

North Eastern Regional Power Committee

MINUTES OF THE 129th OPERATION COORDINATION

SUB-COMMITTEE MEETING OF NERPC

Date : 17/02/2017 (Friday)
Time : 10:00 hrs
Venue : "Hotel RajMahal", Guwahati.

The List of Participants in the 129th OCC Meeting is attached at **Annexure – I**

Shri P.K. Mishra, Member Secretary, NERPC welcomed all the participants to the 129th OCC meeting. He noted the presence of participants from all the utilities except Nagaland. Member Secretary also appraised the forum of the developments in regard to CDAC project. He urged the members to take up the payment issues with respective authorities before it is actually commissioned in order to reduce the time delay.

Thereafter, Member Secretary requested Shri B. Lyngkhoi, Director/SE(C&O) to take up the agenda items for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 128th MEETING OF OPERATION SUB-COMMITTEE OF NERPC.

The minutes of 128th meeting of Operation Sub-committee held on 19th January, 2017 at Guwahati were circulated vide letter No. NERPC/SE (O)/OCC/2016/4556-4591 dated 31st January, 2017.

Observation(s) of OTPC

Item No. B.1.(4):

Status as recorded: On 13.01.17 GM(C&M) has intimated BHEL to complete work within 31.01.17 or work would be given to other agency.

To be Recorded: OTPC is pursuing with BHEL for warranty claim. Date will be provided once there is clarity on the work.

Item No. D.1:

Recorded: The forum unanimously objected to OTPC availing shutdown in the lean season inspite of repeated requests not to do so. S.E., SLDC, Meghalaya stated that OTPC has deceived their beneficiaries repeatedly by not adhering to the shutdown programme.

To be Recorded: OTPC shall try to optimize the outages or reduce the outage period and allow common station shutdown.

Observation(s) of TSECL i.r.o. 127th OCCM minutes:

Item No. D.33:

Recorded: Tripura- Shri D. Paul, Sr. Manager and Smt Sampa Sen, Sr. Manager shall be coordinators for CDAC project.

To be Recorded: Tripura- Shri D. Paul, Sr. Manager and Shri M. Paul, Sr. Manager shall be coordinators for CDAC project.

The Sub-committee confirmed the minutes of 128th OCCM of NERPC with the above modifications as no further comments/observations were received from the constituents.

ITEMS FOR DISCUSSION

B.1. ACTION TAKEN:

DIFFERENCE IN ACTUALS VS LGBR:

Energy Requirement:

| Name of State | Nov16 (actual) | Nov16 (LGBR) | Dec16 (actual) | Dec16 (LGBR) | Jan17 (actual) | Jan17 (LGBR) |
|---------------|----------------|--------------|----------------|--------------|----------------|--------------|
| Ar. Pradesh | 58.87 | 68 | 62.50 | 68 | 65.02 | 68 |
| Assam | 706.25 | 714 | 685.17 | 714 | 718.33 | 714 |
| Manipur | 62.19 | 88 | 70.84 | 95 | 72.08 | 92 |
| Meghalaya | 136.75 | 195 | 144.88 | 210 | 151.38 | 220 |
| Mizoram | 42.74 | 46 | 48.88 | 48 | 48.79 | 48 |
| Nagaland | 59.82 | 68 | 62.99 | 71 | 65.92 | 69 |
| Tripura | 112.99 | 112 | 106.25 | 122 | 104.58 | 128 |
| NER | 1119.62 | 1291 | 1134.05 | 1328 | 1226.10 | 1339 |

Energy Availability:

| Name of State | Nov16 (actual) | Nov16 (LGBR) | Dec16 (actual) | Dec16 (LGBR) | Jan17 (actual) | Jan17 (LGBR) |
|---------------|----------------|--------------|----------------|--------------|----------------|--------------|
| Ar. Pradesh | 57.73 | 52 | 61.39 | 54 | 63.89 | 51 |
| Assam | 694.49 | 567 | 669.55 | 580 | 709.43 | 567 |
| Manipur | 60.66 | 81 | 69.56 | 76 | 70.89 | 71 |
| Meghalaya | 136.75 | 150 | 144.88 | 138 | 151.38 | 125 |
| Mizoram | 41.52 | 48 | 47.66 | 44 | 47.76 | 43 |
| Nagaland | 58.56 | 55 | 61.77 | 54 | 64.99 | 50 |
| Tripura | 111.95 | 211 | 105.58 | 224 | 104.21 | 222 |
| NER | 1101.68 | 1163 | 1112.96 | 1171 | 1212.55 | 1130 |

Demand:

| Name of State | Nov16 (act) | Nov16 (LGBR) | Dec16 (actual) | Dec16 (LGBR) | Jan17 (actual) | Jan17 (LGBR) |
|---------------|-------------|--------------|----------------|--------------|----------------|--------------|
| Ar. Pradesh | 127 | 132 | 131 | 132 | 122 | 137 |
| Assam | 1531 | 1508 | 1388 | 1518 | 1465 | 1456 |
| Manipur | 152 | 179 | 161 | 184 | 163 | 179 |
| Meghalaya | 312 | 425 | 310 | 430 | 331 | 390 |
| Mizoram | 97 | 95 | 97 | 101 | 98 | 101 |
| Nagaland | 128 | 135 | 127 | 135 | 122 | 135 |
| Tripura | 266 | 275 | 230 | 260 | 224 | 250 |
| NER | 2377 | 2749 | 2245 | 2760 | 2330 | 2688 |

It has been observed that there is considerable difference in case of Manipur, Meghalaya and Tripura. Previous OCC forums had requested that states may check the reasons for such variation as to whether due to forecasting error or other reasons, and intimate.

In 129th OCC after detailed deliberation it was concluded that as per presentation by SLDC Meghalaya on 18.01.2017 the main reason for deviation from LGBR figures is the unreliable forecast given by OA consumers. The drawal of OA consumers has been found to be vacillating and this has resulted in the deviation for 2016-17. Members appreciated the analysis of SLDC Meghalaya and requested to keep higher tolerance in forecast for 2017-18. Manipur and Tripura were requested to intimate the reasons for deviation by next OCC meeting.

Deliberation of the sub-Committee:

Manipur and Tripura were requested to intimate the reasons for deviation by next OCC meeting.

The Sub-Committee noted as above.

Action: MSPCL, TSECL.

2. IMPLEMENTATION OF PROJECTS FUNDED FROM PSDF:

The status as informed in 128th OCC:

| State | Protection System | ADMS | CAPACITOR INSTALLATION |
|-------------------|--|--|---|
| Arunachal Pradesh | Approval from the Govt. is awaited | DPR will be submitted soon to CEA & NLDC | Study is in progress and the same will be submitted to NERPC for approval by Feb,17 end |
| Nagaland | LOAs already completed and works is likely to be completed by 30.09.2017 | DPR will be submitted soon to CEA & NLDC | DPR will be submitted soon to CEA & NLDC |

| | | | |
|-----------|---|--|--|
| Mizoram | By Mar'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | DPR will be submitted soon to CEA & NLDC |
| Manipur | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | DPR preparation stage |
| Tripura | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | - |
| Assam | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | - |
| Meghalaya | LOA for 20 Cr. Tender for 20 Cr. Additional LOA for 10Cr. by 31.01.17 Remainder by Mar'17 | DPR to be prepared | DPR to be prepared. |

Deliberation of the sub-Committee:

S.E.(O), NERPC once again reiterated that progress of PSDF projects are to be reported in formats prepared by IA/NPC for onward transmission.

The status as informed in 129th OCC:

| State | Protection System | ADMS | CAPACITOR INSTALLATION |
|-------------------|--|--|---|
| Arunachal Pradesh | Approval from the Govt. is awaited | DPR will be submitted soon to CEA & NLDC | Study is in progress and the same will be submitted to NERPC for approval |
| Nagaland | LOAs already completed and works is likely to be completed by 30.09.2017 | DPR will be submitted soon to CEA & NLDC | DPR will be submitted soon to CEA & NLDC |
| Mizoram | By Mar'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | DPR will be submitted soon to CEA & NLDC |
| Manipur | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | DPR preparation stage |
| Tripura | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | - |

| | | | |
|-----------|--|--|---------------------|
| Assam | By June'17 all LOAs would be issued. | DPR will be submitted soon to CEA & NLDC | - |
| Meghalaya | LOA for 20 Cr. Tender for 20 Cr. Additional LOA for 10Cr. by 31.01.17 Remainder by Mar'17 | DPR to be prepared | DPR to be prepared. |

The Sub-Committee noted as above.

Action: All state utilities.

3. Reasons For Demand - Supply Gap And Its Variation:

It was deliberated in the 4th NPC meeting that monthly power supply position prepared & published by CEA based on the data furnished by the states reflected shortages in almost all the states. However, a number of those states intimated adequate availability of power. This meant that the deficit/shortage in such states was actually not the deficit in true sense but demand-supply gap due to reasons other than shortage of power. The other reasons for the demand-supply gap could be inadequate availability of power, transmission constraint, distribution constraint, financial constraint, etc. The reason for demand-supply gap needed to be clearly mentioned to reflect true picture of power supply position in different states and also to invite attention of various agencies including policy makers to the specific problem areas in the power sector for suitable solution.

After deliberation it was decided in the meeting that all the RPCs would advise the states in their respective regions to intimate broad break-up of demand-supply gap due to various reasons, or at least, the main reason(s) for demand-supply gap in each month.

In 126th OCCM, S.E.(C&O),NERPC informed the forum that as per communication received from GM Division CEA, unscheduled load shedding and scheduled load shedding for peak demand met instance is to be provided. Accordingly, all the constituents & NERLDC were requested to indicate the latter from November, 2016 onwards. The forum requested DoP Ar. Pradesh, MSPCL and DoP Nagaland to submit the shortfall figures periodically.

In 127th OCCM, S.E.(C&O), NERPC once again requested the SLDCs to indicate breakup of short fall figures clearly. He requested NERLDC to provide the breakup in monthly reports clearly and highlight the cases where not provided.

NERLDC expressed that differences are coming up on account of several reasons, and proper accounting of captive load and generation is to be done by SLDCs. In case the captive power consumption is not included, the overall demands met of the states are reflecting less than actual. All SLDCs were requested to check and reflect the captive generation figures in their daily operational reports.

NERPC will circulate the Installed Capacity figures compiled by them for ratification by all.

In 129th OCC, S.E.(C&O), NERPC stated that currently no CPP figures are being received by NERPC. This is leading to improper shortfall calculation in monthly Power Supply Position. Also shortfall figures are not being classified as scheduled load shedding, unscheduled load shedding or shortfall due to system constraints. He requested all SLDCs to kindly clarify the above in their daily report to NERLDC, in order to avoid improper reporting further on.

Deliberation of the sub-Committee:

After detailed deliberation the following were decided:

- In order to arrive at correct Energy Availability/Requirement figures SLDCs are to provide feeder wise drawal figures in the daily report to NERLDC.
- Figures corresponding to Scheduled load shedding and unscheduled load shedding are to be indicated clearly in Daily Report.

Sr. Manager, TSECL requested a clarification about the meaning of scheduled and unscheduled load shedding. Member Secretary, NERPC clarified that scheduled load shedding means the planned load shedding including load shedding due to commercial constraints, while unscheduled load shedding means load shedding due to system constraints or contingencies in the system.

The forum requested NERLDC to accordingly modify the daily report formats and circulate. All SLDCs were requested to submit daily to NERLDC in the new format.

NERLDC again raised the issue of mismatch of Installed Capacity figures available with CEA/ NERPC/ NERLDC. After detailed deliberation it was decided that NERLDC & NERPC will circulate final Installed Capacity Figures based on the data received from all constituents before next OCC Meeting and the same shall be finalized and validated in 130th OCC Meeting.

Member Secretary, NERPC once again informed that de-commissioning of generating units will only recorded when communication is received from CEA. He requested

utilities to write to concerned division of CEA for de-commissioning of generating units.

The Sub-Committee noted as above.

Action: All SLDCs/NERLDC.

4. Long Outage of Important Grid Elements:

| Name of the Element | Name of Utility | Status |
|--------------------------------------|-----------------|--|
| 63MVAR Reactor at Byrnihat | MePTCL | SE, MePTCL informed that the matter is still being pursued with CGL. |
| 400KV 80MVAR Bus Reactor At Palatana | OTPC | 04Nos bushing to be replaced. Work would be completed by OTPC itself. Tentative completion 31.10.2017. |

The Sub-Committee noted as above.

Action: MePTCL, OTPC.

