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**GOVERNMENT OF INDIA**

MINISTRY OF POWER

**EASTERN REGIONAL POWER COMMITTEE**

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No-ERPC/COM-I/GEN/2016/4-1966-H.2005

dated: 21.07.2016

To: As per List

Subject: Minutes of meeting for finalization of compensation procedure under Section 6.3 B of IEGC (4<sup>th</sup> Amendment) held on 18.07.2016 at ERPC Kolkata

Sir,

The Minutes of meeting for finalization of compensation procedure under Section 6.3 B of IEGC (4<sup>th</sup> Amendment) held on 18.07.2016 at ERPC Kolkata is attached for ready reference and necessary action by the constituents.

Yours faithfully,

*A.K. Bandyopadhyaya*  
(A.K. Bandyopadhyaya)  
Member Secretary

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**Minutes of meeting for finalization of compensation procedure under Section 6.3 B of  
IEGC (4<sup>th</sup> Amendment) held on 18.07.2016 at ERPC Kolkata**

Member Secretary, ERPC, welcomed the participants to the meeting. Thereafter, he requested NTPC to share their views on compensation calculation. NTPC gave a detailed presentation (brief note attached at Annexure). The following issues were thereafter discussed threadbare.

List of participants at Annexure-A

**A. CALCULATION OF COMPENSATION PAYABLE TO ISGS FOR SCHEDULE  
<85%**

As per procedure proposed by NTPC, four values of ECR must be calculated for every 15 min. block. Two values of ECR based on SG depending upon Auxiliary Energy modification and SHR modification. Two values of ECR based on DC depending upon Auxiliary energy modification and SHR modification.

It was clarified that calculation based on DC was required, so that the beneficiaries do not have to pay compensation in case of lower DC declaration by ISGS. The following formula was proposed by NTPC:

$$\text{ECR (Comp-SHR)} = [\text{ECR (SE-SHR)} - \text{ECR (DC-SHR)}]$$

$$\text{ECR (Comp-AEC)} = [\text{ECR (SE-AEC)} - \text{ECR (DC-AEC)}]$$

$$\text{ECR}_{ij}(\text{Comp}) = \{\text{ECR}_{ij}(\text{SE-SHR}) - \text{ECR}_{ij}(\text{DC-SHR})\} + \{\text{ECR}_{ij}(\text{SE-AEC}) - \text{ECR}_{ij}(\text{DC-AEC})\}$$

*Where i = 1 to 30/31 days; j= 1 to 96 time blocks of the day*

Odisha raised the query that the eligibility for compensation should be based on actual generation being less than 85% of normative ex-bus generation

NTPC pointed out that as per CERC order, effect of RRAS is to be removed from calculation of compensation. If actual generation is to be considered, it would not be possible to calculate RRAS component and adjust for it.

Members however, felt that the issue raised by Odisha was a valid one as SHR, Auxiliary Consumption depend on actual generation and not scheduled generation. Although there was a mechanism of checking and reconciliation w.r.t. the actual SHR and AEC values at the end of the month, observation of Odisha may be correct, as felt by beneficiaries present. It was pointed out by ERPC Secretariat that as compensation was based on ECR and energy charges are paid by beneficiaries based on schedule, Scheduled Generation (SG) may be considered for compensation payable to the generator. It was also pointed out that the commission had kept a provision for review of the procedure after six months time.

## **B. SHARING OF COMPENSATION AMONG BENEFICIARIES FOR SCHEDULE <85%**

Thereafter, the principle of sharing among beneficiaries was discussed. It was felt that the sharing of compensation payable to the generator by beneficiaries must also to be calculated block-wise. The amount of compensation would be shared among the beneficiaries in proportion to their un-requisition below 85% of entitlement. If a beneficiary had scheduled greater than or equal to 85% of entitlement no compensation would be paid by the beneficiary.

## **C. COMPENSATION TO ISGS FOR RESERVE SHUTDOWN (RSD)**

NTPC informed that as per their understanding, compensation for RSD should be receivable after 7 unit shutdown irrespective of whether the shutdown have been for RSD or not. Member Secretary, ERPC, GM, ERLDC and constituents were of the view that only after 7 RSD events compensation could be paid for further RSD. Any tripping for non-RSD reasons should not be clubbed in counting this "seven stop/start".

There was also a view that as RSD is not due to fault of generator, the generator should be paid for every RSD, although as per the regulations, the beneficiaries could get the benefits of 7 free RSD; if no other tripping occur.

## **D. SHARING OF COMPENSATION FOR RESERVE SHUTDOWN (RSD)**

The startup charges for units under RSD would have to be shared among beneficiaries. For the first RSD to be compensated there has to be a mechanism of sharing among beneficiaries based on earlier RSDs also. For this a matrix system may have to be used.

**Sharing of compensation for 1<sup>st</sup> Shut Down for RSD**

	<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>
<b>RSD 1</b>	√		√		
<b>RSD 2</b>	√		√		
<b>RSD 3</b>		√	√		√
<b>RSD 4</b>	√	√			
<b>RSD 5</b>				√	√
<b>RSD 6</b>		√		√	
<b>RSD 7</b>					
<b>RSD 8</b>	√		√		√
	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>
<b>Ratio</b>	<b>4/16</b>	<b>3/16</b>	<b>4/16</b>	<b>2/16</b>	<b>3/16</b>

\*B1-B5 are the beneficiaries.

The first payable RSD will be critical. Once first RSD payment has been triggered, thereafter for further RSD events the sharing of compensation will become independent and should be liable to be borne by beneficiaries giving schedule below 55% (Technical Minimum).

The procedure formulated by SRPC & proposal of NTPC were also circulated during the meeting by the Secretariat.

On a query NTPC clarified that SHR values and AEC values would be provided at the end of the month based on which previous month calculations would be done taking into consideration adjusted SHR and AEC values as tabulated in CERC order.

WBSEDCL representative observed that due to the operation of these regulations, the beneficiaries will have to pay compensation which was not applicable earlier and will be a new financial burden. Also, during RSD, the beneficiaries would have to continue to bear the fixed charges without availing any power/ reliability.

It was decided that beneficiaries must give their comments by 31.07.2016. Based on the observations, ERPC Secretariat will come out with a draft sharing mechanism by another weeks time and get it circulated by hosting in website. Thereafter, the procedure will be finalized in a separate meeting scheduled preferable in second week of August-16.

**The meeting ended with thanks to the chair.**



Annexure 'A'

ERPC::KOLKATA

ATTENDANCE SHEET

SPECIAL MEETING ON IEGC FOURTH AMENDMENT REGULATIONS

DATE: 18.07.2016 (MONDAY)

TIME: 11:00 HRS

VENUE: ERPC CONFERENCE HALL

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**ITEM37. Principles for calculation of Compensation for degradation of Heat Rate, Aux Consumption and Secondary Fuel Oil consumption due to part load operation and multiple start/stop of units.**

- Clarity on tech min schedule and compensation mechanism should be provided in case of Units of capacity of 200MW and less as well as that for Gas station
- Tech Min of Gas plants shall be also 55% of a Module capacity on bar.
- Compensation for Gas stations should be station specific as per characteristic curve of OEM.
- Preliminary calculations shall be carried out on 15 minute block basis.
- Percentage station-wise loading for a block will be determined excluding schedule given under RRAS using AUX (Normative Auxiliary Energy Consumption) as below :

$$\% \text{ Loading (SE)}_{ij} = \frac{(\text{Total Schedule of the Stage} - \text{Schedule given under RRAS}) \times 100}{(\text{Installed Capacity of the Stage on Bar} \times (1 - \text{AUX} \div 100))}$$

$$\% \text{ Loading (DC)}_{ij} = \frac{(\text{Total Declared Capacity of the Stage}) \times 100}{(\text{Installed Capacity of the Stage on Bar} \times (1 - \text{AUX} \div 100))}$$

Schedule given under RRAS Up is +ve and Down is -ve

- The primary estimate for ECR to be used for calculation of compensation to be paid to ISGS for the 15 minute time block shall be difference in the ECR (DC) and ECR (SE) but calculated separately for degradation in SHR & AEC.

From % Loading  $ij$  of each Block,  $\Delta \text{SHR}$  &  $\Delta \text{AEC}$  will be selected from table given in the regulation and separate ECR(SE-SHR), ECR(SE-AEC), ECR(DC-SHR) & ECR(DC-AEC) corresponding to the SHR & AEC degradation will be calculated as follows:

$$\text{ECR}_{ij}(\text{SE} - \text{SHR}) = \frac{\{(\text{SHR}(1 + \Delta \text{SHR}) - \text{SFC} \times \text{CVSF}) \times \frac{\text{LPPF}}{\text{CVPF}} + \text{SFC} \times \text{LPSFi} + \text{LC} \times \text{LPL}\} \times 100}{(100 - \text{AUX})}$$

While calculating  $\text{ECR}_{ij}(\text{SE} - \text{SHR})$ , normative values of all parameters shall be taken except SHR which will be the degraded SHR value taken from the table (as provided in IEGC regulation 6.3B-3.i) corresponding to the partial loading calculated for the block.

- Same procedure shall be followed for AEC degradation for the block as follows:

$$\text{ECR}_{ij}(\text{SE} - \text{AEC}) = \frac{\{(\text{SHR} - \text{SFC} \times \text{CVSF}) \times \frac{\text{LPPF}}{\text{CVPF}} + \text{SFC} \times \text{LPSFi} + \text{LC} \times \text{LPL}\} \times 100}{\{100 - (\text{AUX} + \Delta \text{AUX})\}}$$

Same procedure for  $\text{ECR}_{ij}(\text{DC} - \text{SHR})$  &  $\text{ECR}_{ij}(\text{DC} - \text{AEC})$

$$\text{ECR}_{ij}(\text{DC} - \text{SHR}) = \frac{\{(\text{SHR}(1 + \Delta \text{SHR}) - \text{SFC} \times \text{CVSF}) \times \frac{\text{LPPF}}{\text{CVPF}} + \text{SFC} \times \text{LPSFi} + \text{LC} \times \text{LPL}\} \times 100}{(100 - \text{AUX})}$$

$$\text{ECR}_{ij}(\text{DC} - \text{AEC}) = \frac{\{(\text{SHR} - \text{SFC} \times \text{CVSF}) \times \frac{\text{LPPF}}{\text{CVPF}} + \text{SFC} \times \text{LPSFi} + \text{LC} \times \text{LPL}\} \times 100}{\{100 - (\text{AUX} + \Delta \text{AUX})\}}$$



$$ECR(\text{Comp-SHR}) = [ECR(\text{SE-SHR}) - ECR(\text{DC-SHR})]$$

$$ECR(\text{Comp-AEC}) = [ECR(\text{SE-AEC}) - ECR(\text{DC-AEC})]$$

$$ECR_{ij}(\text{Comp}) = \{ECR_{ij}(\text{SE-SHR}) - ECR_{ij}(\text{DC-SHR})\} + \{ECR_{ij}(\text{SE-AEC}) - ECR_{ij}(\text{DC-AEC})\}$$

Where  $i = 1$  to 30/31 days

$j = 1$  to 96 time blocks of the day

The compensation payable to ISGS for the block would be:

- Compensation for the block :  $(\text{Comp-B})_{ij} = \{(\text{Total Schedule for the Block } ij - \text{Energy Schedule during the Block } ij \text{ under RRAS}) * ECR_{ij}(\text{Comp})\}$
- Preliminary estimate for calculation of compensation to be paid to ISGS for SHR degradation for the month  $ECR(\text{Comp-SHR } M)$  shall be obtained by adding  $ECR(\text{Comp-SHR})$  for each time block of the month.

Similarly monthly compensation  $ECR(\text{Comp-AEC } M)$  for AEC degradation by adding  $ECR(\text{Comp-AEC})$  for each time block of the month. Total for month:

$$ECR(\text{Comp-M}) = ECR(\text{Comp-SHR } M) + ECR(\text{Comp-AEC } M)$$

# पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड

(पावरग्रिड की पूर्ण स्वामित्व प्राप्त सहायक कंपनी)

## POWER SYSTEM OPERATION CORPORATION LIMITED

(A wholly owned subsidiary of POWERGRID)



पंजीकृत एवं केन्द्रीय कार्यालय: बी-9, प्रथम तल, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110 016  
Registered & Corporate Office : B - 9, 1st Floor, Qutub Institutional Area, Katwaria Sarai, New Delhi - 110 016  
Website : www.posoco.in, www.nldc.in, Tel: 011-26536832, 26524522, Fax: 011-26524525, 26536901

संदर्भ: POSOCO/System Operation/NLDC

दिनांक: 31<sup>st</sup> मई 2016

सेवा मे,

सदस्य सचिव

एन आर पी सी / डब्ल्यू आर पी सी / एस आर पी सी / ई आर पी सी / एन ई आर पी सी

**विषय: Detailed Operating Procedure for taking unit (s) under Reserve Shut down and identifying generating stations to be backed down up to Technical Minimum Schedule**

महोदय,

The 4<sup>th</sup> amendment to Indian Electricity Grid Code (IEGC), 2010 notified on 6<sup>th</sup> April 2016 requires NLDC to formulate a procedure for taking units under Reserve Shut Down and identifying generating units to be backed down up to technical minimum schedule. The relevant extracts are given below:

*"NLDC shall prepare a Detailed Operating Procedure in consultation with the generators and beneficiaries at RPC forums within 2 months' time and submit to the Commission for approval. The Detailed Operating Procedure shall contain the role of different agencies, data requirements, procedure for taking the units under reserve shut down and the methodology for identifying the generating stations or units thereof to be backed down upto the technical minimum in specific Grid conditions such as low system demand, Regulation of Power Supply and incidence of high renewables etc., based on merit order stacking."*

Accordingly, draft operating procedure has been formulated and enclosed. It is requested that the draft procedure may be discussed with the generators and beneficiaries at the respective RPC level and the comments on the procedure may be sent to NLDC at the earliest so that the same could be considered and the final procedure submitted to the Central Electricity Regulatory Commission (CERC).

