AGENDA FOR THE FIRST MEETING OF NATIONAL POWER COMMITTEE

TO BE HELD ON 15-04-2013

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1. **Formation of NPC:** MoP vide its order dated 25-03-2013 has formed the National Power Committee (NPC) and its Conduct of Business Rule (CBR).salient features of CBR are as under:

   (i) The decisions taken in NPC shall be considered concurred by respective RPCs for implementation.

   (ii) The NPC shall meet at least once in six months

   (iii) The quorum of the meeting shall be 50% of its members.

   (iv) NPC shall take decisions based on the majority / general consensus of the strength present.

   - Members may like to note/discuss.

2. **IMPLEMENTATION OF MEASURES TO PREVENT GRID DISTURBANCE**

The Enquiry committee had been constituted by MoP to enquire into the reasons for the grid disturbances on 30th and 31st July, 2012 and to suggest remedial measures for preventing future grid failures. All the recommendations of the Enquiry Committee are being implemented with definite time line and the same is being monitored at the highest level. Some of the recommendations which require common approach / action across the country are as under:

i. **Third Party Protection Audit:**

Enquiry Committee on grid disturbances recommended that the thorough audit of protection system has to be carried out to ensure the healthiness of the protection system. All RPCs (except WRPC) have completed the third party audit (TPA) of protection systems of important sub-stations in all constituent States in the region. WRPC would be completing the TPA by 10th May 2013. It was decided in the meeting held on 25-03-2013, taken by MOSP (I/C) that all states have to prepare DPR for the Renovation and Upgradation (R&U) of their sub-stations and submit the same to respective RPCs within a month time i.e. by 30-04-2013 and if required special meeting of respective RPCs may be held in this regard.

- RPCs may like to indicate their plans of action including preparation of DPRs by States/CPSUs for R&U of sub-stations based on the audit observations.

ii. **Reactive Power Planning:** Enquiry Committee on grid disturbances recommended that "*in order to avoid frequent outages/opening of lines under over voltages and also for providing voltage support under steady state and dynamic conditions, installation of adequate static and dynamic reactive power compensators should be planned.*

***Action: CEA, CTU, STUs*"**

The same was also deliberated in the previous meeting of the proposed NPC and it was requested that States in consultations with CEA and CTU shall submit the schemes for Reactive Power management. The fund requirement was also requested to be intimated so that the early action might be initiated.

- Members may like to confirm the status of schemes.

iii. <u>Ensuring proper functioning of UFR and df/dt relay:</u>

Healthiness of UFR and df/dt is essential for containing the frequency fall and help in avoiding the collapse of grid. As per IEGC (Clause No. 5.2n) all SEBs, distribution licensees, CTU, STUs and SLDCs shall ensure that the above under-frequency and df/dt load shedding/ islanding schemes are always functional. RPC Secretariat shall carry out periodic inspection of UFR and df/dt relays for healthiness.

- Members may like to confirm the status of compliance

iv. <u>Islanding schemes:</u>

As per the recommendations of the enquiry committee, islanding schemes in each region need to be developed in order to ensure continuance of power supply to essential services and to help faster recovery of the grid. In NR, Delhi islanding scheme has been prepared and is being implemented after approval of NRPC. UP and Punjab have also finalized their islanding scheme.

- Members to intimate status of preparation/ implementation of islanding schemes in various States & deliberate for expediting the same

3. <u>Reporting the Status of implementation of the recommendations of the Enquiry committee:</u>

Strict reporting of status of implementation of the recommendations of the Enquiry committee on the prescribed format by all RPCs on fortnightly basis is requested from all RPCs as the same is being monitored by MOSP (I/C). Cooperation is sought from all members.

- Members may like to note please

4. <u>Flat Under-Frequency Relays Based Automatic Load Shedding Schemes:</u>

Under-frequency (U/f) relays in the Northern, Western and Eastern regions – running in synchronism with one another - have been set to shed load automatically in 3 stages at 48.8, 48.6 and 48.2 Hz. With improvement in the operating frequency regime and for enhanced system security, Powergrid in its Grid Security Expert System (GSES) report has proposed to raise the setting of U/f relays and number of stages as 49.0, 48.8, 48.6 and 48.4. The quantum of load shedding by each state through U/F and df/dt relays as per GSES is of the order of 60% of peak demand of individual states.

Automatic UFR load relief

Stage-I:49 Hz - 20 % of identified loads
Stage-II:48.8 Hz - 20 % of identified loads
Stage-III:48.6 Hz - 30 % of identified loads
stage-IV:48.4 Hz) - 30 % of identified loads

df/dt setting

Stage-I : 49.9 Hz with 0.1 Hz/Sec slope overlapping with Stage-III above and
Stage-II : 49.9 Hz with 0.2 Hz/Sec slope overlapping with Stage-IV above

WRPC have submitted that the quantum of load shedding through frequency control relay, as suggested by PGCIL in its GSES report, appears to be on higher side.

