ग्रिड-इंडिया
GRID-INDIA

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)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre

आज़ादी का अमृत महोत्सव

कार्यालय : बी-9, प्रथम एवं द्वितीय तल, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
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CIN : U40105DL2009GOI188682, Website : www.grid-india.in, E-mail : gridindiacc@grid-india.in, Tel.: 011- 42785855

**ग्रिड-इंडिया /रा° भा° प्रे° कें°/2024/** Dated: 23rd सितम्बर 2024

To,

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

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

संदर्भ: CERC Deviation Settlement Mechanism Regulations, 2024 dated 05th August, 2024.

Sir,

A draft methodology for computation & declaration of Normal Rate for Deviation was circulated vide NLDC e-mail communication dated 15th September'2024.Further an online consultation was held on 17th September'2024 with RPCs and RLDCs. The suggestion received was suitably incorporated and final methodology is enclosed herewith.

The same has been uploaded on the Grid-India website.

Thanking you,

Yours sincerely,

23/9/24

**(S.Usha)**
**CGM(I/C),NLDC**

Encl: As above

Copy to:

1. Secretary CERC, 6th ,7th & 8th Floors, Tower B, World Trade Centre ,Nauroji Nagar , New Delhi-110029
2. CMD, Grid-India
3. Director (Market Operation), Grid-India
4. Director (System Operation), Grid-India
5. Executive Director NRLDC/WRLDC/SRLDC/ERLDC/NERLDC

# 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, 2024

**Version-0**

**23rd September'2024**

**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, 2024**

# 1. Background

CERC Deviation Settlement Mechanism Regulations, 2024 (hereinafter referred to as "DSM Regulations") was notified on **05th August 2024**. The date of implementation has been notified as 16.09.2024 by CERC on **27th August 2024**.

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.

| Normal Rate of Charges for Deviation |
|---|
| The normal rate of charges for deviation for a time block shall be equal to the highest of:<br><br>**i.** the weighted average Area clearing **price (**ACP) (in paise/kWh) of the Integrated-Day Ahead (I-DAM) Market segments of all the Power Exchanges;<br><br>**ii.** the weighted average ACP (in paise/kWh) of the Real Time **Market (**RTM) segments of all the Power Exchanges;<br><br>**iii.** the sum of:<br>**a)** 1/3 [ Weighted average ACP (in paise/kWh) of the Integrated-Day Ahead Market segments of all the Power Exchanges];<br>**b)** 1/3 [ Weighted average ACP (in paise/kWh) of the Real-Time Market segments of all the Power Exchanges]; and<br>**c)** 1/3 [Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services (SRAS UP and TRAS UP) deployed and the net charges payable to the Ancillary Service Providers for all the Regions]:<br><br>Provided 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. |

The normal rate of charges (in paisa /Kwh) for deviation shall be rounded off to the nearest two decimal places. The various terms and conditions in this document shall have the same meaning as defined in the CERC Deviation Settlement Mechanism Regulations, 2024 or any other regulation of the Hon'ble CERC.

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

2.1. The weighted average ACP of the Day Ahead Market (DAM, G-DAM & HP-DAM) and Real Time Market (RTM) shall be calculated area wise considering all Power Exchanges.

2.2. In case of non-availability of ACP in any Power Exchange for an Area for a time block, if ACP is discovered in other Power Exchanges/Exchange, the available discovered ACP shall be considered for computing the weighted average ACP for that time block.

2.3. In case of non-availability of ACP for any time block on a given day in all the 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.

2.4. The weighted average ACP of the Integrated-Day Ahead Market segments of all the Power Exchanges shall be computed as follows.

The weighted average ACP of the Integrated-Day Ahead Market segments shall be computed by considering the block wise, area wise price and cleared volume for Day Ahead Market (DAM) and Green Day Ahead Market (GDAM) & High-Price Day Ahead Market (HP-DAM) segments 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 Area say A1.

| **DAM** | |
|---|---|
| Volume IEX (Buy +Sell) = $A1_{DAM\_IEX}$ | Price IEX = $P1_{DAM\_IEX}$ |
| Volume PXIL (Buy +Sell) = $A1_{DAM\_PXIL}$ | Price PXIL = $P1_{DAM\_PXIL}$ |
| Volume HPX (Buy +Sell) = $A1_{DAM\_HPX}$ | Price HPX = $P1_{DAM\_HPX}$ |
| **GDAM** | |
| Volume IEX (Buy +Sell) = $A1_{GDAM\text{-}IEX}$ | Price IEX = $P1_{GDAM\text{-}IEX}$ |
| Volume PXIL (Buy +Sell) = $A1_{GDAM\text{-}PXIL}$ | Price PXIL = $P1_{GDAM\text{-}PXIL}$ |
| Volume HPX (Buy +Sell) = $A1_{GDAM\text{-}HPX}$ | Price HPX = $P1_{GDAM\text{-}HPX}$ |
| **HP-DAM** | |
| Volume IEX (Buy +Sell) = $A1_{HP\text{-}IEX}$ | Price IEX = $P1_{HP\text{-}IEX}$ |
| Volume PXIL (Buy +Sell) = $A1_{HP\text{-}PXIL}$ | Price IEX = $P1_{HP\text{-}PXIL}$ |
| Volume HPX (Buy +Sell) = $A1_{HP\text{-}HPX}$ | Price HPX = $P1_{HP\text{-}HPX}$ |