सादर धन्यवाद,

भवदीय

*बाबा* 31/5/16

के वी एस बाबा

कार्यकारी निदेशक (एन ल डी सी)

प्रतिलिपि (जानकारी हेतु)

सचिव, सीईआरसी

महाप्रबंधक एनआरएलडीसी/डब्ल्यूआ ए डीसी/ एसआरएलडीसी/ ईआरएलडीसी/ एनईआरएलडीसी

# **Detailed Operating Procedure for taking unit (s) under Reserve Shut down and identifying generating stations to be backed down up to Technical Minimum Schedule**

Prepared in compliance to Section 6.3B.6 of  
Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth  
Amendment) Regulations, 2016

(Revision 0: Dated: \_\_ / \_\_ / 2016)

**Power System Operation Corporation Ltd.**

**National Load Despatch Centre**

**New Delhi**



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**Detailed Operating Procedure for  
Taking Unit (s) under Reserve Shut down and  
Identifying Generating Stations to be backed down up to  
Technical Minimum Schedule**

**1. Preamble**

- 1.1. This Procedure is issued in compliance to Regulation 6.3B.6 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016.
- 1.2. The Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016 provide the option to Central Generating Stations (CGS) or Inter State Generating Stations (ISGS) to go for reserve shut down where the scheduled generation falls below technical minimum schedule. In addition to above these regulations have specified provisions for compensating the CGS or ISGS for additional fuel cost towards operating below normative plant availability factor & for multiple start / stop operations.
- 1.3. All the words and expression used in the Procedure shall have the same meaning assigned to them as defined in the Regulations.
- 1.4. This procedure will be implemented with effect from the date of approval by the Hon'ble Central Electricity Regulatory Commission or any other date as specified by the Commission.

**2. Objective**

- 2.1. The objective of the detailed operating procedure is to lay down the role of different agencies, data requirements, procedure for taking generating units under reserve shut down & methodology for identifying the generating stations or units thereof to be backed down up to technical minimum schedule in specific grid conditions such as low system demand, Regulation of Power Supply, incidence of high renewables etc., based on merit order stacking.

**3. Scope**

- 3.1. This procedure shall be applicable to RLDCs, SLDCs, CGS & ISGS whose tariff is either determined or adopted by the Central Commission (CERC). In case of a generating station whose tariff is neither determined nor adopted by the

Commission, the concerned generating company shall have to factor the provisions specified in the aforementioned CERC Regulations in their Power Purchase Agreements (PPAs) entered into it for sale of power or in order to claim compensation for operating at the technical minimum schedule.

#### **4. Role of Different Agencies in implementing the Procedure**

**4.1. CGS/ISGS :** Generating Agencies shall upload the following figures ex bus for each 15-minute time block on day ahead basis and for every revision on the day of operation

- i. Declared Capability (DC) of CGS / ISGS in MW
- ii. Online Declared Capability (DC) of CGS / ISGS in MW
- iii. Ramp up /down rate unit wise and station wise

**4.2. RLDCs:** RLDCs shall upload on their webpage the following figures for each 15-minute time block on day ahead basis and for every revision on the day of operation.

- i. Declared Capability (DC) of generating station in MW
- ii. On-bar Declared Capability (DC) of generating station in MW
- iii. Ex bus Technical Minimum schedule of the Plant in MW which shall be calculated as 55% of on bar DC of the generating station.
- iv. Ramp-up/Ramp down rate unit-wise & station wise
- v. Ex-bus Entitlement of the beneficiary computed from the on-bar DC in MW
- vi. Ex-bus Entitlement of the beneficiary computed from 55% of on-bar DC in MW
- vii. Ex-bus Requisition received from the beneficiaries in MW
- viii. Cumulative Requisitions of all beneficiaries of the generating station in MW

**4.3. SLDCs / Beneficiaries:** SLDCs/Beneficiaries shall furnish requisition in the following manner as specified in IEGC.

- i. SLDCs shall submit the anticipated demand to RLDCs for the next day as per IEGC.
- ii. SLDCs/Beneficiaries shall furnish requisition to RLDC for the next day (D day) by 15:00 hours of current (D-1) day. SLDCs/Beneficiaries shall submit requisition as per their forecasted requirement.
- iii. SLDCs/Beneficiaries shall check the 'injection schedule' (R0) issued at 1800 hours by RLDCs for compliance to the technical minimum norms.



- iv. In case the injection schedule for a generating station is less than its technical minimum, the SLDC(s)/Beneficiary (ies) may raise their requisition up to 55% of entitlement if the original requisition submitted earlier is less than 55%.
- v. The above procedure shall be followed by the SLDCs/Beneficiaries RLDCs for all subsequent revisions also.
- vi. Any compensation computed as per Regulation 6.3B shall be borne by the entity, which has caused the plant to be operated at schedule lower than NPAF but at or above technical minimum schedule based on the compensation mechanism finalized by RPCs.

#### **4.4. Generating stations:**

- i. The generating station shall coordinate with its beneficiaries for providing requisition for making the injection schedule more than or equal to technical minimum schedule.
- ii. When the scheduled generation falls below the technical minimum schedule, the generating station shall have the option to go for reserve shut down under intimation to concerned RLDC & beneficiaries.
- iii. Considering that the minimum economic shutdown hours for units are in the range of 2-8 hours depending on the unit (details at Annex-1), the generating stations need to take a pro-active approach in shut down and restart of units from the view point of merit order.
- iv. The generating station shall submit the details of duration its operation below normative plant availability factor (NPAF) but above technical minimum schedule to the concerned RLDC/SLDC for verification on monthly basis.
- v. The generating station shall submit the required data to RPC/RLDC/SLDCs as per regulation 6.3B.3.

#### **5. Conditions under which RLDC may direct the generating stations to operate at a schedule below normative plant availability factor (NPAF) but at or above technical minimum.**

The RLDC may direct a generating station under its scheduling jurisdiction to operate at a schedule below normative plant availability factor (NPAF) in any of the following conditions.

- i. Threat to grid security
- ii. To relieve transmission congestion
- iii. Sudden Change in weather condition
- iv. Natural calamities such as earth quake, flood etc ..

- v. Prevailing or anticipated Low Demand conditions
- vi. Due to less requisition received from the beneficiary states
- vii. Suo-moto revision of schedules in the interest of better system operation (IEGC-6.5.20)
- viii. high renewable generation
- ix. Maintaining adequate reserves
- x. Any other anticipated condition that is likely to affect reliable grid operation

**SLDC shall follow the above procedure in case of CGS having 100% share to the state or any other eligible generator under its control area.**

## **6. Methodology for taking generating station or unit(s) thereof under Reserve Shut down**

- 6.1. The generating station shall submit its declared capability (DC) to RLDC.
- 6.2. The beneficiaries shall furnish their original requisition for the next day (D-day) to RLDC by 15:00 hrs. of the current (D-1) day..
- 6.3. Ex-Power Plant (Ex-PP) dispatch schedule of a generating station in a time block shall be computed by RLDCs by taking algebraic sum of requisitions of all beneficiaries of that generating station & same shall be uploaded on website as revision R0 for next day (D) by 18:00 hours of current day (D-1).
- 6.4. If the net EX-PP injection schedule for a generating station is less than 55% of the DC on bar the generating station shall intimate the same to all beneficiaries in the format (A-1) given at Annex-2, with copy to the concerned RLDC. A-1 has to be issued by the generators by 19:00 hrs of D-1.
- 6.5. The beneficiaries would then review their requisition & submit a revised requisition by 21:00 hrs to the concerned RLDC.
- 6.6. Based on the revised requisitions received up to 21:00 hrs, RLDC shall prepare revised injection schedule for concerned the generating station. If the scheduled generation is less than 55% of DC, the RLDC shall review the anticipated demand pattern based on the demand forecast given by states & grid conditions to decide whether technical minimum schedule is required to be provided to the generating station.
  - i. In case the grid conditions demand so in the interest of better grid operation, RLDC would suo-moto revise the schedule to operate it at or above technical minimum but below NPAF. While doing so, it is possible that some beneficiary's requisition would go up to ensure technical minimum. RLDC shall issue R-1 schedule accordingly and this would be intimated to the concerned generating station, beneficiaries and the RPC in format A-2 given at Annex-3. RLDC may also intimate NLDC for

invocation of RRAS regulation (up regulation) in case of eligible stations for keeping the unit(s) on-bar for better grid operation if the grid conditions demand so. Such up regulation in real time can be triggered irrespective of prevailing frequency. (Beneficiaries shall not be allowed to revise the schedule down wards at a generating station where one or more unit(s) are running under technical minimum schedule with suo-moto revision by RLDC.

- ii. If the grid conditions do not demand so, the RLDC shall issue R-1 schedule based on the requisitions received. Under such situation, the generating station shall have the option to go for RSD(Reserve shutdown) with intimation to beneficiaries, SLDCs, RLDC and RPC in format A-3 (given at Annex-4).
  - iii. In case of exigencies, RLDCs/NLDC could schedule power to the generating station through RRAS up instruction so as to ensure that the required units are available on bar and operating at the technical minimum level of 55%.
- 6.7. Before taking unit(s) under RSD the generating station whose injection schedule is less than technical minimum schedule, it
- i. May offer an opportunity to the beneficiaries to review their requisitions particularly to the beneficiaries who had originally submitted requisition as per full entitlement and would be willing to avail the un-requisitioned power of other beneficiaries of that station.
  - ii. May like to sell the requisitioned power under STOA after taking no objection certificate from the concerned beneficiary/SLDC whose un-requisitioned power is intended to be sold under STOA.
- 6.8. Before taking unit(s) under RSD, the generating station shall bifurcate the DC in two parts – (i) DC for unit(s) to remain ON-bar & (ii) DC for unit(s) kept under RSD. The generator shall ensure that the DC for unit(s) kept under RSD shall not be more than MCR less Normative Auxiliary Consumption. The DC for unit(s) kept under RSD shall be frozen until its revival from RSD. The beneficiaries shall continue to bear the capacity charge corresponding to total DC including unit(s) kept under RSD.



- 6.9. The above procedure shall be followed for subsequent schedule revisions also.
- 6.10. Once a unit is taken out under reserve shut down (RSD), the period for which the unit will remain under RSD shall be 24 hours or less if so specified by the generating station.
- 6.11. A beneficiary having entitlement in a station more than or equal to the capacity of any unit in the generating station may surrender its entitlement for 24 hours or more in consultation with RLDC. In such situation, the RLDC may facilitate RSD of unit(s) of that station on account of the above beneficiary only. The drawal schedule of the beneficiary from that generating station shall be restricted accordingly for the specified period as requested. The other beneficiaries shall continue to get their full allocation from the total DC in that station. This arrangement could also be extended for two or more beneficiaries in the same generating station.
- 6.12.
- 6.13. RLDC shall compute & upload entitlements corresponding to DC for unit(s) ON-bar and DC for unit(s) under RSD separately. The injection schedule in such case shall be restricted up to ON-bar DC based on the existing requisitions of beneficiaries.
- 6.14. One or more beneficiaries and the generating station may decide for revival for unit (s) under RSD with commitment for technical minimum schedule and mutually agreed 'minimum run time' of the unit (s) post revival. RLDC may also advise the generating stations to revive unit (s) under RSD for better system operation(IEGC 6.5.20).. In such cases RLDC shall ensure technical minimum schedule. Compensation shall be admissible towards start-up cost as per the provisions in the IEGC 4th Amendment.
- 6.15. Regulation of Power Supply: When injection schedule of a CGS/ISGS falls below technical minimum due to imposition of regulation of power supply under the CERC (Regulation of Power Supply) Regulations 2010 and/or CERC order dated 02.09.2015 in 142/MP/2012 by the CGS/ISGS or a transmission licensee, the generator shall try to schedule the surplus power through STOA or PX before opting for reserve shut down.

