CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. 302/MP/2013

Coram:
Shri Gireesh B. Pradhan, Chairperson
Shri A.K Singhal, Member

Date of Hearing: 05.06.2014
Date of Order : 23.10.2015

In the matter of

Endangering the secured grid operation on Southern region (SR) through inadequate/ non-performance of Restricted Governor Mode Operation (RGMO)/ Free Governor Mode Operation (FGMO) with Manual Intervention (MI) and Noncompliance of Regulation 5.2(f), (g), (h), (i) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations 2010 read along with 5(2) of the Central Electricity Regulatory Commission (Indian Electricity Grid code) (First Amendment), Regulations 2012 by the Generators in Southern region.

And
In the matter of

Southern Regional Load Despatch Centre,
29, Race Course Cross Road
Bangalore- 560009 **….Petitioner**

Vs

1. Andhra Pradesh Power Generation Corporation Limited (APTRANSCO)
Vidyutsaudha, Khairatabad,
Hyderabad- 500082, Andhra Pradesh

2. Andhra Pradesh Power Generation Corporation Limited (APGENCO)
Vidyutsaudha, Khairatabad,
Hyderabad- 500082, Andhra Pradesh

3. Karnataka Power Corporation Limited
Shakti Bhawan, 82, Race Course Road,
Banbalore- 560001

4. Karnataka Power Transmission Corporation Limited
Cauvery Bhavan, K.G. Road, Bangalore- 560009

5. Tamil Nadu Generation and Distribution Corporation Limited
NPKRR Maaligai, 800, Anna Salai, Chennai- 600002

6. Kerala State Electricity Board
Vaidyuthi Bhavanam,
Pattom, Thiruvananthapuram- 695004

7. SLDC, TANTRASCO
NPK RR Maaligai
144, Anna Salai, Chennai- 60002

8. NTPC Southern Region HQ,
2nd and 5th floor, MCH Complex,
R.P. Road, Secunderabad- 500003

9. SLDC, KSEB,
Kalamassery,
Ernakulam distt., Kerala,

10. Talcher Super Thermal Power Plant Stage-II
NTPC Limted, P.O.- Deepshikha
Dist- Angul, Talcher, Orissa- 759147

11. Ramagundam Super Thermal Power Station
P.O. Jyotinagar, Distt., Karimnagar- 505215
Andhra Pradesh

12. TS-I (Expn) NLC
NO. 135, Periyar EV R High Road, Kilpauk,
Chennai- 600010
Tamil Nadu

13. TS-II, NLC
No. 135, Periyar EV R High Road, Kilpauk,
Chennai- 600010
Tamil Nadu

14. Simhadri Super Thermal Power project
P.O. NTPC Simhadri,
Distt. Vishakhapatnam- 531020.

15. Udupi Power Corporation Ltd.
2nd flor, Le Pare Richmonde
51, Richmonde Road,
Bangalore- 560025

16. JSW Energy Limited

Post box no.9, Toranagallu
Dist. Bellary- 583275

17. NTPC Tamil Nadu Energy Company Ltd.,
Vallur Thermal Power project,
P.O. Velliviyal, Chavadi, Ponneri
Chennai- 600103

18. Central Electricity Authority **....Respondents**
Sewa Bhawan, R.K. Puram
New Delhi- 110022

Following were present:

Shri V. Suresh, SRLDC
Ms. Jayantika Singh, SRLDC
Shri S. Vallinayagam, Advocate, AP, SLDC, TANGEDCO, TANTRASCO
Smt. Swapna Sheshadri, Advocate, SLDC, Karnataka
Shri N.V. Raghuram, KPCL
Shri M. Jojhikrishnan, NTECL Vallur
Shri Ajay Dua, NTPC Limited
Shri Rohit Chabra, NTPC Limited
Shri A.S. Pandey, NTPC Limited
Shri K.P. Sabpathy, NTPC Limited
Shri Uday Shankar, NTPC Limited
Shri R. Kumar, KPCL
Shri G. Sreenivasan, KSEB
Shri P.D.M.V. Prasad, UPCL, Bangalore
Shri K. Palanirajan, Bangalore
Shri R. Pugazhendi,Bangalore

ORDER

The petitioner, Southern Regional Load Dispatch Centre, has filed the petition seeking direction to the respondents to comply with the provisions of Regulation 5.2 (f) (g), (h) and (i) of the Central Electricity Regulatory Commission (Indian Electricity Gird Code) Regulations, 2010 (Grid Code). The petitioner has made the following prayers:

> "(a) Direct all the generators in the Southern Region to ensure strict compliance of Regulation 5.2 (f), (g), (h) and (i) and deliver RGMO performance to the extent of mandated level;

(b) Direct to submit the detailed action plan with documents for implementation of RGMO/FGMO with IM for the eligible units in a time bound manner;

(c) Direct all the generators to declare availability with due consideration for contribution through RGMO/FGMO with IM at all generation level;

(d) Direct SLDC to monitor effectively and analyze the RGMO performance in their control area and take up appropriately on the default instances;

(e) Direct all the generators to declare COD of new generating units with RGMO feature in service and delivering the mandated contribution;

(f) Direct all the generators to get approval of Hon'ble Commission whenever the expected duration of outage of RGMO feature exceeds more than a week due to technical/operational limitations; and

(g) Issue any other suitable directions as deemed fit."

