December'2022. The suggestion received was suitably incorporated and final methodology was issued on 02<sup>nd</sup> Decwember'2022.

Subsequently, while carrying out the computations, it was observed that in some situations, netting of the Ancillary despatched quantum leads to high/unrealistic Weighted Average Ancillary Service Charge (Paisa/Unit) and in extreme case, infeasible Weighted Average Ancillary Service Charge (Paisa/Unit).

Accordingly, in order to address the above, the methodology has been revised and is enclosed herewith. The same has been uploaded on the Grid-India website.

सादर धन्यवाद,

भवदीय

(Debasis De)  
Executive Director  
NLDC

Encl: As above

Copy to: 1. Secretary CERC, 3 rd & 4 th Floor, Chanderlok Building, 36, Janpath, New Delhi- 110001

2. Executive Director NRLDC/WRLDC/SRLDC/ERLDC/NERLDC

पंजीकृत कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016  
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# **Grid Controller of India limited**

*(Formerly Power System Operation Corporation Limited)*

**(A Govt. of India Enterprise)**

## **Methodology for Computation & Declaration of Normal Rate**

**In accordance with**

**CERC Deviation Settlement Mechanism Regulations, 2022**

**Version-2**

**12<sup>th</sup> December'2022**

**National Load Despatch Centre (NLDC)**

**New Delhi**

## Methodology for computation & declaration of Normal Rate in line with CERC Deviation Settlement Mechanism and Related Matters Regulations, 2022

### 1. Background

CERC Deviation Settlement Mechanism Regulations, 2022 (hereinafter referred to as “DSM Regulations”) was notified on 14<sup>th</sup> March 2022. The date of implementation has been notified as 05.12.2022 by CERC on 31<sup>st</sup> October 2022.

This regulation provides for declaration of Normal Rate of charges for deviation which, as per the DSM Regulations, is applicable for deviation in a time block.

The methodology to be adopted for computation of normal rate of charges for deviation is summarised below.

| <b>For the period 05.12.2022 to 04.12.2023</b>  | <b>From 05.12.2023 onwards</b>   |
|---|--|
| <p>The normal rate of charges for deviation for a time block shall be equal to the highest of:</p> <p>i. the weighted average Area Clearing Price (ACP) of the Day Ahead Market segments of all the Power Exchanges;</p> <p style="text-align: center;">or</p> <p>ii. the weighted average ACP of the Real Time Market segment of all the Power Exchanges;</p> <p style="text-align: center;">or</p> <p>iii. the Weighted Average Ancillary Service Charge of all the regions for that time block.</p> <p>Provided further that in case of non-availability of ACP for any time block on a given day, ACP for the corresponding time block of the last available day shall be considered.</p> | <p>Weighted Average Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services deployed and the net charges payable to the Ancillary Service Providers for all the Regions for that time block.</p> |

The normal rate of charges (paise /Kwh) for deviation shall be rounded off to the nearest two decimal places.

### 2. Procedure for calculating the normal rate of charges:

- a. The weighted average ACP of the Day Ahead Market (DAM, G-DAM) and Real Time Market (RTM) shall be calculated bid area wise considering all Power Exchanges. The list of Bid Areas and States covered under Bid-Areas is enclosed as *Annexure-1*.
- b. Subsequently, as and when any new market segment is introduced in Day Ahead Market, this would be suitably incorporated in the rate computations.

- c. In case of non-availability of ACP in any Power Exchange for a Bid-Area for a time block, if ACP is discovered in other exchanges/exchange, the available discovered ACP shall be considered for computing the weighted average ACP for that time block.
- d. In case of non-availability of ACP for any time block on a given day in all Power Exchanges, the last available ACP for the corresponding time block shall be considered. The non-availability of ACP shall only be considered for those time blocks where the market has not cleared. In case price declared is zero by the Power Exchanges, the same shall be considered.
- e. The **weighted average ACP of the Day Ahead Market** segments of all the Power Exchanges shall be computed as follows.

The weighted average ACP of the Day Ahead Market segments shall be computed by considering the block wise, area wise price and cleared volume for Day Ahead Market (DAM) and GDAM (Green Day Ahead Market) in all the operational Power Exchanges.