## **7. Review of the Procedure after 6 months**

- 7.1. Based on the experience gained through operation for 6 months the Procedure may be reviewed & modified if felt necessary, in the interest of system operation.

## **8. Removal of Difficulties:**

- 8.1. Notwithstanding anything contained in this Procedure, NLDC/RLDCs may take appropriate decisions in the interest of System Operation. Such decisions shall be taken and subsequently intimated to CERC (on monthly basis) and the procedure shall be modified /amended, if necessary.
- 8.2. In case of any difficulty in implementation of this procedure, this procedure shall be reviewed or revised by NLDC with the approval from the Commission.

\*\*\*

# Assessment of Minimum Economic Shutdown hours for coal fired stations

Annex-1

S no	Plant Name	Installed Capacity	Region	Variable Cost	Unit capacity	Normative Aux Consumption (NAC)	Heat Rate increase in % at 55% load as per IEGC	NAC increase at 55% load as per IEGC	Variable cost at 55% p/f	Fuel cost for one(1) hour one unit operation at 55% load	Oil in kL required for cold start as per IEGC	Approx oil rate in Rs/MT	Approx light up cost for cold start up assuming density of oil as 1.0	Minimum economic shutdown hours
				paise/kWh	MW	%	%	%	paise/kWh	Rs. lakhs	kL	Rs/MT	Rs. lakhs	hours
	A	B	C	D	E	F	G	H	$I = D \cdot (100+G) \cdot (100-F) / (100 \cdot (100-F-H))$	J	K	L	$M = K \cdot L / 100000$	$N = M / J$
1	SIPAT-I	1980	WR	122	660	5.75	3	1	127	4.13	110	20000	22.00	5.3
2	SIPAT-II	1000	WR	125	500	5.75	6	1	134	3.21	90	20000	18.00	5.6
3	SINGRAULI	2000	NR	126	500	6.88	6	1	135	3.19	90	20000	18.00	5.6
4	SINGRAULI	2000	NR	126	200	6.88	6	1	135	1.28	50	20000	10.00	7.8
5	RIHAND3	1000	NR	127	500	5.75	6	1	136	3.26	90	20000	18.00	5.5
6	RIHAND2	1000	NR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
7	KSTPS-II	500	WR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
8	KSTPS	2100	WR	131	500	6.68	6	1	140	3.33	90	20000	18.00	5.4
9	KSTPS	2100	WR	131	200	6.68	6	1	140	1.33	50	20000	10.00	7.5
10	CGPL	4150	WR	135	800	5.00	3	1	141	5.58	130	20000	26.00	4.7
11	RIHAND1	1000	NR	144	500	7.75	6	1	154	3.61	90	20000	18.00	5.0
12	TALST2	2000	SR	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.8
13	TSTPP-I	1000	ER	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.8
14	SASAN	3960	WR	153	660	6.00	3	1	159	5.17	110	20000	22.00	4.3
15	VSTPS-II	1000	WR	153	500	5.75	6	1	164	3.92	90	20000	18.00	4.6
16	VSTPS-V	500	WR	156	500	5.75	6	1	167	4.00	90	20000	18.00	4.5
17	VSTPS-IV	1000	WR	157	500	5.75	6	1	168	4.03	90	20000	18.00	4.5
18	VSTPS-II	1000	WR	162	500	5.75	6	1	174	4.15	90	20000	18.00	4.3
19	VSTPS-I	1260	WR	166	210	9.00	6	1	178	1.73	50	20000	10.00	5.8
20	KHSTPP-II	1500	ER	199	500	5.75	6	1	213	5.10	90	20000	18.00	3.5
21	VALLURNT	1500	SR	203	500	5.75	6	1	217	5.21	90	20000	18.00	3.5
22	NSPCL	500	WR	206	250	8.00	6	1	221	2.58	50	20000	10.00	3.9
23	RSTPS	2100	SR	207	500	6.68	6	1	222	5.26	90	20000	18.00	3.4
24	RSTPS	2100	SR	207	200	6.68	6	1	222	2.10	50	20000	10.00	4.8
25	KHSTPP-I	840	ER	208	210	9.00	6	1	223	2.16	50	20000	10.00	4.6
26	FSTPP	1600	ER	214	500	6.47	6	1	229	5.45	90	20000	18.00	3.3
27	FSTPP I	1600	ER	214	200	6.47	6	1	229	2.18	50	20000	10.00	4.6
28	RSTPSU7	500	SR	221	500	5.75	6	1	237	5.67	90	20000	18.00	3.2
29	NTPL	1000	SR	222	500	5.25	6	1	238	5.72	90	20000	18.00	3.1
30	FSTPP-II	500	ER	228	500	5.75	6	1	244	5.85	90	20000	18.00	3.1
31	SIMHST2	1000	SR	232	500	5.25	6	1	249	5.98	90	20000	18.00	3.0
32	NLC2EXP	500	SR	241	500	10.00	6	1	258	5.90	90	20000	18.00	3.1
33	NLCEXP	420	SR	253	210	8.50	6	1	271	2.64	50	20000	10.00	3.8
34	NLCIST1	630	SR	260	210	10.00	6	1	279	2.67	50	20000	10.00	3.7
35	NLCIST2	840	SR	260	210	10.00	6	1	279	2.67	50	20000	10.00	3.7
36	MOUDA-I	1000	WR	260	500	5.75	6	1	279	6.67	90	20000	18.00	2.7
37	UNCHAHAR	420	NR	271	210	9.00	6	1	290	2.82	50	20000	10.00	3.5
38	UNCHAHAR	210	NR	272	210	9.00	6	1	292	2.83	50	20000	10.00	3.5
39	BARH	1320	ER	276	660	5.75	3	1	287	9.34	110	20000	22.00	2.4
40	UNCHAHAR	420	NR	278	210	9.00	6	1	298	2.89	50	20000	10.00	3.5
41	DADRT2	980	NR	303	490	5.25	6	1	325	7.66	90	20000	18.00	2.4
42	JHAJJAR	1500	NR	307	500	5.25	6	1	329	7.91	90	20000	18.00	2.3
43	BGTPP	250	AR	308	250	8.50	6	1	330	3.83	50	20000	10.00	2.6
44	DADRT1	840	NR	323	210	8.50	6	1	346	3.38	50	20000	10.00	3.0

## Notes:

- <https://bharatpetroleum.com/Our-Businesses/I&C/Petro-Prices.aspx> Source for fuel oil prices
- For CGPL Mundra, oil taken for cold start up is assumed as 130 kL by extrapolating the figures for 500 MW and 660 MW in the IEGC amendment
- As per the CEA Technical Standards for construction of electrical plants and electrical lines,
  - Cold start > 72 hours after shutdown when turbine metal temperatures are below 40 % of full load values
  - Hot start <10 hours after shutdown when turbine metal temperatures are approximately 80% of full load values
  - Warm start between 10 and 72 hours when turbine metal temperature is between 40-80% of full load values
- Fuel Oil requirement falls to 30% for hot start and 50% for warm start approximately as compared to cold start.



**Format A1: Intimation for Technical Minimum Schedule**

Date: dd/mm/yyyy

**From:** (Name of Generating Station) / (Name of Owner Organization)**To:** SLDC/Beneficiary-B1 / B2 / B3 /.....**CC:** ERLDC/NRLDC/NERLDC/SRLDC/WRLDC**Sub:** Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,

As per R-0 schedule uploaded by \_RLDC for (date) \_\_\_\_\_ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. Thus you are requested to review your requisition. If the net schedule remains below technical minimum schedule in R-1 schedule to be issued by RLDC for (date)\_\_\_\_\_, we shall be constrained to take out one/two/three unit(s) under Reserved Shut Down & the unit may remain under RSD for next 72 hours.

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

**Format A2: RLDC direction for suo moto revision for Technical Minimum schedule**

Date: dd/mm/yyyy

**From:** (Name of RLDC)**To:** SLDC/Beneficiary-B1 / B2 / B3 /.....**CC:** Name of the Generating Station**Sub:** Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,

As per R-0 schedule uploaded by \_RLDC for (date) \_\_\_\_\_ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. In view of the following grid conditions (at Table-1) this generating unit needs to be kept on bar. \_RLDC hereby revises the schedule at this generating station by raising requisition of the surrendering beneficiaries in those time blocks up to 55% of entitlement in the interest of better operation of the grid in line with regulation 6.5.20 of IEGC. Ramp-up / ramp down adjustment has been done as per regulation 6.5.14 of IEGC.

**Table-1**

<b>S.No.</b>	<b>Time blocks where schedule is moderated for Technical Minimum</b>	<b>Grid Conditions</b>
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

**Format A3: Intimation of Reserve shut down by Generating Station**

Date: dd/mm/yyyy

**From:** (Name of Generating Station) / (Name of Owner Organization)**To:** SLDC/Beneficiary-B1 / B2 / B3 /.....**CC:** ERLDC/NRLDC/NERLDC/SRLDC/WRLDCSub: Reserve shut down of XYZ generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B.3(iii) of IEGC

Sir/Madam,

Please refer to our intimation (A-1) on less than technical minimum schedule at \_\_\_\_\_ (CGS/ISGS) for date \_\_\_\_\_. The injection schedule still is less than technical minimum schedule in the following time blocks (ref. Table-1 below). Thus in line with IEGC section 6.3B.3(iii) we shall desynchronise unit#\_\_\_\_\_ of \_\_\_\_\_ (CGS/ISGS name) with effect from \_\_\_\_\_th block of date \_\_\_\_\_. This unit shall remain under shut down till \_\_\_\_\_hours of date\_\_\_\_\_ or further intimation from RLDC which ever is later.

**Table-1**

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

**Draft Compensation Procedure  
For SHR & AEC For Low Unit  
Loading And For Secondary Fuel  
Oil Consumption For Additional  
Start-Ups In Excess Of 7 Start-Ups  
And Its Sharing By Beneficiaries**

Sub-Regulation 6.3B of  
Central Electricity  
Regulatory Commission  
(Indian Electricity Grid  
Code) (Fourth  
Amendment)  
Regulations, 2016

IEGC (Fourth Amendment)

Southern Regional Power Committee, Bengaluru

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## 1. Introduction

Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016 were notified on 04.06.2016. These Regulations shall come into force with effect from date of publication in Official Gazette except Sub-Regulation 6.3B which shall come into force on such date as the Commission may appoint by notification in the Official Gazette.

### *Regulation 6.3 B:*

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Technical Minimum Schedule for operation of Central Generating Stations and Inter-State Generating Stations:

1. The technical minimum for operation in respect of a unit or units of a Central Generating Station of inter-State Generating Station shall be 55% of MCR loading or installed capacity of the unit of at generating station.
2. The CGS or ISGS may be directed by concerned RLDC to operate its unit(s) at or above the technical minimum but below the normative plant availability factor on account of grid security or due to the fewer schedules given by the beneficiaries.
3. Where the CGS or ISGS, whose tariff is either determined or adopted by the Commission, is directed by the concerned RLDC to operate below normative plant availability factor but at or above technical minimum, the CGS or ISGS may be compensated depending on the average unit loading duly taking into account the forced outages, planned outages, PLF, generation at generator terminal, energy sent out ex-bus, number of start-stop, secondary fuel oil consumption and auxiliary energy consumption, in due consideration of actual and normative operating parameters of station heat rate, auxiliary energy consumption and secondary fuel oil consumption etc. on monthly basis duly supported by relevant data verified by RLDC or SLDC, as the case may be.