2. The petitioner has submitted as under:

(a) All the eligible and non-exempted generators including Central and State Generating Stations, in Southern Region have confirmed that Restricted Governor Mode Operation (RGMO)/Free Governor Mode Operation (FGMO) with Manual Intervention (MI) for their generating stations have been kept in service in terms of the provisions of the Grid Code. There are 269 units in Southern Region with installed capacity (I.C) of 30944 MW. Out of these, 10 units with I.C of 770 MW have been exempted by the Commission from RGMO/FGMO operation due to various reasons. As such, 259 units with I.C of 30174 MW are required/eligible to provide primary response in terms of Regulation 5.2 (f), (g), (h) and (i) and Regulation 5(2) of the Grid Code. Accordingly, excluding the units exempted by the Commission, about 18840 MW and 11334 MW capacity of the thermal and hydro units are expected to contribute through RGMO or FGMO with MI.

(b) All the difficulties/issues expressed by the generators in the implementation of FGMO were deliberated in detail through public hearings before issuing the Grid Code and its amendments. The issues of specific generators were analyzed through petitions and suitable directions were given by the Commission in this regard. As per the Commission`s direction, expert committees were also constituted separately to study the difficulties involved in thermal and Hydro generating units for implementation of RGMO/FGMO. Consolidating the experience gained, difficulties expressed by the generators and recommendations of the expert committees, the Commission had given a unique solution viz. RGMO suiting Indian scenario, wherein maximum contribution of each generating unit is limited up to 5% of MCR. Also, the provision of inherent non-response suggested during rise in system frequency when the frequency is below 50.2 Hz/50.5 Hz (amended), reduces the stress on the Governor.

(c) In addition, the operating frequency band in the country has been narrowed in phased manner over the years. The present frequency band is far conducive for the generating units to deliver better RGMO/FGMO performance than what was a decade back.

(d) The status of implementation and performance of RGMO/FGMO with MI in SR is far below the required level specified in the Grid Code. As per the detailed analysis of unit-wise performance during specific instances for the period from June 2013 to September, 2013, only 95% of possible relief was

considered to compute the consolidated % response of units in SR to accommodate some of the machines likely operating with on bar generation more than 100% MCR.

(e) In various meetings, matter of non-performance of RGMO/FGMO was taken up with all the constituents. Technical sessions/workshops on the Grid Code and other regulatory provisions were regularly conducted at the constituent`s premise to get better involvement at operator`s level. Despite these measures, RGMO/FGMO with MI performance in Southern Region is far below the mandated level.

(f) There have been major instances of frequency excursions during the period from May, 2013 till October, 2013. During that period desired primary response in terms of the provisions of the Grid Code has not been provided by the eligible units. The observed response during these instances was of the order of 15 to 30% of the Grid Code mandated response.

(g) The matter has been regularly taken up in the OCC/TCC/SRPC meetings of SRPC. NLDC is submitting periodical reports to the Commission in this regard.

(h) In the OCC meeting, in which the representatives of all the generating stations in Southern Region were present, SRLDC explained the following initiatives taken in the recent past:

(i) A new practice of conducting regular special meetings on RGMO and VAR management has been commenced in Southern Region in which the representatives of all the major generating

stations including ISGS and State owned generating stations and IPPs participate.

(ii) Individual coordinators from each generating station are identified by the respective constituents.

(iii) A separate web-group has been created to facilitate posting of event details to be analyzed by SRLDC within two days of the event.

(iv) Coordinators from all the generating stations would post the unit wise generation data as recorded at their end for a period +/- half-an-hour of the instant, within two days of posting by SRLDC.

(v) Detailed analysis done by SRLDC for all the posted instants by validating SCADA data with generator`s data and post in the web group. For the purpose of analysis, SRLDC considers the data for a period of two minutes of the specified instance. Wherever significant variation is observed w.r.t. to SCADA data, generator`s data has been adopted to conduct analysis.

(vi) During the special meetings, the details of performance of individual units and also reasons for deviation of data, if any, are discussed in detail.

(i) During the special TCC meeting held on 30.9.2013, all the generators in Southern Region have endorsed that the analysis conducted by SRLDC is correct. The issue of correctness of data generally does not arise as the data validation has been done w.r.t. data received from the generators.

