NTPC Limited

NTPC Comments on Draft CERC (IEGC) (Fifth Amendment) Regulations 2016

CERC vide its public notice dated 9th Dec-2016 has sought comments on Draft IEGC (5th Amendment). The Proposed Amendments and Clause-wise Comments of NTPC are as follows:

1. **Amendment of Regulation 2 of Principal Regulations**

   a) Regulation 2.(1) (sss) 'Definition' of Spinning Reserves shall be substituted as under:-

   "The Capacity which can be activated on the direction of the system operator and which is provided by devices including generating stations/ units, which are synchronized to the grid and able to effect the change in active power."

   c) Regulation 2 (2) may be replaced with the following:

   "Words and expressions used in these regulations and not defined herein but defined in the Act or other relevant CERC Regulations shall have the meaning as assigned to them under the Act or relevant CERC Regulation."

2. **Amendment of Part 1 of Principal Regulations-**

   Following clause shall be added at the end of Regulation 1.4 (v)

   "This section will also cover scheduling and despatch of power of ISGSs for operation of Ancillary Reserve Services, for utilization of Un-requisitioned surplus power and for operation of Spinning Reserves with the process of the flow of information between the Generating Stations, National Load Despatch Centre, Regional Load Despatch Centre, Power Exchanges, the State Load Despatch Cent res and other concerned users."

3. **Amendment of Part 2 of Principal Regulations-**

   a)**Following shall be added as Regulation 2.2.1 (m)**

   "Coordination with ISGSs, Regional Load Dispatch Centers, State Load Dispatch Centers and Regional Power Committees for implementation of Ancillary services, prudent utilization of Un-requisitioned power, and identification and operation of Spinning Reserves at inter-State level as per Detailed Procedure and Regulations specified by the Commission."

   b) **Regulation 2.2.2 (i) may be replaced as under:**

   "NLDC shall be the nodal agency for collective transactions and Ancillary Services including Spinning Reserves."

   c) **Regulation 2.3.2 (g) may be replaced as under:**

   "Operation of Ancillary Services including Spinning Reserves."

   d) **Following shall be added as Regulation 2.4.2 (i) & (j)**

   "2.4.2 (i) – To perform the functions as mandated under the Central Electricity Regulatory Commission (Ancillary Services Operation) Regulations, 2015."

2.4.2 (j) -To maintain the account of energy transacted under Ancillary Services Operation including Spinning Reserves "

e) Following shall be added as clause 2.7.1 (f)-
"be responsible for the functions as mandated in the detailed procedures under Central Electricity Regulatory Commission (Ancillary Services Operation) Regulations, 2015."

NO COMMENTS ON THE AMENDMENTS PROPOSED UNDER SL .NO. 1, 2 & 3 ABOVE.

4. Amendment of Part 5 of Principal Regulations
Amendment Proposed

a) Regulation 5.2 (f): "All thermal generating units of 200 MW and above and all hydro units of 10 MW and above" shall be substituted with ***"All Coal / lignite based thermal generating units of 200 MW and above, Open Cycle Gas Turbine/Combined Cycle generating stations having gas turbines of capacity more than 50 MW each and all hydro units of 25 MW and above".***

b) In 5.2 (f) (i)(a) word "Thermal generating units" shall be substituted with words "Coal/ lignite based thermal generating units."

c) In 5.2 (f)(i)(b), the words and number "10 MW" shall be substituted with the words and number "25 MW".

d) Following shall be added as clause 5.2 (f)(i) (c) –
"Open Cycle Gas Turbine/Combined Cycle generating stations having gas turbines of capacity more than 50 MW each: with effect from 01.04.2017"

e) Regulation 5.2 (f)(ii) (a) may be substituted as follows:
"There should not be any reduction in generation in case of improvement in grid frequency below 50.05 Hz (for example, if grid frequency changes from 49.9 to 49.95 Hz, or from 50.00 to 50.04 Hz there shall not be any reduction in generation). For any fall in grid frequency, generation from the unit should increase as per generator droop upto a maximum of 5% of the generation subject to ceiling limit of 105% of the MCR of the unit having regard to machine capability".

f) In Regulation 5.2 (f)(iii) words "Gas Turbine/combined cycle Power Plants" shall be removed

NTPC COMMENTS ON PROPOSED AMENDMENT IN REGULATION- 5.2(f)/ 5.2(f)(i)(c)/ 5.2.(f)(ii)(a)/ 5.2.(f)(iii)

Hon'ble Commission may appreciate the fact that classical governor control system is in built by design in units of OCGT / CCGT stations. RGMO / FGMO

with Manual Intervention (MI) is technically feasible but will require suitable modification / retrofitting in the existing system with the help of the OEMs and will take time before it can be implemented.