Table 1: Volume in kWh and Price in paisa/ kWh

Buy and sell volumes are considered as absolute values.

**Weighted Average ACP of Integrated Day Ahead Market segments(I-DAM) (in paise/ kWh)** =

$$\frac{[(A1_{DAM\_IEX}*P1_{DAM\_IEX})+(A1_{DAM\_PXIL}*P1_{DAM\_PXIL})+(A1_{DAM\_HPX}*P1_{DAM\_HPX})+(A1_{GDAM\text{-}IEX}*P1_{GDAM\text{-}IEX})+(A1_{GDAM\text{-}PXIL}*P1_{GDAM\text{-}PXIL})+(A1_{GDAM\text{-}HPX}*P1_{GDAM\text{-}HPX})+(A1_{HP\text{-}IEX}*P1_{HP\text{-}IEX})+(A1_{HP\text{-}PXIL}*P1_{HP\text{-}PXIL})+(A1_{HP\text{-}HPX}*P1_{HP\text{-}HPX})) ]}{[A1_{DAM\_IEX}+ A1_{DAM\_PXIL}+A1_{DAM\_HPX}+ A1_{GDAM\text{-}IEX}+ A1_{GDAM\text{-}PXIL}+ A1_{GDAM\text{-}HPX} + A1_{HP\text{-}IEX}+ A1_{HP\text{-}PXIL}+ A1_{HP\text{-}HPX}]}$$

2.5. The weighted average ACP of the RTM 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 Area A1

| **RTM** | |
|---|---|
| Volume IEX (Buy +Sell) = $A1_{RTM\_IEX}$ | Price IEX = $P2_{RTM\_IEX}$ |
| Volume PXIL (Buy +Sell) = $A1_{RTM\_PXIL}$ | Price PXIL = $P2_{RTM\_PXIL}$ |
| Volume HPX (Buy +Sell) = $A1_{RTM\_HPX}$ | Price HPX = $P2_{RTM\_HPX}$ |

Table 2:Volume in Kwh and Price in paisa/Kwh
Buy and sell volumes are considered in absolute values.

Weighted Average ACP of RTM in (in paise/ kWh ) =

$$\frac{[(\boldsymbol{A1_{RTM\_IEX}} * \boldsymbol{P2_{RTM\_IEX}}) + (\boldsymbol{A1_{RTM\_PXIL}} * \boldsymbol{P2_{RTM\_PXIL}}) + (\boldsymbol{A1_{RTM\_HPX}} * \boldsymbol{P2_{RTM\_HPX}})]}{[(\boldsymbol{A1_{RTM\_IEX}}) + (\boldsymbol{A1_{RTM\_PXIL}}) + (\boldsymbol{A1_{RTM\_HPX}})]}$$

2.6. Ancillary Service Charge shall be computed as follows.

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

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

**TRAS_Up(Rs)= TRAS_Market(Rs)+ TRAS_SD(Rs)+ TRAS_ED(Rs)+SCUC_Up(Rs)**

Where,

**TRAS_Up(Rs)** =Total cost of TRAS_UP dispatch in Rs.

**TRAS_Market(Rs)=** Total cost of TRAS_UP dispatch through Procurement of TRAS in Rs.

**TRAS_SD(Rs)=** Total cost of generators despatched under TRAS Up in shortfall category in Rs.

**TRAS_ED(Rs)=** Total cost of generators despatched under TRAS Up in emergency category in Rs.

**SCUC_UP(Rs)=** Total cost of generators despatched under SCUC UP in a time block where the same generators also got scheduled under TRAS Shortfall UP category in Rs.

**TRAS_market(Rs)= TRAS_MD**

Where,

**TRAS_MD**= Cost for generator in Rs cleared in DAM/RTM segments for TRAS and got full or partial despatched.

$\text{TRAS\_MD} = \sum_{i=1}^{n} 1000$ *VDi*$\text{MCP}_{\text{DAM}}$ +$\sum_{i=1}^{n} 1000$ ∗VRi*$\text{MCP}_{\text{RTM}}$

(for all generators cleared as well as despatched fully or partially under TRAS_UP in DAM and RTM market segments)
Where,

$V_{Di}$=Energy in (MWh) despatched under TRAS_market in DAM for Generator i.

