North Eastern Regional Power Committee

Agenda Notes for 14th TCC and 14th North Eastern Regional Power Committee Meetings

Date : 04/09/2013 – TCC **Venue: "Pragna Bhawan," Agartala**

05/09/2013 – NERPC **"Pragna Bhawan," Agartala**

ITEM NO. 1	**CONFIRMATION OF THE MINUTES OF 13TH TCC & 13TH NERPC MEETINGS HELD ON 09.07.2012 & 10.07.2012 AT FARIDABAD & SPECIAL TCC MEETING HELD ON 09.02.2013 AT SHILLONG.**

The minutes of the 13th TCC and 13th North Eastern Regional Power Committee (NER Power Committee) meetings held on 09.07.2012 & 10.07.2012 respectively at Faridabad & the minutes of Special TCC Meeting held on 09.02.2013 at Shillong were circulated vide letter no. NERPC/OP/Committee/2012/4269-334 dated 25.07.2012 & NERPC/NERPC/Committee/2013/2969-3026 dated 22.02.2013.

No comments or observations were received from any constituents, the TCC and NER Power Committee & Special TCC meetings may confirm the minutes of above meetings.

PART: A "FOLLOW – UP" ON DECISIONS IN THE PREVIOUS (13TH) NERPC MEETING.

Status on 'follow up' of the decisions of the 13th NERPC meeting & Special TCC meeting is as given below:

ITEM NO. A.1	**SETTING-UP/UP-GRADATION OF SLDCS IN NER:**

The issue for Up-gradation and Expansion of SCADA/EMS system of NERLDC and SLDCs of North Eastern Region was discussed in the 12th NERPC meeting, held in Amritsar on 15th November 2011.

During the 13th NERPC meeting, held at Faridabad on 10th July 2012, POWERGRID proposed to implement the project of Upgradation/ Expansion of SCADA/EMS system for SLDCs. All constituents except Assam had agreed for implementation of the above project under the existing commercial agreement of ULDC and the tariff to be recovered as determined by CERC. However, the Committee also suggested to approach DoNER / NEC, Govt. of India for funding. A Resolution in this regard, signed by all Ministers of Power, NER was submitted to Hon'ble Union Power Minister, Govt. of India.

Subsequently, Assam Electricity Grid Corporation Limited (AEGCL) vide their letter ADB/ASEB/CE/TT/BID/Tech-2201/Part-XI/2011/52 dated 15th September 2012 had also requested for inclusion of their portion in the above project. Accordingly BOQ for AEGCL portion was finalized in the meeting held at POWERGRID, Gurgoan office on 16th October 2012. Further, AEGCL vide their letter dated 12th November 2012

requested NERPC for suitable amendment in the resolution of RPC/TCC meeting for inclusion of scope for AEGCL. AEGCL had also confirmed vide letter MD/AEGCL/SLDC-PGCIL/2012 dated 1st December 2012 that Upgradation of existing SCADA/EMS system of Assam SLDC shall be part of the existing Commercial Agreement Signed between Assam and POWERGRID under ULDC project and the tariff shall be determined by CERC.

During the Special TCC meeting held in Shillong on 9-2-2013, after deliberation it was agreed that POWERGRID should go ahead with the implementation of Expansion/Upgradation of SCADA/EMS System at NERLDC and SLDCs of North Eastern Region and investment shall be recovered as tariff determined by CERC. However, if funding from DONER/NEC shall be available, the same shall be suitably adjusted in the Project Cost/tariff. However, the committee requested NERPC Secretariat to pursue the matter with DoNER / NEC for funding / funding from PSDF.

Earlier Cost Break up submitted by POWERGRID was as follows:

Cost break-up of installation of SLDCs in four states:			
Name of State	Building cost (Rs. Crs)	SLDC system cost (Rs. Crs)	Total cost (Rs. Crs)
Arunachal Pradesh	40.37	57.25	97.62
Manipur			42.96
Mizoram			40.62
Nagaland			33.8
Sub Total			215.00
Cost break-up of up gradation of SCADA in following three states:			
Assam			6.14
Meghalaya			6.91
Tripura			6.90
Sub Total			19.95

Present Cost Break up given by POWERGRID is as follows:

Name of State	Building cost (Rs. Crs)	SLDC system cost (Rs. Crs)		Total cost (Rs. Crs)	As per OBD rate (ready for award)	No. of RTUs
		SCADA/ EMS	Communication System		SCADA/ EMS system	
Cost break-up of installation of SLDCs in four states:						
Arunachal Pradesh	39.47	43.79	14.37	97.63	8.13	21
Manipur	-	32.91	11.62	44.53	6.61	11
Mizoram	14.38	19.93	6.32	40.62	5.85	6
Nagaland	-	22.65	11.15	33.80	7.82	19
Sub Total	53.85	119.27	43.46	216.58		
Cost break-up of up gradation of SCADA in following three states:						
Assam		6.14			5.01	0

Meghalaya		6.91			9.02	5
Tripura		6.90			5.98	25
Sub Total					**48.42**	**87**
NERLDC					**13.63**	
					62.05	

Note 1: The cost breakup of Arunachal Pradesh, Manipur, Mizoram and Nagaland has been taken from DPR made for SLDCs

Note 2: The cost breakup of Assam, Tripura and Meghalaya has been taken from DPR made for up-gradation/expansion of SLDCs

Note 3: The procurement process for SCADA/EMS system of all SLDCs has been done together including NERLDC for economics of scale

POWERGRID had informed that order for procurement of materials has already been placed.

NERPC has already taken up the matter with concerned authority of NEC & DoNER. NEC and DoNER have already informed that they are unable to consider funding of above projects at this stage due to paucity of fund.

It is pertinent to mention here that the availability of telemetry and voice communication is very crucial for secure grid operation and thus is being closely monitored by CERC. The issue of Up-gradation/establishment of SLDCs is pending for quite some time due to funding issue.

TCC members are requested to take a decision on this matter so that works can be started immediately.

ITEM NO. A.2	**ADDITIONAL REQUIREMENTS OF OPGW BASED COMMUNICATION SYSTEM FOR CENTRAL SECTOR SUB-STATIONS AND GENERATING STATIONS AND OTHER LARGE GENERATING STATIONS IN NER**

Installation of OPGW in NER was discussed during 11th TCC & 11th NERPC held at Kolkata on 5th & 6th May'11 and was agreed in principle. As per deliberations of NERPC meeting, constituents comments were invited for finalization of OPGW based Communication Network. After incorporating the comments of constituents, the final requirement of OPGW as 1901 kms at an initial estimated cost of Rs. 56.36 Crores was finalized. The break-up of proposed 1901 kms OPGW network is as under:

Central Sector = 1349 kms

State Sector = 552 kms

Further, state wise breakup of the State Sector OPGW length is

Tripura = 271 kms

Meghalaya = 107 kms

Nagaland = 25 kms

Manipur = 149 kms

Total = 552 kms

In this regard, FR cum DPR was prepared and submitted to NEC for funding. Subsequently, Special TCC meeting was held at Agartala on 5th August'11 in which Assam informed that they agree to the proposal if the funding was from DoNER/NEC whereas Manipur, Mizoram, Meghalaya and Tripura agreed to the proposal irrespective of the funding from DoNER/NEC or recovery through tariff as per CERC regulations. Since Arunachal Pradesh & Nagaland representatives were not present in the Special TCC meeting, the proposal was deferred for discussion in the next TCC/RPC meeting.

During the 12th NERPC meeting, Mizoram requested to add additional 58.5 km for Mizoram. Mizoram has to submit the proposal to POWERGRID. It was opined that the OPGW Project proposed by POWERGRID may be undertaken subject to the availability of funds from DoNER. Since the funding is yet to be approved, POWERGRID proposes to start the work with the permission of the constituents. In case the funding does not materialize, the utilities have to agree for paying the tariff as per CERC norms.

During the 13th NERPC meeting, representative from Manipur informed that priority will be given to setting-up of SLDC through funding from NEC. Manipur will pursue with the above project only if funding is available.

Assam agreed to the proposal if funding is from NEC.

POWERGRID reiterated the importance of the project stressing on the need of reliable communication for better operation of power system.

The Committee decided to approach NEC/DoNER for funding of the scheme. A Resolution in this regard, signed by all Ministers of Power, NER was submitted to Hon'ble Union Power Minister, Govt. of India.

Present Cost Break up given by POWERGRID is as follows:

Central /State Sector	OPGW length (km)	Estimated Cost (Rs. In Crores)
Central Sector	1349	40.08
State Sector		
Manipur	149	4.40

Meghalaya	107	3.20
Mizoram	59	1.80
Nagaland	25	0.74
Tripura	271	8.10
Total	**1960**	**58.24**

NERPC has already taken up the matter with concerned authority of NEC & DoNER. Both NEC & DoNER have already informed that they are unable to consider funding of above projects at this stage due to paucity of fund.

Committee may like to discuss.

ITEM NO. A.3	**GRID SECURITY EXPERT SYSTEM (GSES)**

Subsequent to the twin Grid Disturbance of 30th and 31st July 2012, a meeting was held on 06th August 2012 between Union Power Minister of India with Chief Ministers/ Power Ministers of States of Northern region and a 12 point resolution was drawn to ensure that such type of incidents do not occur in future. The points pertaining to defence plans are as follows:-

Point No.1: Adequate defence plans and protection system shall be put in place to ensure integrated operation of the National/Regional Grids in adherence with the Indian Electricity Grid Code [IEGC]. All the states shall ascertain preparedness of power system defence plans and cooperate at the Regional level for coordinating their Protection systems.

Point No.2: Defence plans of the states must include islanding schemes, under frequency relays, rate of change of frequency relays, special protection schemes and automatic demand management schemes. The defence plans shall also include restoration procedures that shall be updated and reviewed regularly.

Point No.3: POSOCO would evolve a contingency load shedding protocol, especially when non frequency related load shedding is required".

Further CERC in the order of petition number 125/MP/2012 for Northern Region on the subject of "Effective proper load management by Northern region Constituents and curbing overdrawal" has directed as follows:-

" NRLDC is directed to identify in consultation with the CTU, CEA, STUs and SLDCs the feeders in the State network which are incidental to the inter-state transmission of electricity which can be opened in case of sustained overdrawal from the grid or any

other imminent danger to the grid. It also emerged during the hearing that the identified feeders can be disconnected and restored centrally through the SCADA network".

Accordingly POSOCO prepared a template for ten numbers of scenarios when the power system would be under stress along with the substation and feeder details. The same was communicated by POSOCO vide letter dated 11th September 2012 to CEA with a copy to POWERGRID/RPCs/CERC for automated defense plan for all five regions. (Summary of the scheme is attached at **Annexure -1.0 (I).**

Based on the above inputs, POWERGRID has planned an automated defense plan for all five regions named as Grid Security Expert System (GSES). The brief details of the GSES system are enclosed at **Annexure - 1.0 (II).**

The implementation of the above scheme has been proposed through following projects:-

(i) GSES System: This would involve the installation of relays, PLCs etc at Substation/Generating station level and advance GSES Software at all SLDCs and RLDC. The list of feeders where the relays shall be put has been proposed by RLDC and is proposed to be monitored in the Centralized GSES system at SLDCs. The logics for operation of the above relays shall be finalized by RLDC/RPC in consultation with SLDCs. As per this plan, the automated feeder disconnection has been proposed at 125 No. Substations in North-Eastern Region.

(ii) Communication System for GSES system: this would require dedicated and reliable communication system. Accordingly Fiber Optic based Communication from Substations to SLDCs/RLDC has been proposed.

The communication system for GSES system shall have to be reliable, dedicated and fully secure system. Further, the system shall have to be monitored and operated in real time and hence a fast and dedicated communication network based on fiber optics would be required. The Detailed Project Report for the Fiber Optic based communication for GSES system has been prepared separately.

The Region wise estimated cost based on the feeders identified by POSOCO including IDC shall be as follows:

S.N	Subject	NR	SR	WR	ER	NER	All India
1.	Estimated DPR cost of GSES (in Rs. Crores)	82.59	42.13	124.85	55.42	49.47	354.46
2.	Number of Feeders	1064	763	1502	503	410	4242
3.	Estimated DPR cost of OPGW	141.61	368.37	174.24	83.18	80.42	847.82

	based communication system (in Rs. Crores)						
4.	Length of OPGW	4967	14706	6111	2868	2688	31340
	Total Estimated cost (in Rs. Crores)	**224.20**	**410.50**	**299.09**	**138.60**	**129.89**	**1202.30**

It may be mentioned that the actual quantity may vary during implementation depending upon the number of feeders and substations included in the project.

As per the direction of CERC, a special TCC meeting was organized in NER on 09-02-2013 at Shillong. During the special TCC meeting, POWERGRID had given the detail presentation on the GSES scheme. During the presentation POWERGRID highlighted that consequent to grid disturbance on 30th and 31st July, 2012, twelve (12) point resolutions were drawn in the meeting between Union Power Minister of India with Chief Ministers / Power Ministers of States of NR. As per Para 11 of the resolution, POSOCO had prepared Automatic Defence Plans envisaging ten conditions such as overdrawls, over injection / underdrawls, under voltage, ICT / line loading crossing limits, flows crossing TTC limit, loss of generation > 1000 MW, Angular difference, Under-Frequency Relays, Df/dt relays, and Islanding. Based on the inputs from POSOCO, POWERGRID has prepared detailed project report for implementation of above scheme for all five regions under the Project named as "Grid Security Expert System (GSES)". The system is proposed to be deployed at each SLDC and RLDCs.