For a given time block, the following methodology shall be used for computation of the weighted average ACP in Day Ahead Market for sample bid Area A1.

| <b>DAM</b>                                     |                                  |
|--|----------------------------------|
| Volume IEX (Buy +Sell) = A1 <sub>IEX</sub>     | Price IEX = P1 <sub>IEX</sub>    |
| Volume PXIL (Buy +Sell) = A1 <sub>PXIL</sub>   | Price IEX = P1 <sub>PXIL</sub>   |
| Volume HPX (Buy +Sell) = A1 <sub>HPX</sub>     | Price HPX = P1 <sub>HPX</sub>    |
| <b>GDAM</b>                                    |                                  |
| Volume IEX (Buy +Sell) = A1 <sub>G-IEX</sub>   | Price IEX = P1 <sub>G-IEX</sub>  |
| Volume PXIL (Buy +Sell) = A1 <sub>G-PXIL</sub> | Price IEX = P1 <sub>G-PXIL</sub> |
| Volume HPX (Buy +Sell) = A1 <sub>G-HPX</sub>   | Price HPX = P1 <sub>G-HPX</sub>  |

Volume in Kwh and Price in paisa/Kwh

**Weighted Average ACP of DAM (paise/Unit) =**

$$\frac{[(A1_{IEX} * P1_{IEX}) + (A1_{PXIL} * P1_{PXIL}) + (A1_{HPX} * P1_{HPX}) + (A1_{G-IEX} * P1_{G-IEX}) + (A1_{G-PXIL} * P1_{G-PXIL}) + (A1_{G-HPX} * P1_{G-HPX})]}{[A1_{IEX} + A1_{PXIL} + A1_{HPX} + A1_{G-IEX} + A1_{G-PXIL} + A1_{G-HPX}]}$$

- f. The **weighted average ACP of the Real Time Market** segment of all the Power Exchanges shall be computed as follows.

The weighted average ACP of the Real Time Market (RTM) segment of all the Power Exchanges shall be computed by considering the block wise, area wise price and volume of RTM in all the operational Power Exchanges.

In case of non-availability of ACP for any time block on a given day in all Power Exchanges, ACP for the corresponding time block of the last available day shall be considered. The non-availability of ACP shall only be considered for those time blocks where the market has not cleared. In case price declared is zero by the Power Exchanges, the same shall be considered.

For a given time block, the following methodology shall be used for computation of the weighted average ACP for Real Time Market for a sample bid Area A1

| RTM  |                                 |
|--|---------------------------------|
| Volume IEX (Buy +Sell) = A1 <sub>IEX</sub>   | Price IEX = P2 <sub>IEX</sub>   |
| Volume PXIL (Buy +Sell) = A1 <sub>PXIL</sub> | Price PXIL = P2 <sub>PXIL</sub> |
| Volume HPX (Buy +Sell) = A1 <sub>HPX</sub>   | Price HPX = P2 <sub>HPX</sub>   |

Volume in Kwh and Price in paisa/Kwh

**Weighted Average ACP of RTM (paise/Unit) =**

$$[(A1_{IEX} * P2_{IEX}) + (A1_{PXIL} * P2_{PXIL}) + (A1_{HPX} * P2_{HPX})]$$

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$$[A2_{IEX} + A2_{PXIL} + A2_{HPX}]$$

g. The **weighted average Ancillary Service Charge** shall be computed as follows.

The weighted average Ancillary Service Charge of all the regions for that time block shall be computed duly considering the RRAS (Regulation Up and Regulation down) and SRAS (Up and down) despatched on all India basis.

The following shall be used for computation for a sample time block:

| RRAS  | SRAS   |
|---|--|
| RRAS_Up Volume (Mwh) = RRASUP <sub>v1.....vn</sub><br>Variable Cost (Rs/Unit) = VC <sub>1.....n</sub><br>Fixed cost (Rs/Unit)= FC <sub>1.....n</sub><br>Mark Up (Rs/Unit)= 0.5<br><br>RRAS_UP(Rs) = (FC <sub>1</sub> + VC <sub>1</sub> +0.5)*1000*<br>RRASUP <sub>v1+....</sub> +(FC <sub>n</sub> + VC <sub>n</sub> +0.5)*1000* RRASUP <sub>vn</sub><br><br>n= number of stations | SRAS_Up Volume 15 min (Mwh) = SRASUP <sub>v1(15).....vn(15)</sub><br><br>Energy charge/compensation charge(Rs/Unit) = VC <sub>1.....n</sub><br>Mark Up (Rs/Unit)= M <sub>1.....y</sub><br>SRAS Up price= SRASUP <sub>p1.....pn</sub><br><br>SRAS_Up(Rs) =(VC <sub>1</sub> * SRASUP <sub>v1(15)+...</sub> + VC <sub>n</sub> * SRASUP <sub>vn(15)</sub> )<br>*1000<br>n= number of stations  |
| RRAS_Down Volume (Mwh) = RRASDN <sub>v1.....vn</sub><br>Variable Cost (Rs/Unit) = VC <sub>1.....n</sub><br><br>RRAS_Down (Rs) = (RRASDN <sub>v1</sub> *0.75*VC <sub>1+.....</sub> +<br>RRASDN <sub>v1</sub> *0.75* VC <sub>n</sub> )*1000   | SRAS_Down Volume 15 min (Mwh) = SRAS-DN <sub>v1(15).....vn(15)</sub><br><br>Energy charge/compensation charge(Rs/Unit) = VC <sub>1.....n</sub><br><br>SRAS_Down(Rs)=(SRAS-DN <sub>v1(15)</sub> *VC <sub>1+.....</sub> +SRAS-DN <sub>vn(15)</sub> *VC <sub>n</sub> ) *1000  |
|   | SRAS_Incentive<br>SRAS Incentive Rate (Rs/Unit)=P <sub>1-6</sub><br>SRAS_Up Volume 05 min (Mwh) = SRASUP <sub>v1(5).....vn(5)</sub><br>SRAS_Down Volume 05 min(Mwh) = SRAS-DN <sub>v1(5).....vn(5)</sub><br><br>P <sub>1</sub> = 0.5, P <sub>2</sub> = 0.4, P <sub>3</sub> = 0.3, P <sub>4</sub> = 0.2, P <sub>5</sub> = 0.1, P <sub>6</sub> = 0;<br>SRAS_Incentive=( SRASUP <sub>v1(5)</sub>   +  SRAS-DN <sub>v1(5)</sub>  ) * P <sub>1-6</sub><br>+.....+(SRASUP <sub>vn(5)</sub> + SRAS-DN <sub>vn(5)</sub> ) * P <sub>1-6</sub> |