Provided that:

- (i) In case of coal / lignite based generating stations, following station heat rate degradation or actual heat rate, whichever is lower, shall be considered for the purpose of compensation:

<i>S. No.</i>	<i>Unit loading as a % of Installed Capacity of the Unit</i>	<i>Increase in SHR (for supercritical units) (%)</i>	<i>Increase in SHR (for sub-critical units) (%)</i>
<b>1</b>	85-100	Nil	Nil
<b>2</b>	75-84.99	1.25	2.25
<b>3</b>	65-74.99	2	4
<b>4</b>	55-64.99	3	6

(ii) In case of coal / lignite based generating stations, the following Auxiliary Energy Consumption degradation or actual, whichever is lower shall be considered for the purpose of compensation:

<i>Sl. No</i>	<i>Unit Loading (% of MCR)</i>	<i>% Degradation in AEC admissible</i>
<b>1.</b>	85 – 100	NIL
<b>2.</b>	75 – 84.99	0.35
<b>3.</b>	65 – 74.99	0.65
<b>4.</b>	55 - 64.99	1.00

(ii) Where the scheduled generation falls below the technical minimum schedule, the concerned CGS or ISGS shall have the option to go for reserve shut down and in such cases, start-up fuel cost over and above seven (7) start / stop in a year shall be considered as additional compensation based on following norms or actual, whichever is lower:

<i>Unit Size (MW)</i>	<i>Oil Consumption per start up (Kl)</i>		
	<i>Hot</i>	<i>Warm</i>	<i>Cold</i>
<b>200/210/250 MW</b>	20	30	50
<b>500 MW</b>	30	50	90
<b>660 MW</b>	40	60	110



*(iv) In case of gas based Central Generating Station or inter-State Generating Station, compensation shall be decided based on the characteristic curve provided by the manufacturer and after prudence check of the actual operating parameters of Station Heat Rate, Auxiliary Energy Consumption, etc.*

*(v) Compensation for the Station Heat Rate and Auxiliary Energy Consumption shall be worked out in terms of energy charges.*

*(vi) The compensation so computed shall be borne by the entity who has caused the plant to be operated at schedule lower than corresponding to Normative Plant Availability Factor up to technical minimum based on the compensation mechanism finalized by the RPCs.*

*(vii) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower than the normative Station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station.*

*(viii) There shall be reconciliation of the compensation at the end of the financial year in due consideration of actual weighted average operational parameters of station heat rate, auxiliary energy consumption and secondary oil consumption.*

*(ix) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower than the normative station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station in a month or after annual reconciliation at the end of the year.*

*(x) The change in schedule of power under the provisions of Central Electricity Regulatory Commission (Ancillary Services Operations) Regulations, 2015 shall not be considered for compensation.*

*4. In case of a generating station whose tariff is neither determined nor adopted by the Commission, the concerned generating company shall have to factor the above provisions in the PPAs entered into by it for sale of power in order to claim compensations for operating at the technical minimum schedule.*

*5. The generating company shall keep the record of the emission levels from the plant due to part load operation and submit a report for each year to the Commission by 31st May of the year.*

*6. NLDC shall prepare a Detailed Operating Procedure in consultation with the generators and beneficiaries at RPC forums within 2 months' time and submit to the Commission for approval. The Detailed Operating Procedure shall contain the role of different agencies, data requirements, procedure for taking the units under reserve shut down and the methodology for identifying the generating stations or units thereof to be*

*backed down upto the technical minimum in specific Grid conditions such as low system demand, Regulation of Power Supply and incidence of high renewables etc., based on merit order stacking.*

*7. The RPCs shall work out a mechanism for compensation for station heat rate and auxiliary energy consumption for low unit loading on monthly basis in terms of energy charges and compensation for secondary fuel oil consumption over and above the norm of 0.5 ml/kWh for additional start-ups in excess of 7 start-ups, in consultation with generators and beneficiaries at RPC forum and its sharing by the beneficiaries.*

## **2. Compensation Procedure for SHR/AEC**

### ***Regulations 30(5) of CERC (Terms and Conditions of Tariff), Regulations***

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*‘(5) The energy charge shall cover the primary and secondary fuel cost and limestone consumption cost (where applicable), and shall be payable by every beneficiary for the total energy scheduled to be supplied to such beneficiary during the calendar month on ex-power plant basis, at the energy charge rate of the month (with fuel and limestone price adjustment). Total Energy charge payable to the generating company for a month shall be:*

*(Energy charge rate in Rs./kWh) x {Scheduled energy (ex-bus) for the month in kWh.}*

*(6) Energy charge rate (ECR) in Rupees per kWh on ex-power plant basis shall be determined to three decimal places in accordance with the following formulae:*

*(a) For coal based and lignite fired stations*

$$ECR = \{(GHR - SFC \times CVSF) \times LPPF / CVPF + SFC \times LPSFi + LC \times LPL\} \times 100 / (100 - AUX)$$

*(b) For gas and liquid fuel based stations*

$$ECR = GHR \times LPPF \times 100 / \{CVPF \times (100 - AUX)\}$$

*Where,*

*AUX = Normative auxiliary energy consumption in percentage.*

*CVPF=(a) Weighted Average Gross calorific value of coal as received, in kCal per kg for coal based stations*

*(b) Weighted Average Gross calorific value of primary fuel as received, in kCal per kg, per litre or per standard cubic meter, as applicable for lignite, gas and liquid fuel based stations.*

*(c) In case of blending of fuel from different sources, the weighted average Gross calorific value of primary fuel shall be arrived in proportion to blending ratio.*

*CVSF = Calorific value of secondary fuel, in kCal per ml.*

*ECR = Energy charge rate, in Rupees per kWh sent out.*

*GHR = Gross station heat rate, in kCal per kWh.*

*LC = Normative limestone consumption in kg per kWh.*

*LPL = Weighted average landed price of limestone in Rupees per kg.*

*LPPF = Weighted average landed price of primary fuel, in Rupees per kg, per litre or per standard cubic metre, as applicable, during the month. (In case of blending of fuel from different sources, the weighted average landed price of primary fuel shall be arrived in proportion to blending ratio)*

*SFC = Normative Specific fuel oil consumption, in ml per kWh.*

*LPSFi = Weighted Average Landed Price of Secondary Fuel in Rs./ml during the month*

*Provided that energy charge rate for a gas/liquid fuel based station shall be adjusted for open cycle operation based on certification of Member Secretary of respective Regional Power Committee for the open cycle operation during the month. ‘*

Calculation of Compensation Block Wise based on Unit Loading as % of MCR:

Unit Loading (% of MCR) Based on Schedule

$$= \frac{(Total\ Schedule\ of\ the\ Stage - Schedule\ given\ to\ Stage\ Under\ RRAS)}{Installed\ Capacity\ of\ the\ Stage\ on\ Bar \times (1 - Normative\ Auxiliary\ Consumption)} \times 100$$

RRAS Up schedule is +ve &  
RRAS Down schedule is -ve

$$ECR\ (Schedule\ Energy) = \frac{\left\{ \frac{(GHR \times (1 + \delta SHR) - SFC \times CVSF) \times LPPF}{CVPF} + SFC \times LPSFi + LC \times LPL \right\} \times 100}{(100 - (AUX + \delta Aux))}$$

$\delta SHR$  = Increase in Specific Heat Rate as per 6.3 B(C)(i) of IEGC based on Schedule..

$\delta Aux$  = Increase in Auxiliary Energy Consumption per 6.3 B(C)(ii) of IEGC based on Schedule.

Unit Loading (% of MCR) Based on Declared Capacity

$$= \frac{Total\ Declared\ Capacity\ of\ the\ Stage}{Installed\ Capacity\ of\ the\ Stage\ on\ Bar \times (1 - Normative\ Auxiliary\ Consumption)} \times 100$$

$$ECR\ (Declared\ Capacity) = \frac{\left\{ \frac{(GHR \times (1 + \delta SHR) - SFC \times CVSF) \times LPPF}{CVPF} + SFC \times LPSFi + LC \times LPL \right\} \times 100}{(100 - (AUX + \delta Aux))}$$

$\delta SHR$  = Increase in Specific Heat Rate as per 6.3 B(C)(i) of IEGC based on Declared Capacity.

$\delta Aux$  = Increase in Auxiliary Energy Consumption as per 6.3 B(C)(i) of IEGC based on Declared Capacity.

$$ECR\ (Compensation) = ECR\ (Schedule\ Energy) - ECR\ (Declared\ Capacity)$$

Total Installed Capacity on Bar is number of units on bar in 15 Minutes Blocks (Minus Normative Auxiliary Consumption). The methodology for revision of Total Installed Capacity on Bar for a block would be govern as per the methodology for revision of Declared Capacity by the generators.

COMPENSATION FOR THE STATION HEAT RATE AND AUXILIARY ENERGY CONSUMPTION IN TERMS OF ENERGY CHARGES =

$$ECR\ (Compensation) \times (Total\ Schedule\ of\ the\ Station - Schedule\ given\ to\ station\ Under\ RRAS)$$

RRAS Up schedule is +ve &  
RRAS Down schedule is -ve

**Annual Reconciliation of Compensation for the Station Heat Rate and Auxiliary Energy Consumption on**

**Monthly Basis:**

TOTAL COMPENSATION FOR THE

YEAR

$\Sigma$  Calculated Compensation on Normative Values of each Block for the year upto the current month.

If Actual ECR is less than Normative ECR then Total Compensation for the Year upto the current month is Zero.

If Actual ECR is more than Normative ECR then Total Compensation for the Year upto the current month and

if (Actual ECR upto the current month – Normative ECR )

× (Total Schedule Energy upto the current month

– Energy Schedule Under RRAS upto the current month)

is more than Total Compensation for the Year upto the current month then

Total Compensation for the Year upto the current month arrived by block wise addition would be paid to the generator.

Else Total Compensation to be paid would be restricted to

(Actual ECR upto the current month – Normative ECR) ×

(Total Schedule Energy upto the current month

– Energy Schedule Under RRAS upto the current month)

**Sharing Ratio of the Beneficiary who has caused the plant to be operated at schedule lower than corresponding to Normative Plant Availability Factor up to technical minimum:**

➤ *Ex Bus Entitlement of a Beneficiary based on Total Installed Capacity on Bar =*

*Installed Capacity of the Station on Bar × (1 – Normative Auxiliary Consumption) ×  
Allocation of the Beneficiary for the Block.*

➤ *Unrequisition by the Beneficiary based on Total Installed Capacity on Bar =*

*Ex Bus Entitlement of a Beneficiary based on Total Installed Capacity on Bar – Requisition by Beneficiary*

➤ *Unrequisition by the Beneficiary above 65% of entitlement based on Total Installed Capacity on Bar =*

*Unrequisition by the Beneficiary based on Total Installed Capacity on Bar ×*

*(1 – Normative Auxiliary Consumption) × Allocation of the Beneficiary for the Block × (1 – .65)*

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*Un requisition by the Beneficiary above 75% and upto 65% of entitlement based on Total Installed Capacity on Bar =*

*Un requisition by the Beneficiary based on Total Installed Capacity on Bar ×  
(1 – Normative Auxiliary Consumption) × Allocation of the Beneficiary for the Block × (1 – .75) –  
Un requisition by the Beneficiary above 65% of entitlement based on Total Installed Capacity on Bar*

*Un requisition by the Beneficiary above 85% and upto 75% of entitlement based on Total Installed Capacity on Bar*

*Un requisition by the Beneficiary based on Total Installed Capacity on Bar ×  
(1 – Normative Auxiliary Consumption) × Allocation of the Beneficiary for the Block × (1 – .85) –*

*Un requisition by the beneficiary above 75% of Entitlement*

*Compensated Energy Charge for the Beneficiary in the Block =*

*Un requisition by the Beneficiary above 85% and upto 75% of entitlement based on Total Installed Capacity on Bar ×*

*ECR( Based on upto 75% of MCR) +*

*Un requisition by the beneficiary above 75% and upto 65% of entitlement based on Total Installed Capacity on Bar ×*

*ECR( Based on upto 65% of MCR) +*

*Un requisition by the beneficiary above 65% of entitlement based on Total Installed Capacity on Bar ×*

*ECR( Based on upto 55% of MCR)*

*Reconciled Compensation to be paid to a Generator would be shared among the Beneficiary in the ratio*

*Sum of Compensated Energy Charge for the Beneficiary in the Block for the year upto the current month.*

### **Compensation for Secondary Fuel to Generators availing Reserve Shut Down:**

- *Normative Secondary Fuel Compensation = 0.5 × Total Schedule Energy in Kwhr*
- *If actual Secondary Fuel Compensation is less than normative Fuel Compensation then no compensation for secondary fuel usage for Reserve shut Down would be paid.*
- *If total number of shutdowns in a plant (Stage) is less than 7 shut down then no secondary fuel compensation for stage under Reserve Shut down would be paid*
- *If total shutdown is more than 7 and normative secondary fuel compensation is less than*



actual secondary fuel compensation then Secondary Fuel compensation for each  
reserve shut down over and above 7 shutdown would be given as per the table

Unit Size (MW)	Oil Consumption per start up (Kl)		
	Hot	Warm	Cold
200/210/250 MW	20	30	50
500 MW	30	50	90
660 MW	40	60	110

The compensation would be restricted to actual secondary fuel compensation if  
Calculated Secondary fuel compensation is more than actual secondary fuel .