The project would involve installation of

- Knowledge based SCADA system
- Relays and PLCs etc. at Substation/Generating station level, Digital Tele Protection Coupler (DTPC)
- Advance GSES Software at all SLDCs and RLDC level
- Dedicated and reliable OPGW communication system

In case of load disconnection, the command shall be executed initially from SLDC. In case of non-functionality of command at SLDC level within stipulated time frame, command shall be executed at RLDC level. Similarly in case of disconnection of generator (backing down of generation as being used for SPS) the command shall also be executed from SLDC/RLDC level.

The estimated cost including IDC for the project is Rs. 1202.30 crores (for all five regions) and Rs. 129.89 Crores (for NER). As per scheme, the automated feeder disconnection has been proposed at 125 Nos. of Substations in North Eastern Region covering 410 feeders. The cost of GSES for 410 feeders is Rs. 49.47 Crores and that for dedicated OPGW based communication system (2688km) is Rs. 80.42 Crores.

Chairman, TCC appreciated the proposal of POWERGRID and stated that NER States are not familiar with the scheme and would need more clarifications. Further, he requested all constituents to express their views on implementation of GSES in NER.

CE, Ar. Pradesh stated that proposal is welcome in principle and it is the technology for the future. This is an automatic scheme and before putting into service, it is desirable to know whether such system is well established, whether equipments/auxiliaries are available and whether our existing system / equipments are adequate to adopt the scheme. Since, operation of whole region/country will be put in automatic mode, the software and logic needs to be developed and well proven. Further, the cost implication needed to be seen, whether it will be shared on regional basis or national basis.

He further emphasized that if it is a unified scheme and cost will be shared on national basis, not on regional basis, then it is acceptable. Otherwise, NER should wait and watch the success of implementation the GSES in other region as revenue return is not good.

POWERGRID clarified that the cost recovery will be on regional basis or State basis as the implementation will be at state level.

AGM, NTPC stated that the scheme formulated by PGCIL talks about only reduction / tripping of generation / load and is silent on time frame and conditionalities to bring back the generation / load to restore the grid. Any automatic command for generation, reduction may not be desirable. Therefore, command may be issued to the generator through emergency alarm indicating quantum of reduction of generation and the generator may be allowed to take best possible action. Any generation / load shedding should be evolved based on guidelines of CERC. NER, compared to other region, is a very small grid, therefore, the scheme needs be re-examined to address specific conditions of NER grid and more focus should be on load management.

POWERGRID informed that the scheme is in preliminary stage. Before implementation of the scheme, the region specific information will be collected, discussed further and finalized in consultation with constituents of region.

Director, CEA stated that proposed scheme gives by and large the operational philosophy and, could be tuned and re-tuned through iterative exercises as per system requirement. Accordingly the algorithm/logic may be developed to meet the requirement of the region.

GM, NERLDC informed that the nodes have been identified and the feeders have not been identified for the scheme. Therefore, macro level study for feeders is required before implementation of the scheme.

SE (O), NERPC informed that NE region is very small in comparison to other regions and moreover, it is not well connected with other regions. The corridor/connectivity is inadequate and there is no redundancy in NER grid. Only three States are having full fledged SLDCs in NER. Further, because of remote and isolated location of stations, ensuring healthiness of sophisticated equipments (like MUX, OTDR etc.) is a question mark. In case of any problem with equipment, the system may be bypassed/ deactivated. He also mentioned that the quantum of UFR load relief in respect of NER states has to be relooked as the proposed quantum of load shedding is very high.

MS I/C, NERPC stated that before implementation of the scheme, the adequacy of the existing infrastructure available at substation level like relays, Breakers & auxiliaries / DC system etc. need to be ensured. Further, he requested POWERGRID to provide the detail break up for 2688 km OPGW link network, name of the substations and number of feeders considered at each station etc. for UFR or df/dt based load shedding for NE Region. He also informed that islanding schemes and SPS scheme for the region are yet to be finalized.

CGM (Comml), AEGCL stated that all the States of NER do not have SLDCs and substations are still operating with Electro Mechanical relays. Most of the Sub-stations in NER need upgradation. Moreover, there are so many ongoing schemes, which are incomplete. Implementation of ongoing SCADA scheme has not been completed and its benefits have not been realized so far. Further, he informed that the NER State utilities are running in loss and hence commercial implication is to be seen and DoNER / Govt. of India may be approached for funding. The ongoing schemes should be completed and detail study is required before implementation of GSES.

Director (Trans.), Me.ECL stated that the GSES is a very good scheme, but before implementation of the scheme, all NER States should have SLDC and protection system should be in place and healthy. As far as funding is concerned he supported the view of Ar. Pradesh.

ACE, Manipur informed that there is no SLDC in Manipur and the sub-stations are very old and most of the relays are electro mechanical type, which are under replacement. He also expressed that funding is the major concern and hence scheme should be funded through Govt. of India.

SE, Nagaland stated that there is no SLDC in Nagaland also and hence before implementation of GSES schemes, the ground level infrastructures are required to be in place.

SE (Comml), Mizoram expressed that there is no SLDC in Mizoram and the scheme needs to be studied in detail before implementation.

Because of election in Tripura, the representative from TSECL could not attend the meeting. The following views of TSECL, received by NERPC secretariat, were informed to the house.

- The agenda items are of very new concept and attract advance technology & capital investment. The matter needs details review for examining technical & commercial aspects before discussion in TCC & NERPC meeting.

- TSECL would like to have all relevant information from respective agencies like PGCIL before deliberation in next TCC & NERPC meeting.

- The draft Automated Defence Plan has also not formulated taking into consideration uniform treatment to both State & Central utility in respect of generation & transmission. The load relief prescribed for NER needs review. The OPGW proposed for NER for 2688 Km needs detail breakup.

Chairman, TCC stated that the proposal is agreed in principle but further deliberation on technical and commercial implication is required before implementation of the scheme.

After detailed deliberation the decisions of the committee were summarised as follows:

- **All constituents agreed in principle to the technical requirement of the GSES scheme for NER grid.**
- **The basic infrastructure at most of Sub-station like circuit breakers, protection relays, etc. are not adequate for implementation of the scheme.**
- **There are no full fledged SLDCs in Ar. Pradesh, Manipur, Mizoram and Nagaland.**
- **Funding is major concern as NER states are financially weak.**
- **The quantum of UFR based load shedding needs to be relooked for NER States.**
- **More deliberation on technical and commercial issues is required before formulation/implementation of the scheme.**

The matter was being followed up in OCC meetings and the status is given below:

The detailed cost break-up was mailed to all the constituent States of the region and requested all State constituents to examine the details and communicate their comments/feedback to PGCIL with a copy to NERPC so that the necessary action can be taken by POWERGRID and matter can be discussed further in TCC meeting.

The representative of Assam informed that DPR for GSES, wherein the details of the project cost, mode of finance, interest during construction, State wise details of the OPGW lengthwise etc. have been covered, have been examined at their end. As per DPR, the project is to be funded by internal resources and domestic funding. For the project, Equity component of 30% has been proposed to be made available through POWERGRID internal resources and loan component of 70% through domestic funding and the interest rate has been considered as 10.5% per annum. Such high interest rate will impose huge financial burden on the states of NER and the States are already reeling under severe financial crunch. Implementation of this project will only be feasible in NER, if fund is provided in the form of grant/ through POC as is done in case of Transmission tariff. Regarding the OPGW length, representative of Assam informed that this needs to be rechecked and it is also not very clear, whether existing and new OPGW (under execution) have been excluded or not.

Mizoram has also intimated their observations stating that some of the 132 KV lines belonging to POWERGRID for OPGW although located in Mizoram are not in the list, viz. Badarpur- Kolasib, Kolasib – Lungmual (Aizawl of PGCIL) and Lungmual (PGCIL) – Zuangtui (Mizoram). Further, the 132 KV line from Zuangtui – Lunglei (Khawiva) via Serchip (Bukpui) is not included in the list as stringing work of OPGW is being taken up by this Department. Also they have mentioned that some of the sub-stations which are not in their state have been included in their list. They requested POWERGRID to verify the list of sub-stations accordingly.

Similarly Tripura had intimated that some of the sub-stations included in their state are not correct and requested POWERGRID to verify the same.

The details of OPGW links covered by GSES are given below:

Name of State	Length of OPGW Link (kms)
Ar. Pradesh	214
Assam	1022
Manipur	192
Meghalaya	55
Mizoram	347
Nagaland	537
Tripura	321
Total	2688

In the meantime, after discussion in 2nd NPC meeting, held at CEA, New Delhi on July 16, 2013, the committee has decided to revise the quantum and stages of UFR based load shedding in all regions. Accordingly the CEA, vide their letter dated 22.07.2013, has communicated that 400MW of UFR based load shedding is required for NER in four stages [49.2Hz, 49.0Hz, 48.8Hz, 48.6Hz] with 100MW load shedding at each stage. But In GSES, there was proposal for 450MW of UFR based load shedding and 9 islanding scheme. But at present three islanding schemes have been proposed for implementation in NER. After discussion in OCC & PCC forum, two schemes have been finalized for implementation. In view of above, the original GSES scheme needs a relook.

Committee may like to discuss

ITEM NO. A.4	**T-Connection of Lekhi & Bhalukpong Sub-station:**

During 12th PCC meeting, representative from DoP, Ar. Pradesh informed that the clearance from Department of Environment & Forest is still pending for which work of LILO at Bhalukpong will be delayed. The LILO arrangement at Lekhi is likely to be completed soon. The issue of forest clearance has been intimated to the higher authority and the pile foundation work is likely to be completed by September, 2013.

Committee may like to discuss this long pending issue and Ar. Pradesh may inform the current status of LILO arrangement at Lekhi & Bhalukpong.

ITEM NO. A.5	**INSTALLATION OF HARMONIC FILTERS:**

During the 9th NERPC meeting, POWERGRID had informed that CPRI has already carried out measurement of harmonics in the portion of NER Grid involving RHEP, Nirjuli S/S and Balipara S/S under different conditions including isolation of ER-NER Grid.

During the 10th NERPC meeting POWERGRID had informed that CRPI has submitted offer to them for designing of filters amounting to Rs. 1.75 lacs.

During 12th NERPC Meeting, POWERGRID had informed that as per the study of CPRI, the harmonics are generated at Satyam Steel Plant at Banderdewa in Ar. Pradesh. So, the cost of harmonic filters has to be borne by Satyam Steel Plant, Banderdewa and accordingly, Ar. Pradesh has to take up the matter with the consumer.

During 13th NERPC Meeting, Ar. Pradesh informed that they have received the specification and other details of harmonic filters from POWERGRID and they will implement the same within 2-3 months' time i.e., within September / October 2012.

The installation of Harmonic Filter took place after prolonged period of 2/3 years and unfortunately, when the same was charged on 10.07.2013, it was informed by GM, Satyam Plant that filters got burned. Further, POWERGRID engineer verified the purchase order and challan of the equipment and found out that the purchase order is as per the specification of CPRI, however, the challan is not as per the specifications.

During 88th OCC meeting, DoP, Ar. Pradesh informed that the matter has been taken up with Satyam Plant and power supply will not be resumed to the plant until the work of installation of harmonic filter is completed.

DoP, Ar. Pradesh may take up the issue for early installation of filters so that the problem of harmonic stress on the equipments can be eliminated.

Ar. Pradesh may kindly intimate the current status.

ITEM NO. A.6	**Frequent Tripping of 33 KV System of DoP, Ar. Pradesh at Nirjuli and Ziro:**

The frequent tripping of 33kV system of DoP, Ar. Pradesh is matter of concern. The issue was discussed in 9th, 10th, 11th and 12th TCC meetings. The present status of tripping of 33kV Feeders at Nirjuli and Ziro Sub Station is as below:

(a) Tripping 33kV Feeders at Ziro

SN	Feeder	Jan'10 – Jun'13		Tripping in July'13	
		Nos.	Nos. / Month	Nos.	Nos. / Month
1	Kurung- Kamey	766	19	47	47
2	Old Ziro Feeder	440	11	22	22
3	Kimin Feeder	1208	29	88	88

(b) Tripping 33kV Feeders at Nirjuli

SN	Feeder	Jan'10 – Jun'13		Tripping in July'13	
		Nos.	Nos. / Month	Nos.	Nos. / Month
1	AP – 1	262	7	5	5
2	AP – 2	590	15	23	23
3	AP – 4	82	2	2	2

Arunachal Pradesh is requested to take necessary action on priority to reduce no. of

faults in 33kV feeders owned by DoP, Govt. of Arunachal Pradesh to avoid further failure of transformers/equipments at Nirjuli and Ziro Sub Stations.

Committee may like to discuss.