B.2. OPERATIONAL PERFORMANCE AND GRID DISCIPLINE DURING JANUARY, 2017

As per the data made available by NERLDC, the grid performance parameters for January, 2017 are given below:

NER PERFORMANCE DURING JANUARY, 2017

| States | Energy Met (MU) | | w.r.t. Dec,16 % inc (+) /dec (-) | Energy Reqr. (MU) | | w.r.t. Dec,16 % inc (+) /dec (-) | % inc (+) /dec (-) of energy reqr vs met. In Jan,17 |
|---------------|-----------------|----------------|----------------------------------|-------------------|----------------|----------------------------------|---|
| | Jan-17 | Dec-16 | | Jan-17 | Dec-16 | | |
| Ar. Pradesh | 63.89 | 61.39 | 4.07 | 65.02 | 62.50 | 4.03 | -1.74 |
| Assam | 709.43 | 669.55 | 5.96 | 718.33 | 685.17 | 4.84 | -1.24 |
| Manipur | 70.89 | 69.56 | 1.91 | 72.08 | 70.84 | 1.75 | -1.65 |
| Meghalaya | 151.38 | 144.88 | 4.49 | 151.38 | 144.88 | 4.49 | 0.00 |
| Mizoram | 47.76 | 47.66 | 0.21 | 48.79 | 48.88 | -0.18 | -2.11 |
| Nagaland | 64.99 | 61.77 | 5.21 | 65.92 | 62.99 | 4.65 | -1.41 |
| Tripura | 104.21 | 58.14 | 79.24 | 104.58 | 58.81 | 77.83 | -0.35 |
| Region | 1212.55 | 1112.96 | 8.95 | 1226.10 | 1134.05 | 8.12 | -1.11 |

| States | Demand Met (MW) | | w.r.t. Dec,16 % inc (+) /dec (-) | Demand in (MW) | | w.r.t. Dec,16 % inc (+) /dec (-) | % inc (+) /dec (-) of Demand vs met. In Jan,17 |
|---------------|-----------------|-------------|--|----------------|-------------|--|---|
| | Jan-17 | Dec-16 | | Jan-17 | Dec-16 | | |
| Ar. Pradesh | 120 | 129 | -6.98 | 122 | 131 | -6.87 | -1.64 |
| Assam | 1464 | 1389 | 5.40 | 1466 | 1388 | 5.62 | -0.14 |
| Manipur | 163 | 157 | 3.82 | 163 | 161 | 1.24 | 0.00 |
| Meghalaya | 332 | 310 | 7.10 | 331 | 310 | 6.77 | 0.30 |
| Mizoram | 98 | 96 | 2.08 | 98 | 97 | 1.03 | 0.00 |
| Nagaland | 121 | 127 | -4.72 | 122 | 127 | -3.94 | -0.82 |
| Tripura | 223 | 231 | -3.46 | 224 | 230 | -2.61 | -0.45 |
| Region | 2320 | 2223 | 4.36 | 2330 | 2245 | 3.79 | -0.43 |

REGIONAL GENERATION & INTER-REGIONAL EXCHANGE IN MU

AVERAGE FREQUENCY (Hz)

| Month----> | Jan-17 | Dec-16 |
|---|---------------|---------------|
| Total Generation in NER (Gross) | 1136.24 | 1197.89 |
| Total Central Sector Generation (Gross) | 842.39 | 844.02 |
| Total State Sector Generation (Gross) | 293.86 | 205.76 |
| Inter-Regional Energy Exchange | | |
| (a) NER-ER | 147.19 | 177.63 |
| (b) ER-NER | 1.36 | 36.39 |
| (c)NER-NR | 0.02 | 18.34 |
| (d)NR-NER | 353.79 | 323.55 |
| © Net Import | 207.94 | 163.97 |

| Month----> | Jan-17 | Dec-16 |
|--------------------------|-----------|-----------|
| | % of Time | % of Time |
| Below 49.9 Hz | 6.20 | 11.22 |
| Between 49.9 to 50.05 Hz | 70.42 | 69.95 |
| Above 50.05 Hz | 23.31 | 19.26 |
| Average | 50.00 | 50.00 |
| Maximum | 50.33 | 50.31 |
| Minimum | 49.71 | 49.67 |

The Sub-committee noted as above.

ITEMS FOR DISCUSSION

C.1 Status of Generating Units, Transmission Lines in NER:

During 129th OCC meeting, the status as informed by NTPC, NEEPCO, POWERGRID, DoP Ar. Pradesh and DOP, Nagaland is as follows:

| SN | Items | Status as given in 129 th OCC Meeting | Status as given in 128 th OCC Meeting |
|------------------------|-------|--|--|
| a. New Projects | | | |

| | | | |
|----|--|---|--|
| 1 | Trial operation and CoD of Unit -II of Bongaigoan TPS of NTPC | Unit synchronized on 13.02.2017. CoD by 31.03.2017 | Synchronization & CoD by 31.03.2017 |
| 2 | 400/220kV, 2x315 MVA ICT of NTPC at Bongaigaon | 1st 315 MVA ICT - To be charged within 28.02.17 2nd 315 MVA ICT - Not yet received at site | 1st 315 MVA ICT - To be charged within 21.01.17 2nd 315 MVA ICT - Not yet received at site |
| 3 | Trial operation and CoD 36MW STG of Monarchak GBPP of NEEPCO | Subject to gas availability | Subject to gas availability |
| 4 | Kameng HEP of NEEPCO two units (2 x 150 MW) Next two units (2x150 MW) | Unit #1 Oct'17 Unit #2 Nov'17 Unit #4 Dec'17 | Unit #1 Oct'17 Unit #2 Nov'17 Unit #4 Dec'17 |
| 5 | Pare HEP of NEEPCO (2 x 55 MW) | Unit #1 July'17 Unit #2 Aug'17 | Unit #1 July'17 Unit #2 Aug'17 |
| 6 | 400 kV D/C Silchar - Melriat line of PGCIL | June, 2017. | June, 2017. |
| 7 | 220kV Rangia - Salakati of AEGCL | December 2017 | June 2017 |
| 8 | 132kV Monarchak – Surjamaninagar D/C of TSECL | July, 2017 | July, 2017 |
| 9 | 400/132 kV, 2nd 125 MVA ICT at Pallatana | Synchronized on 08.10.2016 COD expected by 31.01.2017 | Synchronized on 08.10.2016 COD expected by 28.02.2017. Trial operation certificate issued on 22.02.17 |
| 10 | 132kV Pasighat – Aalong of Ar. Pradesh | February, 2017. | January, 2017. |
| 11 | 132kV Doyang- Wokha | March, 2017 | Doyang end bay work complete. Line to be charged at mutually agreeable date. |
| 12 | 220 kV, 20 MVAR Line Reactor& bay at AGBPP on 220 kV NewMariani – AGBPP line | Trial operation by 28.02.17. | NEEPCO site not ready (hydrant and fire extinguisher) Trial operation by 31.01.17. |
| 13 | 132kV Surjamaninagar Bay at OTPC | Work to be executed by GE (T&D). Would be completed by 31.03.2018. | 31.08.2017 |

| | | | |
|---|--|--|--|
| 14 | 400kV D/C Balipara – Kameng | March 2017. | March 2017. |
| 15 | RHEP 80 MVAR Bus Reactor | T.S. preparation stage. | Tendering in process. |
| 16 | SLDCs (Ar. Pradesh, Manipur, Mizoram, Nagaland) | Manipur – Completed, handover by Mar'17, Mizoram- Mar'17, Nagaland- Building ready and handed over, AP- Building handover issues sorted out. | Manipur – Jan'17, Mizoram- Feb'17, Nagaland-Building ready and handed over, AP- Complete Building handover not done. |
| 17 | 400/220 kV 315 MVA ICT-II at Bongaigaon | Manufacturing stage | Manufacturing stage |
| 18 | 220/132 kV, 2x160 MVA ICTs at Balipara | By 31 st August 2017(LOA date). | By 31 st August 2017(LOA date). |
| 19 | 220/132 kV, 1x160 MVA ICT with GIS Bay at Kopili | By 31 st August 2017(LOA date). | By 31 st August 2017(LOA date). |
| 20 | 400/132 kV, 1x315 MVA ICT-III at Silchar | December, 2017(LOA date). | December, 2017(LOA date). |
| 21 | Replacement of 2x315 MVA ICTs with 2x500 MVA ICTs at Misa (PG) | December, 2017(LOA date). | December, 2017(LOA date). |
| 22 | 400 kV Silchar – Misa D/C | Under TBCB | Under TBCB |
| 23 | 1x125 MVAR Bus Reactor at 400 kV at Balipara | December, 2017(LOA date). | December, 2017(LOA date). |
| 24 | 1x125 MVAR Bus Reactor at 400 kV Bongaigoan | December, 2017(LOA date). | December, 2017(LOA date). |
| 25 | Bays at Hailakandi & 132V Silchar-Hailakandi | June, 2017. | March, 2017. |
| 26 | Tuirial HEP of NEEPCO | June, 2017. | - |
| b. Elements under breakdown/ upgradation | | | |
| 26 | 63MVAR Reactor at Byrnihat of Me.PTCL | As recorded in item B.1.(4) | As recorded in item B.1.(4) |
| 27 | Up-gradation of 132 kV Lumshnong-Panchgram line | DPR preparation stage | DPR preparation stage |
| 28 | Switchable line Reactors at 400kV Balipara & Bongaigoan | Procurement works underway. Both to be completed by 31.03.17 | Procurement works underway. Both to be completed by 31.03.17 |

| | | | |
|----|---|--|--|
| 29 | PLCC Panels at Loktak end of Loktak – Ningthoukhong 132 kV feeder and Loktak - Rengpang 132 kV feeder | Work(s) have been included in tender for additional line of 132kV Loktak-Ningthoukhong | Work(s) have been included in tender for additional line of 132kV Loktak-Ningthoukhong |
| 30 | LILO of 132kV Ranganadi – Nirjuli at Pare of NEEPCO by PGCIL | PGCIL-no space for bay at Pare. Solution to be explored. | Jan'17 |
| 31 | LILO of 132kV Ranganadi – Itanagar (Chimpu) at Pare of Ar. Pradesh | Bay at Pare under construction Bay 1: completed Bay 2: March 2017 | Bay at Pare under construction Bay 1: completed Bay 2: March 2017 |
| 32 | 400KV 80MVAR Bus Reactor at OTPC Palatana | As recorded in item B.1.(4) | As recorded in item B.1.(4) |

The Sub-committee noted as above.

C.2 Furnishing of UFR Report and status of Implementation:

As per recommendation of enquiry Committee, the status of installation of UFR in NER was already circulated earlier. It is gathered that, 18.5 MW quantum is yet to be implemented in Arunachal Pradesh & Manipur.

The 123rd OCC forum decided that monthly report is not being furnished. As per clauses of relevant regulations, and Order of Hon'ble CERC in matter of Petition no. 113/MP/2014, NERLDC and NERPC are mandated to submit status of UFR operation and non-operation to CERC. SLDCs were thus requested to submit UFR operation details (feeder-wise quantum of load relief to be indicated) on monthly basis, and even if no UFR operated in particular month, it should indicated as NIL.

The 127th OCC forum requested all the SLDCs/state utilities to certify healthiness of the relays while submitting the UFR operation report monthly.

The latest status as informed by NERLDC in 129th OCC:

| | |
|-------------------|----------------------|
| Arunachal Pradesh | Furnished for Oct'16 |
| Assam | Furnished for Jan'17 |
| Manipur | Furnished for Jan'17 |
| Meghalaya | Furnished for Jan'17 |
| Mizoram | Furnished for Jan'17 |

| | |
|----------|----------------------|
| Nagaland | Furnished for Jan'17 |
| Tripura | Furnished for Dec'16 |

NERPC will form a team for UFR inspection for 1st Stage. 1st stage will cover Arunachal Pradesh, Assam and Manipur. Team will also discuss possibilities for mapping of feeders identified for UFR with SCADA.

The Sub-committee noted as above.

D. NEW ITEMS

D.1 Generation Planning (ongoing and planned outages)

NEEPCO/NHPC may kindly intimate the availability for hydro stations:

| Generating Station | Units running | MW | MU | Reservoir |
|--------------------|---------------|----|-------------------|-----------|
| Khandong | 2 | | 8.03 | 708.1 |
| Kopili-II | 1 | | | |
| Kopili | 4 | | 77.62 | 599.7 |
| Ranganadi | 3 | | Subject to inflow | |
| Doyang | 3 | | 18 | 314.7 |
| Loktak | 3 | | 117.5 | 767.7 |
| AGBPP | - | - | - | - |
| AGTPP | - | - | - | - |

Hydro planning

The outage of other generating stations may be approved considering the present level water level in reservoirs.

Deliberation of the sub-Committee:

The Committee discussed and approved the proposed shutdown by Generating Stations and the same has already been uploaded in the website of NERPC.

D.2 Outage Planning Transmission elements

It was agreed in the 99th OCC meeting that shutdown will be availed only after approval is given by the OCC forum. It was also agreed that deferment/revision of outages elements other than already approved in OCC will be henceforth put/displayed in the website of NERPC (under Operational Activities/OCC Approved

shutdown) as per CERC regulations/ CEA guidelines etc for ensuring smooth & secure grid operation.

Furnishing request of shut down of the element, which was approved by NERPC, by Indenting Agency (ISTS licensees/STUs/Generating Companies) to NERLDC: Planned shutdown approved by NERPC shall be considered for implementation by NERLDC on D-3 basis. If an outage is to be availed on say 10th of the month, the shutdown availing agency would reconfirm to NERLDC on 7th of the month by 10:00 Hr. This practice is necessary to ensure optimal capacity utilization and the time required for associated system study/coordination by/amongst RLDC/NLDC.

In 124th OCCM, SE(C&O) strongly opined that constituents should inform to NERPC/NERLDC in case shutdown is not avail as approved in the OCC meeting and should mention clearly the reason for not availing the shutdown. The full list of shutdown would be placed in the next OCC by NERLDC so that proper record can be made in future for generating units as well as transmission lines. All constituents endorsed the view of SE(C&O).

In 128th OCCM, S.E.(C&O),NERPC stated that OCC approved shutdowns are not being availed and also shutdown requests after OCC approval are being sent repeatedly by different utilities. He stressed that this practice is highly undesirable and no shutdown request after OCC approval would be entertained except in dire emergencies.

The sub-Committee discussed and approved the proposals received from the constituents regarding transmission elements and generating units for February, 2017 - March, 2017 and the same has already been uploaded in website of NERPC.

D.3 Estimated Transmission Availability Certificate (TAC) for the month of October & November, 2016:

NETC and POWERGRID have submitted the outage data for the month of October & November, 2016. So the attributability of outage of the said elements may please be finalized.

The forum once again advised NETC&POWERGRID to submit data in a time bound manner as decided previously.

The Sub-Committee noted as above.

D.4 Furnishing of Technical and Commercial data for computation of PoC Charges and Losses for Q1 of 2017-18 (April 2017 – June 2017):

In the 3rd Validation Committee meeting for PoC application period Oct'15-Dec'15, held on 30th September 2015, at NLDC conference Hall, CERC had proposed a methodology for ratification of projected data at RPC form.

In line with the decision in the Validation Committee meeting, Demand and Generation projections w.r.t North Eastern Region constituents as given by Implementing Agency is attached in **Annexure D.4** for ratification of members.

Deliberation in the meeting

During 129th OCCM, members deliberated and reviewed the generation and demand data for Q1(2017-18) as furnished by NLDC and the same is attached at Annexure – D.4. Figures to be discussed and modifications as follows:

- a) AGTCCPP(RCNagar, NEEPCO) => 132 MW
- b) TGBP(Monarchak, NEEPCO) => 51MW
- c) Meghalaya => demand figure 319 MW.
- d) Assam => Demand of Assam to be changed to 1415 MW
- e) Manipur => Demand to be kept as 161 MW
- f) Ar. Pradesh => Demand to be taken as 138 MW
- g) Mizoram => demand figure 93MW.
- h) Nagaland => demand figure 126 MW.
- i) Tripura => demand figure 285 MW.

The final figures are available in the revised **Annexure D.4**.