**Sharing of Secondary Fuel Compensation among the beneficiary:**

Compensation for total Secondary Fuel consumption

for reserve shut down if total shut down in a plant is more than 7

would be shared among the beneficiaries who unrequited more than 85% of Unrequisition based  
on Total Installed Capacity on Bar and in the ratio of such excess unrequisition

**Note:**

1. If Actual Energy Charge is more than the Normative Energy Charge + Compensated Energy Charge then the Compensated Energy Charge would be paid. The compensation for SHR ( Numerator) and AEC ( Denominator) would be computed and accounted separately
2. If Actual Energy charge is higher than Normative energy Charge but lesser than (Normative Energy Charge + Compensated Energy Charge) then Compensation Energy Charge would be restricted to actual energy charge - normative Energy Charge The compensation for SHR ( Numerator) and AEC ( Denominator) would be computed and accounted separately
3. In case Actual SHR is greater than (Normative + Compensated) SHR but Actual AEC is less than ( Normative + Compensated) AEC then Compensation would restrict to (Normative + Compensated) SHR and Actual AEC and Vice versa.
4. The compensation during triggering of ~~regular power supply~~, the compensation if any would be accounted in the name of the generating station. The amount received from sale of surplus power by generating company due to triggering of Regulation of Power Supply shall be adjusted against the outstanding dues of the regulated entity after deducting energy charges, trading margin, compensation (SHR & AEC) and other incidental expenses borne by the detecting company if any and the remaining amount if any, shall be based on the regulated entity. In case of

## Draft - Sub-Regulation 6.3B

*Regulation of Power Supply by Transmission licensee before passing on the dues to the regulated entity the charges of the Transmission Licensee would be cleared'.*

5. Selection of Reserve Shut Down over and above 7 shut down would be based on the order of Cold, Warm then Hot start.

**Detailed Operating Procedure for**  
taking unit (s) under  
**Reserve Shut down**  
and identifying generating stations to be backed down up to  
**Technical Minimum Schedule**

Prepared in compliance to Section 6.3B.6 of  
Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth  
Amendment) Regulations, 2016

(Revision 0: Dated: \_\_ / \_\_ / 2016)

**Power System Operation Corporation Ltd.**

**National Load Despatch Centre**

**New Delhi**

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**Detailed Operating Procedure for  
Taking Unit (s) under Reserve Shut down and  
Identifying Generating Stations to be backed down up to  
Technical Minimum Schedule**

**1. Preamble**

- 1.1. This Procedure is issued in compliance to Regulation 6.3B.6 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016.
- 1.2. The Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016 provide the option to Central Generating Stations (CGS) or Inter State Generating Stations (ISGS) to go for reserve shut down where the scheduled generation falls below technical minimum schedule. In addition to above these regulations have specified provisions for compensating the CGS or ISGS for additional fuel cost towards operating below normative plant availability factor & for multiple start / stop operations.
- 1.3. All the words and expression used in the Procedure shall have the same meaning assigned to them as defined in the Regulations.
- 1.4. This procedure will be implemented with effect from the date of approval by the Hon'ble Central Electricity Regulatory Commission or any other date as specified by the Commission.

**2. Objective**

- 2.1. The objective of the detailed operating procedure is to lay down the role of different agencies, data requirements, procedure for taking generating units under reserve shut down & methodology for identifying the generating stations or units thereof to be backed down up to technical minimum schedule in specific grid conditions such as low system demand, Regulation of Power Supply, incidence of high renewables etc., based on merit order stacking.

**3. Scope**

- 3.1. This procedure shall be applicable to RLDCs, SLDCs, CGS & ISGS whose tariff is either determined or adopted by the Central Commission (CERC). In case of a generating station whose tariff is neither determined nor adopted by the

Commission, the concerned generating company shall have to factor the provisions specified in the aforementioned CERC Regulations in their Power Purchase Agreements (PPAs) entered into it for sale of power or in order to claim compensation for operating at the technical minimum schedule.

#### **4. Role of Different Agencies in implementing the Procedure**

- 4.1. CGS/ISGS :** Generating Agencies shall upload the following figures ex bus for each 15-minute time block on day ahead basis and for every revision on the day of operation
- i. Declared Capability (DC) of CGS / ISGS in MW
  - ii. Online Declared Capability (DC) of CGS / ISGS in MW
  - iii. Ramp up /down rate unit wise and station wise
- 4.2. RLDCs:** RLDCs shall upload on their webpage the following figures for each 15-minute time block on day ahead basis and for every revision on the day of operation.
- i. Declared Capability (DC) of generating station in MW
  - ii. On-bar Declared Capability (DC) of generating station in MW
  - iii. Ex bus Technical Minimum schedule of the Plant in MW which shall be calculated as 55% of on bar DC of the generating station.
  - iv. Ramp-up/Ramp down rate unit-wise & station wise
  - v. Ex-bus Entitlement of the beneficiary computed from the on-bar DC in MW
  - vi. Ex-bus Entitlement of the beneficiary computed from 55% of on-bar DC in MW
  - vii. Ex-bus Requisition received from the beneficiaries in MW
  - viii. Cumulative Requisitions of all beneficiaries of the generating station in MW
- 4.3. SLDCs / Beneficiaries:** SLDCs/Beneficiaries shall furnish requisition in the following manner as specified in IEGC.
- i. SLDCs shall submit the anticipated demand to RLDCs for the next day as per IEGC.
  - ii. SLDCs/Beneficiaries shall furnish requisition to RLDC for the next day (D day) by 15:00 hours of current (D-1) day. SLDCs/Beneficiaries shall submit requisition as per their forecasted requirement.
  - iii. SLDCs/Beneficiaries shall check the 'injection schedule' (R0) issued at 1800 hours by RLDCs for compliance to the technical minimum norms.



- iv. In case the injection schedule for a generating station is less than its technical minimum, the SLDC(s)/Beneficiary (ies) may raise their requisition up to 55% of entitlement if the original requisition submitted earlier is less than 55%.
- v. The above procedure shall be followed by the SLDCs/Beneficiaries RLDCs for all subsequent revisions also.
- vi. Any compensation computed as per Regulation 6.3B shall be borne by the entity, which has caused the plant to be operated at schedule lower than NPAF but at or above technical minimum schedule based on the compensation mechanism finalized by RPCs.

#### **4.4. Generating stations:**

- i. The generating station shall coordinate with its beneficiaries for providing requisition for making the injection schedule more than or equal to technical minimum schedule.
- ii. When the scheduled generation falls below the technical minimum schedule, the generating station shall have the option to go for reserve shut down under intimation to concerned RLDC & beneficiaries.
- iii. Considering that the minimum economic shutdown hours for units are in the range of 2-8 hours depending on the unit (details at Annex-1), the generating stations need to take a pro-active approach in shut down and restart of units from the view point of merit order.
- iv. The generating station shall submit the details of duration its operation below normative plant availability factor (NPAF) but above technical minimum schedule to the concerned RLDC/SLDC for verification on monthly basis.
- v. The generating station shall submit the required data to RPC/RLDC/SLDCs as per regulation 6.3B.3.

#### **5. Conditions under which RLDC may direct the generating stations to operate at a schedule below normative plant availability factor (NPAF) but at or above technical minimum.**

The RLDC may direct a generating station under its scheduling jurisdiction to operate at a schedule below normative plant availability factor (NPAF) in any of the following conditions.

- i. Threat to grid security
- ii. To relieve transmission congestion
- iii. Sudden Change in weather condition
- iv. Natural calamities such as earth quake, flood etc ..

- v. Prevailing or anticipated Low Demand conditions
- vi. Due to less requisition received from the beneficiary states
- vii. Suo-moto revision of schedules in the interest of better system operation (IEGC-6.5.20)
- viii. high renewable generation
- ix. Maintaining adequate reserves
- x. Any other anticipated condition that is likely to affect reliable grid operation

**SLDC shall follow the above procedure in case of CGS having 100% share to the state or any other eligible generator under its control area.**

## **6. Methodology for taking generating station or unit(s) thereof under Reserve Shut down**

- 6.1. The generating station shall submit its declared capability (DC) to RLDC.
- 6.2. The beneficiaries shall furnish their original requisition for the next day (D-day) to RLDC by 15:00 hrs. of the current (D-1) day..
- 6.3. Ex-Power Plant (Ex-PP) dispatch schedule of a generating station in a time block shall be computed by RLDCs by taking algebraic sum of requisitions of all beneficiaries of that generating station & same shall be uploaded on website as revision R0 for next day (D) by 18:00 hours of current day (D-1).
- 6.4. If the net EX-PP injection schedule for a generating station is less than 55% of the DC on bar the generating station shall intimate the same to all beneficiaries in the format (A-1) given at Annex-2, with copy to the concerned RLDC. A-1 has to be issued by the generators by 19:00 hrs of D-1.
- 6.5. The beneficiaries would then review their requisition & submit a revised requisition by 21:00 hrs to the concerned RLDC.
- 6.6. Based on the revised requisitions received up to 21:00 hrs, RLDC shall prepare revised injection schedule for concerned the generating station. If the scheduled generation is less than 55% of DC, the RLDC shall review the anticipated demand pattern based on the demand forecast given by states & grid conditions to decide whether technical minimum schedule is required to be provided to the generating station.
  - i. In case the grid conditions demand so in the interest of better grid operation, RLDC would suo-moto revise the schedule to operate it at or above technical minimum but below NPAF. While doing so, it is possible that some beneficiary's requisition would go up to ensure technical minimum. RLDC shall issue R-1 schedule accordingly and this would be intimated to the concerned generating station, beneficiaries and the RPC in format A-2 given at Annex-3. RLDC may also intimate NLDC for

invocation of RRAS regulation (up regulation) in case of eligible stations for keeping the unit(s) on-bar for better grid operation if the grid conditions demand so. Such up regulation in real time can be triggered irrespective of prevailing frequency. (Beneficiaries shall not be allowed to revise the schedule down wards at a generating station where one or more unit(s) are running under technical minimum schedule with suo-moto revision by RLDC.

- ii. If the grid conditions do not demand so, the RLDC shall issue R-1 schedule based on the requisitions received. Under such situation, the generating station shall have the option to go for RSD(Reserve shutdown) with intimation to beneficiaries, SLDCs, RLDC and RPC in format A-3 (given at Annex-4).
  - iii. In case of exigencies, RLDCs/NLDC could schedule power to the generating station through RRAS up instruction so as to ensure that the required units are available on bar and operating at the technical minimum level of 55%.
- 6.7. Before taking unit(s) under RSD the generating station whose injection schedule is less than technical minimum schedule, it
- i. May offer an opportunity to the beneficiaries to review their requisitions particularly to the beneficiaries who had originally submitted requisition as per full entitlement and would be willing to avail the un-requisitioned power of other beneficiaries of that station.
  - ii. May like to sell the requisitioned power under STOA after taking no objection certificate from the concerned beneficiary/SLDC whose un-requisitioned power is intended to be sold under STOA.
- 6.8. Before taking unit(s) under RSD, the generating station shall bifurcate the DC in two parts – (i) DC for unit(s) to remain ON-bar & (ii) DC for unit(s) kept under RSD. The generator shall ensure that the DC for unit(s) kept under RSD shall not be more than MCR less Normative Auxiliary Consumption. The DC for unit(s) kept under RSD shall be frozen until its revival from RSD. The beneficiaries shall continue to bear the capacity charge corresponding to total DC including unit(s) kept under RSD.

- 6.9. The above procedure shall be followed for subsequent schedule revisions also.
- 6.10. Once a unit is taken out under reserve shut down (RSD), the period for which the unit will remain under RSD shall be 24 hours or less if so specified by the generating station.
- 6.11. A beneficiary having entitlement in a station more than or equal to the capacity of any unit in the generating station may surrender its entitlement for 24 hours or more in consultation with RLDC. In such situation, the RLDC may facilitate RSD of unit(s) of that station on account of the above beneficiary only. The drawal schedule of the beneficiary from that generating station shall be restricted accordingly for the specified period as requested. The other beneficiaries shall continue to get their full allocation from the total DC in that station. This arrangement could also be extended for two or more beneficiaries in the same generating station.
- 6.12.
- 6.13. RLDC shall compute & upload entitlements corresponding to DC for unit(s) ON-bar and DC for unit(s) under RSD separately. The injection schedule in such case shall be restricted up to ON-bar DC based on the existing requisitions of beneficiaries.
- 6.14. One or more beneficiaries and the generating station may decide for revival for unit (s) under RSD with commitment for technical minimum schedule and mutually agreed 'minimum run time' of the unit (s) post revival. RLDC may also advise the generating stations to revive unit (s) under RSD for better system operation(IEGC 6.5.20).. In such cases RLDC shall ensure technical minimum schedule. Compensation shall be admissible towards start-up cost as per the provisions in the IEGC 4th Amendment.
- 6.15. Regulation of Power Supply: When injection schedule of a CGS/ISGS falls below technical minimum due to imposition of regulation of power supply under the CERC (Regulation of Power Supply) Regulations 2010 and/or CERC order dated 02.09.2015 in 142/MP/2012 by the CGS/ISGS or a transmission licensee, the generator shall try to schedule the surplus power through STOA or PX before opting for reserve shut down.

## **7. Review of the Procedure after 6 months**

- 7.1. Based on the experience gained through operation for 6 months the Procedure may be reviewed & modified if felt necessary, in the interest of system operation.

## **8. Removal of Difficulties:**

- 8.1. Notwithstanding anything contained in this Procedure, NLDC/RLDCs may take appropriate decisions in the interest of System Operation. Such decisions shall be taken and subsequently intimated to CERC (on monthly basis) and the procedure shall be modified /amended, if necessary.
- 8.2. In case of any difficulty in implementation of this procedure, this procedure shall be reviewed or revised by NLDC with the approval from the Commission.