PART: B ITEMS FOR DISCUSSION

ITEM NO. B.1	**Synchronization of Pallatana Module – I and Module - II**

The Gas Based Power Plant (GBPP) of OTPC at Palatana has installed capacity of [2x363.3MW = 726.6MW] and is the largest Combined Cycle Gas Based Power Plant in the region in terms of installed capacity. The Unit # 1 (363.3 MW) of GBPP of OTPC was synchronized with NER grid on October 22, 2012 and was injecting infirm power to Grid. The machine was under trial operation since its synchronization with the grid. The trial operation with DL tuning in PM mode, test for stabilization of machine with full load and other testing required as per PPA etc. were being carried out before declaration of CoD. As the Silchar-Bryrnihat 400kV line was not commissioned during that period, there was problem in evacuation of Power. But constituents of the region had co-operated to the maximum extent possible to facilitate the trial operation of the Unit # 1 even states like Tripura & Mizoram and central sector generating companies like NHPC & NEEPCO had to back down generation as and when required. Unfortunately due to technical problems now and then, the machine was taken under shut down and COD could not be declared. The Silchar-Bryrnihat 400kV line was test charged on February 26, 2013 and CoD was declared from March 1, 2013. After commissioning of above line, the problem in evacuation of power from Unit # 1 is resolved. But technical problem associated with the machine could not be resolved and COD could not be declared before April 22, 2013 (the last date of completion of six month of injection of infirm power to the grid). The trial operation with DL tuning in PM mode etc. was completed. OTPC again got the extension from CERC upto July 31, 2013 to inject infirm power to the grid to complete trial operation and other testing required as per PPA for declaration of CoD. The plant was inaugurated by Hon'able President of India on 21st June, 2013 and during that time the generation was around 70 MW. However, the machine tripped after sometime due to some problem in the gas pipeline. OTPC tried their best, in consultation with ONGC and BHEL, to resolve the problem before July 31, 2013. But due to problem with quality of gas supply, the target could

not be achieved. In the mean time OTPC has again taken up the matter with CERC for further extension / permission for injection of infirm Power to the grid till December 2013 for declaration of CoD and in the ROP of CERC dated 30-07-2013, considering the urgency of the matter, the commission has directed NERLDC to permit the petitioner to inject infirm power into the grid for testing and commissioning till further direction of the commission. The required test for stabilization of machine with full load and other testing required as per PPA are to be completed before declaration of CoD. During 88th OCC meeting it was informed that the cleaning up of gas pipelines, the pigging activity would be completed by August 15, 2013 and ONGC is being pursued to supply the clean gas at the earliest so that plant is ready before the coming festive seasons. The OCC Sub-committee also requested OTPC to provide the progress of the work and the data received from ONGC regularly to NERPC/NERLDC so that constituents are kept informed and if necessary, the forum can pursue with ONGC along with OTPC. Further, it was informed that Unit #2 is ready in all respect and the same is likely to be commissioned by September, 2013.

The status of commissioning schedule of transmission system associated with evacuation of power from generating stations of OTPC at Palatana and of NTPC at Bongaigaon as informed during 88th OCC meeting by POWERGRID is given below:

400 KV Byrnihat – Bongaigaon 400kV line – **October, 2013**

400 KV Balipara – Bongaigoan 400 KV D/C line # 3&4 with FSC **- December, 2013**

SN	Name of Line	Total Tower Locations	Line Length (Km)	Cumulative Progress as on 01.07.2013		
				Foundations completed (Nos)	Erection of towers (Nos)	Stringing (Ckm)
1	400KV D/C Silchar - Melriat line	436	143.58	144	127	79.3
2	400KV D/C Silchar - Imphal line	472	165.99	307	192	53.22
3	220KV D/C Mariani (New) - Mokokchung	157	48	83	53	0
4	400KV D/C Byrnihat-Bongaigaon line	565	201.46	503	490	136.02
5	400KV D/C Balipara-Bongaigaon line #3 & 4 with FSC & Quad Conductor	834	304.57	819	779	412

Committee may like to discuss and review the current status of progress.

ITEM NO. B.2	**Remedial Measures taken in NER after major grid disturbances in July 30-31, 2013 based on recommendations of enquiry committee.**

The major twin grid disturbances occurred on July 30, 2012 and July 31, 2012 had resulted in almost total collapse of Northern, Eastern and North-Eastern regional grids respectively. An Enquiry Committee was constituted by the Ministry of Power under the Chairmanship of Chairperson, CEA to look into the causes of these grid failures and to suggest remedial measures. The committee had suggested number of remedial measures like independent third party protection audit, UFR based load shedding, implementation of SPS and islanding scheme in each region etc. Accordingly following major action has been taken so far in NER including discussion and analysis of various trippings in transmission system and generating stations in PCC forum.

ITEM NO. B.2.1	**Independent third party audit of protection system**

The review of protection Systems was the primary recommendation of the committee. This includes third party protection audit, review of Zone-3 philosophy and deployment of System Protection Scheme (SPS) etc. Based on the recommendation of the committee, independent third party protection audit of NER was planned taking representations from various state utilities, NERPC/NERLDC, and central utilities (NEEPCO/PGCIL/NHPC) in the region. In NER there are 134 Nos. of substations and generating stations of 132kV and above voltage class. The teams, each comprising of four (4) members from different state utilities/owner, PGCIL/NEEPCO/NHPC and NERPC/NERLDC was formed. Because of geographical locations of different sites, the team had to cover most of the locations by road only. The PGCIL, NEEPCO, state constituents had provided required logistic support for the protection audit. The protection audit covering eleven (11) substations / generating stations in the State of Tripura was completed on 21st December, 2012 and rest of the substations / generating stations was completed in February, 2013.

The details of number of substations / generating stations of 132kV and above voltage class in seven (7) State Sector Utilities and four (4) Central Sector Utilities of the NE region are as follows:

State Utilitis / Central Sector Utilities in the Region	Number of substations / generating stations			Total No. of Stations
	400kV	220kV	132kV	
Arunachal Pradesh		1	4	5
Assam		9	39	48
Manipur			9	9
Meghalaya	1		19	20
Mizoram			7	7
Nagaland			6	6
Tripura			13	13
POWERGRID	4	2	9	15
NEEPCO	1	2	4	7
NHPC			1	1
OTPC	1			1
TOTAL	7	14	111	132

After completion of protection audit, the deficiencies in the NER system was highlighted and discussed in detail in OCC and PCC meetings. The detail report highlighting the general observations and recommendations was also submitted to the constituent states [Enclosed as Annexure- B 2.1]. Subsequently as directed by the Ministry of Power and communicated by NERPC/CEA, the Detailed Project Report (DPR) with cost estimate and action plan for implementation etc. was prepared by each constituent of the region for rectification of deficiencies in each substation/generating station. The total number of stations covered in the DPR in respect seven (7) constituent states of the region is 111. The DPR in respect of NEEPCO, NHPC was also submitted separately.

The scope of work covered in the DPR includes the rectification of various deficiencies in each substations/generating stations of 132kV and above voltage class covering following broad areas

a) Modification in switching Scheme
b) Replacement of existing EM/Static relays by numerical relays / Bay Control and Protection Units (BC&PUs) & Substation Automation System (SAS) and providing TSE, DR & EL
c) Replacement of old obsolete equipment (CB, Surge Arrester, Isolators, Earthing switches, CTs, PTs/CVTs) and material
d) Establishment of reliable communication link and Providing carrier intertrip facility
e) Improvement in DC system and providing DG set
f) Improving existing Earthing system
g) Providing required Fire Fighting system / arrangement for transformers / reactors
h) Providing Modern diagnostic tools.

i) Any other improvement required

The estimated cost projected in the DPR for rectification / renovations of substations / generating stations in NER is given below:

Name of Utility	Estimated Cost (Rs. In Crores)
Ar. Pradesh (6 Stations)	**33.454**
Assam (48 Stations)	**381.584**
Manipur (9 Stations)	**40.815**
Meghalaya (21 Stations)	**183.659**
Mizoram (8 Stations)	**65.247**
Nagaland (6 Stations)	**37.525**
Tripura (13 Stations)	**73.618**
NEEPCO (7 Stations)	**40.739**
NHPC (one Stations)	**5.549**
POWERGRID (15 Stations)	**(to be reverted back)**
Total	**Rs. 816 Crores (Approx.) excluding POWERGRID, NEEPCO & NHPC**

The break up details in respect various items are as follows:

States		Ar. Pradesh	Assam	Man.	Meg. (S)	Meg. (G)	Miz.	Nag.	Tri.	Total
Sl. No.	Description									
A	Substation Equipment [Subtotal-A]	**9.216**	**120.789**	**11.065**	**32.437**	**13.348**	**21.464**	**8.414**	**13.321**	**230.055**
B	Control & Relay Panel [Subtotal-B]	**3.873**	**45.720**	**6.895**	**15.674**	**6.806**	**8.499**	**7.585**	**11.652**	**106.705**
C	PLCC Equipment [Subtotal-C]	**2.034**	**22.394**	**1.452**	**4.891**	**1.787**	**2.813**	**2.208**	**7.629**	**45.208**
D	Substation Auxiliary [Subtotal-D]	**8.067**	**72.119**	**9.396**	**21.495**	**11.392**	**11.521**	**8.436**	**16.610**	**159.036**
E	Other works [Subtotal-E]	**0.914**	**69.557**	**2.112**	**46.872**	**1.929**	**9.244**	**1.230**	**12.082**	**143.940**
F	Subtotal A to E [F]	**24.105**	**330.580**	**30.920**	**121.369**	**35.261**	**53.542**	**27.873**	**61.294**	**684.943**
G	Incidental Expenses during execution (@ 5% of F) [G]	**1.205**	**16.529**	**1.546**	**6.068**	**1.763**	**2.677**	**1.394**	**3.065**	**34.247**
H	Contingencies (@ 3% of F) [H]	**0.723**	**9.917**	**0.928**	**3.641**	**1.058**	**1.606**	**0.836**	**1.839**	**20.548**

I	Diagnostic Tools [Subtotal-I]	**7.421**	**24.558**	**7.421**	**7.721**	**6.778**	**7.421**	**7.421**	**7.421**	**76.163**
	Grand Total [F to I]	**33.454**	**381.584**	**40.815**	**138.799**	**44.859**	**65.247**	**37.525**	**73.618**	**815.90**

The substation auxiliary includes DC/AC system, DG set, LT transformer, control & power cables, firefighting, lighting & air conditioning system and other works includes earthing (earth pit, rod/pipe electrodes) & spreading of gravels etc.

The issue of funding from Govt. of India / PSDF for rectification / renovations work proposed in DPR was discussed during the 2nd NPC meeting held at CEA, Delhi on July 16, 2013. The representatives of all regions highlighted about the fund constraint with states. CEA informed that Min. of Power has been requested for considering 20% funding from PSDF. It was made clear that the funding for entire amount, projected in the DPR will not be available and states should take up renovation & upgradation of protection systems without waiting for funds from the centre. The fund accumulated in PSDF from NER is only about Rs. 110 crores. The rectification / renovations work proposed in DPR cannot be taken up with this nominal fund. The rectification / renovations of substations / generating stations are essential for safety, security and reliable operation of the system. Hence constituents should plan accordingly to rectify the deficiencies in their system.

Committee may like to discuss about the funding issue and future course of action.

ITEM NO. B.2.2	**Under Frequency Relay (UFR) based Load Shedding:**

The following three stage of UFR based load shedding is in operation in NER.

Sl. No	**Stages**	**Frequency (in Hz)**	**Amount of Load shedding (in MW)**
1	Stage – I	48.8	60
2	Stage – II	48.5	30
3	Stage – III	48.3	30
Total Load Shedding			**120**

But after discussion in 2nd NPC meeting, held on 16th July 2013 at CEA, New Delhi, the committee has decided to revise the quantum and stages of UFR based load shedding in all regions. Accordingly the CEA, vide their letter dated 22.07.2013, has communicated that following quantum of UFR based load shedding is required for NER in four stages.

Sl. No	Stages	Frequency (in Hz)	Amount of Load shedding (in MW)
1	Stage – I	49.2	100
2	Stage – II	49.0	100
3	Stage – III	48.8	100
4	Stage – IV	48.6	100
Total Load Shedding			**400**

Further NPC has also requested for implementation within three months and monthly progress report of implementation should be communicated to CEA regularly.

After deliberation in OCC and PCC forum, the quantum of UFR based load shedding required at different stages by each constituents in NER (as per the formula adopted in Special TCC meeting of NERPC held in 2009) has been worked out as below:

SN	Stages	Frequency (in Hz)	State-wise Load Shedding	Total Load shedding (in MW)
1	Stage-I	49.2	Arunachal = 5 MW Assam = 55 MW Manipur = 5 MW Meghalaya = 15 MW Mizoram = 5 MW Nagaland = 5 MW Tripura = 10 MW	100
2	Stage-II	49.0	- do -	100
3	Stage-III	48.8	- do -	100
4	Stage-IV	48.6	- do -	100
	Total Load Shedding		**Assam: 220MW (4x55MW)** **Meghalaya: 60MW(4x15MW)** **Tripura: 40MW (4x15MW)** **Ar. Pradesh: 20MW (4x5MW)** **Manipur: 20MW (4x5MW)** **Mizoram: 20MW (4x5MW)** **Nagaland: 20MW (4x5MW)**	**400**

All constituents have agreed to the above proposal. The constituents are requested to identify and furnish the list of feeders for above quantum of UFR based load shedding.