Accordingly, a suitable timeline may be allowed by Hon'ble Commission for implementation of RGMO/ FGMO with MI in the OCGT/ CCGT stations.

NTPC's views on Primary Reserves requirement in India are given below, as part of our comments to Regulation 5.2 (h). Hon'ble Commission may kindly consider the various aspects highlighted thereir. before finalizing the Draft Amendments.

(g) Amendment of Regulation 5.2(h) of the Principal Regulations:

Amendment Proposed

i) The existing Clause 5.2(h) to be replaced with

"All coal/lignite based thermal generating units of 200 MW and above, Open Cycle Gas Turbine/Combined Cycle generating stations having gas turbines of capacity more than 50 MW each and all hydro units of 25 MW and above operating at or up to 100% of their Maximum Continuous Rating (MCR) shall have the capability of (and shall not in any way be prevented from) instantaneously picking up to 105%, 105% and 110% of their MCR, respectively, when the frequency falls suddenly."

ii) Following para may be added at the end of clause 5.2 (h):

"For the purpose of ensuring sustainable primary response, RLDCs/SLDCs shall not schedule the generating units beyond ex-bus generation corresponding to 100% of the Installed capacity.

Further, Valve Wide Open (VWO) operation of units is not allowed so that there is margin available in valve opening for providing primary response upto 5% of the generation level. In case of gas/Liquid fuel based units also, adequate margins while scheduling should be kept by RLDCs/SLDCs in due consideration of prevailing ambient conditions of temperature and pressure viz. a viz. site ambient conditions on which installed capacity of these unit s have been specified.

Provided that the VWO margin shall not be used by RLDC to schedule in Ancillary Services."

NTPC COMMENTS ON PROPOSED AMENDMENT IN REGULATION- 5.2(h)

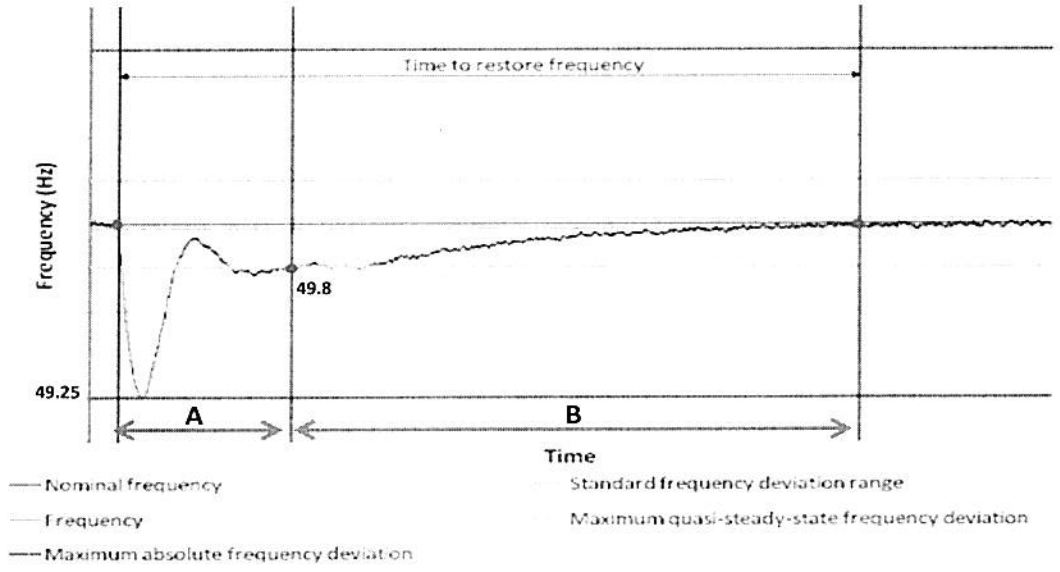
(A) Comments on Primary Reserve Requirement in India