(j) The units delivering 70% of mandated RGMO performance is termed as performing unit giving the benefit of analysis to all the units though few

units may be operating at 6% droop characteristic, as the permissible operating droop is 3% - 6% as per the provisions of the Grid Code. The following guidelines are considered for broad categorization of performance level of the individual unit:

S.No.	RGMO Performance level	Categorization as
1	Performance of 70% and more than that of mandated value	Responded Unit
2	Performance of below 70% but above 30% of mandated value	Partially Responded unit
3	Performance of 30% and below of mandate value	In-sufficiently Responded Unit
4	No change in Generation level	Non-responsive unit
5	Change in Generation opposite to the desired direction	Reverse Responsive Unit

(k) The following was observed from the analysis of specific instances and the Minutes of Special Meetings of SRPC:

(a) The performance was about 15%-30% of the mandated/expected performance level.

(b) None of the units are consistent in performance.

(c) Generally Hydro units like Sharavathi, Iddukki are performing.

(d) Units like UPCL, NLC TS-I Expansion, Hydro units of TANGEDCO, etc., were delivering reverse response at some of the instances.

(e) Number of time, RGMO feature is kept out by the generator without consent of SRLDC. This nature of toggling is

done mostly during less generation at thermal units and high reservoir level at Hydro units.

(f) Most of the time, the generators attribute 'Coal Quality' as reason for non-performance / less performance.

(g) The generators explained that they endeavor to operate the unit to deliver the maximum possible MW generation to the grid thereby the units are operated at the extreme boundary level of boiler parameters etc. Under such conditions, it is not possible for the unit to deliver necessary relief through RGMO/ FGMO, even though RGMO / FGMO feature is kept in service.

(l) During all the TCC and OCC meetings, the following was clarified by SRLDC and SRPC:

(a) Mere declaration of availability of RGMO / FGMO feature in service would not be considered as compliance of the Grid Code. However, it should deliver the desired/Grid Code mandated performance.

(b) The maximum limit (Up to 5% of MCR) of expected performance prescribed in the Grid Code is after giving due consideration to the difficulties expressed by the generators and recommendations of expert committees. The generators shall ensure performance of RGMO as per the prescribed limit.

(c) The generators have to consider the requirement of delivering RGMO performance also while declaring their capability / availability to the beneficiaries.

(d) No generator shall keep the RGMO feature out of service without proper communication to SRLDC and its consent.

(e) In case any technical difficulty arises for keeping the RGMO / FGMO feature out of service for a period of more than five days, the generator should approach the Commission seeking direction for exemption or extension of unit and till such direction, the unit will be deemed as FGMO with MI and would be considered for analysis, accordingly.

(f) Instances of not delivering performance at least to the extent of 70% of mandated value will be construed as non-compliance of the provisions of the Grid Code and direction of SRLDC.

(m) The complexity of grid operation in Southern Region increases day by day due to (i) single unit of capacity 1000 MW, like Kudankulam is added to the grid and many high capacity units are in the process of getting synchronized; (ii) System demand increases at a pace of 10% per annum (Appx.) in the midst of delay in commissioning of generating units and associated transmission elements; (iii) Frequent grid disturbances of category GD-I due to lapses in protection system as well as non-replacement of defective equipments; (iv) change in demand by the constituents of SR

during changeover period was in huge quantum; and (v) Non-implementation of contingency plan for mitigating sudden variation in wind generation.

(n) As per the enquiry committee report on Grid disturbance, effective functioning of RGMO is essential for secured grid operation as well as survival during islanding / isolation due to grid disturbance.

(o) In the meeting called by CEA on preparedness for integration of Southern Region with N-E-W grid, due emphasis was given to FGMO/ RGMO as one of the significant attribute for ensuring reliable grid operation and advised to expedite the implementation in all the Regions. Accordingly, ensuring the RGMO performance in the country is a pre-requisite for reliable grid operation while integrating Southern Region with N-E-W grid.

(p) The generators are getting more focused towards availability, PLF, etc. instead of the mandated contribution for secured grid operation.

(q) Even the new generating units like NTECL are not complying with the operating procedure of Southern Region which was developed, reviewed and updated periodically by SRLDC with mutual consent of all entities of Southern Region in terms of the Grid Code. The COD of new units have been made by the generating station without ensuring delivery of RGMO performance as well as without demonstrating continuous stable operation.

3. Reply to the petition has been filed by Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO), Karnataka Power Corporation Ltd.

(KPCL), Andhra Pradesh Generation Corporation Ltd. (APGENCO), Tamil Nadu Transmission Corporation Ltd (TANTRANSCO), Neyveli Lignite Corporation (NLC), NTPC Limited, APTRANSCO, Kerala State Electricity Board (KSEB), Transmission Corporation of Telangana Limited, Karnataka Power Corporation Limited (KPCL), SLDC, Karnataka, and NTECL Vallur TPP (NTPC Tamil Nadu Energy Company Limited.