Committee may like to discuss.

ITEM NO. B.2.3	System Protection Scheme (SPS) associated with Generating Unit#1 (363.3MW) of OTPC at Palatana

After deliberation in OCC and PCC forums following four (4) System Protection Scheme (SPS) associated with generating Unit#1 (363.3MW) of OTPC at Palatana has been planned for NER and are under implementation.

Case 1: Tripping of generating unit of OTPC at Palatana

Case 2: Tripping of 400 kV D/C Palatana- Silchar line (with generation from OTPC's plant at Palatana)

Case 3: Tripping of 400 kV Silchar-Byrnihat line (with generation from OTPC's plant at Palatana)

Case 4: Tripping of 400 KV Silchar – Byrnihat line (without generation from OTPC's plant at Palatana)

The scheme for all the four cases will be as follows:

Case 1: <u>When Palatana unit trips:</u>

i. When generator at Palatana trips a signal will be generated from trip relay of the unit.

ii. This signal should trip the CB of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines at Silchar.

iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, the CB at Badarpur of 132 kV Badarpur – Panchgram line should be tripped.

iv. After these trippings an instant load of 80 MW will be relieved during off-peak hours & 130 MW will be relieved during peak hours which will prevent the system from cascade tripping

v. Then manual demand disconnection/management should be imposed.

Case 2: <u>When 400 kV Palatana-Silcher (D/C) lines trip</u>

i. When both the ckts of 400 kV Palatana – Silchar lines trips, a signal will be generated from trip relays at Silchar

ii. This signal should trip the CBs at Silchar end of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines.

iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, the CB at Badarpur end of 132 kV Badarpur – Panchgram line should be tripped.

iv. After these trippings an instant load of 80 MW will be relieved during off-peak hours & 130 MW will be relieved during peak hours which will prevent the system from cascade tripping

v. Then manual demand disconnection/management should be imposed.

Case 3: 400 kV Silchar – Byrnihat line (with generation at Pallatana)

When 400 kV Byrnihat – Silchar lines trip, signal will be generated from trip relays at Silchar

i. This signal should trip CB of GTG/STG of Generating Unit at Palatana. But unit may run in Full Speed No Load (FSNL) condition.

iii. An instant relief of load of 230/130 MW will prevent the system from cascade tripping.

v. Then manual demand disconnection/management should be imposed.

Case 4: When 400 kV Silchar – Byrnihat line trip(without generation at Pallatana)

i. When 400 KV Byrnihat – Silchar line trips, a signal will be generated from trip relays at Silchar.

ii. This signal should trip the CB of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines at Silchar.

iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, a signal will be generated from trip relay of 132 KV Silchar – Panchgram line. This signal should trip the CB at Badarpur of 132 kV Badarpur – Panchgram line.

iv. After these trippings an **instant load relief** of around **95 MW in Peak Hours** which will prevent the system from cascade tripping

v. Then manual demand disconnection/management may be imposed, if necessary.

Load reduction in 132 kV pocket is required for SPS under Case-I and the scheme has already been implemented by NERTS in line with discussion in OCC forum.

For Case-II, generation reduction at Palatana as well as load reduction in 132 kV pocket are required. Load reduction part has already been implemented by NERTS in line with discussion in OCC forum. Regarding generation reduction, it has been seen from the study that injection of power at Palatana should be reduced to around 20 MW excluding own auxiliary consumption.

For Case-III, generation reduction to the tune of 200 MW is required in case Unit # 1 is running under full load i.e the generation should be brought down to around 150 MW. The scheme will be kept in 'OFF' mode / ineffective mode in case generation is around 150 MW. OTPC, BHEL will plan how the required generation reduction will be effected for implementation of the schemes under Case-II & Case-III.

Regarding SPS under Case-IV, it has been decided that the scheme will be implemented as early as possible considering the adverse impact of tripping of the line on the NER grid. The scheme is similar to Case-I and hence implementation should not take much time. NERTS was requested to take necessary action for implementation at the earliest.

SPS will be reviewed from time to time after implementation for further improvement based on the system requirement. The SPS will be reviewed again when the second Unit at Palatana is connected to the NER grid.

TCC Member may kindly discuss to implement the schemes at the earliest as operation without SPS schemes is marginalising the reliability of the grid and may even lead to grid disturbances.

ITEM No. B.2.4	**Implementation of Islanding Scheme in NER:**

The implementation of Islanding scheme is also one of major recommendations of enquiry committee in order to restore the system fast in case of grid disturbance. In NER most of generating plants are either hydro based or gas based plant. The frequency at which the Gas based generating Units trip is generally much higher than islanding frequency i.e. 47.9Hz recommended by the enquiry committee. During discussion in OCC and PCC forum it was brought to notice that the frequency setting for tripping of the Gas based generating Units of NTPS is 48.72 Hz. Similarly the frequency setting at which generating Units of AGBPP are likely to trip is 47.5 Hz (for M/s Mitsuibisi make unit) and 48.0 Hz (for M/s BHEL make unit) and that of AGTPP is 48.0 Hz. & Gas based generating Units of OTPC at Palatana is 47.8 Hz (for M/s BHEL make Unit). After deliberation in OCC and PCC forums following islanding scheme and associated frequencies levels for creation of islands in NER has been planned and are under implementation.

SN	Islanding Scheme	Lines required to be opened	UFR Location	Implementing Agency
	ISLAND AT 48.80 Hz: Island comprising of generating units of AGBPP (Gas), NTPS (Gas) & LTPS (Gas) and loads of Upper Assam system & Deomali area	220 kV New Mariani (PG) – AGBPP	UFR-1 [At New Mariani (PG)]	**POWERGRID**
		220 kV New Mariani (PG) – Misa		
		220 kV Mariani – Misa	UFR-2 [At Mariani, Samaguri of	**AEGCL**
		220 kV Mariani – Samaguri		

	(Ar. Pradesh) **[Total Generation: 380-400MW and load: 200MW (off peak)-300MW (peak)]**	132 kV Mokukchung – Mariani	AEGCL]	
		132 kV Dimapur (PG) – Bokajan	UFR-3 [At Dimapur (PG)]	**POWERGRID**
	ISLAND AT 48.20 Hz: Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam) **[Total Generation: 150-160MW and load: 110MW (off-peak)-150MW (peak)]**	132 kV Palatana – Udaipur	UFR-1 [At Palatana]	**OTPC**
		132 kV Palatana – Surjamani Nagar		
		132 kV Silchar – Dullavcherra	UFR-2 [At Silchar]	**POWERGRID**
		132 kV AGTPP – Kumarghat	UFR-3 [At Kumarghat]	**POWERGRID**
		132 kV P K Bari – Kumarghat		
	ISLAND AT 47.90 Hz: Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER	To be decided after system study		

There is no financial implication for UFRs as the inbuilt feature of Numerical relays, provided for protection of the corresponding line (s) at identified location would be used. The isolation of islanded pocket from rest of the NER grid is only the first stage. The operation of UFRs has to be with certain time delay (say about 0.2 secs). But after isolation from rest of the grid, the load and generation matching should take place automatically in the islanded pocket either by reduction of generation or adjustment of loads. The input from SCADA and use of Programmable Logic Controller (PLC) etc. may be required. Otherwise islanded pocket may not survive due to load generation mismatch. Detail engineering is required for automatic load generation matching for successful operation of the island. Regarding the Case – III above i.e. isolation of NER from ER at ER-NER boundary, the relevant study required is being carried out in association with WRPC.

Committee may like to discuss and note.

ITEM No. B.2.5	Standardization of Protection scheme for transmission System in NER:

After detailed deliberation Protection co-ordination subcommittee has decided to adopt the following Protection Philosophy in NER in line with requirement of CEA's regulation.

(A) Line Protection

SN	Protection	Setting
1	Distance Protection: Zone - 1	The setting shall be 80 % of the protected line length. Time Delay = Instantaneous
2	Distance Protection: Zone – 2	For single circuit line, the setting shall be [100% of the protected line length (length of principal line section) + 50% of the shortest line emanating from far end bus bar] **or** [120% of the protected line] whichever is higher. For double circuit line, the setting shall be 150% of the protected line length (length of principal line section) to take care of the effect of mutual compensation. However, it must be ensured that Zone-II setting does not enter into lower voltage level through transformer. It may be restricted to 50% of total transformer impedance to have discrimination with Zone-III. T_{Z2} = 300ms (for lines less than 100kms) T_{Z2} = 500ms (for lines more than 100kms)
3	Distance Protection: Zone – 3	The setting shall be [120% of protected section + 100% of the longest line emanating from the far end bus bar] **or** [100% of the protected line + 100% of the longest line emanating from the far end bus bar + 20%-30% of the shortest line emanating from the far end of the second line considered], whichever is lower. It must be ensured that Zone-III setting does not enter into lower voltage level through transformer. It should be restricted to (protected section + 90% of total transformer impedance) T_{Z3} = 1.0 secs.
4	Distance Protection: Reverse Zone	Reverse reach shall be 20% of the shortest line & 10% of longest line emanating from that bus T_{Z3R} = 1.0 – 1.2 secs.
5	Lines with Series and other compensations in the vicinity of Sub-station	80% of the protected line with Permissive Over Reach (POR) Scheme should be adopted. 100 milli seconds time delay for allowing correct distance measurement after the series capacitor is bypassed. 100 ms
6	Power swing blocking	Block tripping in all zones (except Zone 1) for all lines. Out of step tripping to be applied on all inter regional tie lines. De-block time delay = 2 Secs.

7	Protection for broken conductor	Negative sequence current to positive sequence current ratio more than 0.2 (I2/I1 ≥ 0.2). Only for alarm. 3.5 – 5.0 Secs.
8	Carrier Communication & Protection	Protection using carrier communication (PLCC / OPGW) is to be provided for all 400 kV, 220 kV and 132 kV lines (where auto-reclosure is in operation). Each 400 kV and 220 kV line shall be provided with two (2) protection channels in addition to one speech + data channel for each direction. In case of 220kV and 132kV lines, the speech and data channel can also be used for protection, wherever possible.
9	Back up protection	For 220 kV, 132kV and 66kV lines with only one distance Protections (i.e Main-I), back up protection by IDMT O/C and E/F is also to be provided.
10	Directional Earth fault protection	400 kV & 220 kV lines with two (2) Numerical Distance Protections Relays (i.e. Main-I & Main –II), shall be supplemented with activation of inbuilt IDMT Directional Earth Fault (DEF) protections to detect very high resistance fault, which cannot be detected by Distance relay. $T_{DEF} = T_{Z3} + 100ms$
11	Auto Re-closing with dead time	Single Phase Auto Reclose Scheme Dead time = 1.0 sec, Reclaim time = 25 sec.
		Three Phase Auto Reclose Scheme Dead time = 1.0 sec, Reclaim time = 25 sec.
12	Over Voltage Protection	Two stage Over voltage protection to be provided for 400kV lines Stage # II setting for all lines are same as below: V_{S2}= 140% & T_{S2}= 100ms Stage # I setting of multiple circuits connected between two same stations to be graded with time & voltage. For example, the Over Voltage settings for four circuits connected between two stations A & B shall be as follows: Circuit # 1 : V_{S1}= 110% & T_{S1}= 5 s Circuit # 2 : V_{S1}= 110% & T_{S1}= 6 s Circuit # 3 : V_{S1}= 112% & T_{S1}= 5 s Circuit # 4 : V_{S1}= 112% & T_{S1}= 6 s O/V relay for 400kV lines shall be connected to trip concerned line breaker(s), start LBB, block auto reclosure and send direct trip command.
13	Disturbance	To be provided as a standard for all 400kV & 220kV lines on

	Recorder (DR), Event Logger (EL) and Fault locator (FL)	both ends. DR, EL & FL, being inbuilt feature in Numerical Relays, such features should also be used even at 132kV and 66kV level.
14	Time Synchronising Equipment (TSE)	To be provided as a standard for all 400kV, 220kV and 132kV/ 66kV substations.

(B) Bus bar and LBB Protection

SN	Protection	Setting
1	LBB protection and bus bar protection	Bus bar & LBB protection to be provided at 400kV & 220kV level for substations and Generating stations having multiple feeds. Bus bar & LBB protection may also be provided at 132kV level for important substations having multiple feeds. LBB current should be in pick up condition always LBB Time delay = 200ms.