Primary control (governor control) is used for frequency stabilization after a large disturbance which operates in seconds (proportional control), the Secondary control restores the primary reserves & frequency to target frequency (50 Hz) and operates in minutes (Integral control) and the tertiary control restores secondary reserves and operates in tens of minutes. For keeping primary reserves, it is necessary to define "event" / "disturbance" and also the quasi steady state frequency by which entire reserves should be harnessed. In absence of

secondary control in Indian grid, target frequency is also not fixed. However considering the target frequency of 50 Hz and a quasi steady state frequency of 49.8 Hz (Δf=-0.2 Hz) due to outage of largest power station in the country as a credible contingency, following example can be considered for keeping primary reserve.

- Power demand and corresponding generation considered as 150,000 MW at 50Hz at the time of disturbance.
- "Disturbance" / "Event": Outage of largest power station or as per NERC / WECC guideline 3% of Generation i.e 4,500 MW is considered as event of credible contingency.
- Load damping** of 4% and
- Governor Droop Setting*** of 5% is assumed.

Parameter	Unit	Peak Load
Demand	MW	150,000
Generation	MW	150,000
"Disturbance" Generation outage, ΔP_G	MW	4500
Post trip Generation, P_G' ($=P_G - \Delta P_G$)	MW	145,500
Capacity of Machines on Governor control to deliver primary response.	MW	40,000
D (Load Damping)**	MW/Hz	6,000
1/R (Governing)***	MW/Hz	16,000
AFRC, β = (D + 1/R)	MW/Hz	22,000
$\Delta f = \Delta P_G \div \beta$	Hz	-0.20
$f = f_N + \Delta f$	Hz	49.80



From the above calculation for the present situation of Indian grid, the frequency decline can be arrested to -0.2 Hz (quasi Steady State Frequency at 49.8 Hz if nominal frequency is maintained at 50 Hz by Secondary Control) in case of

outage of largest power station if Primary reserve or Governor control is ensured on units having total capacity of only approx 40,000 MW out of in service (synchronised to Grid) Thermal generation of approx 150,000 MW The maximum absolute frequency deviation can also be arrested at ove 49.25 Hz which is above the acceptable range of UCTE.

1. So, putting RGMO / FGMO with MI in almost all machines as proposed in the IEGC, even in the Gas Turbines, is a luxury attracting in-fructuous/ avoidable expenditure for making the old systems RGMO compliant.

2. Even withholding cheaper power of Pit head stations like Sipat, Singrauli, Korba etc for the purpose of primary response is also against the theory of economic despatch.

Hence Primary Reserve margin may be kept in those machines whose variable cost is moderately high and operating at part load. System operator should carry out such study and earmark those 40,000 MW plus machines which must be operated on Governor control (not RGMO) and support grid security in the event of disturbances.

The prerequisite to the above is to keep frequency within the governor dead band of target frequency of 50 Hz by Secondary Control, which can be achieved through implementation of AGC mechanism.

Till that time, the way forward is as follows:

I. Keep these stipulations in IEGC regarding Governor Control in abeyance, as the same remained suspended from 2004 to 2010, to be re-introduced in its uncorrupted form as "Governor Control" at a future point in time after introduction of secondary control and frequency constancy is achieved.

II. Discard all the unconventional and non-standard changes incorporated in the Governor Control logic by several generators to meet the stipulations of RGMO and FGMO. Discard the locally coined terms of FGMO and RGMO from use and align with the internationally accepted terminology of "Governor Control". Re-establish uncorrupted Governor Control in all our machines. This has also been recommended by M/s Solvina International.

III. Introduce Secondary Control in time bound manner, duly supplemented by Tertiary Control.

IV. Once Secondary Control and Tertiary Control are successfully introduced, we will be able to control frequency at a constant value and maintain Inter-Regional exchanges to schedule for more than 99% of the time. The only deviations

remaining to be taken care of will then be the large frequency deviation events (like a large unit tripping, loss of large load area etc).