$V_{Ri}$= Energy in (MWh) despatched under TRAS_market in RTM for Generator i. (where. i=1 to n)

n= Number of generators

MCP=Market clearing price

TRAS_SD(Rs)= $\sum_{i=1}^{n} 1000$*$V_{si}$*1.1*$ECR_i$
Where,

**TRAS_SD(Rs)=** Total cost of generators in Rs despatched under TRAS_shortfall (Up) category.
$V_{si}$=Energy in MWh despatched under TRAS_shortfall category for Generator i.
$ECR_i$ = variable cost of the ith Generator (in Rs/ kWh)

n = total number of generators ( i varies from 1 to n).

TRAS_ED=$\sum_{i=1}^{n} 1000 * V_{ei}$*Comp$_i$

**TRAS_ED(Rs)=** Total cost of generators despatched under TRAS_Emergency Up )

$V_{ei=}$ Energy (MWh) despatched under TRAS_Emergency for Generator i.
Comp$_i$= compensation charge of generator i( in Rs/ kWh)
n = total number of generators ( i varies from 1 to n).

SCUC_Up(Rs) = $\sum_{i=1}^{n} 1000$*V$_{si}$*ECR$_i$

**SCUC_UP(Rs)=** Total cost of generators despatched under SCUC UP in a block where the same generators also got scheduled under TRAS-Shortfall category.

V$_{si=}$Energy (MWh) despatched under SCUC UP for Generator(i) and which also got despatched under TRAS shortfall in same time block.
ECR$_i$ = variable cost of the ith Generator(in Rs/ kWh)
n = total number of generators ( i varies from 1 to n).

Sample calculation for a block with SRAS Despatch-

SRAS_Up(Rs)=SRAS_Des+SRAS_I

Where,
SRAS_Des(Rs)= Charges payable for SRAS_UP dispatch in Rs

SRAS_I(Rs) = Charges for SRAS incentive (Up) in Rs

SRAS_Des(Rs)= $\sum_{i=1}^{n} \mathbf{1000}$*V$_{si}$*ECRi

V$_{si=}$Volume despatched(in MWh) under SRAS for i$^{th}$ generator.
ECR= energy charge or the compensation charge applicable for generator i.
n = total number of generators ( i varies from 1 to n).

(SRAS_I(in Rs) =$\sum_{i=1}^{n} \mathbf{1000} *$ V$_{si}$*Inc$_i$( ……i=1 to n)

V$_{si=}$5 minute energy despatched(in MWh) under SRAS for generator i.
Inc$_{i=}$Incentives applicable for Generator i as per CERC regulations **for SRAS Up**.
n = total number of generators ( i varies from 1 to n).

*As per the CERC approved procedure for 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 Charge (AS) (in Rs):=[TRAS_UP + SRAS_Up]

**If [**TRAS_Up Volume(Shortfall+Market+Emergency +SCUC UP)+ SRAS_Up Volume(despatched for the 15min time block **]>0**
Ancillary Service Charge of All India (in paise/kWh) =

$$\frac{100*AS}{[\text{TRAS\_Up Volume(Shortfall+Market despatched +Emergency +SCUC UP)+ SRAS\_Up Volume(despatched for the 15min time block } *1000]}$$

**Else,** Ancillary Service Charge **= 0**

For Example:

| |
|---|
| i)the weighted average Area clearing price (ACP) (in paise/kWh) of the Integrated-Day Ahead (I-DAM) Market segments of all the Power Exchanges= 6 Rs/Kwh |
| ii)the weighted average ACP (in paise/kWh) of the Real Time Market (RTM) segments of all the Power Exchanges= 9 Rs/Kwh |
| iii)the sum of: (2+3+0=5 Rs/Kwh)<br>**a)** 1/3 [ Weighted average ACP (in paise/kWh) of the Integrated-Day Ahead Market segments of all the Power Exchanges]; = 6/3= 2 Rs/Kwh<br>**b)** 1/3 [ Weighted average ACP (in paise/kWh) of the Real-Time Market segments of all the Power Exchanges]; 9/3= 3Rs/Kwh<br>**c)** 1/3 [Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services (SRAS UP and TRAS UP) deployed and the net charges payable to the Ancillary Service Providers for all the Regions]:= 0 Rs/Kwh<br>If [TRAS_Up Volume(Shortfall+Market+Emergency +SCUC UP)+ SRAS_Up Volume(despatched for the 15min time block ]<=0 |
| Normal rate will be: 9 Rs/Kwh |

## 3. Procedure for calculating the reference charge rate for deviation by way of 'under-injection' for Seller whose bid is cleared in the HP-DAM:

3.1. The weighted average ACP of the HP-DAM Market of all the Power Exchanges shall be computed as follows.

3.1.1. In case of non-availability of ACP in any Power Exchange for an Area for a time block, if ACP is discovered in other exchange(s), the discovered ACP shall be considered for computing the weighted average ACP for that time block.