(C) Protection for Inter Connecting Transformer (ICT) [400kV/220kV/132kV/66kV Class]

SN	Protection	Setting
1	Differential protection	Differential Relay to be provided for Internal Fault in Transformer Trip
2	Restricted Earth Fault (REF) protection	REF to be provided for Internal Earth Fault in Transformer Trip
3	Back up Directional (IDMT) O/C & E/F protection on HV and LV side with non-directional High Set Element	Back up protection to be provided for Internal and external Fault. Directional Trip for IDMT Non-directional Trip for HS
4	Over Fluxing (OF) protection	Over Flux Relay be provided for protection from Over Fluxing (V/f)=1.1 for alarm & (V/f)=1.4 for tripping
5	Over Load Relay	Over Load Relay to be provided for Over Load Alarm 110% of rated current T_{OL} = 5 Secs
6	Buchholz protection	Buchholz Relay to be provided for detection of incipient internal fault in Transformer Tripping for both stages (The contacts for both stages shall be paralleled so that tripping command goes to CB(s) in both stages.) However, the

		existing practice of two stage tripping may be reviewed by utilities.
7	Winding Temperature Indicator (WTI)	WTI to be provided for preventing the transformer winding from High Temperature Operation. Cooling, Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
8	Oil Temperature Indicator (OTI)	OTI to be provided for preventing the transformer oil from High Temperature Operation. Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
9	Pressure Relief Device (PRD)	PRD to be provided for protection of transformer tank from blasting due to development of high internal pressure during heavy internal fault Trip
10	Magnetic Oil Gauge (MOG)	MOG to be provided for Low oil level Alarm. Alarm
11	Oil Surge Relay (OSR)	OSR to be provided for OLTC against sudden oil surge Trip
12	Surge Arresters	Gapless Surge Arresters shall be provided on both primary and secondary sides of transformers, located outdoors with overhead connection.
		The Protection of transformer could be divided into two groups (Group-A & Group-B) and each group should be connected to separate DC source. Both Group-A & Group-B protection shall give trip impulse to circuit breaker of ICT. The Group-A should include Differential protection, back up protection (on HV side), over fluxing protection (on HV side), high oil temperature tripping, PRD tripping and Delta winding protection (wherever applicable). The Group-B should include REF protection, back up protection (on LV/MV side), over fluxing protection (on LV/MV side), high Winding temperature tripping, OSR tripping, low oil level tripping and Buchholz tripping.

(D) Protection for Reactor

SN	Protection	Setting
1	Differential protection	Differential Relay to be provided for Internal Fault in Transformer Trip
2	Restricted Earth Fault (REF) protection	REF to be provided for Internal Earth Fault in Transformer Trip

3	Back up Impedance Protection	Back Up Impedance protection to be provided for protection of reactor from winding fault Impedance setting around 60% of winding Time Delay 1000ms
4	Buchholz protection	Buchholz Relay to be provided for detection of incipient internal fault in Transformer Tripping for both stages (Matter to reviewed again later)
5	Winding Temperature Indicator (WTI)	WTI to be provided for preventing the transformer winding from High Tem. Operation. Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
6	Oil Temperature Indicator (OTI)	OTI to be provided for preventing the transformer oil from High Tem. Operation. Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
7	Pressure Relief Device (PRD)	PRD to be provided for protection of transformer tank from blasting due to development of high internal pressure during heavy internal fault Trip
8	Magnetic Oil Gauge (MOG)	MOG to be provided for Low oil level Alarm. Alarm
9	Surge Arresters	Gapless Surge Arresters (SAs) shall be provided on HV side. The Neutral Grounding reactor shall also be provided with SAs.
		The Protection of reactor could be divided into two groups (Group-A & Group-B) and each group should be connected to separate DC source. Both Group-A & Group-B protection shall give trip impulse to circuit breaker of reactor. The Group-A should include Differential protection, back up protection, high oil temperature tripping, and PRD tripping. The Group-B should include REF protection, high Winding temperature tripping, low oil level tripping and Buchholz tripping.

(E) Protection for Bus Coupler / Bus Transfer bay

SN	Protection	Setting
1	Bus coupler or Bus transfer bay protection	Non Directional over current and Earth fault protection.

The Protection Coordination Sub-committee has also decided to include Generator Protection Philosophy for NER and Central and State Generating companies in NER

(NEEPCO, NHPC, NTPC & OTPC; Assam, Meghalaya, Tripura) has been requested to submit their practices.

For kind information of TCC members

ITEM No. B.2.6	Formation of System Study Group in NER

In 82nd OCC meeting and special TCC meeting held at Shillong on 09-02-2013, it was decided to create Power system study group in the region taking representation from various constituents including IIT (Guwahati). The nomination form all constituents [Ar. Pradesh, Assam, Manipur, Mizoram, Meghalaya, Nagaland, Tripura, NERPC, NERLDC, NERTS, OTPC and NEEPCO] have been received and nomination from IIT will be pursued.

The first meeting of system study group of NER was organized on 20.08.2013 at NERLDC, Shillong as per the decision of 88th OCC meeting. Representatives from Assam, Meghalaya, Nagaland, Mizoram, OTPC, BHEL, NERTS, NERPC & NERLDC were present in the meeting. NERLDC demonstrated different aspects of system study in the meeting along with the procedures for data base development, addition of elements in the base cases, system study related to Total Transfer Capability (TTC) / Available Transfer Capability (ATC) of their own transmission network etc. to the representatives with the objective to develop the capability of each state to carry out various studies relating to their own transmission network as well as for regional network independently for different contingencies so that corrective measures can be taken accordingly. The soft copy of relevant files including SLD for the existing network of each state (compatible to PSSE software) was also handed over to the participants so that system studies for different conditions can be carried out by them independently. Such files will also be mailed to the Ar. Pradesh, Manipur and Tripura, who could not participate in the meeting. NERLDC has also agreed to provide all kind of support to State constituents for system studies. Constituents were also requested to study their network for reactive power management. The system studies associated with proposed SPS was also explained to the participants.

For kind information of TCC members and to be put for approval of RPC.

ITEM NO. B.3	Rangia (Assam) – Motonga (Bhutan) 132kV transmission line

The existing Rangia(Assam)-Motonga (Bhutan) 132kV single circuit transmission line forms one of the interconnections between Assam in North Eastern Region (NER) and Bhutan for flow of electric power. The existing line helps both Assam and Bhutan in meeting the load demand in the connected areas. The length of the transmission line is about 57 kms, out of which about 44kms comes under Indian Territory and rest of the line (about 13kms) falls under Bhutan territory. The drawal of power by Assam at Rangia using Rangia-Deothang (Motonga) line is basically the displacement of power without exceeding the daily allocated quantum of Power from Eastern Region(ER) to NER.

The Ministry of External Affairs (MEA), Government of India (GoI) [vide letter No. EIV/231/14/200 dated 11-03-2013] has authorised Power Grid Corporation of India Ltd. (PGCIL) to carry out the Operation & Maintenance (O&M) of the Indian Portion of 132kV Deothang – Rangia transmission line and associated bay at Rangia substation in Assam and the O&M charges of above infrastructure shall be payable to PGCIL by PTC India Ltd. as per mutually agreed terms and conditions. But Department of Hydro Power & Power System, Ministry of Economic Affairs, Bhutan [vide their letter No. DHPS / TPSD/GOI (TCC-ERPC)/2012-13/269 dated 8-05-2013] and Bhutan Power Corporation (BPC) Ltd. [vide their letter No. 3/BPC/D&CD/MD/2013/113 dated 30-04-2013] have desired to formally handover the above said assets, lying in Indian territory that was built and works completed by PGCIL in 2009, to PGCIL as assets are in the books of BPC. Ltd. It is also understood that the PTC India Ltd. and PGCIL are also pursuing for early settlement of the matter.

In case of Forced outage of transformers at BTPS, the drawal by Assam at 132kV level is restricted at BTPS. If Rangia – Deothang (Motonga) 132kV line is kept in charged condition, Assam can draw power from Bhutan via above line to meet their loads in 132kV BTPS-Dhaligaon-Rangia section. Similarly Bhutan will also be benefitted through this interconnection. Hence, till the asset is handed over to PGCIL, the interconnection between Assam and Bhutan through above line may be kept in charged condition at all times.

NERPC has already taken up the matter with Bhutan, Min. of External Affairs and PTC. The GM division of CEA has also been requested to take up the issue of Rangia-Deothang 132kV line in appropriate forum. The MD of M/s Bhutan Power Corporation (BPC) has also been invited to TCC / NERPC meeting for further discussion to resolve the matter.

The Committee may like to discuss.

ITEM NO. B.4	**Frequent Tripping in NER, Particularly in Manipur system, Meghalaya system in Khliehriat area, NHPC in Loktak, NEEPCO in AGBPP, Assam in Sarusjai area and Nagaland system in Dimapur area**

The frequent tripping in Manipur / Meghalaya / Nagaland system / Generating station at Loktak of NHPC / Assam, due to absence of required protection system / switchgears or mal/non-operation of protective relays / switchgears and tripping of generating units in AGBPP of NEEPCO due to inadequate capacity of engines, has become a regular feature for the region and is also a matter of concern for NER. The number of tripping from May 2013 to August 20, 2013s is as follows:

Name of State/ Generating Utility	No. of trippings	Multiple trippings	Load loss	Generation loss
Manipur	18	18	(a) Load loss in Manipur: **20MW to 106MW** (b) Total load loss in the region: **214MW**	
NHPC	23	17		(a) Generation loss: **35MW to 105MW**
Meghalaya	20	16	(a) Load loss in Meghalaya: **24MW to 213MW** (b) Total load loss in the region: **245MW to 505MW**	(a) Generation loss from Leshka & Umiam Stage-I&II in Meghalaya: **42MW to 160MW**

Nagaland	7	2	(a) Load loss in Nagaland: **15MW to 51 MW**	
AGBPP	43	-	-	(a) Generation loss: **75MW to 230MW**

The details of tripping are enclosed as **Annexure B.4.** The situation is affecting not only the concerned state but also NER grid. Sometimes the state like Manipur plunges into darkness. The matter has been discussed number of times in OCC/PCC forums. But there is no improvement in the prevailing condition. Unless the situation improves, it is difficult to expect safe, secure and reliable operation of the NER grid. Moreover, a healthy transmission system can only provide reliable power supply to the distribution network of the state. Therefore, urgent action is required for reducing undesirable trippings in the transmission system / generating station for the overall interest of the state (s) as well as for the NE Region.

ITEM NO. B.4.1	**Non-operation of Protective Switchgear of DoP, Manipur & NHPC**

In several cases Loktak connected transmission lines are getting tripped due to non-operation of protective switchgear in 132 kV Loktak - Ningthoukhong and 132 kV Loktak - Rengpang lines. This is resulting in undesirable isolation of 132 kV System affecting 132kV portion of NER Grid.

During analysis of tripping in various OCC/PCC meetings it has been observed that most of the multiple/undesirable tripping in NER is happening in Manipur system in association of Loktak HEP.

In PCC forum it is always informed that renovation work in various substations in Manipur is in progress and after completion of works the situation would improve.

Manipur was requested to take up renovation work fast and to carrying out regular patrolling of the lines, passing through jungle areas requiring regular trimming of trees to reduce transient fault. POWERGRID also informed that some the relays in existing substations are not healthy and need immediate replacement for smooth operation of the grid. POWERGRID expressed their willingness to provide some relays for replacement in existing substation at Yurembam. Based on the decision of OCC /PCC forum of NERPC, during the month of July 2013, the representative of PGCIL had also visited various substations of DoP of Manipur as well as the generating station at Loktak of NHPC and had suggested some corrective actions.

The matter has already been discussed with the representative of DoP, Manipur and Loktak HEP for early rectification/replacement of their non-functioning of relays & switchgear but till now no improvement is observed.

Committee may like to discuss.

ITEM NO. B.4.2	Non-operation of Protective Relays & Switchgear of Me. ECL causing unwarranted outages of Transmission System at Meghalaya (Khandong-Khliehriat-NEHU Portion):

During analysis of trippings in PCC forum, it has been observed that due to non-operation of switchgear and protection scheme in Khliehriat (Me.ECL), NEHU, Lumshnong, there was unwarranted tripping of 132kV Khandong – Khliehriat (PG) Line # 1 & 2, 132kv Khliehriat (PG) – Khliehriat (Me.ECL) Line # 1 & 2, 132kV Khliehriat (PG) – Badarpur (PG) line.

Committee may like to discuss.

ITEM NO. B.4.3	Frequent Tripping of AGBPP (Kathalguri) Units:

Frequent tripping of generating units of AGBPP has also become a matter of concern for the region. During the 11th PCC meeting, NEEPCO informed that AGBPP has already initiated the action and order has already been placed for procurement of three (3) gas engines with compressor of higher capacity and the work is likely to be completed by March, 2014. After commissioning of gas engines of higher capacity, the problem is likely to be resolved.

During 12th PCC meeting, constituents enquired from NEEPCO about the preventive action being taken by AGBPP to reduce frequent tripping of machines till the commissioning of high capacity gas engines.

NEEPCO informed that all efforts are being taken to reduce the frequent tripping of the plant. Moreover, during the winter season, the plant is more stable compared to summer season and the commissioning of gas engines of higher capacity (likely to be completed by March 2014) will resolve the problem of frequent tripping.

NEEPCO may like to intimate the status.

ITEM NO. B.4.4	Multiple Tripping in and around Sarusjai area of Assam

It has been observed that there were cases of multiple tripping of elements in and around Sarusjai area of Assam.

It is pertinent to mention that if ISTS elements tripped more than five times in a month, as per Standards of Performance of ISTS Licensees regulations of CERC, the details of the same have to be published in the website of the respective ISTS licensees and to be reported to CERC.

Committee may discuss the issue for early rectification/replacement of relays & switchgear or other measures required to reduce multiple trippings in NER grid.

ITEM NO. B.5	Lines Under Long Outages:

The long outage of the following lines are being pursued in OCC forums. The status for restoration of these lines as reviewed in the 88th OCC meeting is as follows:

(a) 220kV BTPS – Agia line (one ckt) – [Since Nov'97]: Material has already been procured and the target for completion of work is January, 2014.