NERLDC informed that YTC data has not yet been submitted by TSECL & MePTCL for Q1 of 2017-18.

The Sub-Committee noted as above.

Action: TSECL & MePTCL

D.5 Assessment of Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) by SLDC on respective Inter-State Transmission Corridor

Updated PSSE Base Cases have been **mailed to all the SLDCs on 06.02.17**. All SLDCs are requested to assess the Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) **for the month of**

February'17 using these cases, and submit the study cases and results to NERLDC by **20th February, 2017**.

NERLDC has assessed the state control area wise, state subsystem wise and group of control-area wise TTCs for NER Grid, on behalf of SLDCs of NER. The study results conducted by NERLDC will be mailed to all SLDCs. SLDCs are requested to check the TTC of their control areas as computed by NERLDC and **give comments, if any by 20th February'17**.

If no comments received from any SLDCs of NER, TTC, ATC & TRM figures of State control area and group of control areas as assessed by NERLDC will be considered as final **and may be uploaded on website**.

As per discussions in 122nd OCC meeting of NERPC, all SLDCs of NER may host the assessed TTC / ATC / TRM figures on their website for information dissemination.

Deliberation in the meeting

AGM(SO-I),NERLDC informed that the workshop on PSSE was successfully conducted by NERLDC on 16.02.2017. The forum unanimously appreciated the efforts of NERLDC in this regard. Engineer, NERLDC requested that all SLDCs may kindly nominate their Reliability co-ordinators at the earliest. S.E.(O),NERPC concluded that from now on SLDCs should communicate their TTC/ATC for every quarter to OCC forum. S.E. (O), NERPC requested MSPCL to submit their study report in next OCC Meeting.

| Sl. No. | Name of Utility | Name of Reliability Coordinator |
|----------------|------------------------|--|
| 1 | Arunachal Pradesh | Mr. Nangkong Perme |
| 2 | Assam | Mr. Navojit Patir |
| | | Ms. Barsha Kashyap |
| 3 | Manipur | Ms. L. Ritu |
| | | Ms. K. Steela |
| 4 | Meghalaya | Mr. David J. Lyngdoh |
| 5 | Mizoram | Mr. David Lalmumpaia |
| 6 | Nagaland | Mr A. Jakhalu |
| 7 | Tripura | Mr. Mrinal Pal |
| 8 | NERPC | Mr Srijit Mukherjee/S. Ranjan |
| 9 | NERLDC | Mr. A. Mallick |
| | | Mr. S.C. De |
| | | Ms. Momai Dey |

The Sub-Committee noted as above.

Action: All SLDCs.

D.6. Certification of open cycle generation of AGBPP for FY 15-16:

As per methodology decided in 87th OCC meeting and modus operandi decided in 19th & 20th CCM the open cycle generation of AGBPP for FY 15-16 is to be certified. Accordingly it is requested of NERLDC to kindly verify "the generator operation in OC mode due to some fault and problem is resolved in a reasonable time, with DC revision". After verification by NERLDC, certification would be done by NERPC.

In 126th OCC the forum requested NERLDC/NERPC to complete the procedure and present the certification in next OCC meeting, so that members may ratify.

In 127th OCCM, Manager, NERLDC informed that the verification for FY 15-16 is under process. He also suggested that the exercise be made periodical so that no backlogs remain. S.E.(C&O), NERPC welcomed the suggestion and requested NEEPCO to submit the outage data monthly.

In 128th OCCM, S.E.(C&O),NERPC intimated the forum that the verification for FY15-16 has been received from NERLDC. The final certification would be presented in next OCC/CCM for ratification by members. Sr. Manager, NEEPCO informed that outage details are being submitted quarterly. SE(C&O), NERPC requested NEEPCO to submit the details monthly.

The open cycle certification for FY15-16 is attached in Annexure D.6. Members may please ratify.

Deliberation in the meeting

Members ratified the outage verification by NERLDC and open cycle certification for FY 15-16.

The Sub-committee noted as above.

D.7. Renovation and Modernization of Umiam Stage-III HEP (2 x 30 Mw)

In line with the policy for taking up Renovation & Modernization (R & M) of old hydroelectric power plants initiated by the Ministry of Power, Government of India, MeECL has decided to take up R & M of Umiam Stage-III HEPP (2 x 30 Mw) commissioned in 1979, considering the aggravated condition of the power plant.

In 126th OCCM, S.E., MePGCL informed that Umiam Stage-III has already completed its useful life having been in service for 37 years since commissioning. He requested that R&M cost be funded from PSDF.

S.E.(C&O),NERPC informed that R&M of power plants are not specifically funded from PSDF under PSDF regulations. However they may be funded under extraordinary Cl.4.1.(e). He requested MePGCL to submit the proposal at the earliest so that the matter may be followed up with NLDC/CERC.

Deliberation in the meeting

S.E.(O), NERPC informed that NERPC would take up with CEA and apprise members of the status in the next meeting.

The Sub-committee noted as above.

Action: MePGCL/NERPC/CEA.

D.8 Reporting of commissioned transmission elements for TARANG App.

TARANG (Transmission App for Real Time Monitoring and Growth) Mobile App & Web Portal has been developed by REC Transmission Projects Company Ltd (RECPTL) for progress monitoring of transmission systems on Pan-India basis, which was launched by Hon'ble Minister of State for Power on 17th August 2016. The app can be downloaded on smartphones or be accessed through its website (www.tarang.website). As part of the responsibility charter, POSOCO has been assigned the responsibility to update the systems under operation in the 'Completed Transmission Systems' section of the app.

In order to provide this information to the Ministry of Power, it is requested to provide the details of commissioning of transmission elements in respective state for each month by the 3rd day of the next month to NERLDC.

In 126th OCCM, Sr. Engineer, NERLDC emphasized the need for furnishing this data for TARANG app devised by Ministry of Power, Govt. of India for information to the public. It was also mentioned that during recent visit to Guwahati on 11.11.2016, the same was emphasized by Joint Secretary (Power). NERLDC requested all utilities to submit the data to: **nerldcso2@posoco.in** by 3rd of every month for the previous month.

In 127th OCCM, Sr. Engineer, NERLDC informed that whatever elements have been commissioned in previous month need to be mailed to NERLDC by 3rd of every month. DGM, SLDC, AEGCL requested that respective transmission utilities may be approached for the required data. DGM(MO),NERLDC clarified that the details of any EHV commissioned elements within a State are supposed to be available with SLDCs, so there should not arise any difficulty in this regard.

It was agreed that SLDCs would furnish the data.

In 128th OCCM, NERLDC informed that even if no elements have been commissioned in the preceding month then a NIL report is to be submitted to NERLDC. NERLDC also informed that the updated Power Map and Grid Maps of all the states of NER will be circulated and all utilities are requested to give comments on the same.

Deliberation in the meeting

NERLDC informed that currently only MSPCL is mailing the report on commissioned elements. It was requested to all the SLDCs to submit the report by mail periodically.

The Sub-committee noted as above.

Action: All SLDCs.

D.9. Installation of DAS to monitor FRC for generators:

In continuation to discussions in 125th OCC meeting on this matter, and letter from ED-NLDC dtd. 10th October'16, it is requested that all generators may take urgent action to ensure Primary response as per stipulation [As per Sec.1(4) of Part-II of CEA's Grid Connectivity standards, 0-10% droop for hydro generator governors ; 3-6% droop for Thermal generator governors].

Also, as per Section 11.2.(i) of CEA's Technical Standards for Construction, all generating stations must store important analog data in 1 seconds interval.

NEEPCO has informed that AGTPP and Ranganadi HEP have properly working DAS, that are capable of storing Machine side data like Voltage, frequency, Active power generation, Reactive power generation, Line currents, etc. Also, it was confirmed in last OCC that DAS at AGBPP is installed but not time-synchronized.

All generating stations may confirm that their governors are properly tuned for giving primary response as per regulations.

Also, NEEPCO may intimate the status of installation of DAS for their remaining generating stations.

In 126th OCCM, Sr. Manager, NEEPCO informed that all their plants have DAS installed. AGM(SO-I),NERLDC clarified that in case of oscillations/ disturbance response of generators(in ms) cannot be captured by SCADA due to low resolution of data.

NERLDC requested NEEPCO to ensure that all their installed DAS are time synchronized and data during events is not lost. Also, the resolution of data of DAS to be checked by NEEPCO and ensured that at least 1 sec resolution data is available.

In 127th OCCM, Sr. Engineer, NERLDC once again reiterated that DAS is required for analyzing response of governors and their absence severely impairs calculation of FRC. Sr. Manager, NEEPCO informed that installation of DAS in case of old generating units of Kopili, Khandong and Doyang involves huge financial involvement. He assured that management would be apprised of the requirement and any decision taken in this regard would be informed to the forum.

In 128th OCCM, NERLDC informed that on 23.12.2016, at 0127 hrs, all 400 kV lines from Kishenpur substation (Northern Region) except 400 kV Moga -Kishenpur II tripped which led to complete Valley (Kashmir) system collapse. Total Load Loss in J&K was about 1200 MW and Generation loss was of about 250 MW. All the generators primary response characteristics are required. In this respect NERLDC requested all generating utilities to provide time stamped MW, MVAR, Voltage and frequency data from 01:20Hrs to 01:30 Hrs of 23.12.2016. NERLDC also informed that the format was mailed to all the generators on 26th Dec'16.

Deliberation in the meeting

NERLDC informed that data from BgTPP, Loktak HEP, Khandong, Kopili, AGBPP, AGTPP and Doyang has not yet been received after repeated request. Manager, NHPC, Loktak informed that DAS is not installed at Loktak, so providing the data is difficult. He requested NERLDC to intimate the minimum time resolution required, upon which exercise would be done to furnish the data. NERLDC informed that format for submission for data already mailed to all the generating stations and requested all generators to furnish data at least in 1 sec interval.

AGM, NERLDC informed that following two incidences occurred in National grid for which FRC calculations are to be done. Without proper data it is very difficult to calculate/ascertain exact contributions of Generators and States towards frequency correction. He requested all for submission of data as requested.

- 1) On 21.02.17, at 1559 hrs, 900 MW generation loss due to tripping of Klaisindh Units - 1,2
- 2) On 05-Feb-17, at 12:24hrs 765kV Mainpuri-Bara ckt tripped along with both running units at Bara TPS (UP). Generation loss of 1100MW occurred.

The Sub-committee noted as above.

Action: NHPC, NEEPCO.

D.10. Finalization of the Annual Load Generation Balance Report (LGBR) for Peak as well as Off-peak scenarios and the Annual outage plan for 2017-18 by 31.12.16 as per IEGC

As per IEGC, each SLDC shall submit LGBR for its control area, for peak as well as off-peak scenario, by 31st October for the next financial year, to respective RPC Secretariat. The annual plans for managing deficits/surpluses in respective control areas shall clearly be indicated in the LGBR submitted by SLDCs.

As per IEGC, all SEBs/STUs, Transmission Licensees, CTU, ISGS, IPPs, MPPs and other generating stations shall provide to the respective RPC Secretariat their proposed outage plan in writing for the next financial year by 31st October of each year. These shall contain identification of each generating unit/transmission line/ICT etc., the preferred date for each outage and its duration and where there is flexibility, the earliest start date and latest finishing date.

For performing system studies, load forecasting, outage management and various other activities, it is necessary that LGBR report for the upcoming Financial Year is available beforehand. All entities are requested to furnish their details to NERPC for finalization of LGBR.

For purpose of system studies, it is requested that Demand Figures of states for the months of April'17, May'17, and June'17 be indicated to NERLDC.

In 127th OCCM, it was decided that the utilities would submit their figures at the earliest to NERPC.

NERLDC intimated that for computation of TTC/ATC figures on 5 months ahead basis, the LGBR figures as indicated by NERPC are required. To facilitate TTC calculations, the forum was requested to submit figures for April'17, May'17 and June'17 at the earliest to NERLDC.

In 128th OCCM, after detailed deliberation it was decided that all state utilities would submit their figures at the earliest to NERPC.

NERLDC again requested the forum to submit figures for May'17 and June'17 at the earliest to NERLDC for calculation of TTC/ATC figures on 5 month ahead basis.

Deliberation in the meeting

After detailed deliberation it was decided that all state utilities would submit their figures at the earliest to NERPC.

NERLDC again requested the forum to submit figures for May'17 and June'17 at the earliest to NERLDC for calculation of TTC/ATC figures on 5 month ahead basis.

The Sub-committee noted as above.

Action: NERPC, All SLDCs.

D.11. Status of reactors under outage in NER Grid

400 kV Nodes in NER Grid are experiencing high voltage during Off-Peak hours. As per information available with NERLDC, the following reactors are under outage:

63 Mvar Line Reactor of 400 kV Balipara - Bongaigaon III line at Bongaigaon is under out since 12.11.16.

400 kV, 50 Mvar Bus Reactor at Misa is under outage since 03.12.16.

400 kV, 63 Mvar Bus Reactor at Byrnihat is under outage since 09.12.14

400 kV, 80 Mvar Bus Reactor at Palatana is under outage since 15.03.16

200 kV, 2x12.5 Mvar Bus Reactor at Samaguri is under long outage.

132 kV, 2x2 Mvar Bus Reactor at Dharmanagar is under long outage.

It is requested to inform the status of restoration of the above reactors at the earliest.

Apart from the above reactors, it is also requested to provide commissioning status of the following reactors:

20 Mvar Line Reactor of 220 kV AGBPP - New Mariani (PG) line at AGBPP

Conversion of line Reactors of 400 kV Balipara - Bongaigaon I & II lines at Balipara and Bongaigaon to Bus reactors (4 Nos.)

400 kV, 1x125 Mvar Bus Reactor at Balipara

400 kV, 1x125 Mvar Bus Reactor at Bongaigaon.

400 kV, 1x80 Mvar Bus Reactor at Ranganadi.

220 kV, 1x31.5 Mvar Bus Reactor at Mokokchung (PG).

In view the Critical voltage profile of NER Grid in Off-Peak hours, it is suggested no shutdown of Reactors in NER Grid shall be availed unless in case of Emergency.

In 127th OCCM, DGM (AM), NERTS informed the following:

400kV 50 MVAR Bus Reactor at Misa is under gasket replacement and filtration will be brought back in service shortly.