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## Assessment of Minimum Economic Shutdown hours for coal fired stations

S no	Plant Name	Installed Capacity	Region	Variable Cost	Unit capacity	Normative Aux Consumption (NAC)	Heat Rate increase in % at 55% load as per IEGC	NAC increase at 55% load as per IEGC	Variable cost at 55% p/f	Fuel cost for one(t) hour one unit operation at 55% load	Oil in kt required for cold start as per IEGC	Approx oil rate in Rs/MT	Approx light up cost for cold start up assuming density of oil as 1.0	Minimum economic shutdown hours
	A	B	C	D	E	F	G	H	I = D*(100-G)/100	J	K	L	M=K*L/100000	N = M/J
				paaise/kWh	MW	%	%	%	Rs/kWh	Rs. lakhs	kt	Rs/MT	Rs. lakhs	hours
1	SIPAT-I	1980	WR	122	660	5.75	3	1	127	4.13	110	20000	22.00	5.3
2	SIPAT-II	1000	WR	125	500	5.75	6	1	134	3.21	90	20000	18.00	5.6
3	SINGRAULI	2000	NR	126	500	6.89	6	1	135	3.19	90	20000	18.00	7.8
4	SINGRAULI	2000	NR	126	200	6.89	6	1	135	3.19	50	20000	10.00	5.5
5	RHANOZ	1000	NR	127	500	5.75	6	1	136	3.26	90	20000	18.00	5.4
6	RHANOZ	1000	NR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
7	KSTPS-II	500	WR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
8	KSTPS	2100	WR	131	500	6.88	6	1	140	3.33	90	20000	18.00	7.5
9	KSTPS	2100	WR	131	200	6.88	6	1	140	3.33	50	20000	10.00	4.7
10	CGPL	4150	WR	135	800	5.00	3	1	141	5.58	130	20000	26.00	5.0
11	RHANOZ	1000	NR	144	500	7.75	6	1	154	3.61	90	20000	18.00	4.8
12	TALSI2	2000	SR	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.8
13	TSTPP-I	1000	ER	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.3
14	SASAN	3960	WR	153	660	6.00	3	1	159	5.17	110	20000	22.00	4.6
15	VSTPS-II	1000	WR	153	500	5.75	6	1	164	3.92	90	20000	18.00	4.5
16	VSTPS-V	500	WR	156	500	5.75	6	1	167	4.00	90	20000	18.00	4.3
17	VSTPS-V	1000	WR	157	500	5.75	6	1	168	4.03	90	20000	18.00	4.3
18	VSTPS-II	1000	WR	162	500	5.75	6	1	174	4.15	90	20000	18.00	5.8
19	VSTPS-I	1160	WR	166	210	9.00	6	1	178	1.73	50	20000	10.00	3.5
20	KHSTPP-II	1500	ER	199	500	5.75	6	1	213	5.10	90	20000	18.00	3.9
21	VALLURNT	1500	SR	203	500	5.75	6	1	217	5.21	90	20000	18.00	3.4
22	NSPCL	500	WR	206	250	8.00	6	1	221	2.38	50	20000	10.00	4.8
23	RSTPS	2100	SR	207	500	6.88	6	1	222	2.10	50	20000	10.00	4.6
24	RSTPS	2100	SR	207	200	6.88	6	1	222	2.10	50	20000	10.00	3.5
25	KHSTPP-I	840	ER	208	210	9.00	6	1	229	5.45	90	20000	18.00	4.6
26	FSTPP	1600	ER	214	500	6.47	6	1	239	2.18	50	20000	10.00	3.2
27	FSTPP-I	1600	ER	214	200	6.47	6	1	237	5.67	90	20000	18.00	3.1
28	RSTPSU7	500	SR	221	500	5.75	6	1	244	5.72	90	20000	18.00	3.1
29	NTPL	1000	SR	222	500	5.25	6	1	244	5.85	90	20000	18.00	3.0
30	FSTPP-II	500	ER	228	500	5.75	6	1	249	5.98	90	20000	18.00	3.1
31	SIHST2	1000	SR	232	500	5.25	6	1	258	5.90	90	20000	18.00	3.8
32	NLCCEP	500	SR	241	500	10.00	6	1	271	2.64	50	20000	10.00	3.7
33	NLCCEP	420	SR	253	210	8.50	6	1	279	2.67	50	20000	10.00	2.7
34	NLCUST1	650	SR	260	210	10.00	6	1	279	2.67	50	20000	18.00	3.5
35	NLCUST2	340	SR	260	210	10.00	6	1	279	2.67	50	20000	10.00	3.5
36	MOUDA-I	1000	WR	260	500	5.75	6	1	290	2.82	50	20000	10.00	2.4
37	UNCHAHAAR	420	NR	271	210	9.00	6	1	292	2.83	50	20000	22.00	2.5
38	UNCHAHAAR	210	NR	272	210	9.00	3	1	287	9.34	110	20000	10.00	2.4
39	BARH	1320	ER	276	660	5.75	6	1	298	2.89	50	20000	18.00	2.3
40	UNCHAHAAR	420	NR	278	210	9.00	6	1	325	7.66	90	20000	18.00	7.6
41	DAORT2	980	NR	303	490	5.25	6	1	329	7.91	90	20000	10.00	7.6
42	JHAJAR	1500	NR	307	500	5.25	6	1	330	3.38	50	20000	10.00	3.0
43	BGTTP	250	AR	308	250	8.50	6	1	346	3.38	50	20000	10.00	3.0
44	DADRT	840	NR	323	210	8.50	6	1	346	3.38	50	20000	10.00	3.0

## Notes:

- 1) <https://bharatpetroleum.com/Our-Businesses/IEGC/Petro-Prices.aspx>. Source for fuel oil prices
- 2) For CGPL, Mandra, oil taken for cold start up is assumed as 130 kl. by extrapolating the figures for 500 MW and 660 MW in the IEGC amendment.
- 3) As per the CEA Technical Standards for construction of electrical plants and electrical lines.
  - Cold start > 72 hours after shutdown when turbine metal temperatures are below 40 °C of full load values
  - Hot start < 10 hours after shutdown when turbine metal temperatures are approximately 80% of full load values
  - Warm start between 10 and 72 hours when turbine metal temperature is between 40-80% of full load values
- 4) Fuel Oil requirement falls to 30% for hot start and 50% for warm start approximately as compared to cold start.



**Format A1: Intimation for Technical Minimum Schedule**

Date: dd/mm/yyyy

From: (Name of Generating Station) / (Name of Owner Organization)

To: SLDC/Beneficiary-B1 / B2 / B3 / .....

CC: ERLDC/NRLDC/NERLDC/SRLDC/WRLDC

Sub: Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,

As per R-0 schedule uploaded by RLDC for (date) \_\_\_\_\_ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. Thus you are requested to review your requisition. If the net schedule remains below technical minimum schedule in R-1 schedule to be issued by RLDC for (date) \_\_\_\_\_, we shall be constrained to take out one/two/three unit(s) under Reserved Shut Down & the unit may remain under RSD for next 72 hours.

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

## Format A2: RLDC direction for suo moto revision for Technical Minimum schedule

Date: dd/mm/yyyy

**From:** (Name of RLDC)

**To:** SLDC/Beneficiary-B1 / B2 / B3 / .....

**CC:** Name of the Generating Station

**Sub:** Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,

As per R-0 schedule uploaded by \_RLDC for (date) \_\_\_\_\_ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. In view of the following grid conditions (at Table-1) this generating unit needs to be kept on bar. \_RLDC hereby revises the schedule at this generating station by raising requisition of the surrendering beneficiaries in those time blocks up to 55% of entitlement in the interest of better operation of the grid in line with regulation 6.5.20 of IEGC. Ramp-up / ramp down adjustment has been done as per regulation 6.5.14 of IEGC.

**Table-1**

S.No.	Time blocks where schedule is moderated for Technical Minimum	Grid Conditions
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

**Format A3: Intimation of Reserve shut down by Generating Station**

Date: dd/mm/yyyy

From: (Name of Generating Station) / (Name of Owner Organization)

To: SLDC/Beneficiary-B1 / B2 / B3 / .....

CC: ERLDC/NRLDC/NERLDC/SRLDC/WRLDC

Sub: Reserve shut down of XYZ generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B.3(iii) of IEGC

Sir/Madam,

Please refer to our intimation (A-1) on less than technical minimum schedule at \_\_\_\_\_ (CGS/ISGS) for date \_\_\_\_\_. The injection schedule still is less than technical minimum schedule in the following time blocks (ref. Table-1 below). Thus in line with IEGC section 6.3B.3(iii) we shall desynchronise unit# \_\_\_\_\_ of \_\_\_\_\_ (CGS/ISGS name) with effect from \_\_\_\_\_th block of date \_\_\_\_\_. This unit shall remain under shut down till \_\_\_\_\_ hours of date \_\_\_\_\_ or further intimation from RLDC which ever is later.

Table-1

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

**POWER SYSTEM OPERATION CORPORATION LTD.**  
(A wholly owned subsidiary company of POWERGRID)  
**SOUTHERN REGIONAL LOAD DESPATCH CENTRE**  
**29, Race Course Cross Road, Bangalore-560 009**  
CIN No. U40105DL2009GOI188682



Ref: SRLDC / OS / 2016 / JUN/1

Dated: 02/06/16

**To**  
**Member Secretary**  
**Southern Regional Power Committee,**  
**Bangalore**

Sub: Detailed operating procedure for taking unit(s) under reserve shut down and identifying generating stations to be backed down upto technical minimum schedule

Ref: NLDC Lr dtd 31.05.16

Dear Sir,

Kind reference is invited to the NLDC letter dt 31.05.16 and further discussion in 31st CSCM held today afternoon wherein SRLDC has presented the details of the draft detailed operating procedure for taking unit(s) under reserve shut down and identifying generating stations to be backed down upto technical minimum schedule prepared by NLDC in line with the 4th amendment to IEGC, 2010 notified on 6th April 2016.

The due date for submission of the draft procedure by NLDC to CERC is 6th June 2016 after consultation with RPCs. It is therefore requested to arrange for the consolidated comments of RPC secretariat and SR constituents if any by 04th June 2016 for enabling timely submission.

Thanking you,

Yours faithfully,  
  
(V Suresh)  
Addl General Manager (OS)

Copy to:

1. Executive Director, NLDC, POSOCO, New Delhi

**Detailed Operating Procedure for  
Taking Unit (s) under Reserve Shut  
down and  
Identifying Generating Stations to be  
backed down up to Technical  
Minimum Schedule  
(Draft)**

02.06.16

# Preamble

CERC (IEGC) (Fourth Amendment) Regulations, 2016 provide

- Option to Central Generating Stations (CGS) or Inter State Generating Stations (ISGS) to go for reserve shut down where the scheduled generation falls below technical minimum schedule.
- Regulation have specified provisions for compensating the CGS or ISGS for additional fuel cost towards operating below normative plant availability factor & for multiple start / stop operations

# Objective

- Lay down the role of different agencies
- Data requirements
- Procedure for taking generating units under reserve shut down
- Methodology for identifying the generating stations or units thereof to be backed down up to technical minimum schedule in specific grid conditions such as low system demand, Regulation of Power Supply, incidence of high renewables etc., based on merit order stacking

# Objective

- Lay down the role of different agencies
- Data requirements
- Procedure for taking generating units under reserve shut down
- Methodology for identifying the generating stations or units thereof to be backed down up to technical minimum schedule in specific grid conditions such as low system demand, Regulation of Power Supply, incidence of high renewables etc., based on merit order stacking



# Scope / Applicability

- RLDCs, SLDCs, CGS & ISGS whose tariff is either determined or adopted by the Central Commission (CERC)
- In case of a generating station whose tariff is neither determined nor adopted by the Commission, the concerned generating company shall have to factor the provisions specified in the aforementioned CERC Regulations in their Power Purchase Agreements (PPAs) entered into it for sale of power or in order to claim compensation for operating at the technical minimum schedule

# **Role of Different Agencies (1) CGS/ISGS**

Generating Agencies shall upload the following figures ex bus for each 15-minute time block on day ahead basis and for every revision on the day of operation

- i. Declared Capability (DC) of CGS / ISGS in MW
- ii. Online Declared Capability (DC) of CGS / ISGS in MW
- iii. Ramp up /down rate unit wise and station wise

# **Role of Different Agencies (2) RLDC**

RLDC shall Upload the following

- i. Declared Capability (DC) of generating station in MW
- ii. On-bar Declared Capability (DC) of generating station in MW
- iii. Ex bus Technical Minimum schedule of the Plant in MW which shall be calculated as 55% of on bar DC of the generating station.
- iv. Ramp-up/Ramp down rate unit-wise & station wise
- v. Ex-bus Entitlement of the beneficiary computed from the on-bar DC in MW
- vi. Ex-bus Entitlement of the beneficiary computed from 55% of on-bar DC in MW
- vii. Ex-bus Requisition received from the beneficiaries in MW
- viii. Cumulative Requisitions of all beneficiaries of the generating station in MW

## **Role of Different Agencies (3)**

### **SLDC/Beneficiaries(1)**

- i. SLDCs shall submit the anticipated demand to RLDCs for the next day as per IEGC.
- ii. SLDCs/Beneficiaries shall furnish requisition to RLDC for the next day (D day) by 15:00 hours of current (D-1) day. SLDCs/Beneficiaries shall submit requisition as per their forecasted requirement.
- iii. SLDCs/Beneficiaries shall check the 'injection schedule' (R0) issued at 1800 hours by RLDCs for compliance to the technical minimum norms.