(b) 132kV Mariani – Mokokchung line – [Since Apr'08]: Assam informed that the line was charged but tripped immediately after charging due to faults in some portion of the lines under Nagaland. Nagaland informed that the work of replacement of some insulators is under progress. After completion of replacement work and checking of jumpers, conductor etc., the line can be charged. The work is likely to be completed by September, 2013.

(c) 39km of 132kV Rengpang – Jiribam line – [Since Oct'02]: During 86th OCC meeting the representative of Manipur had informed that stringing of line is complete and work at termination point near substation is going on; the same will be completed by July, 2013.

(d) LILO of 132 kV Dimapur (Nagaland) – Kohima (Nagaland) Line at 220/132 kV Dimapur (PGCIL) Substation- [Since Aug'11]:

During 64th OCC Meeting held on 09.08.2011, POWERGRID had informed that since completion of LILO of 132kV Dimapur (DoP) – Kohima LILO 132kV line at 220/132kV substation at Dimapur (PG) on 23rd March 2011, there were as many as 30 nos. of tripping in 132kV Dimapur (PG) – Kohima Line. Such frequent tripping caused failure of 132kV GIS CB (for Kohima Bay) resulting outage of the line. Accordingly, POWERGRID requested DoP, Nagaland to take necessary action to reduce the frequent tripping of the line and Nagaland agreed to look into the matter. Since then, DoP, Nagaland has bypassed the LILO arrangement by placing jumper to have direct connectivity between Dimapur (DoP) and Kohima.

During 65th OCC Meeting held on 09.09.2011 POWERGRID had informed about the restoration of 132kV GIS CB of Kohima Bay and the sub-Committee had also decided that POWERGRID should take shutdown to complete LILO work at 220/132 kV Dimapur(PG) substation after restoration of 132 KV Karong – Kohima line.

Since then the issue has been discussed in OCC forum number of times, but till now, DoP, Nagaland has not given consent for restoration of LILO.

For over all benefit of the region, vide NERPC letter No. NERPC/OP/OCC/2012/6670-73 dt 14/12/2012 has requested concerned states to take early necessary action to bring back above into service.

Concern constituents may kindly intimate the current status.

ITEM NO. B.6	Pollution Mapping for North Eastern Region:

In order to facilitate cost effective selection of insulators for transmission lines and minimizing the trippings of transmission lines due to insulator flash over, it is essential to have knowledge of the pollution severities. Inquiry Committee on Grid Disturbance in Northern Region on 2nd Jan' 2010, recommended POWERGRID to complete pollution mapping in association with CPRI. Transmission corridors of region are adversely affected due to heavy pollutants emitted by Industries / Costal Pollutants in the region. Proper mapping is necessary to develop a pollution profile of the region.

Pollution mapping of the region is proposed to be executed in association with CPRI using approach similar to the one adopted in Northern region.

- CPRI & POWERGRID shall provide training (including hands on training) to the associated engineers of POWERGRID & constituents (State Utilities) at suitable locations in the region and suggest the Guidelines/Procedures.

- Dummy insulator to be arranged & installed by POWERGRID and STUs on their transmission lines. Measurements shall be carried out three (03) times representing three seasons per year and shall repeat the same for next year also. (i.e. total 6 samples for two years)

- Initial samples shall be installed & measurement of Equivalent Salt Deposited Density (ESDD) & Non Soluble Deposited Density (NSDD) to be done under the supervision of CPRI. Subsequent measurements shall be carried out by officials of constituents.

- Chemical Analysis of selected samples shall be carried out by CPRI. The CPRI shall analyze the measurements / results of test carried out at site & laboratory and determine the pollution levels. Pollution map shall be produced on geographical map of region.

Funding:

- Expenditure on pollution mapping is to be reimbursed to POWERGRID directly from the beneficiaries as one time reimbursement. **Expected expenditure for the program is INR 3 Crores**

The above methodology & funding mechanism for Pollution Mapping Program is similar to the one adopted for Northern Region and in line with the decision taken in 22nd NRPC & 66th OCC meeting.

In the Special TCC meeting held at Shillong on February 9, 2013, it was highlighted that the pollution level in different areas is generally classified into four categories depending on level of pollution like low, medium, heavy and very heavy. Depending upon the severity of pollution, the creepage distance requirement of insulators, which depends on level of pollution, is decided for substations or transmission lines at the design stage. The pollution level is likely to increase with industrial growth. The Cement industries, smokes from brick kilns etc. causes problem for existing / new transmission lines and substations. The insulators with higher creepage distance or polymer insulators are generally used in such highly polluted areas. It is essential to know the level pollution in different areas and hence, like NR, pollution mapping of NER, in association with CPRI, is also desirable.

After detail discussion, the committee had requested POWERGRID to bear the burden of one time expenditure of about Rs. 3 crores for NER. POWERGRID had agreed to revert back on this matter.

The Committee may like to discuss.

ITEM NO. B.7	**Requisition based scheduling:**

Requisition based scheduling is being practiced in all other regions. Therefore, the implementation of Requisition based scheduling was deliberated in OCC and CC forums. NERLDC had given presentations on requisition based scheduling in both forum. During the presentation, the format in which requisitions of demand on daily basis (block-wise for 96 blocks and for each station) should be submitted was explained. The importance of minimum technical limit, ramp rate of machine, dead band of hydro machines etc. were also explained to the constituents. Other issues were also discussed. In case of revisions in generation/DC from the generating stations, constituents have also to revise their requisition accordingly. Revision in requisition from hydro stations should be avoided as it will affect 4th day schedule. On the issue of revision by ISGS, full or curtailed requisition initially submitted by the constituents would be considered for subsequent revisions also**.** It has been decided that in case of non-submission of requisition by any constituent due to unavoidable reasons, full share of that constituent may be considered for preparation of schedule.

After detail deliberation in OCC forum, for the benefit of constituents, the mock exercise was started from 22-07-2013 as a preparation for implementation of requisition based scheduling and the Sub-committee has decided to implement the requisition based scheduling w.e.f 27.08.2013 (based on requisition submitted by the constituents on 26-

08-2013). The constituents have been requested to submit the data on daily basis to NERLDC till 25-08-2013, which will be treated as mock exercise to familiarize the constituent states before implementation on 27-08-2013. NERLDC was also requested to intimate the constituent state(s), if any discrepancy is observed in the submission of requisition so that they can rectify their mistakes during the period of mock exercise.

Similarly, generating stations was requested to submit their minimum technical requirement, ramp up rate of machine, dead band of hydro machines etc. to NERLDC so that the new system is implemented successfully.

NERLDC apprehends teething problems in initial period of implementation of the scheme. The Sub-committee has requested the constituents to provide full co-operation and support to NERLDC for successful implementation.

The Committee may like to discuss.

ITEM NO. B.8	**Reactive Power Planning:**

After deliberation in last NPC meeting held on July 16, 2013 at New Delhi, it has been decided that all states would carry out reactive power planning not only at transmission level but also at distribution level and prepare schemes to maintain voltage profile as per relevant regulations / standards. These schemes would be forwarded by the states to the Power system wing of CEA under intimation to NPC secretariat at the earliest. Further, execution of approved schemes would be taken up by the states without waiting for the funds from PSDF.

The Committee may like to discuss.

ITEM NO. B.9	**Ring fencing of Load Despatch Centres (LDCs):**

The status of implementation of recommendations of Pradhan Committee for ring fencing of SLDCs (i.e. functional autonomy and incentive schemes etc.) is to be intimated to NPC secretariat every month.

The Committee may like to discuss.

ITEM NO. B.10	Implementation of CEA Regulations:

In last NPC meeting, it was decided that all power utilities will be sensitized on CEA's regulations through workshops in regional forum. After completion of awareness phase, the violations of CEA regulations could be discussed & minuted in RPC meetings and persistent violations could be reported to CERC by CEA/RPC.

The Committee may like to discuss.

ITEM NO. B.11	Inclusion of NLDC as a member in NPC forum:

The first meeting for formation of forum of Regional Power Committee (RPCs) was held on 26-09-2011 at CEA, New Delhi. During the meeting it was unanimously decided that Hon'ble Minister of Power,Meghalaya, Sh. A.T. Mondal to be the first Chairman of NPC, a national body of RPCs. He had advised that forum may initially start as an advisory body and later MoP may be approached to give it a statutory status through amendment of IE Act 2003. The draft constitution and conduct of business rules was framed. Subsequently NPC was established vide Ministry of Power's order dated 25th March 2013. The first meeting of National Power Committee (NPC) was held on 15th April 2013 under the chairmanship of Chairperson, CEA at CEA, New Delhi.

At present the composition of National Power Committee (NPC) is as follows:

1	Chairperson, CEA	Chairperson, NPC
2	Member (GO&D), CEA	Member
3	Chairperson of each of NRPC, WRPC, ERPC, and SRPC	Member
4	Representative of Chairperson of NERPC	Member
5	TCC chairperson of each RPC (NRPC, WRPC, ERPC, SRPC and NERPC)	Member
6	Member secretary of (NRPC, WRPC, ERPC, SRPC and NERPC)	Member
7	Chief Engineer (GO&D), CEA	Member Secretary, NPC

In last NPC meeting, Chairperson NPC & CEA has advised RPCs to consult the constituents regarding inclusion of NLDC as a member in NPC.

The Committee may like to discuss.

ITEM NO. B.12	Reporting Procedure in case of reportable event (as per definition of IEGC)

NERLDC has requested SLDC, ISGS & ISTS licensees for submission of report of reportable events as per clause no 4.6.3 and 5.9.6 of IEGC and clause no 12.1 and 15.3 of Grid Standards.

As per 5.2.r of IEGC, information/data of reportable event including disturbance recorder/sequential event recorder output to be sent to RLDC within 24 hours. In absence
of such details, objective analysis of the tripping/event could not be done. Analysis of tripping/events is essential for improvement of reliability and security of the grid as well as for regulatory compliance/reporting.

TCC Members may please ensure for submission of above information within specific time for further analysis/corrective measures.

ITEM NO. B.13	Reliable Voice/data communication

Many Telemetry Data/Voice communication links provided under the NEULDC scheme is not operational due to lack of maintenance and other issues. Then It may be noted that the infrastructure of SLDCs for the state of Manipur, Mizoram, Nagaland and Arunachal Pradesh are now almost nonexistent and need to be augmented at the earliest in view of the fast changing scenario in the Power sector. The matter was discussed in OCC/ UCC but there is no tangible improvement specially in the State sector.

Further new ISGSs namely Monarchak, Pare [of NEEPCO] and BTPS [of NTPC] are likely to be commissioned within the next one year with Monarchak likekly to be commissioned within the next 2-3 months. The telemetry, voice communication in addition to other requirements of the IEGC have to be in place before synchronization of the units.

TCC members may please discuss and arrive at a solution so that 100% data are available at SLDCs/RLDC and all important Power stations/Sub stations are covered by dedicated voice links for smooth running of NER Grid.

ITEM NO. B.14	Metering in ISTS – need of timely action by all Entities as per Regulations

IEGC 6.4.21 & 6.4.21:

As per IEGC 6.4.21, the CTU shall install special energy meters on all inter connections between the regional entities and other identified points for recording of actual net

MWh interchanges and MVArh drawals. The installation, operation and maintenance of special energy meters shall be in accordance with Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.

All concerned entities (in whose premises the special energy meters are installed) shall take weekly meter readings and transmit them to the RLDC by Tuesday noon The SLDC must ensure that the meter data from all installations within their control area are transmitted to the RLDC within the above schedule.

As per IEGC 6.4.22, **the RLDC shall be responsible for computation of actual net injection / drawal** of concerned regional entities, 15 minute-wise, based on the above meter readings.

CEA Metering Regulations (6), (15) & (18) :

Regulation (6). Ownership of meters. - (1) Interface meters

(a) All interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing **shall be owned by CTU**.

Regulation (15). Meter failure or discrepancies. - (1) **Interface meters**

(d) Billing for the Failure period:
(ii) Readings recorded by Main, Check and Standby meters for every time slot shall be analysed, crosschecked and validated by the Appropriate Load Despatch Centre (LDC). **The discrepancies, if any, noticed in the readings shall be informed by the LDC in writing to the energy accounting agency for proper accounting of energy. LDC shall also intimate the discrepancies to the Appropriate Transmission Utility or the licensee,** who shall take further necessary action regarding testing, calibration or replacement of the faulty meters in accordance with the provisions laid down.

Regulation (18). Calibration and periodical testing of meters. –

(1) **Interface meter**

(a) At the time of commissioning, each interface meter shall be tested by the owner at site for accuracy using standard reference meter of better accuracy class than the meter under test.

(b) **All interface meters shall be tested at least once in five years.**

Due to lapse in the part of different entities, Meter data processing, computation and issuance of Accounts are delayed on many occasions.

As discussed in CCM, OCC, all are requested to submit names of nodal officers with mobile numbers. Also, all entities may carry out responsibilities in line with Regulations.