400kV, 63 MVAR, Balipara – III Line reactor at Bongaigaon suffered winding failure and required to be sent to factory for repair. Out of two spare reactors for Biswanath-Chariali one would be shifted to Bongaigaon to restore Balipara-III Line Reactor.

Commissioning of 20 MVAR line reactor of 220kV AGBPP-New Mariani at AGBPP - would be completed by 20.12.2016

NERLDC expressed seriousness in outage of several reactors, and particularly when Lean hydro is ongoing. The matter of outage of Palatana reactor was discussed in detail. Presently voltage profile at Palatana is critical, and restoration is necessary. Palatana informed issues with BHEL in that they are not getting any reply from BHEL. The forum suggested OTPC should take up with BHEL in a 15 days time frame, and intimate what is the future course of action within 1 month to OCC forum. In case of delay by BHEL, OTPC should make arrangement for restoration by engaging 3rd party vendors.

Status of Restoration of other reactors:

400kV, 63 MVAR, Balipara – III Line reactor at Bongaigaon suffered winding failure and required to be sent to factory for repair. Out of two spare reactors for Biswanath-Chariali one would be shifted to Bongaigaon to restore Balipara-III Line Reactor. After repair of damaged reactor, the same would be replenished to BNC.

20 MVAR line Reactor at AGBPP => Expected by 20th Dec, 2016.

50 MVAR BR at Misa => Shutdown taken for additional 2 days for Gasket replacement. Will return to service shortly.

63 MVAR BR at Byrnihat => CGL yet to visit site although they accepted the offer. PG/MePTCL to follow up for early restoration.

2x12.5 BR at Samaguri => AEGCL to inform status in next meeting

6. 2x2 MVAR BR at Dharmanagar => TSECL to inform status in next meeting.

In 128th OCCM, Sr. Manager, TSECL informed that Bus reactor at Dharmanagar is under outage since 20 years back, the exact status of restoration and whether it should be altogether removed from list of elements will be informed in next OCC meeting. DGM, SLDC, AEGCL informed that Samaguri reactor would be restored by 31.07.2017.

NERPC informed all the utilities that if any reactor is to be removed from the overall list of Reactive Power Capacity of NER it will be done only after getting decommissioning letter from CEA.

ACE, MePTCL also requested that since the reactor is very important from operational point of view for NER Grid and stated that since MePTCL do not have the capital to invest on repairing the 63MVA fault reactor at Byrnihat, he requested NERPC Secretariat to explore funding from PSDF.

SE(C&O) stated that they will look into the matter and requested MePTCL to send the proposal; however, MePTCL should go ahead with repairing for safety of the grid.

Deliberation in the meeting

The status of different reactors under outage as informed in 129th OCC is as follows:

| SI.No. | Name of element | Status on 129 th OCC Meeting |
|--------|---|--|
| 1. | 50 MVAR bus reactor at Misa | In service |
| 2. | 63 Mvar Line Reactor of 400 kV Balipara - Bongaigaon III line at Bongaigaon | Sent to factory for repair. One spare reactor for HVDC BNC would be installed at Bongaigaon within 31.03.2017. |
| 3. | 63MVAR bus reactor at Byrnihat | Pls refer to Item B.1.(4) |
| 4. | 80 Mvar Bus Reactor at Palatana | Within 31.10.2017 would be charged. |
| 5. | 2x12.5 Mvar Bus Reactor at Samaguri | Under revival stage. Would be restored within 31.07.2017. |
| 6. | 2x2 Mvar Bus Reactor at Dharmanagar | Reactor is out of service and would never be put again in service. |
| 7. | 20 Mvar Line Reactor of 220 kV AGBPP | Pls refer to Item C.1.(12) |
| 8. | 400 kV, 1x125 Mvar Bus Reactor at Balipara | Pls refer to Item C.1.(23) |
| 9. | 400 kV, 1x125 Mvar Bus Reactor at Bongaigaon | Pls refer to Item C.1.(24) |
| 10. | 400 kV, 1x80 Mvar Bus Reactor at Ranganadi. | Pls refer to Item C.1.(15) |
| 11. | 220 kV, 1x31.5 Mvar Bus Reactor at Mokokchung (PG). | December'17 |

Member Secretary, NERPC once again informed that de-commissioning of grid elements is only recorded when communication is received from CEA. He requested utilities to write to concerned division of CEA for de-commissioning of elements.

The Sub-committee noted as above.

Action: AEGCL/TSECL/NERTS/MeECL/OTPC.

**D.12. Constraint in Bipolar Operation of +/- 800 kV HVDC Biswanath Chariali –
Agra:**

As communicated by NLDC, in case of operation of the HVDC Bipole BNC-Agra link for power flow in Agra-BNC direction, it is not possible to operate the Bipole link in Constant Power mode. In this scenario for operation in Agra-BNC direction, only constant current mode is possible wherein upon tripping of any pole, the other will not share load and the filters may also not disconnect.

During lean hydro (winter) months, NER may import power from NR through this Bipole link to relieve congestion of Eastern-Regional grid. In constant current mode operation, if the filter banks do not trip immediately after reduction of power flow through the link, the 400 kV Nodes in NER may experience severe overvoltage (due to low fault level of around 4000 MVA at 400 kV Biswanath Chariali) that may lead to tripping of the 400 kV lines from Biswanath Chariali, Ranganadi, Balipara, Bongaigaon, and trigger a major disturbance in NER.

Considering the importance of this link in operation of NER grid, NERTS may intimate the following:

- Issues related to operation of +/- 800 kV Agra-BNC bipole in Constant Power Mode
- Time required for disconnection of Filter Banks at BNC in case while running in Constant Current Mode, 1 Pole gets blocked / tripped?
- Maximum possible Power Flow in Agra to BNC direction (separately for different modes of operation)

In 127th OCCM, NERLDC explained that in case of power flow in Agra-BNC direction in Bipolar mode, the poles operated independently of each other and thus the cause of concern in grid operation, particularly in Lean Hydro season in NER. The matter was discussed at length. S.E.(C&O),NERPC concluded that POWERGRID to depute concerned person from Biswanath-Chariali HVDC to attend next OCCM for fruitful deliberation of agenda items pertaining to HVDC operation, and clarification of any queries of forum members.

In 128th OCCM, DGM (AM), NERTS informed that upon consultation with HVDC team it has been confirmed that operation in constant power mode with load sharing is possible. The forum requested NERTS to conduct site visit to BNC for OCC members' familiarisation with HVDC operation. NERTS concurred. The forum again requested NERTS that concerned person from Biswanath-Chariali HVDC to attend next OCCM

for fruitful deliberation of agenda pertaining to HVDC operation, and to clarify any queries of the members.

AGM, NERLDC expressed concerns about Non/improper operation of filters at BNC resulting in high voltage problems and on some occasions causing tripping of lines on over voltage. He requested for corrective actions by concerned authorities.

Deliberation in the meeting

Engineer, POWERGRID Biswanath-Chariali through a presentation highlighted different operational aspects of HVDC operation. Briefly the different operational issues are as follows:

- The \pm 800kV HVDC project was envisaged to evacuate power from Subansiri project. Only later on in the commissioning stage the bi-directional flow of power was included in the scope. Since the elements were designed for uni-directional flow of power, derating with regard to the flow from Agra to BNC was inevitable. In monopolar mode only 1000MW may flow from Agra to BNC while it is 1500MW in bipolar mode.
- Reactive Power Control (RPC) decides the number of AC filter sub banks and switching sequence in relation to the power order.
- In case of forward power flow i.e. from BNC to Agra, Agra is in Master mode while in reverse power flow i.e. Agra to BNC there is no master. Synchronous blocking and de-blocking is available in Master mode only.
- In reverse flow only SPCC mode i.e. Separate Pole Current Control is available.
- RPC is set to manual in case of reverse power flow.

Cause of rise in voltage

No load sharing between the two poles due to tripping of one monopole and AC filters remaining connected even after pole trips due to manual mode of RPC operation, till the operator trips the filters manually causes sudden rise of voltage.

Interim remedial measures

- Power sharing between two poles is being explored.
- Additional 3 Nos. reactors for Subansiri line will be tried to be converted to bus reactors.

The presentation is attached in **Annexure D.12**.

The Sub-committee noted as above.

Action: NERTS.

D.13. Dedicated voice communication and Data channel:

Dedicated voice communication with Substations and Generating Stations needs to be checked daily. Currently in most of the stations only one link is installed. In some stations VOIP phones are out (NLDC, Doyang, Kathalguri etc). Redundant of links need to be established on priority. Details of status of voice communication are attached in Annexure-D.29.

SCADA data from KATHALGURI, DOYANG, KOPILI, KHANDONG, RANGANADI, ITANAGAR, ZIRO etc are out since long due to which Grid management activity is severely affected.

RTU Outage details are given below:

| Sl. No. | Station Name | Date of Outage |
|---------|--------------|----------------|
| 1 | Ranganadi | 21.05.16 |
| 2 | Ziro | 07.08.16 |
| 3 | Kopili | 09.05.15 |
| 4 | Doyang | 24.01.15 |
| 5 | Khandong | 16.09.16 |
| 6 | Khatalguri | 25.07.16 |
| 7 | Haflong | 14.09.16 |
| 8 | Itanagar | 01.08.16 |

In 127th OCCM, Sr. Manager, NEEPCO informed the following:

RTU for RHEP is at tendering stage.

AGBPP RTU commissioned. By Jan 2017 data would be received at NERLDC subject to link restoration.

RTUs for Kopili, Khandong and Doyang in final stage of LOA.

NERTS and DoP Ar. Pradesh were requested to update the status by next OCC meeting.

Deliberation in the meeting

| Sl. No. | Station Name | Status as informed in 129 th OCC |
|---------|--------------|--|
| 1 | Ranganadi | Tendering stage for installation of RTU |
| 2 | Ziro | ABB has done site visit. Report awaited. |
| 3 | Kopili | LOA for installation of RTU placed on 30.12.2016 |
| 4 | Doyang | LOA for installation of RTU placed on 30.12.2016 |
| 5 | Khandong | LOA for installation of RTU placed on 30.12.2016 |

| | | |
|---|------------|---|
| 6 | Kathalguri | Link working. |
| 7 | Haflong | PLCC panel shifted. Link yet to be established. Will be complete by 31.01.17. |
| 8 | Itanagar | NERLDC to update the latest status. |

The Sub-committee noted as above.

Action: NEEPCO/NERTS/DoP Ar. Pradesh/NERLDC.

D.14. Strengthening of capacity of Khandong Bus as per grid requirement:

The normal life of 2x25MW Khandong Power Station is going to be completed in April, 2019. NEEPCO is in the process of R&M of the Power Station for life extension. Accordingly, order has been placed with M/s CPRI for field study and DPR preparation.

Though the generation from Khandong & Kopili Stage-II Power Station in peak hydro season is hardly 70MW and Khandong Bus is well equipped for evacuation of that quantum of energy. But In Kopili Power Station SY there is already one 220/132KV, 160MVA autotransformer and one more similar transformer is under installation. There are two 132KV lines from Khandong to Kopili. The new lines is having Zebra conductor and it is learnt that the conductor of old line will also be changed to higher capacity.

As you are aware that Khandong SY is having double Bus with transfer facility and bus conductor is single Zebra and all the jack buses and jumpers are single panther.

In this scenario, NEEPCO may be informed whether any strengthening of Khandong Bus is required. Same shall be included in the scope of study and suitable decision shall be taken subject to the strength of the existing structures.

In 128th OCCM, DGM, AEGCL suggested that SC level for Khandong Bus needs to be calculated taking into consideration addition of 160MVA 220/132kV transformer at Kopili and HTLS conversion of 132kV Kopili-Khandong-II. The forum approved the suggestion.

Deliberation in the meeting

Engineer, NERLDC informed that the calculated SC level after incorporating the future system upgradations is coming around 11kA (approx.), while the 3-phase SC level is 2000MVA. The forum recommended bus upgradation at Khandong if it is already not as

per 'Transmission Planning Criteria' of CEA. The appropriate item abstract is reproduced below:

15.2 "The maximum short-circuit level on any new substation bus should not exceed 80% of the rated short circuit capacity of the substation."

Sr. Manager, NEEPCO informed that prima facie it appears that bus has to be upgraded. Since the structure cannot support Twin Moose, HTLS Zebra would be considered for strengthening bus.

The Sub-committee noted as above.

Action: NEEPCO.

D.15. High voltage issues at 220 KV sides of Tinsukia and Namrup:

NRPP commissioning activities are going on and they are facing high voltage problem at 220 KV side which hampering the commissioning activities. As Kathalguri Generating Station is the only available source of voltage regulation. So, necessary action may be initiated in order to regulate the voltage for smooth running of commissioning activities of NRPP.

In 128th OCCM, Sr. Manager, NEEPCO informed that AGBPP alone cannot regulate the voltage, the maximum 2kV relief may be obtained by lowering the excitation. He also suggested that line reactor installation may provide higher relief. Members also requested NERPC to explore options whether compensating device installation for the benefit of grid may be funded from PSDF.

AGM, NERLDC informed the forum that NERLDC had received letter No. AEGCL/CGM/SLDC/T-12/16/68 dated 31.12.16 regarding frequent tripping of 220 kV NRPP- Tinsukia line on Over Voltage at NRPP end. They replied back vide letter no. User_NE/2016-17/5 dated 09.01.17. NERLDC also conducted studies and AGBPP was requested to absorb Reactive Power as per their Capability Curve.

Deliberation in the meeting

NERLDC again requested AGBPP to absorb Reactive Power as per their Capability Curve. After detailed deliberation the forum decided to drop the agenda item in the meantime.

The Sub-committee noted as above.