4. TANGEDCO vide its affidavit dated 28.2.2014 has made its submission with regard to insufficient primary response as under:

Thermal units

(a) The algorithm running in the digital control system as per the guidelines of IEGC delivers the command to turbines for RGMO performance whereas due to the secondary responses like fall in drum pressure, fall in steam temperatures, fall in enthalpy of steam etc., the MW reduction is noticed and the machine performance is recorded as any of the categories mentioned by the petitioner i.e no response, partial response, and insufficient response, responded and reverse response.

(b) Usage of low GCV coal than the designed GCV coal affects the operating parameters. Usage of more quantity of coal than the design quantity coal depletes margin/reserves and there in an inherent delay to maintain the vital operating parameters.

(c) During the "hold time" operation, any change in grid frequency will not induce frequency load (no response) according to M/s. BHEL, the OEM.

5. TANGEDCO vide its further affidavit dated 7.7.2014 has submitted that it is making every efforts to comply with the directions of the Commission. However, hydro units (including units of irrigation based generating stations) listed in Annexure- I of the reply cannot be operated on RGMO due to the following reasons:

(a) Water is discharged on the instructions of the Irrigation authorities, i.e. PWD, Govt. of Tamil Nadu.

(b) In the Cauvery Basin, the irrigation demand let out from Mettur Dam is met out by the Dam Power House and Tunnel Power House and the total discharge let out from both the power houses is the source for the seven barrage power houses operating in cascading system along the river course.

(c) FGMO operation of the units with a manual intervention involves consequent variation of and interference with this discharge in the river course is not possible.

(d) Since all hydro machines of Erode generation circle are operating on low head and high discharge, small variation in power system would lead to high variation in discharge around 1000 cusecs per MW and around 4000 cusecs for 10% of maximum continuous rating.

(e) In the Kadamparai (4x100MW) hydro generating station, machines are being operated in 4 different modes, Generator, SCP, SCG and Pump, hence not operated under FGMO/RGMO. However, the EGH and control modules are common for all modes. The operation being carried out between the frequency band width of 49.5 Hz to 50.5 Hz at a fixed guide vane opening.

6. NLC in its reply dated 25.2.2014 has submitted that the RGMO performance and status of implementation as under:

(a) During high frequency condition, unloading is happening with minor variation in parameter and any fall in frequency at that occasion results in increase in generation based on the available margin.

(b) Normally the units are being kept in maximum loading condition and any further loading during sudden drop in frequency affects the boiler parameters such as maximum fuel flow restriction, After Mill Temperature and flue gas temperature, etc. The moisture content in the lignite during increase in fuel flow conditions result in low After Mill Temperature leading to tripping of mills. Therefore, during sudden fall in frequency, the increase in generation is not up to expected level.

(c) During loading of unit, Main Stream Pressure drops at a faster rate and EHC control loop gets changed over, leading to disturbance in various systems and sub-systems.

(d) During unloading of unit, Main Steam pressure would shoot up instantaneously and HP B/P valves would open at 156 Ksc. The trip open will occur when the pressure reaches 158 Ksc**.** This disturbance will have its cascading effect before lignite feeding systems/furnace conditions respond on auto mode. This would also lead to total disturbance and may even lead to unit tripping.

(e) Sudden rise and drop in load may lead to severe fluctuations in Boiler Drum pressure and Drum level, which may result in unit tripping.

(f) The SH/RH metal temperatures rise during furnace fouling limiting the load on the unit. In the above situation, any load raise due to RGMO would result in overheating of coils and subsequent failure of tubes, leading to the outage of the unit.

(g) Restriction of Flue Gas Temperature at 950^{o}C is being practiced for ensuring stability of operation. In the above condition, any sudden loading of the unit in RGMO would raise flue gas temperature beyond the limit causing heavy fouling in the furnace.

(h) Control valves would be strained and with ageing of the unit overloading in a continuous manner is not advisable for safe operation of station.

(i) Loading of the unit more than MCR at lesser frequency may lead to rise in Generator rotor temperature and impose restriction on load rising.

(j) The generators are normally declaring estimated maximum capability and no reserve capacity would be available to respond during fall in frequency below 50.05 Hz.

(k) Units running near technical minimum thus require oil support for providing any kind of primary response.

7. APTRANSCO in its reply dated 26.2.2014 has submitted as under:

(a) Most of the generating stations run on full load and thereby no proper RGMO/FGMO response could be seen during fall of frequency. Some active generation is required to be compromised to ensure RGMO/FGMO, and the recommendations could be put forward in this regard at appropriate level.

(b) The generators under SLDC, Andhra Pradesh are not able to generate 105% at Maximum Contentious Rating with full valve opening due to poor coal quality.

(c) Out of 16 thermal generating stations, 13 are under RGMO and every possible steps are being taken to implement RGMO in remaining three generating stations.

