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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संदर्भ संख्या: NLDC/SO/FRP/2024/ **दिनांक:** 28th May 2024

सेवा में,

All the Stakeholders

विषय: Draft NLDC Methodology for computation of Average Monthly Frequency Response Performance, Beta 'ß'

संदर्भ: Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024

महोदय/महोदया,

In compliance with Regulation 62 Clause 5 and Regulation 65 Clause 4 of CERC (Terms and Conditions of Tariff) Regulations, 2024, the Methodology for computation of Average Monthly Frequency Response Performance, Beta 'ß' for generating stations has been formulated by NLDC and is enclosed herewith.

The draft methodology has been published on GRID-INDIA website on 28th May 2024 and is available at https://grid-india.in/en/notices/

Suggestions/feedback on the draft methodology are invited by 17th June 2024 at **operating_procedure@grid-india.in**.

सधन्यवाद,

भवदीय,

(सुरजीत बैनर्जी /Surajit Banerjee)

मुख्य महाप्रबंधक (प्र. प्र.), रा.भा.प्रे.कें./Chief GM (SO), NLDC

Copy to:

1. Secretary, Central Electricity Regulatory Commission
2. Executive Director, NLDC/NRLDC/WRLDC/SRLDC/ERLDC/NERLDC, GRID-INDIA
3. Director (Market Operation)/ Director (System Operation), GRID-INDIA
4. Chairman and Managing Director, GRID-INDIA

Grid Controller of India Limited

(formerly Power System Operation Corporation Limited)

National Load Despatch Centre (NLDC)

Methodology
for Computation of
Average Monthly
Frequency Response Performance, β
for Generating Stations

May, 2024

Prepared in compliance with

Regulation 62 Clause 5 and Regulation 65 Clause 4 of

CERC (Terms & Conditions of Tariff) Regulations, 2024

Draft for Stakeholder Consultation

1. **Background:** Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024, as notified on 15th March 2024, came into force on 01st April, 2024. This methodology for computation of Average Monthly Frequency Response Performance, Beta 'β' is in compliance with Regulation 62 Clause 5 and Regulation 65 Clause 4 of CERC (Terms and Conditions of Tariff) Regulations, 2024. The relevant regulations are quoted below:

Quote

CHAPTER – 11 COMPUTATION OF CAPACITY CHARGES AND ENERGY CHARGES

62. Computation and Payment of Capacity Charge for Thermal Generating Stations:

…(5) In addition to the AFC entitlement as computed above, the thermal generating station shall be allowed an incentive of up to 1.00% of AFC approved for a given year, which shall be billed monthly as per the following.

Incentive = (1.00% x ß x CCy)/12

Where,

ß = Average Monthly Frequency Response Performance for that generating station, as certified by RPCs, which shall be computed by considering primary response as per the methodology prescribed by the NLDC with approval of the Commission, and ß shall range between 0 to 1.

Provided that the incentive shall be payable only if the Beta value is higher than 0.30.

CCy= Capacity Charges for the Year.

65. Computation and Payment of Capacity Charge and Energy Charge for Hydro Generating Stations:

… (4) In addition to the AFC entitlement as computed above, the hydro generating station shall be allowed an incentive of up to 3% of the Capacity Charge approved for a given year which shall be billed monthly as per the following.

Incentive = (3% x ß x CCy)/12

Where,

ß = Average Monthly Frequency Response Performance for that generating station, as certified by RPCs, which shall be computed by considering primary response as per the methodology prescribed by the NLDC with approval of the Commission and beta shall range between 0 to 1.

Provided that incentive shall be payable only if Beta value is higher than 0.30.

CCy= Capacity Charges for the Year.

Unquote

2. **Scope and extent of application:** The scope and extent of application of this methodology shall be as per Regulation 2. (Scope and extent of application) of CERC (Terms and Conditions of Tariff) Regulations, 2024 and amendments thereof.

3. **Definitions and Terms**: The definitions and terms used in this methodology are as per CERC (Indian Electricity Grid Code) Regulations, 2023 and CERC (Terms and Conditions of Tariff) Regulations, 2024 and amendments thereof.