D.16. Frequent tripping of units of AGBPP (NEEPCO) due to tripping of Gas Compressor:

During the period from October'16 to December'16, there has been multiple tripping of units of Assam Gas Based Power Plant (AGBPP) of NEEPCO, resulting in lower availability of power for NER Grid. The list of trippings of units of AGBPP on account of tripping of Gas Compressor are listed below:

| Sl. No. | Date of tripping | Time of tripping in Hrs | Unit tripped | Reason for tripping |
|---------|------------------|-------------------------|--------------|--|
| 1 | 15.10.2016 | 11:43 | 6 | Due to tripping of GC # 2 |
| 2 | 15.10.2016 | 20:20 | 7 | Due to tripping of GC#1 on valve sequence failed |
| 3 | 15.10.2016 | 20:20 | 8 | |
| 4 | 16.10.2016 | 20:30 | 2 | Due to tripping of GC # 3 |
| 5 | 16.10.2016 | 20:30 | 4 | |
| 6 | 16.10.2016 | 20:30 | 7 | |
| 7 | 17.10.2016 | 08:58 | 2 | Due to tripping of GC#1 |
| 8 | 17.10.2016 | 08:58 | 7 | |
| 9 | 17.10.2016 | 08:58 | 3 | |
| 10 | 17.10.2016 | 08:58 | 4 | |
| 11 | 17.10.2016 | 08:58 | 8 | |
| 12 | 13.12.2016 | 00:56 | 2 | Due to tripping of GC#3 |
| 13 | 13.12.2016 | 00:56 | 7 | |
| 14 | 16.12.2016 | 17:10 | 2 | Due to tripping of GC#3 |
| 15 | 16.12.2016 | 17:10 | 4 | |
| 16 | 16.12.2016 | 17:10 | 7 | |
| 17 | 18.12.2016 | 08:17 | 2 | Due to tripping of GC#3 |
| 18 | 18.12.2016 | 08:17 | 7 | |
| 19 | 23.12.2016 | 11:16 | 2 | Due to tripping of GC#3 |
| 20 | 23.12.2016 | 11:16 | 7 | |
| 21 | 25.12.2016 | 11:42 | 4 | Due to tripping of GC#2 |

In 128th OCCM, Sr. Manager, NEEPCO informed that due to microprocessor problem in circuitry of CR panel for GC#3 the problem is persisting, however this does not affect generation. The matter is being addressed locally and status would be intimated to the forum.

Deliberation in the meeting

AGM(SO-I),NERLDC informed the forum that the trippings have reduced and recommended to drop the item. Members agreed the same.

The Sub-committee noted as above.

D.17. Providing of Bank Protection of Dikrong River at Ranga De Reserve Village, Bihpuria Circle, Dist: Lakhimpur, Assam due to erosion of land on account of discharge of Ranganadi HEP:

The Ranga De Reserve Village is situated under Bihpuria Circle of Lakhimpur District in Assam at the left bank of Dikrong River where continuous erosion river bank is going on due discharge of Ranganadi Hydro Generation. At present, the fate of the villagers is in uncertainty. Earlier NEEPCO had provided river bank protection of Dikrong River from Bihari Basti to a part of Ranga De Reserve Village leaving around 2 KM bank unprotected which is suffering erosion endangering the life and property of the villagers.

In fact due to indiscriminate erosion of Dikrong River Bank, POWERGRID is shifting all the Towers of 400kV D/C Balipara-Ranganadi Line to pile foundation as per the approval of NERPC. Presently, the construction of those Pile foundations is in progress.

Now, the villagers of Ranga De Reserve Village are not allowing POWERGRID to carry out pile foundation in Location No. 48 & 49 which falls in said stretch of 2KM unprotected bank and pressing hard for providing River Bank Protection.

NEEPCO may extend the Bank Protection in unprotected 2 KM stretch in line with earlier execution of River Bank Protection as the river bank erosion is mainly on account of downstream discharge of Ranganadi HEP.

Deliberation in the meeting

DGM (AM), NERTS informed that matter was referred to GM, Pare HEP of NEEPCO but, GM, Pare stated that the matter does not come under the purview of Pare HEP. Subsequently, matter was referred to GM, Ranganadi HEP and Circle Officer of Bihpuria Circle of Lakhimpur District in Assam. S.E. (C&O), NERPC stated that NEEPCO should involve into the matter to resolve ROW in co-ordination with POWERGRID and Local administration so that POWERGRID can complete the pile

foundation. Accordingly, the forum advised NEEPCO and NERTS to jointly conduct the site survey and revert back to the forum.

The Sub-committee noted as above.

Action: NEEPCO/NERTS.

D.18. Providing of Insulation Sleeve in 33kV Tertiary System of Misa, Balipara, Bongaigaon and Silchar Sub Station:

Network reliability is a priority for electrical utilities. Supply interruptions add to maintenance costs and affect customer service. Substation faults are particularly expensive: equipment is often damaged and difficult to repair or replace; specialized post-fault maintenance may be required, and significant customer "supply" lost. Thus protecting of substations and overhead distribution/transmission networks by insulating vulnerable bare metalwork is of utmost importance.

Birds and animals often enter substations and interfere with overhead lines causing faults by bridging air clearances. Outages occur especially on distribution equipment, where conductor spacing allows relatively small birds and animals to bridge phases. The insulated tubes, tapes, sheets, preformed covers and barriers provide a proven, cost-effective and easy-to-install retrofit solution to bird and animal outages.

The tertiary of 400kV Sub Stations viz. Misa, Balipara, Bongaigaon and Silchar is at 33kV Level and the possibility of bridging the conductors by small birds and animals is high which is likely to cause substation fault. In fact, there is an instance of animal fault created by monkey at Tertiary System of 400/220/33kV Balipara Sub Station for which 400/220/33kV ICT got tripped.

In view of above, it is essential to enhance the insulation of Tertiary System of above sub stations by providing insulation sleeves in bare metallic conductors. The tentative expenditure for carrying out the jobs will be around **Rs. 4.00 Crores (Rupees Four Crores Only)** which POWERGRID proposes to execute and realize the expenditure through PoC Mechanism against System improvement.

Deliberation in the meeting

The forum approved the proposal in-principle and referred the matter to next TCC/RPC meeting.

The Sub-committee noted as above.

Action: NERPC.

D.19. Reimbursement of Security Expenditure for Deployment of AISF & CISF security personnel CISF engaged at ± 800kV HVDC Biswanath Chariali Sub Station:

The ± 800KV HVDC Biswanath Chariali Substation is one of the largest substations in the country & a project of national importance. The station is under operation & maintenance by POWERGRID, NER w.e.f. Sept'2015.

The station is located in a sensitive area with history of frequent breakdown in law & order conditions & is therefore susceptible severe security threat. Even during its constructional phase, frequent sabotages have occurred & damages have been caused to assets in the station. In view of criticality of the station, maintaining adequate security is of utmost importance since any act of damage/ sabotage is likely to cause colossal loss to this station & the National power system as a whole.

In view of the above, 63 nos. Assam Industrial Security Force (AISF) in and 21 nos. Central Industrial Security Force (CISF) personnel have been granted by concerned State Government & Ministry of Home Affair (GOI) for ensuring security of the station.

The total additional expenditure incurred by POWERGRID for deployment of special security force at ± 800KV HVDC Biswanath Chariali Substation is **Rs. 3.25 Crore (Rupees Three Crores Twenty Five Lakhs Only) per annum.**

Now, since the expenditure is additional on grounds of uncongenial Law and Order situation beyond the control of POWERGRID, the same is proposed for reimbursement from CERC under PoC Mechanism in line with the reimbursement being provided to POWERGRID for deployment of CISF Security Personal in at Bongaigaon & Salakati Sub Station.

Deliberation in the meeting

The forum advised POWERGRID to place the issue in next TCC/NERPC Meeting for necessary deliberation.

The Sub-committee noted as above.

D.20. Additional Security Expenditure for Maintenance of 132KV Jiribam-Loktak-II line in the State of Manipur:

The following Transmission Lines of POWERGRID traverses through the state of Manipur.

- a) 132KV Jiribam-Loktak-II line

- b) 132KV Aizawl-Jiribam line
- c) 132KV Haflong Jiribam line
- d) 400KV D/C Silchar-Imphal line
- e) 132KV Loktak-Imphal-II line
- f) 132KV Dimapur-Imphal line

Normal patrolling & maintenance of all the above lines in the state of Manipur often gets affected due to uncongenial law & order situation. But, as experienced, sabotage by the miscreants in 132KV Jiribam-Loktak-II line is more. There is history of frequent sabotage/ damage by miscreants to this transmission line towers including causing harm to transmission Line personnel. Considering the criticality of the line as linked with Loktak Generation, POWERGRID is constrained to carry out maintenance under security coverage provided by the State Administration, for which an amount of **Rs. 1.00 Crore (Rupees One Crore Only)** is additionally incurred every year by POWERGRID.

Now, since the expenditure is additional on grounds of uncongenial Law and Order situation beyond the control of POWERGRID, the same is proposed for reimbursement from CERC under PoC Mechanism.

Deliberation in the meeting

The forum advised POWERGRID to place the issue in next TCC/NERPC Meeting for necessary deliberation.

The Sub-committee noted as above.

D.21. SPS for transfer of 160 MW to Bangladesh through Tripura-Bangladesh link:

POWERGRID vide. C/CTU-PIg/NE/02/Bangladesh dated. 07.02.2017 has informed that in the 12th India-Bangladesh JWG &JSC meeting decision was taken to enhance power transfer through 400kV SMNagar-South Comilla link (charged at 132 kV). In this regard a SPS needs to be in place to increase reliability in power supply. Following SPS action has been suggested by POWERGRID:

| Sl. No. | Contingency | SPS Action |
|---------|--|--|
| 1 | Outage of one ICT out of 400/132kV 2x125MVA ICTs at Palatana | Limit transfer to 100MW on Cross-Border link, followed by shifting of 60MW load from |

| | | |
|---|--|--|
| | | Indian grid to Bangladesh grid. |
| 2 | Outage of 132 kV Palatana-SMNagar line | Tripping of Cross border link followed by shifting of entire 160MW load from India to Bangladesh grid. |
| 3 | Outage of one circuit of S.M. Nagar-South Comilla line | Limit transfer to 130MW on Cross-Border link, followed by shifting of 30MW load from Indian grid to Bangladesh grid. |

Deliberation in the meeting

AGM(SO-I),NERLDC informed that as per the suggested scheme of SPS, its implementation involves load reduction in Bangladesh system. In order for effective resolution, he suggested that a meeting be convened with Bangladesh Power Department officials, NERPC, NERLDC, CTU and TSECL. The forum requested NERPC to write to CTU for taking up the matter with MoP.

The Sub-committee noted as above.

Action: NERPC.

D.22 Procurement of ERS for NER from PSDF funding:

PSDF Secretariat (NLDC, New Delhi) vide. NLDC-PSDF/NPC-CEA/2016-17/60 dtd. 21st April 2016 has intimated that submission and approval of the schemes is governed in accordance with the guidelines for disbursement of funds from PSDF approved by MoP on 18.9.2014. Guidelines are available on <http://psdfindia.in/>. The schemes have to be submitted as per formats prescribed in guidelines.

During 124th OCCM, DGM(AM),NERTS stated that detailed clarification is required with regard to the following:

1. Status of funding from PSDF
2. Ownership of Asset and location of storage.
3. Signing authority for consultancy agreement.

During 124th OCCM, S.E(O),NERPC requested NERTS to carry out the works on behalf of the NER constituents at the earliest and the issue of ownership of asset will

be discussed in due course of time. Further, he requested NERTS that all the queries can be sorted out by NERPC & NERTS so that procurement shall not be delayed.

In 125th OCCM, DGM, SLDC, AEGCL opined that signing of consultancy agreement implies consultancy fees to POWERGRID for procurement and objected to payment of any such charges. DGM(AM),NERTS agreed to revert back with the details.

In 126th OCCM, DGM(AM),NERTS informed that consultancy charges would be waived off in case signing authority is NERPC. OCC forum mandated NERPC to be the signing authority and recommended that the matter be put up in the next TCC/RPC meeting for information.

Deliberation in the meeting

S.E.(C&O),NERPC informed that constituents has requested NERPC to sign the agreement on behalf of NER constituents and POWERGRID should agree to waive off the consultancy charge. DGM (AM), NERTS requested NERPC to sign at the earliest so that the work can proceed further.

The Sub-committee noted as above.

Action: NERPC/NERTS.

D.22. Change of E-mail ids of NERLDC:

As per the guidelines of POSOCO Corporate Centre, NERLDC is migrating to POSOCO domain. So all the constituents are requested to kindly take a note of the following email ids

| Sl. No. | Name of Department/Activities | Email Ids |
|---------|-------------------------------|----------------------------|
| 1 | Control Room | nerldccr@posoco.in |
| 2 | Open Access | nerldcoa@posoco.in |
| 3 | System Operation- II | nerldcso2@posoco.in |
| 4 | NERLDC RTSD | rtsdnerldc@posoco.in |
| 5 | Outage Related activities | nerldcoutage@posoco.in |
| 6 | Protection Related activities | nerldcprotection@posoco.in |
| 7 | Market Operation | nerldcmo@posoco.in |
| 8 | SEM data | monerldc@posoco.in |

This is for kind information and necessary action.

NERLDC requested all the utilities to use above mentioned ids for further communication henceforth. For control room, in addition to above Id, copy may also please be marked to earlier Ids (i.e. nerldccontrolroom@gmail.com and nerldc_cr@yahoo.co.in) also till the system is streamlined.

D.23. CT Ratio of Transmission Lines & Enhancement of Loadability of lines in NER:

As deliberated in 125th OCC meeting held on 14th September, 2016 at Guwahati double jumpering of bay and line before the CT upgradation work was to be completed, so that full capacity of CTs can be utilized for loading the lines.

| Sl. No | Name of the line | CT Ratio at either end (current) | | CT Ratio at either end (required) | | No. Of CTs required | | Current Status (as in 129 th OCC) |
|--------|---|----------------------------------|-------|-----------------------------------|-------|--|---|---|
| | | Stn A | Stn B | Stn A | Stn B | Stn A | Stn B | |
| 1 | 132 kV AGTPP- Agartala-I | 600/1 | 400/1 | 800/1 | 800/1 | 3 by PGCIL | 4 by PGCIL | Aug'17 |
| 2 | 132 kV AGTPP- Agartala-II | 600/1 | 400/1 | 800/1 | 800/1 | 3 by PGCIL | 4 by PGCIL | Aug'17 |
| 3 | 132 kV Jiribam- Aizwal | 400/1 | 400/1 | 600/1 | 600/1 | 3 by PGCIL | 4 by PGCIL | Aug'17 |
| 4 | 132 kV Jiribam- Haflong | 400/1 | 400/1 | 600/1 | 600/1 | 3 by PGCIL | 4 by PGCIL | Aug'17 |
| 5 | 132 kV Khandong - Umrangso- Haflong | 300/1 | 400/1 | 600/1 | 600/1 | 3 at Khandong by NEEPCO, 3 at Umrangso by AEGCL | 3 at Umrang so by AEGCL, 3 at Haflong by PGCIL | NEEPCO -31.3.17 AEGCL- Mar,17 PG (Haflong) Aug,17 |

| | | | | | | | | |
|---|--------------------------------------|-------|-------|-------|-------|--------------------------------|--|--------|
| 6 | 132 kV Loktak - Imphal-II | 400/1 | 600/1 | 600/1 | 600/1 | 3 by NHPC | | Mar'17 |
| 7 | 132 kV D/C Doyang - Dimapur | 300/1 | 600/1 | 300/1 | 600/1 | 3 by PGCIL & 6 by NEEPCO | | Aug'17 |

PGCIL, AEGCL, NHPC & NEEPCO to inform the current status of double jumpering of bay and line & also status of upgradation of CT Ratios.