(d) SLDC is taking every endeavour to bring in RGMO in the Hydro generating stations. However, due to technical problems in old hydro generating stations, implementation of RGMO is not possible in these stations.

(e) Regular meetings are conveying with all the generators for reviewing performance of RGMO/FGMO with MI and SLDC shall insist all the generators for improving the performance of RGMO or FGMO with manual intervention in future.

8. Karnataka Power Corporation Ltd (KPCL) in its reply dated 26.2.2014 has submitted the status of implementation of RGMO in all the generating stations and has submitted as under:

(a) As per the Commission`s directions, action was taken in all units of the generating stations and all generating station were directed to implement FGMO with MI wherever RGMO was yet to be implemented.

(b) In case of large hydro generating stations with impulse type turbines, response is satisfactory as these units are with higher inertia constant and higher GD2. Therefore, these units inherently would be able to give relief to the required extent. Other hydro generating stations are also responding to the corresponding prevailing head.

(c) In case of thermal generating stations, command is given to control valve for operation. However, actual relief seen is not uniform. Actual relief coming from the system depends on various margins available at the time of operation and is dynamic in nature.

(d) KPCL agrees for the data and mathematical portion of the analysis done by SRLDC. However, KPCL have to consider parameter as defined by the manufacturers of units as per the Grid Code, before concluding that response is insufficient.

(e) Units are already running on more than 100%.

(f) Reasonable time should be given to implement RGMO after synchronization and for declaring of COD, considering the stabilization period

required for the units. However, it is already mandated in the Grid Code to put the unit in FGMO with MI till RGMO is implemented forthwith. In this regard, 6 to 8 weeks time should be given for implementation of RGMO in the generating station.

9. KSEB in its reply dated 13.2.2014 has submitted that all other generating stations except hydro generating stations are usually operated at full load and the MW support from them is therefore limited. KSEB as a distribution utility is mandated to meet the requirement within its control area and therefore, reserving the 5% margin for FGMO performance is difficult in practice.

10. With regard to insufficient response of Hydro Units, KPCL submitted that maximum guide vane position reached during low head operation with no further possibility to increase generation during frequency fall. KPCL has further submitted that water discharge restriction to maintain the level of downstream balancing reservoir.

11. SLDC, Karnataka in its reply dated 27.5.2014 has submitted that SRLDC along with the constituents of other SLDCs of Southern Region are analyzing RGMO performances whenever any grid incidences happen. SLDC Karnataka is coordinating with nodal officers of generators in data collection.

12. NTPC Tamil Nadu Energy Company Limited in its reply dated 30.5.2014 has submitted that during 90th OCC meeting, it was clarified that Vallur units were maintained above 70% level only except with intermittent oil support due to wet coal.

13. Transmission Corporation of Telangana Limited vide its affidavit dated 3.7.2014 has submitted that the non-performance/poor performance of RGMO/FGMO has already been taken up with all generating stations under control area of SLDC, Telangana.

14. SLDC, APTRANSCO vide its affidavit dated 5.7.2014 has submitted that if the generators want exemption from RGMO/FGMO due to technical or poor coal quality, they should approach to the Commission in this regard.

15. During the course of hearing on 13.2.2014 the representative of the petitioner submitted that all the generators in Southern Region confirmed that RGMO/FGMO with Manual Intervention (MI) for their generating stations have been kept in service in terms of the Grid Code. However, as per the analysis of various instances and discussion with generators, most of the generators have misunderstood the Grid Code that they need to ensure the availability of mechanism only but not the performance.

16. During the next hearing on 18.3.2014, the representative of the petitioner cited the example of tripping of all units of CGPL on 12.3.2014 at 19:22 hrs which resulted in loss of 3700 MW and consequently, the frequency of N-E-W-S grid fell from 49.9 Hz to 49.5 Hz within a minute and to 49.2 Hz in the next minute i.e. frequency fall of 0.7 Hz within two minutes. The representative of the petitioner submitted that the power number of the N-E-W-S grid is about 4500- 5000 MW/Hz. As such the decrease in frequency by 0.7Hz on account of tripping of 3700 MW

units shows that the response of RGMO/FGMO was almost 'NIL' and the rate of fall in frequency was more than 0.03 Hz per second. He further explained that the expected RGMO response based on the on-bar capacity of Southern Region was about 1002 MW whereas the actual contribution observed on 12.3.2014 was only 128 MW. Frequency drop has the impact on system stability, line loading and power oscillations.