*\*SRAS performance would be measured on a daily basis to arrive at the Incentive Rate which would be used for computing the incentive for the block for the station.*

Ancillary Services Net Cost (Rs)  $AS_{NET}$  (Rs):

$$[RRAS\_UP - RRAS\_Down + SRAS\_Up + SRAS\_Incentive - SRAS\_Down]$$

If  $AS_{NET} > 0$

Weighted Average Ancillary Service Charge of All India (paise/Unit) =

$$\frac{100 * AS_{NET}}{[ (RRAS\_Up\ Volume + SRAS\_Up\ Volume(15min)) * 1000]}$$

If  $AS_{NET} < 0$

Weighted Average Ancillary Service Charge of All India (paise/Unit) =

$$\frac{100 * AS_{NET}}{[ (RRAS\_Down\ Volume + SRAS\_Down\ Volume(15min)) * 1000]}$$

h. **Normal Rate of Charges (paise/Unit) of an area** for a time block =

Maximum of

- weighted average ACP of DAM of that area
- weighted average ACP of RTM of that area
- Weighted Average Ancillary Service Charge of All India

### 3. Normal rate of charges for deviation for inter-regional deviation and cross-border transactions.

- Inter-regional corridors are interconnected through different bid areas and neighboring countries are also connected to different bid areas in India. To simplify the settlement of inter-regional and cross-border deviations, the highest of the weighted average price of the unconstrained market clearing price (UMCP) of DAM, RTM of all Power Exchanges & weighted average Ancillary Services charges shall be considered for computing the normal rate of charges for deviation.
- In case of non-availability of UMCP for any time block on a given day in all Power Exchanges, the last available UMCP for the corresponding time block shall be considered.

The following shall be used for computation for weighted average UMCP of DAM for a sample time block:

| DAM                                  |                        |
|--------------------------------------|------------------------|
| Volume IEX (Buy +Sell) = $V_{IEX}$   | UMCP IEX = $P_{IEX}$   |
| Volume PXIL (Buy +Sell) = $V_{PXIL}$ | UMCP PXIL = $P_{PXIL}$ |
| Volume HPX (Buy +Sell) = $V_{HPX}$   | UMCP HPX = $P_{HPX}$   |

| GDAM                                   |                         |
|--|-------------------------|
| Volume IEX (Buy +Sell) = $V_{G-IEX}$   | UMCP IEX = $P_{G-IEX}$  |
| Volume PXIL (Buy +Sell) = $V_{G-PXIL}$ | UMCP IEX = $P_{G-PXIL}$ |
| Volume HPX (Buy +Sell) = $V_{G-HPX}$   | UMCP HPX = $P_{G-HPX}$  |

Volume in Kwh and Price in paisa/Kwh

**weighted average UMCP of DAM (paise/unit) =**

$$\frac{[(V_{IEX} * P_{IEX}) + (V_{PXIL} * P_{PXIL}) + (V_{HPX} * P_{HPX}) + (V_{G-IEX} * P_{G-IEX}) + (V_{G-PXIL} * P_{G-PXIL}) + (V_{G-HPX} * P_{G-HPX})]}{[V_{IEX} + V_{PXIL} + V_{HPX} + V_{G-IEX} + V_{G-PXIL} + V_{G-HPX}]}$$