3.1.2. In case of non-availability of ACP for any time block on a given day in all Power Exchanges, the same shall be considered zero.

3.1.3. If a generator has participated in HP-DAM and other market segments eg DAM/RTM etc, then the reference charge rate applicable for such generators will be the weighted average ACP of the HP-DAM Market segments of all the Power Exchanges for that time block

3.1.4. The weighted average ACP of the HP-DAM of all the Power Exchanges shall be computed as follows.

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

| **HP-DAM** | |
|---|---|
| Volume IEX (Buy +Sell) = $A1_{HP\text{-}IEX}$ | Price IEX = $P1_{HP\text{-}IEX}$ |
| Volume PXIL (Buy +Sell) = $A1_{HP\text{-}PXIL}$ | Price PXIL = $P1_{HP\text{-}PXIL}$ |
| Volume HPX (Buy +Sell) = $A1_{HP\text{-}HPX}$ | Price HPX = $P1_{HP\text{-}HPX}$ |

Table 3: Volume in kWh and Price in paisa/ kWh

Buy and sell volumes are considered in absolute values.

Weighted Average ACP of HP-DAM (in paisa/ kWh) =

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

## 4. Normal rate of charges for deviation for inter-regional deviation and cross-border:

4.1. 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

4.1.1. weighted average All India Market clearing price (MCP) (in paise/kWh) of the Integrated-Day Ahead Market segments of all the Power Exchanges.

4.1.2. weighted average All India Market clearing price (MCP) (in paise/kWh) of the Real Time Market (RTM) of all the Power Exchanges.

4.1.3. the sum of:

4.1.3.1. 1/3 [ Weighted average All India Market clearing price (MCP) (in paise/kWh) of the Integrated-Day Ahead Market segments of all the Power Exchanges];

4.1.3.2. 1/3 [ Weighted average All India Market clearing price (MCP) (in paise/kWh) of the Real-Time Market segments of all the Power Exchanges]; and

4.1.3.3. 1/3 [Ancillary Service Charge (in paise/kWh) computed based on the total quantum of Ancillary Services (SRAS UP and TRAS UP) deployed and the net charges payable to the Ancillary Service Providers for all the Regions]:

4.2. The inter-regional deviation caused by way of over drawal or under drawal or over injection or under-injection shall be computed notionally at normal rate of charges for deviation.

4.3. Normal rate of charge for Inter regional and cross border deviation shall be published by NLDC.

4.4. In case of non-availability of MCP for any time block on a given day in all Power Exchanges, the last available MCP for the corresponding time block shall be considered.

The following shall be used for computation for weighted average All India MCP of I-DAM for a sample time block:

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

| GDAM | |
|---|---|
| Volume IEX (Buy +Sell) = $V_{G\text{-}IEX}$ | MCP IEX = $P_{G\text{-}IEX}$ |
| Volume PXIL (Buy +Sell) = $V_{G\text{-}PXIL}$ | MCP PXIL = $P_{G\text{-}PXIL}$ |
| Volume HPX (Buy +Sell) = $V_{G\text{-}HPX}$ | MCP HPX = $P_{G\text{-}HPX}$ |
| **HPDAM** | |
| Volume IEX (Buy +Sell) = $V_{H\text{-}IEX}$ | MCP IEX = $P_{H\text{-}IEX}$ |
| Volume PXIL (Buy +Sell) = $V_{H\text{-}PXIL}$ | MCP PXIL = $P_{H\text{-}PXIL}$ |
| Volume HPX (Buy +Sell) = $V_{H\text{-}HPX}$ | MCP HPX = $P_{H\text{-}HPX}$ |

Table 4:All India Volume in kWh and Price in paisa/ kWh
Buy and sell volumes are considered in absolute values.

**Weighted average MCP of I-DAM (in paise/ kWh) =**

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

**The following shall be used for computation for weighted average MCP 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 = $P_{HPX}$ |

Table 5:Volume in KwH and Price in paisa/KwH
Buy and sell volumes are considered in absolute values.

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

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

**Ancillary Service Charge shall be computed as defined in 2.6.**

## 5. Validity of the procedure:

This procedure shall be effective from 00:00 Hrs of 16.09.2024 until further orders from the Hon'ble Commission. The procedure shall be reviewed in case of any regulatory changes or based on the experience gained.

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

NLDC shall publish the normal rate of charges for deviation on a weekly basis. By Thursday of the current week the applicable normal rate for the previous week (Monday to Sunday) shall be published by NLDC on its website.

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.