Analysis

17. We have considered the submissions of the petitioner and the respondents and perused documents on record.

18. The Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 lay down the rules, guidelines and standards to be followed by various participants in the system to plan, develop, maintain and operate the power system, in the most secure, reliable, economic and efficient manner, while facilitating healthy competition in the generation and supply of electricity. The IEGC Regulations, 2010 facilitates the optimal operation of the grid, facilitation of coordinated and optimal maintenance planning of the grid and facilitation of development and planning of economic and reliable National / Regional Grid. The Operating Code, under Grid Code describes the operational philosophy to maintain efficient, secure and reliable Grid Operation and contains the general security aspects to be followed by generating companies and all Regional entities of the Grid. Also, the generators on the pretext of technical constraints cannot be allowed to avoid the provisions of the Grid Code.

19. Regulations 5.2 (f), (g), (h) and (i) of the Grid Code provides as under:

"(f) All thermal generating units of 200 MW and above and all hydro units of 10 MW and above, which are synchronized with the grid, irrespective of their ownership, shall have their governors in operation at all times in accordance with the following provisions:

Governor Action

i) Following Thermal and hydro (except those with upto three hours pondage) generating units shall be operated under restricted governor mode of operation with effect from the date given below:

(a)	Thermal generating units of 200 MW and above,	
	1) Software based Electro Hydraulic Governor (EHG) system:	01.08.2010
	2) Hardware based EHG system	01.08.2010
(b)	Hydro units of 10 MW and above	01.08.2010

The restricted governor mode of operation shall essentially have the following features:

a) 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, there shall not be any reduction in generation). For any fall in grid frequency, generation from the unit should increase by 5% limited to 105 % of the MCR of the unit subject to machine capability.

b) Ripple filter of +/- 0.03 Hz. shall be provided so that small changes in frequency are ignored for load correction, in order to prevent governor hunting.

c) If any of these generating units is required to be operated without its governor in operation as specified above, the RLDC shall be immediately advised about the reason and duration of such operation. All governors shall have a droop setting of between 3% and 6%.

d) After stablisation of frequency around 50 Hz, the CERC may review the above provision regarding the restricted governor mode of operation and free governor mode of operation may be introduced.

ii) All other generating units including the pondage upto 3hours Gas turbine/Combined Cycle Power Plants, wind and solar generators and Nuclear Power Stations shall be exempted from Sections 5.2

(f), 5.2 (g), 5.2 (h) and 5.2 (i) till the Commission reviews the situation:

Provided that if a generating unit cannot be operated under restricted governor mode operation, then it shall be operated in free governor mode operation with manual intervention to operate in the manner required under restricted governor mode operation.

(g) Facilities available with/in load limiters, Automatic Turbine Run-up System (ATRS), Turbine supervisory control, coordinated control system, etc., shall not be used to suppress the normal governor action in any manner and no dead bands and/or time delays shall be deliberately introduced except as specified in para 5.2(f) above.

(h) All thermal generating units of 200 MW and above and all hydro units of 10 MW and above operating at or up to 100% of their Maximum Continuous Rating (MCR) shall normally be capable of (and shall not in any way be prevented from) instantaneously picking up to 105% and 110% of their MCR , respectively, when frequency falls suddenly. After an increase in generation as above, a generating unit may ramp back to the original level at a rate of about one percent (1%) per minute, in case continued operation at the increased level is not sustainable. Any generating unit not complying with the above requirements, shall be kept in operation (synchronized with the Regional grid) only after obtaining the permission of RLDC.

(i) The recommended rate for changing the governor setting, i.e., supplementary control for increasing or decreasing the output (generation level) for all generating units, irrespective of their type and size, would be one (1.0) per cent per minute or as per manufacturer's limits."

20. As per the above provisions, all thermal generating units of 200 MW and above and all hydro units of 10 MW and above which are synchronized with the Grid, irrespective of their ownership, are required to have their governors in operation at all time in accordance with the provisions of sub-clauses (i) to (iii) of Clause (f) of Regulation 5.2 the Grid Code. Also, the generators on the pretext of technical constraints cannot be allowed to avoid the said provisions of the Grid Code. The narrowing of the frequency band to 49.90 Hz to 50.05 Hz, requires loading of units by only 4% with 5% droop. Even if frequency falls to 49.70 Hz, the

droop of 5% requires loading to be increased by 12% which may be beyond the thermal reserve capacity of the unit. Under these circumstances, limit of 5% as provided in the Grid Code saves the system from the kind of problems being narrated by the respondents. Further, there is a provision of ramping back @ one percent per minute as per stipulations of the Grid Code. On the un-loading side, it is to mention that frequency seldom goes beyond 50.30 Hz i.e increase of 0.25 Hz above 50.05Hz. As such, the units would require unloading by only 10% considering 5% droop. Accordingly, in our view, unloading by 10% would not cause any process disturbances beyond the capability of the machine.