The forum also recommended inclusion of CT upgradation of 132kV Khandong-Khliehriat-I (from 300/1 to 600/1) in the list. NERLDC requested PGCIL, AEGCL, NHPC & NEEPCO to submit a report to the forum after completion of the works.

The Sub-committee noted as above.

Action: NERTS/NHPC/NEEPCO/AEGCL.

D.24. Implementation of New Environmental Norms at BgTPP, NTPC, Palatana, OTPC, AGTCCPP, NEEPCO & AGBPP, NEEPCO:

As per new Environmental Norms for Thermal Power Plants (TPP) issued by Ministry of Environment, Forest & Climate Change (MoEF & CC) dated 07th December'15, available at <http://www.moef.gov.in/sites/default/files/Thermal%20plant%20gazette%20scan.pdf> new guidelines regarding water consumption limit, SO₂, NO_x emission etc is mentioned.

The new guidelines are as follows:

| Emission parameter | TPPs (units) installed before 31 st Dec'03 | TPPs (units) installed after 31 st Dec'03 and upto 31 st Dec'16 | TPPs (units) to be installed from 1 st Jan'17 |
|------------------------------------|--|--|--|
| Particulate Matter | 100 mg/Nm ³ | 50 mg/Nm ³ | 30 mg/Nm ³ |
| Sulphur Dioxide (SO ₂) | 600 mg/Nm ³ for units less than 500MW capacity 200 mg/Nm ³ for units 500MW and above capacity | 600 mg/Nm ³ for units less than 500MW capacity 200 mg/Nm ³ for units 500MW and above capacity | 100 mg/Nm ³ |

| | | | |
|--------------------------|------------------------|------------------------|------------------------|
| Oxides of Nitrogen (NOx) | 600 mg/Nm ³ | 300 mg/Nm ³ | 100 mg/Nm ³ |
|--------------------------|------------------------|------------------------|------------------------|

As per guidelines, TPPs shall have to meet the limits within Two (2) years from the date of publication of the Gazette Notification i.e. 07.12.15.

NTPC, OTPC & NEEPCO are requested to kindly inform about the status of implementation of the new Environmental Guidelines along with the implementation of Flue Gas Desulphurization (FGD).

Deliberation in the meeting

Sr. Manager, NEEPCO informed that in case of AGBPP the emission is being continuously monitored by PCB, Assam and it has been found to be within limits. Similar is the case of AGTCCPP. Manager, OTPC informed that emission is being monitored online and url for reference: <http://115.114.10.246:8080/>. AGM, NTPC also intimated that NTPC would install FGD (Flue Gas Desulphurization) unit shortly after COD of all three units of BgTPP.

The Sub-committee noted as above.

D.25. Status of Implementation of URTDMS Project in NER:

At present 8 Nos PMUs installed in NER at Bongaigaon, Balipara, Sarusajai, Misa, Badarpur, Agartala, NEHU and Imphal as part of Pilot Project. Under URTDSM Scheme around 90 numbers of PMUs are expected to be installed at various locations across NER along with visualization stations and state of the art analytical tools

Deliberation in the meeting

NERLDC raised that analysis of some events could not be done due to delay of the URTDSM project. The matter was referred to next NeTEST meeting of NERPC.

The Sub-committee noted as above.

D.26. Workshop on 'Restoration procedure of NER Grid':

The "Restoration Procedure of NER Grid" has been finalized & uploaded in NERLDC website.

A workshop on restoration procedure will be organized by NERLDC in Guwahati one day before or after the 130th OCC to be held in March, 2017. The exact date will be communicated after finalization date of OCC. All the SLDCs are requested to give small presentations (10-20 minutes) in the seminar regarding their own system for the knowledge of all other utilities.

All the utilities of NER are requested to please nominate at least two participants, for the workshop

The Sub-committee noted as above.

D.27. Delay in restoration of Manipur system after partial collapse:

On 03/02/2017 at 10.05 hrs Manipur system collapsed partially affecting around 50 MW of load in surrounding areas of Imphal(MA). Ningthoukhong, Jiribam(MA) loads were not affected. As reported by SLDC, Imphal, the reason for the disturbance was bursting of one 33kV Cable & Bus PT at Imphal S/S of Manipur. This fault resulted in tripping of following lines-

- 1) 132 kV Dimapur – Imphal(PG) from Dimapur end
- 2) 132 kV Loktak – Imphal(PG)from Loktak end
- 3) 132 kV Silchar – Imphal(PG) I & II from Silchar end
- 4) 132 kV Dimapur – Imphal from Dimapur end

Despite of best efforts the system restoration took considerable time and only at 1144 Hrs power could be extended to Imphal(MA) from Imphal(PG).

Concerned authorities are requested to please elaborate the reasons for delay as well as unwarranted trippings of above lines due to internal faults in Manipur system.

Deliberation in the meeting

MSPCL representative informed that on 03.02.2017 faulty cable feeder was charged multiple times from Imphal(PG) end without communicating with SLDC, Manipur.

DGM (AM), NERTS informed that a detailed investigation would be carried and forum would be apprised. MSPCL informed that due to non-availability of persons at Imphal (PG) restoration was delayed. The forum expressed concerned about the incident and requested NERTS to avoid the same in future.

The Sub-committee noted as above.

Action: NERTS

D.28. Long outage of Bongaigaon end Line reactor(63 MVAR) of 400 kV Bongaigaon-Balipara ckt-III:

The Line reactor (63 MVAR) of 400 kV Bongaigaon-Balipara ckt-III is out of service since 12.11.2016 resulting in high voltage in the system and due to this problem only

two out of four circuits in this corridor can be kept in service during off peak hours. Early restoration of this reactor is urgently required.

Deliberation in the meeting

Please refer to discussion in **item D.11.**

The Sub-committee noted as above.

D.29. Status of 132kV Kohima – Karong Circuit Breaker at Kohima End:

The Circuit Breaker of 132kV Karong-Kohima line at Kohima end is nonoperational since October 2016, due to which the alternate supply to Karong is affected. Currently, 132kV Karong-Kohima line is kept idle charged from Karong end and isolated at Kohima end. Last November, SLDC Nagaland informed that a new circuit breaker is under installation and expected to be commissioned by the end of November 2016 (copy of e-mail circulated in the meeting).

132kV Yurembam-Karong line is highly fault prone and it is always difficult to reach the fault area and rectify due to law and order problems. As such it is highly essential to keep the alternate supply line operational for 132/33/11 kV Karong Sub-Station from Kohima end.

In this regard, the Forum may kindly deliberate and ensure availability of alternate power to Karong from Kohima end, in view of the upcoming 11th Manipur Assembly election.

Deliberation in the meeting

The matter could not be discussed due to absence of DoP Nagaland representative.

The Sub-committee noted as above

D.30. Khandong Battery Bank Replacement:

Khandong 220V Station battery bank and charger panel will be replaced w.e.f. 01.03.17 to 10.03.17. During that period:-

1. No DC supply is available for Khandong PS. So, we can only provide DC to Kopili-II feeder and any one feeder of Khleriat from Kopili Stage-II battery bank. Rest feeders will be under shutdown during that period.
2. Kopili Stage-II as well as Kopili-II and one feeder of Khleriat will be at Bus-B only. Bus-A will be under Shutdown as no protection for Bus-coupler bay during that time.

3. If DC required to extend KHI-II feeder instead of KHI-I then PGCIL has to execute the work. We will provide DC feeder for the same from our Kopili Stage-II DCDB.

Deliberation in the meeting

After detailed deliberation it was decided that Khandong battery bank would be replaced without any shutdown of any line. An arrangement would be worked out after mutual discussion with NERTS.

The Sub-committee noted as above

Action: NERTS/NEEPCO

Additional Agenda:

D.31. Streamlining of Outage Planning:

NERLDC informed that as per the outage planning procedure, the proposed shutdown list of inter-regional, 765 kV elements and Intra-state lines/elements which is affecting TTC/ATC is not being received by NLDC between 5th to 8th of every month for the next month as agreed in the earlier OCC meetings of NERPC. In view of that, shutdowns proposed in one RPC for requiring approval in the other RPC OCC meetings could not be done. Also in view of complexity of National Grid detail system study is required before it get approved in RPCs as well as for better coordination of proposed shutdown. NERLDC also informed that proposed list from RPCs may be a uploaded in the website at least by 8th of every month. NERLDC informed that there is requirement to streamline the process of outage planning.

Deliberation in the meeting

NERPC decided that outages to be discussed in OCC meeting to be forwarded by last date of previous month. (i.e. Shutdowns for March'17 OCC to be forwarded by 28th Feb'17). No outage will be entertained after that.

NERLDC also informed that as per Clause no. 6.1 of Procedure for Transmission Elements Outage Planning issued by NLDC vide letter POSOCO/NLDC/System Operation/Outage Planning dated 28th February'13 that Planned Outages which have been approved in the OCC meeting of a region shall be considered for approval by RLDCs/NLDC on D-3 basis. If an outage is to be availed on say 10th of the month, the indenting agency would forward such requests to the concerned RLDC on 7th of the month by 1000 hours. In case the request for transmission element outage is not

received within the timeline, it will be assumed that the indenting agency is not availing the outage.

The Sub-committee noted as above

Action: All utilities/NERLDC/NERPC

D.32. FOLD Working Group on Hydro:

NERLDC informed that during 18th FOLD (Forum of Load Despatcher) held on 21st November'17 at New Delhi formation of Working Group on Hydro for studying various aspects of Hydro Stations was discussed. Letter from CEO, POSOCO (Letter No. POSOCO/NLDC/AASO/2017/1325 dated 16th Feb'17) regarding circulation of a Questionnaire was presented and discussed. Questionnaire was circulated among the constituents.

Deliberation in the meeting

NERLDC requested NEEPCO, NHPC, AEGCL, MePTCL, Mizoram, Nagaland and TSECL to submit the Questionnaire by 28th Feb'17.

Action: NEEPCO, NHPC, AEGCL, MePTCL, Mizoram, Nagaland and TSECL

Date & Venue of next OCC meeting

It is proposed to hold the 130th OCC meeting of NERPC on second week of March, 2017. However, the exact date and venue will be intimated in due course.

The meeting ended with thanks to the Chair.

Annexure-I**List of Participants in the 129th OCC Meetings held on 17.02.2017**

| SN | Name & Designation | Organization | Contact No. |
|-----|---|-----------------|-----------------------------|
| 1. | Sh. N. Perme, EE, SLDC | Ar. Pradesh | 09436288643 |
| 2. | Sh. A.K. Goswami, GM (Comml.),APDCL | Assam | 09864105893 |
| 3. | Sh. J. K. Baishya, DGM, SLDC | Assam | 09435041494 |
| 4. | Sh. Bimal Ch. Borah, AGM, SLDC | Assam | 09435119248 |
| 5. | Sh. A.N. Dev Choudhury, AGM (Comml.) | Assam | 09854120791 |
| 6. | Sh. Pranab Saha, DM, SLDC | Assam | 09435561717 |
| 7. | Ms Laishram Ritu, Manager, SLDC | Manipur | 09612882984 |
| 8. | Ms Khoisnam Steela, Manager, SLDC | Manipur | 08730831103 |
| 9. | Sh. B. Wankhar, EE (MO) | Meghalaya | 09436105914 |
| 10. | Sh. R. Syiem, ACE (Trans.) | Meghalaya | 09863065704 |
| 11. | Sh. F.E. Kharshiing, SE, SLDC | Meghalaya | 09863066960 |
| 12. | Sh. B. Nikhla, EE, SD MePTCL | Meghalaya | 09436314163 |
| 13. | Sh. T. Gidon, EE, SLDC | Meghalaya | - |
| 14. | Sh. A.G. Tham, AEE MePTCL | Meghalaya | 09774664034 |
| 15. | Sh. Lalduhawma, EE, SLDC | Mizoram | 09436144113 |
| 16. | Sh. David Lalnunpuia, JE, SLDC | Mizoram | 09436135889 |
| | No Representative | Nagaland | - |
| 17. | Sh. Debabrata Pal, Sr. Manager (Comml.) | Tripura | 09436500244 |
| 18. | Sh. Mrinal Paul, Manager | Tripura | 09436137022 |
| 19. | Sh. Joypal Roy, Sr. Manager (E/M) | NEEPCO | 09435577726 |
| 20. | Sh. Abhijit Kalita, Sr. Manager (E/M) | NEEPCO | 09435339831 |
| 21. | Sh. Lakheswar Keditin, Mgr (E) | NEEPCO | 08974387503 |
| 22. | Sh. N.R. Paul, AGM | NERLDC | 09436302723 |
| 23. | Sh. R. Sutradhar, DGM (MO) | NERLDC | 09436302714 |
| 24. | Sh. Ankit Jain, Sr. Engineer (SO-I) | NERLDC | 09436335381 |
| 25. | Miss Momai Dey, Engineer | NERLDC | 09436302716 |
| 26. | Sh. P. Kanungo, DGM (AM) | PGCIL | 09436302823 |
| 27. | Sh. M.J. Baishya, Engineer | PGCIL | 09435555740 |
| 28. | Sh. Rahul Barik, Engineer (E) | NHPC | 09402880203/094 36894880 |