ITEM NO. B.15	Construction of Transmission Line from Surjamaninagar to Silchar via P.K. Bari by POWERGRID:

Three (3) Nos. of 400 KV D/C line within and across the state of Tripura is constructed by PGCIL for evacuation of power from 726 MW Combined Cycle Gas Based Power Plant (CCGBPP) of OTPC at Palatana.

These are:

a. 400 KV D/C line from Pallatana – Silchar- Byrnihat – Bongaigoan

b. 400 KV D/C line from Pallatana to Surjamaninagar (charged at 132 KV)

c. 400 KV D/C line from Silchar to P.K. Bari (to be charged at 132 KV)

Evacuation of power from Pallatana project to NER Grid is solely dependent on 400 KV D/C line from Pallatana to Bongaigoan via Silchar & Byrnihat line. This line passes through deep forest area as well as hilly terrain of high wind zone. Further, the area is also prone to storm & cyclone. As a result the reliability of above line comes under threat particularly during monsoon makiking the evacuation of power from this project vulnerable. Therefore, a reliable, alternative transmission system with higer capability is required to ensure evacuation of power from Pallatana project. Further, the concept of TTC and ATC has called for requirement of capacity augmentation of Pallatana Transmission System.

Since 2 nos. of 400 KV D/C line i.e. Silchar to P.K. Bari & Pallatana to Surjamaninagar are being constructed by PGCIL, the left out middle portion of about 130 KM line from P.K. Bari to Surjamaninagar is essentially required to be constructed by PGCIL for enhancing the transmission capability and reliability of grid connectivity from Pallatana project.

However, in the minutes of the meeting held at Guwahati on 30-10-2012 to review the inter-state works of Comprehensive Scheme for Strengthening of Transmission System in NER & Sikkim, following recordings has been made regarding construction of **Surajmaninagar-P. K. Bari 400 kV D/C line**

Director (SP&PA), CEA informed that the Surjamaninagar- P. K. Bari 400 kV D/C line (initially op. at 132 kV) was agreed as a part of evacuation system from Monarchak GBPP (NEEPCO) in the standing committee meeting on Power System Planning in NER held on 25-06-2008 to be implemented by TSECL. Subsequently, TSECL has included this line in the scope of works for Comprehensive Scheme for Strengthening of Transmission & Distribution System in NER & Sikkim for the state of Tripura, the DPR for which had been prepared by POWERGRID. The issue of implementation of this line was also discussed with Secretary (Power), Government of Tripura on 14th March, 2012 in his chamber when a team of CEA and POWERGRID visited Tripura to prioritize the scope of works to be covered under tranche-I of the proposed World Bank assistance.

It was decided to consider the implementation of this line under tranche-II /

tranche- III of the World Bank assistance depending upon priority of Tripura. In view of the above, it was agreed that the Surjamaninagar- P. K. Bari 400 kV D/C line (initially op. at 132 kV) along with 400 kV P. K. Bari sub-station may be implemented as an intra-state system.

Tripura informed that World Bank funding is not firm up at present

The Committee may like to discuss.

ITEM NO. B.16	Full Utilization of Surplus Power during Hydro Season:

Tripura informed that firm entitlement of power is not shown in day ahead by hydro generators but schedule is released on the day of operation with much variation. As a result there is wider mismatch between actual drawal and drawal schedule. The surplus power is forced to sale through UI and frequency remained at 50.2 Hz and above, resulting UI price in most of the time during monsoon. Had there been proper planning of entitlement known on day ahead, the state utility could have properly arrange for either bilateral sale or through exchange. The states are heavily burden with higher energy charge in addition to capacity charge of generating stations, but enable to earn corresponding revenue. Due to such improper utilization of energy revenue earning by state utility, payment on account of power purchase liability is becoming uncertain.

The Committee may like to discuss.

ITEM NO. B.17	Application of congestion charge in the Inter and Intra congestion points:

It has been observed from the past experience that during the high hydro season on one side the availability of power is found to be sufficient to meet the demand but on the other hand due to fault in the sub-sub-transmission network caused by the thunder storm and torrential rain the demand of the region crash to a substantial level resulting in surplus availability of power which in general has a tendency to flow to the other region through the only existing NER-ER corridor.

As per the recent regulation issued by CERC, for any violation of Import/Export of power over and above the ATC limit the congestion charge is to be applied. In this regard it is to be mentioned that unlike other regions as the corridor connectivity is mainly through 400 KV DC between ER and NER, any deviation beyond ATC is going to have a direct impact on the congestion charge which would have been averted had there been a multiple connectivity between these two regions. So a fresh look in this matter may be given to save the NE states from paying the very high unnecessary congestion charges.

The Committee may like to discuss.

ITEM NO. B.18	NER Strengthening Scheme – II:

In a meeting of NER constituents, held at Guwahati on 30-10-2012 to review the inter-state transmission works, the following **scope of works for inter-state transmission system** was decided and the scheme was named as "System Strengthening Scheme in NER-II (NERSS-II)".

(i) 2nd 400/220 kV, 315 MVA transformer at Balipara (PG)
(ii) LILO of 2nd ckt. of Silchar - Bongaigaon 400 kV D/c line at Byrnihat (Meghalaya)
(iii) Biswanath Charialli - Itanagar (Ar. Pradesh) 132 kV D/c line (Zebra conductor)
(iv) Silchar - Misa 400 kV D/c (Quad) line
(v) Replacement of existing 132/33kV, 2x10MVA ICT at Nirjuli by 2x50MVA ICT
(vi) Ranganadi HEP-Nirjuli (PG) 132kV D/c line with LILO of one ckt. at Itanagar (Ar. Pradesh)
(vii) Imphal (PG) - New Kohima (Nagaland) 400kV D/c line (to be initially operated at132kV)

The above transmission system was taken for discussion by the Empowered Committee of Govt. of India. The Empowered Committee has decided that out of above, 1st and 5th elements are exempted from Tariff Based Competitive Bidding (TBCB) as they are basically augmentation / renovation works of the existing sub-stations. Therefore, 1st & 5th element may be implemented by POWERGRID. The balance scope of works given below is to be implemented through TBCB:

(i) LILO of 2nd ckt. of Silchar - Bongaigaon 400 kV D/c line at Byrnihat (Meghalaya)
Biswanath Charialli - Ilanagar (Ar. Pradesh) 132 kV D/c line (Zebra conductor)
(ii) Silchar - Misa 400 kV D/c (Quad) line
(iii) Ranganadi HEP-Nirjuli (PG) 132kV D/c line with LILO of one ckt. at Itanagar (Ar. Pradesh)
(iv) Imphal (PG) - New Kohima (Nagaland) 400kV D/c line (to be initially operated at132kV)

Further, the Empowered Committee also decided that line bays for termination of these transmission lines shall also be implemented by POWERGRID.

Accordingly, following scope of works is to be implemented by POWERGRID:

- 2nd 400/220 kV, 315 MVA ICT at Balipara substation of POWERGRID

- Replacement of existing 132/33 kV, 2X10 MVA ICT by 132/33 kV, 2X50 MVA ICT at Nirjuli sub-station of POWERGRID

- 2 Nos 400 kV GIS Line bays at Byrnihat sub-station of (Me. PTCL) for termination of LILO of 2nd ckt of Silchar – Bongaigaon 400 kV D/c line at Byrnihat

- Installation of 50 MVAR fixed line reactor at Byrnihat end of Silchar – Byrnihat 2nd 400 kV circuit

- Installation of 63 MVAR bus reactor (2nd) at Byrnihat.

- 2 Nos 132 kV Line bays at Biswanath Chariali sub-station of POWERGRID for termination of Biswanath Chariali – Itanagar (Ar. Pradesh) 132 kV D/c line (Zebra Conductor)

- 4 Nos 132 kV Line bays at Itanagar sub-station of Govt. of Arunachal Pradesh

[2 Nos for termination of of Biswanath Chariyali – Itanagar (Ar. Pradesh) 132 kV D/c line (Zebra Conductor) and

2 Nos for termination of LILO of Ranganadi HEP – Nirjuli (PG) 132 kV D/c line at Itanagar (Ar. Pradesh)]

- 2 Nos 400 kV GIS Line bays at Silchar substation of POWERGRID for termination of Silchar – Misa 400 kV D/c line

- 2 Nos 400 kV GIS Line bays at Misa substation of POWERGRID for termination of Silchar – Misa 400 kV D/c line.

- 2 Nos 80 MVAR Switchable Line Reactors at Misa end of Silchar – Misa 400 kV D/c line. (one on each ckt)

- Installation of 80 MVAR bus reactor at Misa

- 2 Nos 132 kV Line bays at Nirjuli sub-station of POWERGRID for termination of Ranganadi HEP - Nirjuli (PG) 132 kV D/c line (corresponding bays at Ranganadi HEP are under the scope of NEEPCO)

- 2 Nos 132 kV Line bays at Imphal sub-station of POWERGRID for termination of Imphal (PG) – New Kohima (Nagaland) 400 kV D/c line (initially charged at 132 kV)

- 2 Nos 132 kV Line bays at New Kohima sub-station of Govt. of Nagaland for termination of Imphal (PG) – New Kohima (Nagaland) 400 kV D/c line (initially charged at 132 kV).

- In view of space constraint, the bays at Misa and Silchar would be implemented as GIS bays.

The process of implementation of the transmission system would be initiated after receipt of confirmation regarding space availability from respective utility / department. POWERGRID vide letter dated 21-03-2013 requested Meghalaya, Nagaland and Arunachal Pradesh to confirm the availability of space at their respective sub-stations for the following:

- Me.ECL to confirm the availability of space for following at its Byrnihat sub-station for:

➢ 2 Nos 400 kV line bays at its Byrnihat sub-station for termination of LILO of 2nd ckt of Silchar – Bongaigaon 400 kV D/c line at Byrnihat

- Space for installation of 50 MVAR fixed line reactor at Byrnihat end of Silchar – Byrnihat 2nd 400 kV circuit

- Space for installation of 63 MVAR bus reactor (2nd) at Byrnihat

- Dept. of Power, Nagaland to confirm the availability of space for 2 Nos 132 kV Line bays at New Kohima S/s of Govt. of Nagaland for termination of Imphal (PG) – New Kohima (Nagaland) 400 kV D/c line (initially charged at 132 kV).

- Dept. of Power, Arunachal Pradesh to confirm the availability of space for 4 Nos 132 kV Line bays at Itanagar substation of Govt. of Arunachal Pradesh

- 2 Nos for termination of of Biswanath Chariyali – Itanagar (Ar. Pradesh) 132 kV D/c line (Zebra Conductor).

- 2 Nos for termination of LILO of Ranganadi HEP – Nirjuli (PG) 132 kV D/c line at Itanagar (Ar. Pradesh)

Meghalaya, Nagaland and Arunachal Pradesh are requested to confirm the availability of space at their respective sub-stations for the above mentioned scope of works to be implemented by POWERGRID.

Further, NEEPCO is also requested to take necessary actions to construct 2 Nos of 132 kV line bays at Ranganadi HEP switchyard matching with the commissioning of Ranganadi HEP – Nirjuli (PG) 132 kV D/c line and confirm the same.

Members may like to discuss and approve.

ITEM NO. B.19	**Modification in scope of Pallatana – Bongaigoan Transmission System (For delivery of Power to Mizoram):**

Following transmission system was planned for delivery of power from Pallatana & Bongaigaon generation projects to the state of Mizoram:

- 7x10MVA, 132/33kV New substation at Melriat New (upgradable to 400kV)
- Silchar – Melriat (New) 400kV D/c line (charged at 132kV)
- Melriat (New) – Melriat(Mizoram) interconnecting 132kV D/c line

Subsequently, on request of Power & Electricity Department, Govt. of Mizoram and advice of Central Electricity Authority, following modification have been done:

- Melriat (POWERGRID) – Sihhmui (Mizoram) 132kV D/c line instead of Melriat (POWERGRID) – Melriat (Mizoram) 132kV D/c line
- Deletion of 2x50MVA, 132/33 kV transformer at Melriat (PG) sub-station
- LILO of one circuit of Aizawl (POWERGRID) – Zemabawk (Mizoram) 132kV D/c line at Melriat (POWERGRID). [Note : 2 nos. 132kV transformer bays to be utilized for termination of the above LILO lines]

The above modifications have been agreed in the 3rd Standing Committee Meeting on Power System Planning of North Eastern Region held on 21st December, 2011 at NRPC, Delhi.

Members may like to discuss and approve.