In view of above a common approach for deciding the required quantum of load relief through these frequency control relays is required to be adopted by all the regions of NEW grid as well as SR grid, which will soon be synchronized with NEW grid, so that uniform pattern of load shedding could take place in NEW grid as well as SR grid.

- Members may like to deliberate and finalise.

5. Zone -3 setting of Distance Relays:

Enquiry committee recommended (Para 9.1.2 of Enquiry committee report) that till protection audit is taken up, there is need to take immediate review of zone-3 philosophy in particular.

Earlier, Zone-3 settings were not considered as part of the line loadability criterion. However, after the grid disturbances, the Zone-3 settings have been collected and analysed to arrive at the safe line loading limits. In a meeting taken by Member (PS), CEA with CTU and POSOCO on 26th September 2012 regarding transmission line loadability, loading limits of transmission lines on all India basis were finalized and circulated vide letter dated 3rd October 2012. The report contains Zone-3 settings as well, wherever available. All concerned have been advised to check the settings where indicated / intimate the settings where not available. It was also decided at the meeting that Zone-3 settings need to be reviewed by POWERGRID in coordination with STUs, Generators and POSOCO so as to avoid load encroachment. Following issues in regard to Zone -3 setting of distance relays are submitted consideration of NPC:

5.1 Implementation of revised Zone -3 setting:

In regard to implementation of revised Zone-3 settings as above, PGCIL have submitted that they have reviewed and implemented the Zone-3 philosophy in coordination with STUs and Generators. However status in this regard from all STUs is still awaited.

- RPCs may like to discuss/inform the status of implementation of revised Z-3 settings in each State.

5.2 Tripping of Distance Protection Schemes in Zone - 3 on load encroachment (Agenda from WRPC)

Enquiry committee also recommended in its Zone -3 review recommendation (Para 9.1.2 of Enquiry committee report) that techniques are available to modify characteristics of the relay so that it can distinguish between load encroachment and faults. These techniques and other alternatives should be explored immediately.

In pursuance of implementation of zone 3 setting under recommendations of Committee's report on GD of 30th and 31st July 2012, a meeting of WRPC was held on 29.11.2012 wherein interalia various aspects of zone 3 settings and related issues were discussed. Details are given at **Appendix** for reference.

In the aforesaid meeting after discussion, it was suggested that utilities will consider all these options and judiciously adopt the measures to avoid inadvertent tripping.

Further, under Para 20 of the revised Transmission Planning Criteria w.e.f 01.02.2013 of CEA, guidelines on zone-III setting to avoid tripping of lines in extreme loading conditions have been given. Same is reproduced below :

QUOTE

20 Guidelines for consideration of zone – 3 settings

20.1 *In some transmission lines, the Zone-3 relay setting may be such that it may trip under extreme loading condition. The transmission utilities should identify such relay settings and reset it at a value so that they do not trip at extreme loading of the line. For this purpose, the extreme loading may be taken as 120% of thermal current loading limit and assuming 0.9 per unit voltage (i.e. 360 kV for 400kV system, 689 kV for 765kV system). In case it is not practical to set the Zone-3 in the relay to take care of above, the transmission licensee/owner shall inform CEA, CTU/STU and RLDC/SLDC along with setting (primary impendence) value of the relay. Mitigating measures shall be taken at the earliest and till such time the permissible line loading for such lines would be the limit as calculated from relay impedance assuming 0.95 pu voltage, provided it is permitted by stability and voltage limit considerations as assessed through appropriate system studies.*

UNQUOTE

In view of various opinions/alternatives mentioned in Appendix and CEA guidelines on zone-3 loadability limits it is necessary that common philosophy/approach in regard to Zone – 3 setting of relay may be evolved through NPC forum.

- Members may like to discuss the same

6 IMPLEMENTATION OF DEMAND MANAGEMENT(IEGC 5.4), GRID SECURITY EXPERT SYSTEM AND DEMAND ESTIMATION (Agenda from WRPC):

A petition was filed by PGCIL with the CERC (Petition 265/MP/2012) seeking Commission's approval for implementation of Grid Security Expert System by PGCIL in all the five regions. CERC directed in its ROP of above petition, dated 10th January 2013, that the RPCs of all five regions would also take up the issue of "Implementation of Automatic Demand Management Scheme at SLDC/DISCOM level" (ADMS) and "Implementation of Grid Security Expert Systems" (GSES) as an agenda item within one month from the date of issue of this ROP and file their decisions within one week thereafter, after serving copies thereof on all the constituents of the respective RPC. Both the issues were discussed in the 22nd WRPC meeting held on 26.02.2013 at Gandhinagar. The recommendation of WRPC are as below:

1) The implementation of GSES and ADMS were agreeable in principle.

2) As the Automatic Demand Management Scheme is a subset/ part of GSES and therefore it was recommended that the same will be implemented along with GSES.