21. NLC has submitted that the units are running near technical minimum and any rise in frequency could require oil support. Therefore, it appears that generators take out governors for avoiding oil support which may be required for supporting primary response on un-loading side. We are of the view that, oil support, if required, should be provided as the same is being passed as normative consumption in tariff. In case of Central Generating Stations, actual oil consumption is always less than the normative oil consumption used for energy charge computations. Therefore, oil support, if required, for grid security needs to be resorted. Taking out of RGMO/FGMO with MI during technical minimum condition or for any other reason is not desirable, as it would jeopardize the grid security. We warn the generators against such practice of taking out RGMO/FGMO, without informing SLDC/SRLDC. We direct the respondents to avoid such practice failing which they will be liable to action under Section 142 of Act.

22. On the issue of keeping margins while scheduling of the units, we are of the view that the units should not be scheduled by RLDCs/SLDCs beyond ex-bus generation corresponding to 100% of the Installed Capacity. Further, units should not be allowed to operate with their valves wide open. This would ensure adequate primary response by opening of the valve to the fullest.

23. On the issue of poor primary response and non-sustainability of primary response after few minutes, the respondents have expressed various technical difficulties such as secondary responses in form of fall in drum pressure, fall in steam temperatures, fall in enthalpy of steam, usage of low GCV coal than design coal, moisture content in the lignite, SH/RH metal temperatures rise, etc. It is clarified that the limit of 5% increase in generation was stipulated by the Commission after considering all these difficulties of the generators and based on the recommendation of CEA who had already considered these objections at length.

24. With regard to hydro units of Kadamparai (4x100MW) Hydro generating Station under SLDC, Tami Nadu, TANGEDCO has sought exemption from RGMO, on the following grounds:

> " *These machines are being operated in four different modes i.e generator, SCP, SCG and Pump. But the EHG and control modules are common for all modes. The operation being carried out between the band width of 49.5 Hz to 50.5 Hz at a fixed guide vane opening. Back to back starting machine on pump mode and GV opening setting difference from no load GV opening in Generation mode. whenever grid frequency rises above 50 Hz to 50.5 Hz load rejection is there in all 4 units during generation mode."*

The justifications given by TANGEDCO seeking exemption of such high capacity generating station from RGMO/FGMO with MI are not clear and are not acceptable. TANGEDCO has not placed on record the recommendation from the

OEM stating that the unit load while operating on generator mode cannot be increased during frequency fall. Taking note of the importance of hydro units in providing sustainable primary response to the grid, we are not inclined to entertain exemption in case of Kadamparai (4x100MW) hydro generating station.

25. Tamil Nadu and Andhra Pradesh have sought exemption from some hydro units from RGMO/FGMO due to constraints by irrigation authorities. Tamil Nadu and Andhra Pradesh have submitted that their generating stations are irrigation based stations which need to be operated as per the instructions of the Irrigation authorities. As per our direction dated 5.6.2014, Tamil Nadu and Andhra Pradesh have submitted detailed submissions regarding the constraints imposed by Irrigation authorities and as to how these constraints restrict the operation of their generating stations/units under RGMO/FGMO. The TANGEDCO has submitted as under:

> "(a) The discharges of water are dependent upon the instructions of Irrigation Authorities (PWD of Government of Tamil Nadu).
>
> (b) Depending upon the reservoir level, rainfall and discharge required for the irrigation, the quantity of water discharge is decided by PWD and not by the answering respondent.
>
> (c) In the Cauvery Basin, the irrigation demand let out from Mettur Dam is met out by both the Dam Power House, and Tunnel Power House. The total discharge let out from both the Power Houses is the source for the Seven Barrage Power Houses operating in cascading system along the river course.
>
> (d) The flow of water in respect of these Power Houses is under the strict and exclusive control and direction of irrigation authorities. No variation or interference what so ever in the discharge or the flow of water is allowed by the irrigation authorities. Water resources used incidentally for Power Generation and involves among other serious issues, the safety of Canal system and the interest of ire of ayacut formers
>
> (e) The FGMO operation of these units with a manual intervention involves consequent variation of and interference with this discharge in the

river course which is not feasible and such a requirement cannot be complied with because of binding constraints as above.

(f) In respect of this issue the Executive Engineer /PWD /Mettur dam had stated that any change in discharge of water from Mettur dam cannot be made without any concurrence of the Tamil Nadu Government, since the quantum of water discharge is being decided based on dam level, crop pattern, rain fall and delta farmers demands etc.

(g) All the Hydro Machines of Erode Generation Circle are operating on low head and high discharge. Hence small variation in Power System will lead to high variation in discharge around 1000 cusecs per MW and around 4000 cusecs for 10% of Maximum continuous rating. The sudden increase in discharge will cause sudden increase in water levels which is dangerous to life of Public, Cattle etc., living along the river course."

26. APGENCO has submitted that the Commission vide order dated 7.5.2015 in Petition No. 13/RP/2013 has already considered its submission and has exempted its hydro stations from RGMO/FGMO after considering the letter of Department of Irrigation and CAD, Govt of Andhra Pradesh dated 23.12.2011 objecting the implementation of RGMO in irrigation based hydro units. In the light of our decision in said order dated 7.5.2015, We also exempt the irrigation based hydro stations of the TANGEDCO from RGMO/FGMO considering the above position/constraints imposed by Irrigation authorities.