V. After completion of these only, we should go for introducing Primary Control. All generating units with the exclusion of spilling hydro, waste heat recovery units and RE sources must then be operated on Governor Control in its purest form. Since we have not commenced carrying reserves for Primary Control, the Governor control will work only in the direction of reducing generation for large frequency rise events. All machines on Governor Control must provide this service.

VI. It will then be the proper time for us to introduce Primary Control Reserves. The minimum required quantum of Primary Control reserve must now be carried on the committed generating units in highest incremental cost bracket. Large pondage hydro units having no risk of spilling, if committed in service will also be an ideal choice. This quantum required can of course be worked out easily as shown in the example. Each of these machines may carry 10-20% of its capacity as Governor Reserve. How these machines can be made to deliver this reserve in under 1 minute will also have to be looked into.

VII. In the above sequence, a full-fledged frequency/interchange control system, at par with any other electricity system in the world can be achieved.

(B) Cost of Carrying 5% Primary Reserves in all machines

The cost of carrying the reserves needs to be considered while proposing that the units will not be scheduled by RLDC/SLDC beyond ex-bus generation corresponding to 100% of the Installed Capacity. The excess capacity available in each generating unit, including the zero cost hydro units, by their overload capability or otherwise, will remain unused for most of the time. The Electricity Act requires the Hon'ble Regulatory Commissions to make recommendations to bring about efficiency and economy in the industry.

Let us examine the cost of carrying 5% Primary Control Reserve, on all machines in the system, uniformly.

Let us imagine our 120,000MW system carrying a Primary Control Reserve Capacity of 6,000MW (5% uniformly on all machines). Let us also assume for simplicity 50% of the entire capacity is low cost energy (Pit Head Stations, Hydro etc) having an average variable cost of Rs.1.25/kWh and the other 50% capacity has an average variable cost of Rs.3.25/kWh. Our stipulation of carrying 5% capacity reserve uniformly on all machines, translates to 3,000MW of the low variable cost capacity and 3,000 MW of high variable cost capacity remaining unused, for near 100% time. Obviously, to meet the 3,000MW load in the system vacated by the first 3,000MW capacity being in service presently will have to be served for 100% time from the latter high cost capacity units.

By dispatching the low cost capacity fully and carrying the 3,000 MW additional reserve capacity on the higher variable cost units (10% on 50% capacity of 60,000MW) we will be deploying 3,000 MW generation at Rs 1.25/kWh while withdrawing the same quantum at Rs 3.25/kWh. The annual saving made would be Rs 5256 Crore in the system.

Hon'ble Commission may consider the disadvantages of restricting the scheduling to ex-bus generation corresponding to 100% installed capacity and withdraw the proposed amendments for this purpose.

Notwithstanding the above, in the event Hon'ble Commission decides to implement the proposed draft regulation 5.2(h), it will be required to revise the operating norms of generating stations. This is because, the Operating Norms have been earlier fixed based on actual performance achieved by Stations in the previous years. Such performance included the generation level and hence better operating norms achieved out of the excess capacity available beyond the Installed Capacity. Since this capacity will no more be available for despatch, it would lead to deterioration in performance norms of many of the Stations.

6. Amendment of Part 6 of Principal Regulations:

a) Amendment to Regulation 6.5

Amendment Proposed

i) Clause 3, shall be substituted as follows:

"By 1 PM every day, the ISGS shall advise the concerned RLDC, the station-wise ex-power plant MW and MWh capabilities foreseen for the day after the next day, i.e., from 0000 hrs to 2400 hrs of the day after the next day."

NO COMMENTS

Amendment Proposed

ii) Clause 4 shall be substituted as follows:

"The above information of the foreseen capabilities of the ISGS and the corresponding MW and MWh entitlements of each State, shall be compiled by the RLDC every day for the day after the next day, and advised to all beneficiaries by 3 PM. The SLDCs shall review it vis-à-vis their foreseen load pattern and their own generating capability including bilateral exchanges, if any, and advise the RLDC by 5 PM their tentative drawal schedule for each of the ISGS in which they have Shares, long-term and medium-term bilateral interchanges, approved short-term bilateral interchanges."