## **Role of Different Agencies (3)**

### **SLDC/Beneficiaries(2)**

- iv. In case the injection schedule for a generating station is less than its technical minimum, the SLDC/Beneficiary may raise their requisition up to 55% of entitlement if the original requisition submitted earlier is less than 55%.
- v. The above procedure shall be followed by the SLDCs/Beneficiaries RLDCs for all subsequent revisions also.
- vi. Any compensation computed as per Regulation 6.3B shall be borne by the entity, which has caused the plant to be operated at schedule lower than NPAF but at or above technical minimum schedule based on the compensation mechanism finalized by RPCs.

# **Role of Different Agencies (4)**

## **Generating Stations(1)**

- i. The generating station shall coordinate with its beneficiaries for providing requisition for making the injection schedule more than or equal to technical minimum schedule.
- ii. When the scheduled generation falls below the technical minimum schedule, the generating station shall have the option to go for reserve shut down under intimation to concerned RLDC & beneficiaries.
- iii. Considering that the minimum economic shutdown hours for units are in the range of 2-8 hours depending on the unit (details at Annex-1), the generating stations need to take a pro-active approach in shut down and restart of units from the view point of merit order.

## **Role of Different Agencies (4)**

### **Generating Stations(2)**

- iv. The generating station shall submit the details of duration its operation below normative plant availability factor (NPAF) but above technical minimum schedule to the concerned RLDC/SLDC for verification on monthly basis.
- v. The generating station shall submit the required data to RPC/RLDC/SLDCs as per regulation 6.3B.3.

**Conditions under which RLDC may direct the generating stations to operate at a schedule below NPAF but at or above technical minimum.**

- Threat to grid security
- To relieve transmission congestion
- Sudden Change in weather condition
- Natural calamities such as earth quake, flood etc
- Prevailing or anticipated Low Demand conditions
- Due to less requisition received from the beneficiary states
- Suo-moto revision of schedules in the interest of better system operation (IEGC-6.5.20)
- High renewable generation
- Maintaining adequate reserves
- Any other anticipated condition that is likely to affect reliable grid operation



## Methodology for taking generating station or unit(s) thereof under RSD (1)

SL No	Time	Action By	Action	Remarks / To
1	09:00	Generators	Declaration of Declared Capability	RLDC
2	15:00	Beneficiaries	Original requisition for the next day (Dday)	RLDC
3	18:00	RLDC	Ex-Power Plant (Ex-PP) dispatch schedule ( algebraic sum of requisitions of all beneficiaries )	ISGS & Beneficiaries
4	19:00	Generators	If EX-PP injection schedule < 55% then issue Format A-1	Beneficiaries and RLDC
5	21:00	Beneficiaries	Revised Requisition	RLDC
6	21:00	RLDC	Revised Injection schedule	ISGS & Beneficiaries

# **Methodology for taking generating station or unit(s) thereof under RSD (2)**

- If the scheduled generation is < 55% of DC, RLDC shall review the anticipated demand pattern based on the demand forecast given by states & grid conditions to decide whether technical minimum schedule is required to be provided to the generating station.
  - ✓ In case the grid conditions demand so in the interest of better grid operation, RLDC would suo-moto revise the schedule to operate it at or above technical minimum but below NPAF.
  - ✓ Some beneficiary's requisition would go up to ensure technical minimum. RLDC shall issue R-1 schedule accordingly and intimated to the concerned generating station, beneficiaries and the RPC in format A-2 given at Annex-3.
  - ✓ RLDC may also intimate NLDC for invocation of RRAS regulation (up regulation) in case of eligible stations for keeping the unit(s) on-bar for better grid operation if the grid conditions demand so. Such up regulation in real time can be triggered irrespective of prevailing frequency.
  - ✓ (Beneficiaries shall not be allowed to revise the schedule down wards at a generating station where one or more unit(s) are running under technical minimum schedule with suo-moto revision by RLDC.

## **Methodology for taking generating station or unit(s) thereof under RSD (3)**

- ii. If the grid conditions do not demand so, RLDC shall issue R-1 schedule based on the requisitions received. Under such situation, the generating station shall have the option to go for RSD(Reserve shutdown) with intimation to beneficiaries, SLDCs, RLDC and RPC in format A-3 (given at Annex-4).
- iii. In case of exigencies, RLDCs/NLDC could schedule power to the generating station through RRAS up instruction so as to ensure that the required units are available on bar and operating at the technical minimum level of 55%.

## **Methodology for taking generating station or unit(s) thereof under RSD (4)**

Before taking unit(s) under RSD the generating station whose injection schedule is less than technical minimum schedule, it

- i. May offer an opportunity to the beneficiaries to review their requisitions particularly to the beneficiaries who had originally submitted requisition as per full entitlement and would be willing to avail the un-requisitioned power of other beneficiaries of that station.
- ii. May like to sell the requisitioned power under STOA after taking no objection certificate from the concerned beneficiary/SLDC whose un-requisitioned power is intended to be sold under STOA.

## **Methodology for taking generating station or unit(s) thereof under RSD (5)**

- Before taking unit(s) under RSD, the generating station shall bifurcate the DC in two parts –
  - ✓ DC for unit(s) to remain ON-bar &
  - ✓ DC for unit(s) kept under RSD.
- Generator shall ensure that the DC for unit(s) kept under RSD shall not be more than MCR less Normative Auxiliary Consumption.
- DC for unit(s) kept under RSD shall be frozen until its revival from RSD.
- Beneficiaries shall continue to bear the capacity charge corresponding to total DC including unit(s) kept under RSD

## **Methodology for taking generating station or unit(s) thereof under RSD (6)**

- Beneficiary having entitlement in a station more than or equal to the capacity of any unit in the generating station may surrender its entitlement for 24 hours or more in consultation with RLDC.
- In such situation, the RLDC may facilitate RSD of unit(s) of that station on account of the above beneficiary only.
- Drawal schedule of the beneficiary from that generating station shall be restricted accordingly for the specified period as requested.
- Other beneficiaries shall continue to get their full allocation from the total DC in that station. This arrangement could also be extended for two or more beneficiaries in the same generating station.

## **Methodology for taking generating station or unit(s) thereof under RSD (7)**

- Once a unit is taken out under RSD, period for which the unit will remain under RSD shall be 24 hours or less if so specified by the generating station.
- RLDC shall compute & upload entitlements corresponding to DC for unit(s) ON-bar and DC for unit(s) under RSD separately. The injection schedule in such case shall be restricted up to ON-bar DC based on the existing requisitions of beneficiaries.
- One or more beneficiaries and the generating station may decide for revival for unit (s) under RSD with commitment for technical minimum schedule and mutually agreed 'minimum run time' of the unit (s) post revival.
- RLDC may also advise the generating stations to revive unit (s) under RSD for better system operation(IEGC 6.5.20). In such cases RLDC shall ensure technical minimum schedule. Compensation shall be admissible towards start-up cost as per the provisions in the IEGC 4th Amendment.

## **Methodology for taking generating station or unit(s) thereof under RSD (8)**

- Regulation of Power Supply: When injection schedule of a CGS/ISGS falls below technical minimum due to imposition of regulation of power supply under the CERC (Regulation of Power Supply) Regulations 2010 and/or CERC order dated 02.09.2015 in 142/MP/2012 by the CGS/ISGS or a transmission licensee, the generator shall try to schedule the surplus power through STOA or PX before opting for reserve shut down



**Thank You**

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**6<sup>th</sup> April, 2016**

**NOTIFICATION**

**No. L-1/18/2010-CERC:** In exercise of powers conferred under clause (h) of subsection (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, the Central Electricity Regulatory Commission hereby makes the following regulations to amend the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 as amended from time to time (hereinafter referred to as “the Principal Regulations”).

**1. Short title and commencement:**

(1) These Regulations may be called the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016.

(2) These Regulations shall come into force with effect from date of publication in Official Gazette except Sub-Regulation 6.3B which shall come into force on such date as the Commission may appoint by notification in the Official Gazette.

**2. Amendment in Regulation 2 of Principal Regulations-** Following new clauses shall be added after clause (iiii) of Sub-Regulation (1) of Regulation 2 of Principal Regulations as under, namely:

“(jjjj) Date of Commercial Operation or 'COD' shall have the same meaning as provided in Sub-Regulation 6.3A.1, 6.3A.2 and 6.3A.4 of these Regulations.

(kkkk) Trial Operation or Trial Run shall have the same meaning as provided in Sub-Regulation 6.3A.3 and 6.3A.5 of these Regulations.

(llll) Technical Minimum Schedule in respect of Central Generating Stations and inter-State Generating Stations shall have the same meaning as provided in Sub-Regulation 6.3B of these Regulations.”

**3. Amendment in Regulation 6.1 of the Principal Regulations-** Following clause shall be added after clause (d) of Principal Regulations:

“(e) Procedure for declaration of commercial operation of Central Generating Stations, inter-State Generating Stations and inter-State Transmission Systems, and technical minimum schedule for operation of the Central Generating Stations and inter-State Generating Stations”

**4. Amendment in Regulation 6.2 of the Principal Regulations –** Following shall be added at the end of first para of Regulation 6.2 of the Principal Regulations:

“This code also provides for the procedure and mechanism for declaration of commercial operation of Central Generating Stations, inter-State Generating Stations and inter-State Transmission System and technical minimum schedule for operation of Central Generating Stations and inter-State Generating Stations.”

## **5. Addition of new Regulations:**

The following Regulations shall be added after Regulation 6.3 of the Principal Regulations:

### **“6.3A Commercial operation of Central generating stations and inter-State Generating Stations**

1. Date of commercial operation in case of a unit of thermal Central Generating Stations or inter-State Generating Station shall mean the date declared by the generating company after demonstrating the unit capacity corresponding to its Maximum Continuous Rating (MCR) or the Installed Capacity (IC) or Name Plate Rating on designated fuel through a successful trial run and after getting clearance from the respective RLDC or SLDC, as the case may be, and in case of the generating station as a whole, the date of commercial operation of the last unit of the generating station:

Provided that:

(i) Where the beneficiaries / buyers have been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries/buyers and concerned RLDC or SLDC, as the case may be.

(ii) Where the beneficiaries / buyers have not been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the concerned RLDC or SLDC, as the case may be.

(iii) The generating company shall certify that:

(a) The generating station meets the relevant requirements and provisions of the technical standards of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 and Indian Electricity Grid Code, as applicable:

(b) The main plant equipment and auxiliary systems including Balance of Plant, such as Fuel Oil System, Coal Handling Plant, DM plant, pre-treatment plant, fire-fighting system, Ash Disposal system and any other site specific system have been commissioned and are capable of full load operation of the units of the generating station on sustained basis.

(c) Permanent electric supply system including emergency supplies and all necessary instrumentation, control and protection systems and auto loops for full load operation of unit have been put in service.

(iv) The certificates as required under clause (iii) above shall be signed by the CMD/CEO/MD of the generating company and a copy of the certificate shall be submitted to the Member Secretary of the concerned Regional Power Committee and the concerned RLDC / SLDC before declaration of COD. The generating company shall submit approval of Board of Directors to the certificates as required under clause (iii) within a period of 3 months of the COD.

(v) Trial run shall be carried out in accordance with Regulation 6.3A.3 of these Regulations.

(vi) Partial loading may be allowed with the condition that average load during the duration of the trial run shall not be less than Maximum Continuous Rating or the Installed Capacity or the Name Plate Rating excluding period of interruption and partial loading but including the corresponding extended period.

(vii) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to Maximum Continuous Rating or Installed Capacity or Name Plate Rating, the generating company has the option to de-rate the capacity or to go for repeat trial run. Where the generating company decides to de-rate the unit capacity, the demonstrated capacity in such cases shall be more or equal to 105% of de-rated capacity.

(viii) The concerned RLDC or SLDC, as the case may be, shall convey clearance to the generating company for declaration of COD within 7 days of receiving the generation data based on the trial run.

(ix) If the concerned RLDC or SLDC, as the case may be, notices any deficiencies in the trial run, it shall be communicated to the generating company within seven (7) days of receiving the generation data based on the trial run.

(x) Scheduling of power from the generating station or unit thereof shall commence from 0000 hrs after declaration of COD.