27. It is observed that while reporting the response of the hydro stations, SLDC, Tamil Nadu has indicated the position of generation at 19:00 hrs. and 20:00 hrs of 12.3.2014. The same does not indicate the clear picture of primary response for the grid incident at 19:22 hrs. Further, SLDC, Tamil Nadu has not cited any reasons for non-responsive behavior of these generating units which have been already put under RGMO. We direct SLDC, Tamil Nadu to rely on the one minute/two minute SCADA data of SRLDC while reporting the response of generators in future.

28. Considering the issue of un-favorable cost-benefit analysis in making investments in hydro power stations which are due for renovation in a couple of years where the unit rating is 25MW to 50MW, we are of the view that till the time such units go in for R&M, units may be operated on FGMO with MI as per the provisions of Grid Code.

29. Having considered the submissions of the petitioner and the respondents, we direct that all generators in Southern region, unless otherwise exempted, shall strictly comply with the Regulation 5.2 (f), (g), (h) and (i) of the Grid Code and shall deliver RGMO/FGMO performance to the extent of mandated level. Any willful locking of the Governors, poor and reverse response, introduction of more than mandated dead band or any other activity to curtail the primary response, will be viewed seriously and action under Section 142 of Act shall be taken against such generators for non-compliance of the provisions of the Grid Code. In our view, proper governor response is important and should be implemented by all concerned to ensure safe and secure operation of the grid in view of the synchronous interconnection of Southern Regional Grid with NEW Grid. It is pertinent to mention that in order to consider various aspects in the implementation of RGMO/FGMO with manual intervention in the thermal units including reversion back to FGMO mode of operation in case frequency gets stabilized within the specified band, the Commission has constituted a High Level Committee. Based on the recommendations of the Committee, necessary amendments to the IEGC Regulations, 2010 would be considered by the Commission as deemed fit and necessary.

30. The petitioner has prayed to direct the respondents to submit the detailed action plan with documents for implementation of RGMO/FGMO with MI for the eligible units in a time bound manner. In this regard, it is clarified that the provision regarding Governor Action is very clear in the Grid Code. The generator can implement RGMO or else and has to operate its units on FGMO with Manual Intervention. Therefore, we are not inclined to grant time for RGMO operation or FGMO with MI.

31. The petitioner has also prayed to direct all the generators to declare availability with due consideration for contribution through RGMO/FGMO with MI at all generation levels. However, RLDCs /SLDCs, responsible for integrated and secure operation of the power system, have inherent powers to restrict the schedule corresponding to 100% of installed capacity without valve wide open condition. The generators should ensure that the units are not operated with valve wide open condition even at part loads ensuring primary governor response at all stages. It is reiterated that units should not be scheduled by LRDC/SLDC beyond 100%/MCR rating.

32. With regard to the prayer of the petitioner to direct generators to declare COD of new generating units with RGMO feature in service and delivering the mandated contribution, it is to point out that Regulation 24 (2) (iv) of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 (2014 Tariff Regulations) which is read as follows:

> *"the rate of return of a new project shall be reduced by 1% for such period as may be decided by the Commission, if the generating station or transmission system is found to be declared under commercial operation without*

commissioning of any of the Restricted Governor Mode Operation(RGMO)/ Free Governor Mode Operation (FGMO), data telemetry, communication system up to load dispatch centre or protection system."

As such, penalty for declaring COD without RGMO/FGMO service in place, already exists in 2014 Tariff Regulations. However, staff of the Commission is directed to review the procedure for declaration of COD.

33. With regard to the prayer of the petitioner to direct the generators to seek approval of the Commission whenever the expected duration of outage of RGMO/FGMO feature exceeds more than a week due to technical/operational limitations, the Commission is of the view that requests for outage of RGMO/FGMO with MI based on valid technical reasons, shall be dealt at SLDC/RLDC level. In case of any dispute/difficulty, the matter should be resolved at RPC level at first instance.

34. We appreciate the efforts being made by SRLDC in reporting the response of its control areas. It is noted that SLDCs are regularly conducting meetings with generators for sensitizing the issue of improving the primary response. However, SLDCs are not reporting the performance of the generators on regular basis. Accordingly, SLDCs/RLDCs are directed to keep watch on the response of generators during major frequency excursions and submit report on quarterly basis to SERCs and POSOCO. SLDCs, through their respective SERCs, may also initiate action against defaulting State`s generators in accordance with the provisions of the Grid Code.

35. The petition is disposed of in terms of the above.

SD/-	SD/-
(A. K. Singhal)	**(Gireesh B. Pradhan)**
Member	**Chairperson**