| | | | |
|-----|-------------------------------------|-------|-------------|
| 29. | Sh. N.K. Gupta, Manager | OTPC | - |
| 30. | Sh. J. Bhattacharyya, AGM | NTPC | 09435720036 |
| 31. | Sh. R.V. Patnaik, AGM (OS) | NTPC | 09438233243 |
| 32. | Sh. Deborshi Bhattacharjee, AM | PWC | 09874279207 |
| 33. | Miss Pushpa Ghosh Dastidar, AM | PWC | 09831205269 |
| 34. | Sh. P.K. Mishra, MS | NERPC | - |
| 35. | Sh. B. Lyngkhai, Director/S.E (C&O) | NERPC | 09436163419 |
| 36. | Sh. S. Mukherjee, AEE | NERPC | 08794277306 |
| 37. | Sh. A. Agrawal, AEE | NERPC | 07424064484 |
| 38. | Sh. S. Ranjan, AE | NERPC | 08794276168 |

| GENERATION FORECAST USING PAST 3 YEARS DATA (Apr to June) | | | | | | | | | | | | | | Projected Generation Figure for Apr 2017- June 2017 (MW) | Remarks | Data given by Utility | Validation in 129th OCC | Remarks |
|---|-------------------|--|--------|--------|---------|--------|--------|---------|--------|--------|-----------------|-----------------|-----------------|--|-------------------------------|-----------------------|-------------------------|-------------------------------|
| Sl. No | Region | Maximum Injection Figures in MW (SEM Data) | | | | | | | | | 2014-15 Average | 2015-16 Average | 2016-17 Average | | | | | |
| | | 2014-15 | | | 2015-16 | | | 2016-17 | | | | | | | | | | |
| | | Apr'14 | May'14 | Jun'14 | Apr'15 | May'15 | Jun'15 | Apr'16 | May'16 | Jun'16 | | | | | | | | |
| 102 | AGPPP, NEEPCO | NER | 76 | 80 | 81 | 82 | 82 | 122 | 122 | 129 | 79 | 82 | 124 | 124 | Last Year Figure | 132 | 132 | As per data given by NEEPCO |
| 103 | Doyang, NEEPCO | NER | 67 | 25 | 53 | 34 | 45 | 48 | 32 | 49 | 69 | 48 | 42 | 50 | Average of Last 3 years | 52 | 52 | As per data given by NEEPCO |
| 104 | Kopili, NEEPCO | NER | 93 | 110 | 177 | 30 | 124 | 175 | 29 | 177 | 220 | 127 | 110 | 142 | Average of Last 3 years | 180 | 180 | As per data given by NEEPCO |
| 105 | Kharidong, NEEPCO | NER | 25 | 14 | 25 | 40 | 42 | 50 | 26 | 44 | 51 | 21 | 44 | 40 | Last Year Figure | 62 | 62 | As per data given by NEEPCO |
| 106 | Ranganadi, NEEPCO | NER | 402 | 417 | 402 | 427 | 431 | 433 | 516 | 412 | 424 | 407 | 430 | 451 | Last Year Figure | 401 | 401 | As per data given by NEEPCO |
| 107 | AGBPP, Kathaguri | NER | 239 | 213 | 211 | 213 | 208 | 206 | 252 | 252 | 260 | 221 | 209 | 254 | Average of Last 3 years | 220 | 220 | As per data given by NEEPCO |
| 108 | Lekta, NHPC | NER | 105 | 103 | 105 | 70 | 102 | 105 | 106 | 105 | 107 | 104 | 92 | 106 | Average of Last 3 years | 105 | 105 | As per data given by NHPC |
| 109 | ONGC Palasana | NER | 343 | 338 | 354 | 505 | 388 | 541 | 547 | 542 | 665 | 345 | 478 | 585 | Last Year Figure | 547 | 547 | As per data given by OTPC |
| | Bongaiagon, NTPC | NER | | | | | | | 0 | 234 | 233 | | | | Last Year Figure | 161 | 161 | As per data given by NTPC |
| 110 | Arunachal Pradesh | NER | | | | | | | | | | | | | No Generation in Ar. Pradesh. | 0 | 0 | |
| 111 | Assam | NER | 237 | 308 | 330 | 387 | 365 | 315 | 301 | 214 | 543 | 292 | 356 | 353 | Last Year Figure | 250 | 250 | As per data given by AEGGL |
| 112 | Manipur | NER | | | | | | | | | | | | | No Generation in Manipur | 0 | 0 | |
| 113 | Meghalaya | NER | 109 | 177 | 235 | 98 | 121 | 254 | 132 | 167 | 279 | 174 | 158 | 193 | Average of Last 3 years | 270 | 270 | As per data given by MPTCL |
| 114 | Nagaland | NER | 2 | 8 | 32 | 13 | 6 | 22 | 6 | 0 | 27 | 14 | 14 | 11 | Average of Last 3 years | 18 | 18 | As per data given by Nagsand |
| 115 | Tripura | NER | 106 | 87 | 134 | 97 | 214 | 86 | 181 | 2 | 149 | 109 | 132 | 111 | Average of Last 3 years | 133 | 133 | 82 MW TSECL & 51 MW Monarchak |
| 116 | Mzoram | NER | 3 | 26 | 8 | 5 | 2 | -6 | 3 | 9 | 3 | 12 | 0 | 5 | Average of Last 3 years | 8 | 8 | As per data given by Mzoram |

Note:

1. Projections are based on monthly maximum injection in the last 3 years from actual metered data.

2. Generation forecast has been done based on the following criteria

(i) If there is an increasing trend then last year average generation has been considered

(ii) Otherwise average of past three year average generation has been considered

3. In case of new generators where past data was not available following has been assumed

(i) 1.0 pif for hydro generators

(ii) 0.7 pif for thermal generators.

(iii) 0.3 pif for gas stations

4. In case of the re-organized states of Andhra Pradesh and Telangana Generation is divided in the ratio 53.89% for Telangana and 46.11% for Andhra Pradesh for FY 2012-13 and 2013-14.

This is as per letter No.CE/COMML/APCC/DE-COMML/POC-DATA-15-16/D.No/15 dtd. 09.10.15 as received from APTRANSCO.

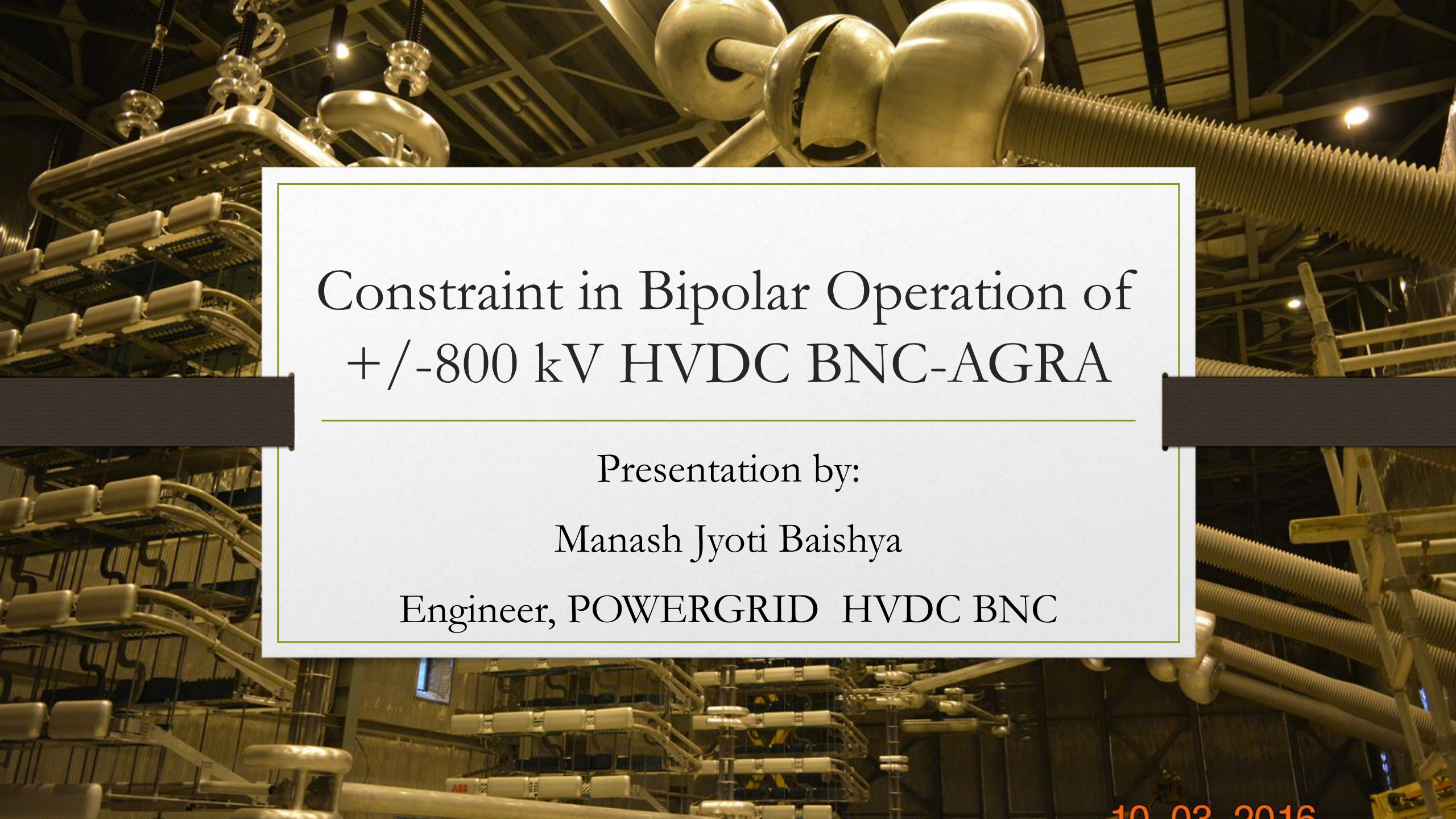
#REF! #REF!
233.600008 233.48668

| DEMAND FORECAST USING PAST 3 YEARS DATA (Apr 2017 - June 2017) | | | | | | | | | | | | | | | | | |
|--|---------|--------|--------|---------|--------|--------|---------|--------|--------|-----------------|-----------------|-----------------|--|--|--------------------|-------------------------|---|
| | 2014-15 | | | 2015-16 | | | 2016-17 | | | 1 | 2 | 3 | 4 | To be considered in basecase | Data given by DICS | Validation in 129th OCC | Comments |
| | Apr-14 | May-14 | Jun-14 | Apr-15 | May-15 | Jun-15 | Apr-16 | May-16 | Jun-16 | 2014-15 Average | 2015-16 Average | 2016-17 Average | Projected Demand for (Apr 2017 - June 2017) before normalization | Nomalised Peak Demand for (Jan 2017 - Mar 2017) (4*N(f)) | | | |
| Arunachal Pradesh | 104 | 111 | 110 | 114 | 109 | 108 | 141 | 119 | 130 | 108 | 110 | 130 | 138 | 124 | | | Data not submitted by Arunachal Pradesh |
| Assam | 1,230 | 1,212 | 1,215 | 1,282 | 1,260 | 1,324 | 1,356 | 1,423 | 1,458 | 1,219 | 1,289 | 1,412 | 1,500 | 1,351 | 1415 | 1415 | As per data given by AEGCL |
| Manipur | 112 | 109 | 117 | 148 | 153 | 147 | 146 | 144 | 151 | 113 | 149 | 147 | 171 | 154 | 161 | 161 | As per data given by MSPCL |
| Meghalaya | 272 | 296 | 289 | 312 | 295 | 295 | 295 | 282 | 311 | 286 | 301 | 296 | 304 | 274 | 319 | 319 | As per data given by MePTCL |
| Mizoram | 76 | 73 | 74 | 80 | 84 | 81 | 82 | 88 | 80 | 74 | 82 | 83 | 89 | 80 | 93 | 93 | As per data given by Mizoram |
| Nagaland | 95 | 102 | 105 | 107 | 101 | 105 | 110 | 105 | 119 | 101 | 104 | 111 | 116 | 105 | 126 | 126 | As per data given by Nagaland |
| Tripura | 246 | 233 | 230 | 238 | 254 | 249 | 264 | 249 | 273 | 236 | 247 | 262 | 274 | 247 | 285 | 285 | As per data given by TSECL |

Normalization Factor N(f) = 0.90

Notes

- Projections are based on the past 3 years' monthly Peak Demand Met data available on the website of CEA
- The above projections are being done for financial year 2017-2018 (Q1) i.e. Apr 2017 to June 2017
- Projections are being done based on the forecast function available in MS Office Excel
- In case of the re-organized states of Andhra Pradesh and Telangana Maximum Demand is divided in the ratio 53.89% for Telangana and 46.11% for Andhra Pradesh for FY 2012-13 and 2013-14. This is as per letter No.CE/COMML./APPCC/DE-COMML/POC-DATA-15-16/D.No/15 dtd. 09.10.15 as received from APTRANSCO.
- CEA Reports can be accessed from the following links:
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-06.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-05.pdf
http://www.cea.nic.in/reports/monthly/powersupply/2016/psp_peak-04.pdf
http://cea.nic.in/reports/monthly/powersupply/2014/psp_peak-05.pdf
http://cea.nic.in/reports/monthly/powersupply/2014/psp_peak-06.pdf
http://cea.nic.in/reports/monthly/powersupply/2015/psp_peak-04.pdf
http://cea.nic.in/reports/monthly/powersupply/2015/psp_peak-05.pdf
http://cea.nic.in/reports/monthly/powersupply/2015/psp_peak-06.pdf