3) Settings of frequency based defense mechanisms and quantum of load shedding etc., needs to be co-ordinated with other regions of the NEW Grid.

4) Manual load shedding, Automatic load shedding by demand management and load shedding under AUFLS and df/dt of GSES requires to be co-ordinated to

avoid overlap and have clear distinction between manual actions and automatic control actions.

5) Logic, technology, communication facilities, funding and controlling agencies needs to be addressed.

6) Possibility of including WAMS data in the above schemes requires to be explored.

In order to implement above schemes i.e. GSES & ADMS a national outlook is very much required so that regions will have common philosophy /guidelines with regard to queries/recommendations of WRP Committee as pointed above.

- Members to deliberate

7 Review of UI Mechanism:

Enquiry Committee on grid disturbances recommended that "*A review of UI mechanism should be carried out in view of its impact on recent grid disturbances. Frequency control through UI may be phased out in a time bound manner and Generation reserves/Ancillary services may be used for frequency control. Appropriate regulatory mechanism needs to be put in place for this purpose*."

- Members may discuss revisions required in existing UI mechanism.

8 Training and Certification of System Operators:

The training and certification of system operators in control room need to be given focused attention. Sufficient financial incentives need to be given to certified system operators so that system operation gets recognized as specialized activity. Certain states like Maharashtra has already introduced an incentive scheme in this regard. Other states need to confirm the same.

- Members to intimate status of implementation.

9 Ring Fencing of LDCs:

RPCs also need to deliberate on the implementations of the report of the Pradhan Committee on Ring Fencing of the LDCs and confirm the present status.

- Members to intimate status of implementation.

10. Implementation of CEA Regulations: As per the provisions of Electricity Act 2013 CEA has framed regulations related to

(i) The technical standards for construction of electrical plants, electric lines and connectivity to the grid, the safety requirements for construction, operation and maintenance of electrical plants and electric lines,

(ii) The Grid Standards for operation and maintenance of transmission lines and

(iii) The conditions for installation of meters for transmission and supply of electricity.

Some of the above regulations find mention in CERC regulations and they are accordingly implemented as per the provision of the particular CERC Regulation. Safety regulation of CEA are implemented through Electrical Inspector appointed by central government. However all regulation of CEA are required to be implemented throughout

the country. Therefore a methodology need to be evolved for implementation of CEA Regulations.

- Members to deliberate

11. Common Commercial Input data formats for all RPCs (Agenda from WRPC) :

RPC's are preparing UI pool A/c, Reactive Energy A/c, Regional Energy A/c Regional Transmission A/c and various other reports based on the input data provided by RLDCs/NLDCs. The input data formats is not uniform among the regions also the methodology of data processing and preparing these A/cs is not uniform in all the regions.

To bring uniformity in the preparation of these A/cs, it is proposed that the data formats, procedures and methodologies of A/c preparation be standardized, so that software for preparing the above A/cs can be on the same platform and therefore the software development for preparation of these A/cs would be common for all the RPCs.
In this regard it is suggested that representatives from NLDC, RLDCs and RPCs associated with the preparation of the above A/cs may formulate the procedures, methodologies and up gradation/renovation of the existing soft wares being used in RPCs.

- Members may like to discuss and finalize

12. Fund Requirement: Members may like to finalize the methodology for meeting the requirement of fund for establishment expenditure of NPC.

13. Any other point with the permission of the chair.

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Appendix

Tripping of Distance Protection Schemes in Zone III on load encroachment

In pursuance of implementation of zone 3 setting under recommendations of Committee's report on GD of 30th and 31st July 2012, a meeting was held on 29.11.2012 wherein interalia various aspects of zone 3 settings and related issues were discussed which are given below :

(i) Susceptibility of overreaching distance zones to undesirable operation
(ii) Zone Characteristics Impacting Loadability
(iii) Variations in Zone Positioning
    a. Mho characteristic angle adjustment - maintaining a given mho circle
    b. Offsetting of mho characteristics
(iv) Variations in Zone Shape
    a. Lens characteristic
    b. Rectangular (Quadrilateral) characteristic
(v) Supervision of Zone tripping
        a. Use of blinders
    b. Use of load encroachment characteristics
(vi) Means to prevent tripping on load:
    a. Shaping the characteristics & load encroachment blocking
    b. Using ground directional overcurrent (67N) instead of Z2 in pilot schemes
    c. Maximum sensitivity angle (characteristic or torque angle) Considerations
(vii) Power Swings and Their Impact on The Power System
    a. Impedances Seen by Distance Relays During Power Swings
    b. Effect of Power Swings on Distance Relays
    c. Means to Prevent Tripping on Power Swings.
(viii) Power-Swing Blocking and Tripping Functions
    a. Power-Swing Blocking, Tripping Principles & Functions and Additional Considerations
    b. Distance Protection Requirements During OOS Conditions
    c. Power Swing Protection During Single Pole Open Conditions
    d. Three-Phase Faults Following Power Swings