The following shall be used for computation for weighted average UMCP of RTM for a time block

| RTM                                  |                         |
|--------------------------------------|-------------------------|
| Volume IEX (Buy +Sell) = $V_{IEX}$   | Price IEX = $P_{IEX}$   |
| Volume PXIL (Buy +Sell) = $V_{PXIL}$ | Price PXIL = $P_{PXIL}$ |
| Volume HPX (Buy +Sell) = $V_{HPX}$   | Price HPX = $P_{HPX}$   |

Volume in Kwh and Price in paisa/Kwh

**weighted average UMCP of RTM (paise/unit) =**

$$\frac{[(V_{IEX} * P_{IEX}) + (V_{PXIL} * P_{PXIL}) + (V_{HPX} * P_{HPX})]}{[V_{IEX} + V_{PXIL} + V_{HPX}]}$$

#### 4. Validity of the procedure:

This procedure is valid for one year from 05.12.2022 to 04.12.2023. The procedure shall be reviewed prior to completion of one year or in case of any regulatory changes or based on the experience gained.

#### 5. Time line for publication of normal rate of charges for deviation:

NLDC shall publish the normal rate of charges for deviation on weekly basis by Thursday of the current week for the previous week (Monday to Sunday).

Normal rate of charges shall not be revised after declaration as per the timeline above. No post facto revision in the DSM account would be carried out due to any revision of normal rate of charges for deviation or contract rate or reference charge rate already used for DSM computation.

## Annexure-1: Bid Areas and States covered under Bid-Areas

| Sr. No. | Bid Area | Region | States covered under Bid Area  |
|---------|----------|--------|--|
| 1       | N1       | NR     | Jammu and Kashmir, Himachal Pradesh, Chandigarh, Haryana               |
| 2       | N2       | NR     | Uttar Pradesh , Uttaranchal, Rajasthan, Delhi                          |
| 3       | N3       | NR     | Punjab   |
| 4       | E1       | ER     | West Bengal, Sikkim, Bihar, Jharkhand                                  |
| 5       | E2       | ER     | Orissa   |
| 6       | W1       | WR     | Madhya Pradesh   |
| 7       | W2       | WR     | Maharashtra, Gujarat, Daman and Diu, Dadar and Nagar Haveli, North Goa |
| 8       | W3       | WR     | Chhattisgarh   |
| 9       | S1       | SR     | Andhra Pradesh, Telangana, Karnataka, South Goa                        |
| 10      | S2       | SR     | Tamil Nadu, Puducherry   |
| 11      | S3       | SR     | Kerala   |
| 12      | A1       | NER    | Tripura, Manipur, Mizoram, Nagaland                                    |
| 13      | A2       | NER    | Assam, Arunachal Pradesh, Meghalaya                                    |

**Revision History:**

| Ver No | Date of Issue           | Original Clause  | Revised Clause  | Remarks  |
|--------|-------------------------|--|---|--|
| 1      | 02 <sup>nd</sup> Dec'22 |  |   | Original Methodology   |
| 2      | 12 <sup>th</sup> Dec'22 | <p>g. ASNET&gt;0</p> <p>If ASNET&gt;0<br/>Weighted Average Ancillary Service Charge of All India (paise/Unit) =</p> $\frac{100*AS_{NET}}{[(RRAS\_Up\ Volume+ SRAS\_Up\ Volume(15min) -RRAS\_Down\ Volume- SRAS\_Down\ Volume(15min)) *1000]}$ <p>If ASNET&lt;0<br/>Weighted Average Ancillary Service Charge of All India (paise/Unit) =</p> <p>(-)</p> $\left[ \frac{100*AS_{NET}}{[(RRAS\_Up\ Volume+ SRAS\_Up\ Volume(15min) -RRAS\_Down\ Volume- SRAS\_Down\ Volume(15min)) *1000]} \right]$ | <p>g.ASNET&gt;0</p> <p>If ASNET&gt;0<br/>Weighted Average Ancillary Service Charge of All India (paise/Unit) =</p> $\frac{100*AS_{NET}}{[(RRAS\_Up\ Volume+ SRAS\_Up\ Volume(15min)) *1000]}$ <p>If ASNET&lt;0<br/>Weighted Average Ancillary Service Charge of All India (paise/Unit) =</p> $\frac{100*AS_{NET}}{(RRAS\_Down\ Volume+ SRAS\_Down) Volume(15min)) *1000}$ | <p>It was observed that in some situations, netting of the Ancillary despatched quantum leads to high/unrealistic Weighted Average Ancillary Service Charge (Paisa/Unit) and in extreme case, infeasible Weighted Average Ancillary Service Charge (Paisa/Unit).</p> |