NO COMMENTS

Amendment Proposed

iii) Existing clause no.7 shall be substituted as follows:

"7. By 7 PM each day, the RLDC shall convey:

(i) The ex-power plant "despatch schedule" to each of the ISGS, in MW for different time block, for the day after the next day. The summation of the

ex-power plant drawal schedules advised by all the beneficiaries shall constitute the ex-power plant station-wise despatch schedule.

(ii) The tentative "net drawal schedule" to each regional entity, in MW for different time block, for the day after the next day next day. The summation of the station-wise ex-power plant drawal schedules from all ISGS and drawal from /injection to regional grid consequent to other long term access, medium term and short–term open access transactions, after deducting the transmission losses (estimated), shall constitute the regional entity-wise drawal schedule.

(iii) ISGS wise Un-requisitioned surplus (URS) power to ISGS and SLDCs.

COMMENTS:

Clause 7.(iii) may be modified as: By 7 PM each day, RLDC shall convey "ISGS wise Un-requisitioned surplus (URS) power to SLDCs and Beneficiary-wise URS power to ISGS."

Amendment Proposed

iv) Clause 8 shall be substituted as follows:

8(a) Original Beneficiaries of an ISGS will have first right to give requisition for the URS power of the ISGS. Such original beneficiaries shall advice RLDCs, through their SLDCs, regarding quantum of power and time duration of such drawal out of declared URS of the ISGS, by 8 P.M. In case full URS of an ISGS is requisitioned by more than one original beneficiary, RLDC shall allocate URS proportionately based on the share of these original beneficiaries in the ISGS.

8(b) RLDCs to post the ISGS wise data of balance URS on its website by 9 P.M. after modifying the tentative net drawal schedule of the original beneficiaries after taking into account the URS requisitioned and associated transmission losses.

COMMENTS:

Clause 8(b) may be modified as: "RLDC shall convey Beneficiary-wise URS power to ISGS after modifying the tentative net drawal schedule of the original beneficiaries after taking into account the URS requisitioned and associated transmission losses."

This is necessary because, based on this detail only Generator will be able to proceed for sale of total available URS power in market and later on after sale will be able to apportion the Gains accrued from URS-sale among the concerned beneficiaries on pro-rata basis.

Amendment Proposed

8(c) ISGS may sell the balance URS power left after completion of the process of requisition by other original beneficiaries of the plant, in the market. The original beneficiary shall communicate by 12 PM about the quantum and duration of such URS power to ISGS to enable ISGS sell same in the market.

If the original beneficiary fails to communicate to ISGS, then the ISGS shall be entitled to sell the URS power of the beneficiary in the market.

COMMENTS:

For the purpose of clarity the time mentioned as 12 PM in the Regulation 8(c) may be mentioned in HRS i.e. 24:00 hrs.

The requirement of communicating about the quantum is redundant. As per the Tariff Policy the quantum not requisitioned is to be communicated by Beneficiary to the Generator. Under the scheduling process, the availability, entitlement, requisitioning and scheduling is being coordinated by RLDC. Hence the quantum which is not requisitioned should be provided beneficiary-wise by RLDC to the Generator. Original beneficiaries may revise their requisition between 21:00 hrs to 24:00 hrs on the (D-2) day. By 24:00 Hrs of (D-2) day, RLDC shall post the beneficiary-wise URS Data of all ISGS on its website.

A mechanism may be further provided to prevent any initial undue over-requisitioning on (D-2) day as a margin/ cushion which may be subsequently surrendered in real time by beneficiaries at the time of actual drawl. This may frustrate the process of making available cheaper un-requisitioned power to other needy beneficiaries in the country as envisaged in the Tariff Policy. Accordingly, a persistent URS/ surrender of power by more than 5% of schedule in the individual time-blocks for consecutive 3 days may not be allowed.

Clause 8(c) may be accordingly modified as follows:.

8(c-i): RLDC shall post the beneficiary-wise URS Data on its website by 24:00 Hrs. of (D-2) day after incorporating any revision in requisition of Original Beneficiaries if any sought by them till 24:00 hrs. of (D-2) day.