2. Date of commercial operation (COD) in relation to a generating unit of hydro generating station including pumped storage hydro generating station shall mean the date declared by the generating company after demonstrating peaking capability corresponding to the Installed Capacity of the generating station through a successful trial run, and after getting clearance from the respective RLDC or SLDC, as the case may be, and in relation to the generating station as a whole, the date of commercial operation of the last generating unit of the generating station.

Provided that:

(i) Where beneficiaries have been tied up for purchasing power from the generating station, trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries and concerned RLDC or SLDC, as the case may be;

(ii) Where the beneficiaries/buyers have not been tied up for purchasing power from the generating station, the trial run shall commence after a notice of not less than seven days by the generating company to concerned RLDC or SLDC, as the case may be.

(iii) The generating company shall certify that:

(a) The generating station or unit thereof meets the requirement and relevant provisions of the technical standards of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 and Indian Electricity Grid Code, as applicable:

(b) The main plant equipment and auxiliary systems including Drainage Dewatering system, Primary and Secondary cooling system, LP and HP air compressor, Firefighting system, etc. have been commissioned and are capable for full load operation of units on sustained basis.

(c) Permanent electric supply system including emergency supplies and all necessary Instrumentations Control and Protection Systems and auto loops for full load operation of the unit are put into service.

(iv) The certificates as required under clause (iii) above shall be signed by the CMD/CEO/MD of the generating company and a copy of the certificate shall be submitted to the Member Secretary of the concerned Regional Power Committee and concerned RLDC or SLDC, as the case may be, before declaration of COD. The generating company shall submit approval of Board of Directors to the certificates as required under clause (iii) within a period of 3 months of COD.

(v) Trial run shall be carried out in accordance with sub-Regulation 6.3A.3 of this Regulation.

(vi) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to Maximum Continuous Rating or Installed Capacity or Name Plate Rating, the generating company shall have the option to either de-rate the capacity or to go for repeat trial run. If the generating company decides to de-rate the unit capacity, the demonstrated capacity in such cases shall be more or equal to 110% of de-rated capacity.

(vii) In case a hydro generating station with pondage or storage is not able to demonstrate the peaking capability corresponding to the installed capacity for the reasons of insufficient reservoir or pond level, the date of commercial operation of the last unit of the generating station shall be considered as the date of commercial operation of the generating station as a whole, and it will be mandatory for such hydro generating station to demonstrate peaking capability equivalent to installed capacity of the generating station or unit thereof as the case may be, as and when such reservoir/pond level is achieved:

(viii) If a run-of-river hydro generating station or a unit thereof is declared under commercial operation during lean inflows period when the water inflow is insufficient for such demonstration of peaking capability, it shall be mandatory for such hydro generating station or unit thereof to demonstrate peaking capability equivalent to installed capacity as and when sufficient water inflow is available. In case of failure to demonstrate the peaking capacity, the unit capacity shall be de-rated to the capacity demonstrated with effect from the COD.

(ix) The concerned RLDC or SLDC as the case may be, shall accord clearance to the generating company within seven (7) days of receiving the generation data based on the trial run.

(x) If the concerned RLDC or SLDC as the case may be, notices any deficiency in trial run, it shall be communicated to the generating company within seven (7) days of receiving the generation data based on trial run.

(xi) Scheduling shall commence from 0000 hrs after declaration of COD.

3. Trial Run or Trial Operation: Trial Run or Trial Operation in relation to a thermal Central Generating Station or inter-State Generating Station or a unit thereof shall mean successful running of the generating station or unit thereof on designated fuel at Maximum Continuous Rating or Installed Capacity or Name Plate Rating for a continuous period of 72 hours and in case of a hydro Central Generating Station or inter-state Generating Station or a unit thereof for a continuous period of 12 hours:

Provided that:

(i) The short interruptions, for a cumulative duration of 4 hours, shall be permissible, with corresponding increase in the duration of the test. Cumulative Interruptions of more than 4 hours shall call for repeat of trial operation or trial run.

(ii) The partial loading may be allowed with the condition that average load during the duration of the trial run shall not be less than Maximum Continuous Rating, or the Installed Capacity or the Name Plate Rating excluding period of interruption and partial loading but including the corresponding extended period.

(iii) Where the beneficiaries have been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries and concerned RLDC or SLDC, as the case may be.

(iv) Units of thermal and hydro Central Generating Stations and inter-State Generating Stations shall also demonstrate capability to raise load upto 105% or 110% of this Maximum Continuous Rating or Installed Capacity or the Name Plate Rating as the case may be.

4. Date of commercial operation in relation to an inter-State Transmission System or an element thereof shall mean the date declared by the transmission licensee from 0000 hour of which an element of the transmission system is in regular service after successful trial operation for transmitting electricity and communication signal from the sending end to the receiving end:

Provided that:

(i) In case of inter-State Transmission System executed through Tariff Based Competitive Bidding, the transmission licensee shall declare COD of the ISTS in accordance with the provisions of the Transmission Service Agreement.

(ii) Where the transmission line or substation is dedicated for evacuation of power from a particular generating station and the dedicated transmission line is being implemented other than through tariff based competitive bidding, the concerned generating company and transmission licensee shall endeavour to commission the generating station and the transmission system simultaneously as far as practicable and shall ensure the same through appropriate Implementation Agreement in accordance with relevant provisions of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 or any subsequent amendment or re-enactment thereof. In case the transmission line or sub-station dedicated to a generator is being implemented through tariff based competitive bidding, then matching of commissioning of the transmission line/sub-station and generating station shall be monitored by Central Electricity Authority.

(iii) Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavour to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement. Where either of the transmission systems or both are implemented through tariff based competitive bidding, the progress of implementation of the transmission systems in a matching time schedule shall be

monitored by the Central Electricity Authority.

(iv) In case a transmission system or an element thereof is prevented from regular service on or before the Scheduled COD for reasons not attributable to the transmission licensee or its supplier or its contractors but is on account of the delay in commissioning of the concerned generating station or in commissioning of the upstream or downstream transmission system of other transmission licensee, the transmission licensee shall approach the Commission through an appropriate application for approval of the date of commercial operation of such transmission system or an element thereof.

(v) An element shall be declared to have achieved COD only after all the elements which are pre-required to achieve COD as per the Transmission Services Agreement are commissioned. In case any element is required to be commissioned prior to the commissioning of pre-required element, the same can be done if CEA confirms that such commissioning is in the interest of the power system.

(vi) The transmission licensee shall submit a certificate from the CMD/CEO/MD of the Company that the transmission line, sub-station and communication system conform to the relevant Grid Standard and Grid Code, and are capable of operation to their full capacity.

Note: Transmission Licensee referred to in this Sub-Regulation shall include “Deemed Transmission Licensee” as per the provision of the Act.

5. Trial run and Trial operation in relation to a transmission system or an element thereof shall mean successful charging of the transmission system or an element thereof for 24 hours at continuous flow of power, and communication signal from the sending end to the receiving end and with requisite metering system, telemetry and protection system in service enclosing certificate to that effect from concerned Regional Load Despatch Centre.

6. Date of commercial operation in relation to a communication system or an element thereof shall mean the date declared by the transmission licensee from 0000 hour of which a communication system or element thereof shall be put into service after completion of site acceptance test including transfer of voice and data to respective control centre as certified by the respective Regional Load Dispatch Centre.

7. In the event of inconsistency between the provisions relating to trial operation and commercial operation as specified in Sub-Regulation 6.3A.1 to 6.3A.6 of these regulations and the provisions of Central Electricity Regulatory Commissions (Terms and Conditions of Tariff) Regulations, 2014 or any subsequent enactment thereof, the provisions of these regulations shall prevail.



### 6.3B – Technical Minimum Schedule for operation of Central Generating Stations and Inter-State Generating Stations

1. The technical minimum for operation in respect of a unit or units of a Central Generating Station or inter-State Generating Station shall be 55% of MCR loading or installed capacity of the unit of at generating station.
2. The CGS or ISGS may be directed by concerned RLDC to operate its unit(s) at or above the technical minimum but below the normative plant availability factor on account of grid security or due to the fewer schedules given by the beneficiaries.
3. Where the CGS or ISGS, whose tariff is either determined or adopted by the Commission, is directed by the concerned RLDC to operate below normative plant availability factor but at or above technical minimum, the CGS or ISGS may be compensated depending on the average unit loading duly taking into account the forced outages, planned outages, PLF, generation at generator terminal, energy sent out ex-bus, number of start-stop, secondary fuel oil consumption and auxiliary energy consumption, in due consideration of actual and normative operating parameters of station heat rate, auxiliary energy consumption and secondary fuel oil consumption etc. on monthly basis duly supported by relevant data verified by RLDC or SLDC, as the case may be.

Provided that:

- (i) In case of coal / lignite based generating stations, following station heat rate degradation or actual heat rate, whichever is lower, shall be considered for the purpose of compensation:

S.No.	Unit loading as a % of Installed Capacity of the Unit	Increase in SHR (for supercritical units) (%)	Increase in SHR (for sub-critical units) (%)
1	85-100	Nil	Nil
2	75-84.99	1.25	2.25
3	65-74.99	2	4
4	55-64.99	3	6

- (ii) In case of coal / lignite based generating stations, the following Auxiliary Energy Consumption degradation or actual, whichever is lower, shall be considered for the purpose of compensation:

Sl. No	Unit Loading (% of MCR)	% Degradation in AEC admissible
1.	85 – 100	NIL
2.	75 – 84.99	0.35
3.	65 – 74.99	0.65
4.	55 - 64.99	1.00

(iii) Where the scheduled generation falls below the technical minimum schedule, the concerned CGS or ISGS shall have the option to go for reserve shut down and in such cases, start-up fuel cost over and above seven (7) start / stop in a year shall be considered as additional compensation based on following norms or actual, whichever is lower:

Unit Size (MW)	Oil Consumption per start up (Kl)		
	Hot	Warm	Cold
200/210/250 MW	20	30	50
500 MW	30	50	90
660 MW	40	60	110

(iv) In case of gas based Central Generating Station or inter-State Generating Station, compensation shall be decided based on the characteristic curve provided by the manufacturer and after prudence check of the actual operating parameters of Station Heat Rate, Auxiliary Energy Consumption, etc.

(v) Compensation for the Station Heat Rate and Auxiliary Energy Consumption shall be worked out in terms of energy charges.

(vi) The compensation so computed shall be borne by the entity who has caused the plant to be operated at schedule lower than corresponding to Normative Plant Availability Factor up to technical minimum based on the compensation mechanism finalized by the RPCs.

(vii) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower than the normative Station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station.

(viii) There shall be reconciliation of the compensation at the end of the financial year in due consideration of actual weighted average operational parameters of station heat rate, auxiliary energy consumption and secondary oil consumption.

(ix) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary

Energy Consumption are lower than the normative station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station in a month or after annual reconciliation at the end of the year.

(x) The change in schedule of power under the provisions of Central Electricity Regulatory Commission (Ancillary Services Operations) Regulations, 2015 shall not be considered for compensation.

4. In case of a generating station whose tariff is neither determined nor adopted by the Commission, the concerned generating company shall have to factor the above provisions in the PPAs entered into by it for sale of power in order to claim compensations for operating at the technical minimum schedule.

5. The generating company shall keep the record of the emission levels from the plant due to part load operation and submit a report for each year to the Commission by 31<sup>st</sup> May of the year.

6. NLDC shall prepare a Detailed Operating Procedure in consultation with the generators and beneficiaries at RPC forums within 2 months' time and submit to the Commission for approval. The Detailed Operating Procedure shall contain the role of different agencies, data requirements, procedure for taking the units under reserve shut down and the methodology for identifying the generating stations or units thereof to be backed down upto the technical minimum in specific Grid conditions such as low system demand, Regulation of Power Supply and incidence of high renewables etc., based on merit order stacking.

7. The RPCs shall work out a mechanism for compensation for station heat rate and auxiliary energy consumption for low unit loading on monthly basis in terms of energy charges and compensation for secondary fuel oil consumption over and above the norm of 0.5 ml/kWh for additional start-ups in excess of 7 start-ups, in consultation with generators and beneficiaries at RPC forum and its sharing by the beneficiaries.

Sd/-  
(Shubha Sarma)  
Secretary

Note: Principal Regulations were published in Gazette of India, Extraordinary, Part-III, Section 4 at Serial No. 115 on 28.4.2010, the first amendment to the Principal Regulations were published in the Gazette of India, Extraordinary, Part-III, Section 4 at Serial No.60 on 6<sup>th</sup> March, 2012; the second amendment to the Principal Regulations were published in the Gazette of India, Extraordinary, Part-III, Section 4 at Serial No. 08 on 6<sup>th</sup> January, 2014; and the third amendment to the Principal Regulations were published in the Gazette of India, Extraordinary, Part-III, Section 4 at Serial No. 271 on 10<sup>th</sup> August, 2015.