Constraint in Bipolar Operation of +/-800 kV HVDC BNC-AGRA

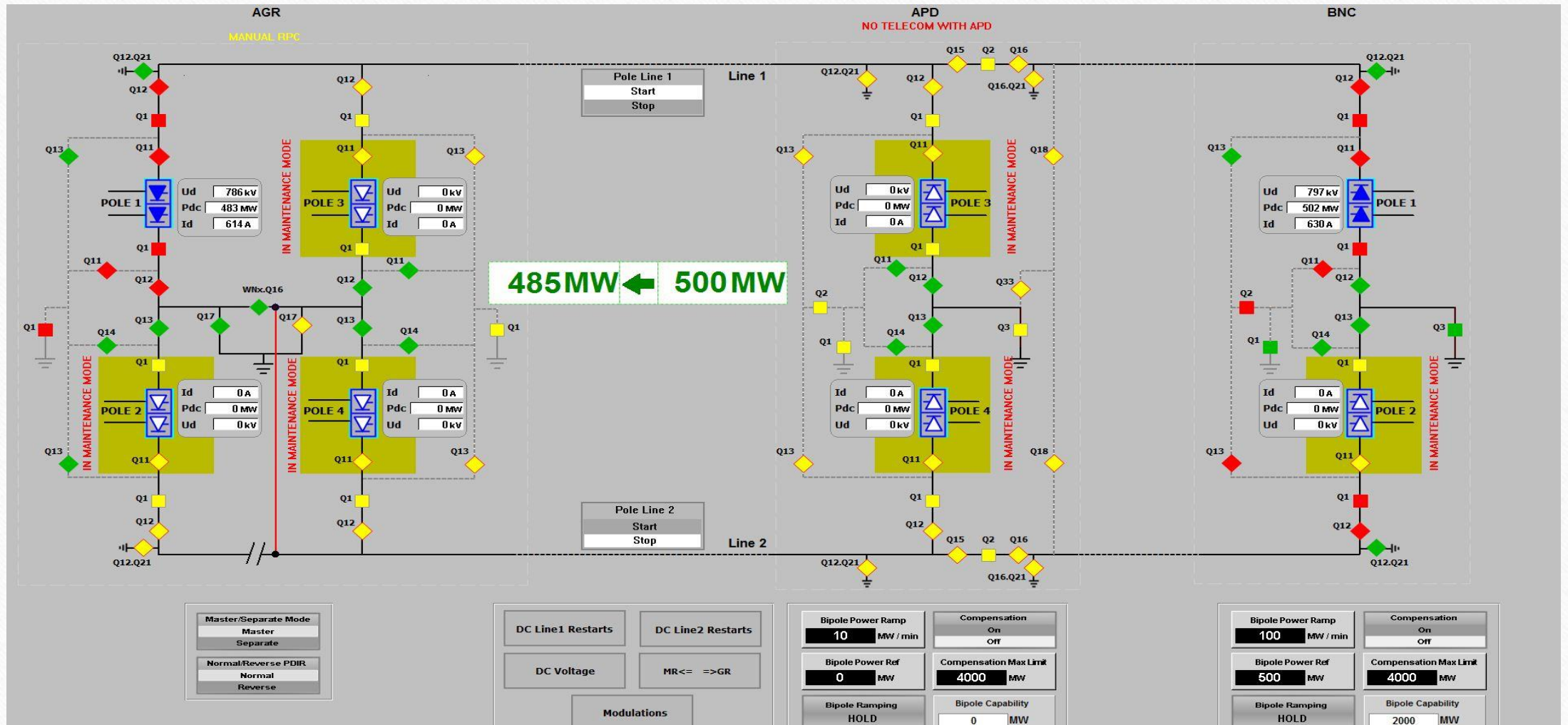
Presentation by:

Manash Jyoti Baishya

Engineer, POWERGRID HVDC BNC

NEA Interconnector Project is a Multi terminal project designed for a normal power transfer from the North Eastern Region i.e Biswanath Chariali Converter Station and Alipurduar to Northern Region i.e Agra.

Purpose: To utilize the huge generation potential of North East with minimum LOSSES



Due to delay in the upcoming Projects of Subansiri and Kameng, there is power requirement in NER during lean hydro months i.e winter.

Hence, this requires the direction of Power flow in NEA Project to be reversed so as to import power from the Northern Region.

During normal power flow i.e from BNC to Agra, the operating modes of the converters can be:

- Monopole with Ground return
- Monopole with Metallic return
- Bipole

Maximum allowed current reference that can be entered is:

| | Maximum value | | Minimum value |
|-----------------------|-----------------|-----------------|-------------------|
| Circuit configuration | Monopolar | Bipolar | Monopolar/Bipolar |
| Current Order | 1337 A(1000 MW) | 1003 A(1500 MW) | 188 A(140 MW) |
| Current Ramp | 375 A/min | 375 A/min | 1 A/min |

Filter Requirements:

Monopolar operation

| Dc side power(MW) | Total filters(Nos.) |
|-------------------|---------------------|
| 150-525 | 2 |
| 525-1125 | 3 |
| 1125-1500 | 4 |
| 1500-1995 | 5 |

Monopolar operation(Reduced Voltage)

| Dc side power(MW) | Total filters(Nos.) |
|-------------------|---------------------|
| 150-600 | 2 |
| 600-1125 | 3 |
| 1125-1200 | 4 |

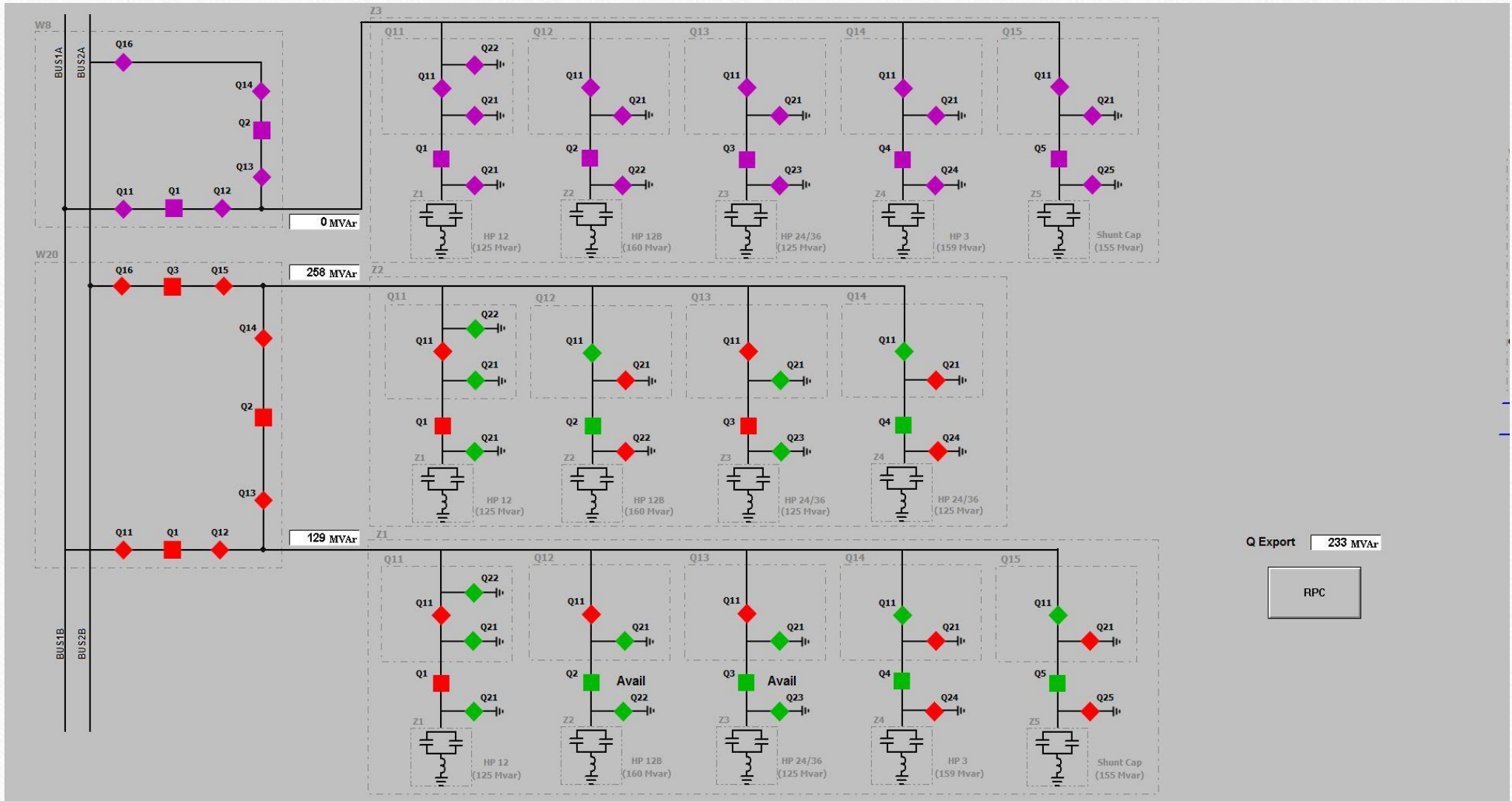
Filter Requirements:

Bipolar operation

| Dc side power(MW) | Total filters(Nos.) |
|-------------------|---------------------|
| 300-750 | 3 |
| 750-1050 | 4 |
| 1050-1200 | 5 |
| 1200-2250 | 6 |
| 2250-3990 | 7 |

Bipolar operation(Reduced Voltage)

| Dc side power(MW) | Total filters(Nos.) |
|-------------------|---------------------|
| 300-900 | 3 |
| 900-1500 | 4 |
| 1500-2400 | 5 |



In Reverse Power direction:

The transmission is recognized to have limited control functions and flexibility as the operation mode was added at a late stage of project execution. So the control could be made only on pole level in this mode.

Restrictions in Reverse Power Flow:

1. Only Bipole 1 converters can operate i.e S1(BNC) and S3(Agra)
2. DC line voltage at rectifier i.e S3(Agra) is reduced
3. Only SPCC i.e Separate Pole Current Control can be used.

Once Reverse Power direction is entered:

- Operation control mode is automatically changed to separate
- Converters control mode is automatically set to SPCC
- RPC(Reactive Power Controller) is automatically set to manual in station where it is ON

Concern with SPCC:

While in SPCC bipolar operation mode, in case of tripping or sudden outage of one pole, the power doesn't get shifted to the other operating pole, rather the operating pole retains its power value. This causes a sudden decrease in power flow, but filters remain in service for a short duration according to the original power.

This delay in putting only the required filters according to the reduced power, may cause the voltage at the ac bus to rise

Due to **RPC** going in **manual mode** after entering the Reverse Power mode, excess filters are to be removed manually. Due to this, a minimum time of at least 2 min is required for the operator to remove the filter manually.

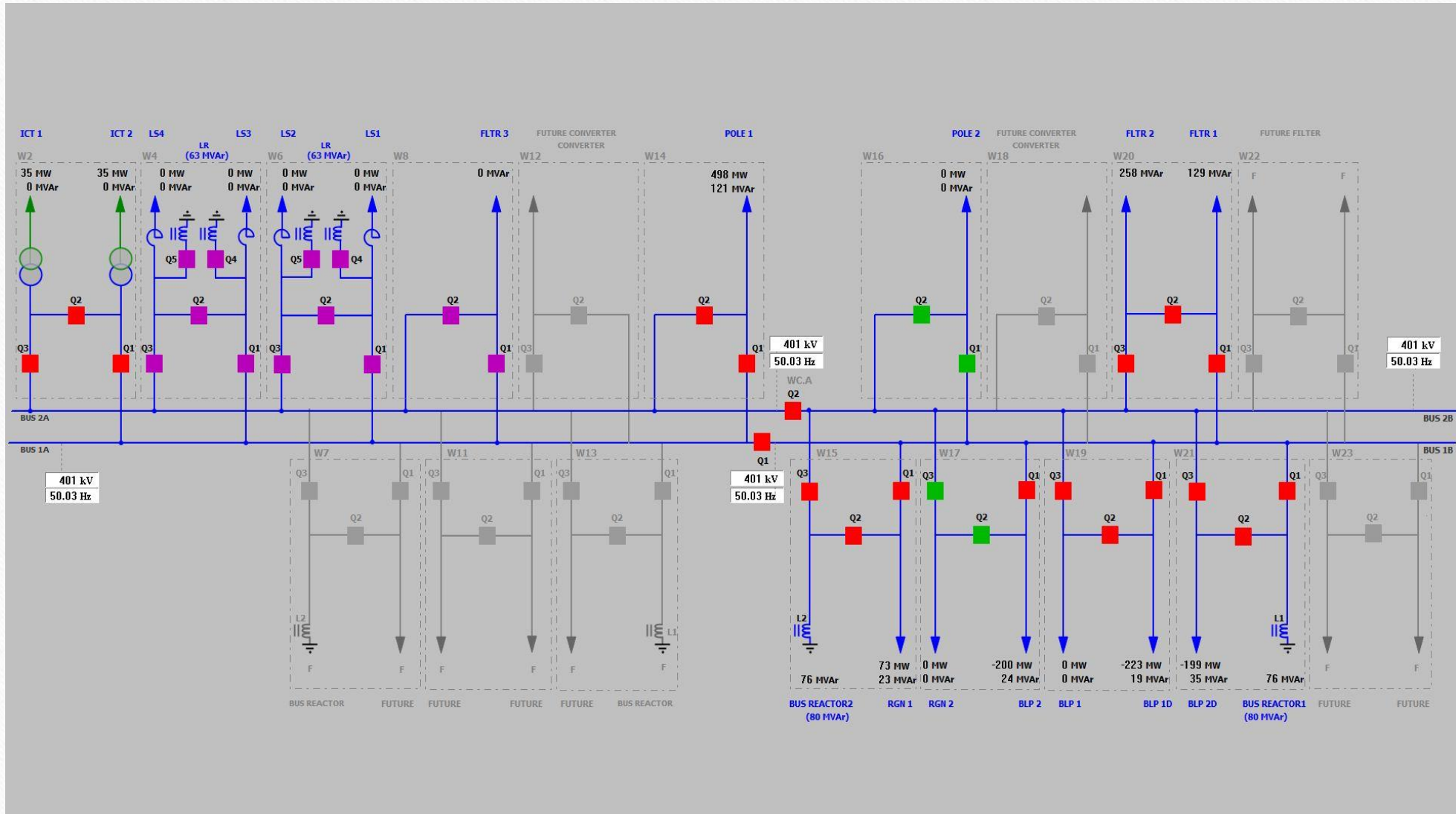
As per experience, insertion of an excess filter sub-bank can cause a voltage rise of nearly 8-10 kV.

And since due to NER being a weak grid, this delay in taking out of excess filters brings out a major disturbance to the entire North Eastern grid voltage level.

The issues regarding reverse power flow in SPCC has already been discussed with POWERGRID Corporate HVDC Engineering and is under consideration.

Furthermore, 3 numbers of Line Reactors, each of capacity **63 MVAR**, are received at BNC site.

Commissioning of at least 2 of the above said reactors will be done tentatively within 31st of March, which will definitely reduce the problem of overvoltage, if any, further.



+/-800 kV HVDC Biswanath Chariali

Thank you



+/-800 kV HVDC Biswanath Chariali

15-Feb-17



+/-800 kV HVDC Biswanath Chariali