8(c-ii): ISGS may sell the available URS power left after completion of the process of requisition in the market by 18:00 hrs of (D-1) day. During the period of Sale process, no revision in availability, entitlement, scheduling etc. will be done.

8(c-iii): Any continuous and persistent over-requisition by beneficiary on the (D-2) day and subsequent relinquishment on the (D-1) day or (D) day by more than 5% of its Schedule for consecutive 3 days shall be construed as gaming. After consecutive 3 days of more than 5% surrender of URS power by beneficiary in the real time (Final implemented schedule), ISGS can sell the URS power in the market on the 4^{th} day based on previous day's actual URS power of the beneficiary.

Amendment Proposed

8(d) The URS which has been sold and scheduled by ISGS in the market (power exchange or through STOA) cannot be called back by the original beneficiary.

COMMENTS:

In order to facilitate implementation of above the following may also be included in Regulation 8(d) beforehand in the beginning – "After the market (DAM) results are known, ISGS shall inform the respective beneficiaries by 19:00 hrs about the quantum of URS power sold in market from their share."

8(e) After sale in market as under 8(d) above, if any power still remains under URS, the same may be requisitioned by the beneficiaries of the station.

8(f) By 6 P.M, each day, RLDC shall convey ex-power power plant dispatch to each ISGS for the next day after incorporating sale in market.

8(g) Any change in drawals/ foreseen capacities shall be communicated to RLDCs by 10 P.M of the day prior to day of scheduling."

7. New Regulation 6.5(A): New Regulation "6.5 (A)" shall be added after Regulation 6.5 as follows:

"6.5 (A) Scheduling and commercial settlement of energy exchanged under Ancillary services including Spinning Reserves and URS:

a. The Central Electricity Regulatory Commission (Ancillary Services Operations)Regulations, 2015 provides detailed frame work of scheduling and despatch, withdrawal, energy accounting and commercial settlement of Reserves Regulation Ancillary Services.

b. In case of spinning reserves, the Scheduling and commercial settlement of energy exchanged shall be as per the framework to be notified separately by the Commission.

c. In case the un-requisitioned surplus power surrendered by the original beneficiary is requisitioned by the other beneficiaries of the ISGS, it shall be treated as reallocation and the fixed charge and variable charge for such energy exchanged shall be borne by the other beneficiary(ies).

COMMENTS:

The methodology of temporary re-allocation for URS scheduling among beneficiaries is implemented for more than 5 years. However, the URS power of ISGS has been still increasing including from the Pit head power stations.

In order to facilitate scheduling of more URS power, it is required to allow scheduling of URS power from an ISGS in the real time (from 1900 hrs of D-1 day) by any of the State beneficiary in the country and should not be limited to only the original beneficiary of the ISGS.

Further, the scheduling of such URS Power should be permitted only at variable charge and the fixed charge liability for such quantum should remain with original beneficiary.

Amendment Proposed

d. In case of sale of un-requisitioned surplus power in market, the generator and the original beneficiary would share the realized gains in the ratio of 50:50. This gain shall be calculated as the difference between selling price of such power and fuel charge including incidental expenses. Subject to provisions to CERC Tariff Regulations, the liability of fixed charge in such case shall remain with original beneficiary.

COMMENTS

Regulation 6.5(A)(d): The following activities may also be included and specified in the Regulations to avoid any post-sale issue.

- The basis of fuel charge for the purpose of calculating Gain may be clarified in the Regulations - whether it will be the Actual Variable Charges or Normative Variable Charges.

- The gain sharing by ISGS will be done on monthly basis.

- The final Variable/ Fuel Charge for the Gain calculation shall be reckoned after the Third Party sample results for GCV of coal for the month is received. There will be no subsequent revision in the Fuel Charge (upward or downward) for the purpose of Gain calculation.

- If the URS power sale is lower than the total URS power available from different beneficiaries in an ISGS, the gain sharing will be on pro-rata basis in proportion to URS made available by concerned beneficiary.

- In case of any Unit Outage and consequent revision of Station DC during real-time operation, URS power of each beneficiary will be revised. Accordingly, URS contributed by beneficiaries for the Gain calculation will also be revised.

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