4. **Steps for computation of Average Monthly Frequency Response Performance, Beta 'ß':**

4.1. NLDC shall notify the **reportable event** in accordance with CERC (IEGC) Regulations, 2023.

a) After every event involving a sudden 1000 MW or more load or generation loss or a step change in frequency by 0.1 Hz, NLDC would get the PMUs frequency data. NLDC would also get the exact quantum of load/generation lost from the RLDC of the affected region. ***{Clause 9(a)(i) of Annexure-2 of IEGC, 2023}***

b) NLDC shall plot the frequency graph and determine the initial frequency, minimum/maximum frequency, settling frequency and time points (points A, C and B). Accordingly, frequency difference points and corresponding time to be used for FRC calculations would be informed to all RLDCs. ***{Clause 9(a)(ii) of Annexure-2 of IEGC, 2023}***

4.2. Generating stations shall extract **high resolution data (1 second or better resolution)** of active power generation, as recorded at the generating station.

4.3. Generating stations shall compute **Frequency Response Characteristic (FRC)** of the generating station for the reportable event as per NLDC "Methodology for Computation of Primary Frequency Response Obligation and Performance", prepared in compliance with CERC (IEGC) Regulations, 2023.

a) The generation loss/ load loss quantum, initial frequency, minimum/maximum frequency, settling frequency and time points (points A, C and B) shall be the same as notified by NLDC.

4.4. Assessment of **Frequency Response Obligation (FRO):**

a) Frequency Response Obligation (FRO) of regional entity generating stations and state control areas shall be assessed by NLDC, as per NLDC "Methodology for Computation of Primary Frequency Response Obligation and Performance", prepared in compliance with CERC (IEGC)

Regulations, 2023.

b) FRO of state control areas, as assessed by NLDC shall be referred by the Load Despatch Center of the concerned state control area to assess FRO of generating stations and bulk consumers other than regional entities, in accordance with the control area jurisdiction as per Regulation 43 of CERC (IEGC) Regulations, 2023.

4.5. Generating station shall compute **Frequency Response Performance (FRP)** of the generating station for the reportable event as per NLDC "Methodology for Computation of Primary Frequency Response Obligation and Performance", prepared in compliance with CERC (IEGC) Regulations, 2023.

a) FRP of generating station for the reportable event = Actual Frequency Response Characteristic (AFRC), as calculated for the reportable event / Frequency Response Obligation (FRO) of the generating station, as applicable on the date of reportable event

$$\textbf{FRP (Event i)} = \frac{\boldsymbol{AFRC}}{\boldsymbol{FRO}}$$

where, $\boldsymbol{i}$ = the reportable event occurred during the billing month and considered for calculation of Beta,'ß'

b) FRP shall be a numeric value up to two decimal places

c) Hydro generating stations shall not be considered for FRP calculations during high inflow periods, as notified by the respective RPC in accordance with CERC (IEGC) Regulations, 2023 to avoid spillage.

4.6. Consideration of Frequency Response Performance for each reportable event, FRP (Event i) as calculated above for the purpose of computation of Average Monthly FRP, Beta 'ß':

a) If FRP for an event is less than or equal to 0, FRP (Event i) shall be equal to 0.

b) If FRP for an event lies between 0 to 1, FRP (Event i) shall be equal to the calculated value.

c) If FRP for an event is greater than or equal to 1, FRP (Event i) shall be equal to 1.

4.7. Generating station shall compute **Average Monthly Frequency Response Performance, Beta 'ß' (up to 2 decimal places)**:

$$\textbf{Beta 'ß'} = \frac{\textbf{FRP (Event 1)+FRP (Event 2)+ FRP (Event 3)+\dots+ FRP (Event n)}}{\textbf{Number of reportable events considered for calculation of Beta}}$$

$$\textbf{i.e. Beta 'ß'} = \frac{\sum_{i=1}^{n} \textbf{FRP (Event } i\textbf{)}}{n}$$

where,

- i = the reportable event occurred during the billing month and considered for calculation of Beta, 'ß'
- n = the total number of reportable events occurred during the billing month and are being considered for calculation of Beta,

4.8. In case, there is no reportable event which can be considered for the generating station during the billing month, Average Monthly Frequency Response Performance, Beta 'ß' (up to 2 decimal places) for that particular billing month shall be the median of last ten (10) reportable events which have been considered for computation of FRP for that generating station.

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