ITEM NO. B.20	**Tuirial Transmission System:**

Following transmission system for evacuation of power from the Tuirial HEP (60 MW) was decided in the 3rd Meeting of Standing Committee on Power System Planning of North Eastern Region held on 21st Dec., 2011 held at NRPC, New Delhi:

- Tuirial HEP - Kolasib 132 kV S/c line (to be implemented by P&E Deptt., Govt. of Mizoram)

- LILO of Jiribam - Aizawl 132 kV S/c line at Tuirial HEP (to be implemented by POWERGRID)

In the meeting of Standing Committee, NEEPCO informed that though the Government of Mizoram has agreed to buy entire ex-bus power from the project, this being an inter-state project, its allocation would be decided by Ministry of Power. Subsequently, CEA vide its letter dated 10-04-2013 revised the transmission system and the revised transmission system is as given below:

- Tuirial HEP-Kolasib 132 kV SIC line (existing, implemented by P&E Deptt., Govt. of Mizoram)

- Tuirial HEP-Sihhmui 132 kV D/C (to be implemented by NEEPCO / P&E Deptt., Govt. of Mizoram)

But Govt. of Mizoram has not agreed for change in scope of work to include Tuirial HEP-Sihhmui 132 kV D/C line (to be implemented by NEEPCO / P&E Deptt., Govt. of Mizoram) which was communicated to Hon'ble Union Minister of Power, Govt. of India. vide D.O letter No. F 23015/26/2009-RC dt. 29/4/2013. The matter was referred to CEA. CEA (vide letter No. 82/6/2013-SP&PA/ dt19/7/2013) has communicated that if MoP, Govt. of India gives direction that Tuirial Project be considered as a regional project and its allocation would be decided by MoP, Govt. of India, then implementation of LILO of Jiribam-Aizawl 132 kV S/C line at Tuirial HEP can be taken up by Powergrid.

Members may like to discuss and approve.

ITEM NO. B.21	**Proposal for Study Tour – NERPC**

As approved during the 12th NERPC meeting, the study tour to Australia for the first batch of 10 delegates from constituent states of the region was conducted from 18.11.2012 to 25.11.2012.

A tentative proposal for study tour for 2nd batch of 19 participants is place below for discussion.

Sl. No.	Name of State / Organisation	Maximum number of participants	Duration and Place of visit
1	Ar. Pradesh	2	For a duration of about one week and place of visit could be China
2	Assam	4	
3	Manipur	2	
4	Meghalaya	2	
5	Mizoram	2	
6	Nagaland	2	
7	Tripura	2	
8	NERPC	2 (Only Executive Engineers)	
9	NRLDC	2	
	Total	20	

However, the number of participants, duration of program and place will be finalized based on the availability of fund in the Reactive Pool Account. The nomination should reach NERPC by October 15, 2013 and it should be ensured that the nominated person have not availed such tour to abroad from the Reactive pool fund of NER to give opportunity to others. The list of participants would be forwarded to tour operator to take further action to organize the tour. M/s Aviana Travles from Kolkata, who was associated with the study tour for first batch, may be engaged for organising the tour for the second batch also. The processing of visa shall also be done by the tour operator.

Members may like to discuss and finalize the program so that NERPC can take further action for study tour of second batch.

PART C COMMERCIAL ISSUES

ITEM NO. C.1	**Procurement of SEM/DCD for 2013-2014**

NERLDC has worked out requirement of SEM/DCD for 2013-14 which is attached at **Annexure- C.1**

Members may like to discuss and approve.

ITEM NO. C.2	**Signing of Transmission Service Agreement -PGCIL**

The TSA has already been signed by NEEPCO, Mizoram, Arunachal, Manipur, Meghalaya and Nagaland.

During 13th NERPC Meeting, Assam intimated that the matter was under process and they would sign the TSA within two months i.e., within Sept'12. Further Tripura also

agreed to sign the TSA. But till now, Assam and Tripura both have not signed the TSA which is mandatory as per CERC norms.

During the 87th OCC meeting, representatives from Assam and Tripura informed that the matter has been taken up with Competent Authorities and they have agreed to sign the TSA. The matter was also discussed in 20th CC meeting. The sub-committee requested POWERGRID to contact the concerned person of Assam & Tripura for signing of the TSA.

During the 88th OCC meeting, Assam informed that they have taken up the matter with SERC to revise their tariff before signing the agreement. Unless SERC gives their concurrence to their proposal, it would be difficult for them as the burden has to pass on to their consumers. However, Assam will pursue the matter with SERC and agreement will be signed immediately once they get the concurrence.

POWERGRID may intimate the current status.

ITEM NO. C.3	**Signing of Zero date for Indemnification Agreement - PGCIL**

The Kameng HEP (4x150 MW) is being implemented by NEEPCO. The original schedule of commissioning of Kameng HEP was Nov.'09, which was subsequently revised to Dec'12. POWERGRID had undertaken construction of transmission line for evacuation of Power from the above project. In Oct'11, NEEPCO has again revised its commissioning schedule to June'16. The implementation work of associated transmission system was slowed down to the maximum extent possible & is now likely to be completed by Mar'14.

The Lower Subansiri HEP (8x250 MW) is being implemented by NHPC. The original Sch. of commissioning of Lower Subansiri HEP was Dec'11, which subsequently revised to Mar'12 / Dec'12 / Mar'13 / Dec'13. The implementation work of associated transmission system being constructed by POWERGRID was slowed down to maximum extent possible & is now likely to be completed by Dec'13. After various meeting, NHPC agreed for Dec'13 as zero date, but signing of Indemnification Agreement is still pending.

NEEPCO & NHPC have yet to sign zero date for Indemnification Agreement despite regular follow-up by POWERGRID.

NEEPCO and NHPC are requested to expedite signing of Indemnification Agreement.

ITEM NO. C.4	**Signing of Power Purchase Agreement (PPA) in respect of Subansiri Lower HE Project (2000MW) in Ar. Pradesh**

Signing of PPA in respect of Subansiri Lower HEP (2000MW) in Ar. Pradesh has been pending since long in spite of regular follow up. Department of Power, Govt. of

Arunachal Pradesh has given consent for signing of the said Power Purchase Agreement (PPA) vide their letter dated 22-05-2013 but same has been withdrawn vide their letter dated 05-06-2013.

Ar. Pradesh may kindly intimate the status of signing of PPA.

ITEM NO. C.5	**Signing of BPSA in respect of Loktak Power Station:**

Signing of BPSA in respect of Loktak Power Station is pending with Dept. of Power, Govt. of Ar. Pradesh, P&E Department of Govt. of Mizoram and APDCL (Assam) in spite of regular follow up. In the 19th & 20th CCM, beneficiaries had assured that these BPSA will be signed on priority but no significant development took place.

During 88th OCC meeting, Assam informed that they have taken up the matter with SERC to revise their tariff before signing the agreement. Unless SERC gives their concurrence to their proposal, it would be difficult for them as the burden has to pass on to their consumers. However, Assam had assured to pursue the matter with SERC and agreement will be signed immediately once they get the concurrence.

Assam, Mizoram & Ar. Pradesh may kindly intimate the status.

ITEM NO. C.6	**Pending Power Purchase Agreement with APDCL:**

The issue of executing fresh Power Purchase Agreements (PPAs) with Assam Power distribution Co. Ltd (APDCL) for all the Power stations in operation was initiated by NEEPCO vide its letter dated 16.08.2004. In response to the APDCL letter no. ASEB/COM/NEEPCO/KHEP/2008/45 dated 19.01.2011, NEEPCO forwarded 07(seven) no. draft PPAs to the APDCL for its 07 (seven) no. Power stations in operation vide letter no. NEEPCO/ED/COMML/R-9/2011-12/3859 dated 01.02.2012. Since then, a series of communications have been made by NEEPCO to the APDCL for execution of the said PPAs.

During 88th OCC meeting, Assam informed that they have taken up the matter with SERC to revise their tariff before signing the agreement. Unless SERC gives their concurrence to their proposal, it would be difficult for them as the burden has to pass on to their consumers. However, Assam had assured to pursue the matter with SERC and agreement will be signed immediately once they get the concurrence.

Though a very long period has already been elapsed since initiation of the matter relating to execution of fresh PPAs, no positive response/communication has been received by NEEPCO from APDCL till date.

Considering urgency of the matter in light of present rules & regulations, the same is placed for deliberation.

ITEM NO. C.7	Huge Outstanding dues Receivable by NEEPCO from Me. ECL:

M/s Me.ECL is drawing electricity from the Power Stations of NEEPCO in operation in proportion to their share allocations.

As per records, total dues receivable from Me.ECL as on 21.07.2013 is ₹241.53 Crores (excluding Late Payment Surcharge). Of the aforesaid huge outstanding amount payable by M/s Me.ECL to NEEPCO, dues more than 90 (ninety) days old is ₹ 210.95 Crores and that more than 60 (sixty) days old is ₹ 223.93 Crores.

Since the financial year 2010-11, M/s Me.ECL is failing continuously to liquidate even their regular monthly bills. In addition to fast growing of Me.ECL outstanding amount due to non-payment of regular bills, the dues has triggered an alarming figure after serving of arrear bills on account of revision of Annual Fixed Charges (AFC) of the NEEPCO's Power stations for the tariff period 2009-14 by the Central Commission.

Apart from repeated request/persuasion with Me.ECL to settle their dues, the following further actions have been initiated by NEEPCO:

- Regulation of Power Supply to Me.ECL
- Filing petition before the Central Electricity Regulatory Commission (CERC) for recovery of dues.
- Drawal of Minutes dated 12.11.2012 with Me.ECL for settlement of outstanding dues in twenty four installments along-with payment of regular bills.

But Me.ECL has not taken any follow up action in view of above steps taken by NEEPCO and the outstanding due of Me.ECL is increasing very fast. In fact, during the financial year 2012-13, only a lumpsum amount of ₹ 50.00 (Fifty) Crores has been paid by Me.ECL to NEEPCO.

The above is for deliberation among the members with a request for seeking an action plan from Me.ECL for liquidation of the said outstanding amount as NEEPCO cannot run its power stations efficiently pending such a huge amount which may lead to hamper NEEPCO for providing service to all beneficiaries including Me.ECL.

ITEM NO. C.8	Outstanding Dues of POWERGRID against NER Constituents – PGCIL

The current total outstanding of POWERGRID's NER beneficiaries (as on 30.06.2013) is as under:

Amount is in Rs. Crores

SN	Beneficiary	Outstanding dues (>60 days) (PoC+ Non PoC Bills)	Total Outstanding
1	Arunachal Pradesh	0.10	0.32
2	ASEB (Assam)	0.00	7.20
3	Manipur	0.66	3.94
4	MeECL (Meghalaya)	7.76	16.94
5	Mizoram	0.17	3.28
6	Nagaland	0.00	0.31
7	TSECL (Tripura)	0.14	1.05
	Total	***8.83***	***33.04***

The total outstanding as on 30.06.2013 is Rs. 33.04 Crore, out of which, same beyond 60 days is Rs. 8.83 crore. Constituents are requested to clear at least the outstanding dues over 60 days, at the earliest. To encourage timely payment, POWERGRID has an attractive rebate policy in place. As per existing rebate policy, the payments made upto 55 days from the date of billing is entitled for graded rebate depending upon the date of payment. All constituents are requested to avail advantage of the attractive rebate policy and make payments in time.

ITEM NO. C.9	**UI Outstanding**

The Status of latest UI outstanding payable to pool is as below:

Mizoram : 3.8 Crores
Assam : 13.4 Crores
Manipur : 1.2 Crores

Payment default is creating constraint in timely settlement of UI.

ITEM NO. C.10	**Non-payment of NERLDC fees and charges Bills:**

In Terms of the CERC (fees and charges of RLDC and other related matters) Regulation, 2009 notified by CERC vide dated 18th September' 2009, CERC has approved fees and charges of RLDCs and NLDCs for the control period 2009-14.

After issuance of orders, NERLDC is raising the bills on monthly basis on the 1st working day of every month as per the Fees and Charges Regulation. The status of latest outstanding is as below:

Manipur	**37.9 Lacs**
Meghalaya	**48.3 Lacs**
Mizoram	**23.6 Lacs**

ITEM NO. C.11	**Outstanding Dues of NHPC against NER Constituents for more than 60 Days:**

Me.ECL, Meghalaya: An amount of Rs.5.03 Crs including surcharge is outstanding for more than 60 days on account of energy supplied from Loktak Power Station. While deferring regulation of power supply, Me.ECL, Meghalaya had agreed to pay Rs.1.44 Crs per month starting from the month of March, 2013 in addition to payment of current bills.

APDCL, Assam: An amount of Rs. 4.10 Crs including surcharge is outstanding for more than 60 days on account of energy supplied from Loktak Power Station. Assam had requested for waival of surcharge. NHPC has already replied their letter clarifying that surcharge has been levied as per CERC regulations, BPSA & TPA, hence, can not be waived off.
The matter of outstanding dues was discussed in 20th CC sub-committee meeting. But no action has been taken so far.

TCC members are requested to ensure that the outstanding dues are liquidated at the earliest.

ITEM NO. C.12	**Opening / Maintaining of Letter of Credit (LC) - NHPC**

Mizoram: P&E Dept. Govt. of Mizoram has not furnished any Letter of Credit of requisite amount of Rs. 56 Lakhs in spite of regular follow up. The existing LC has already expired on 25.03.2013. During 20th CC sub-committee meeting held on 21-06-2013 at Guwahati, Mizoram had assured to furnish LC by end of July 2013.

Ar. Pradesh: Dept. of Power, Govt. of Ar. Pradesh has furnished Letter of Credit of only for Rs. 33.50 Lakhs against requisite amount of Rs. 58 Lakhs.

Me.ECL, Meghalaya: - Me.ECL has not furnished Letter of Credit of requisite amount of Rs.1.47 Crs in spite of our regular follow up. The existing LC has already expired on 31.07.2013.

APDCL, Assam: - APDCL has not furnished Letter of Credit of requisite amount in spite of our regular follow up. As on date LCs amounting to Rs. 1.90 Crs is available with NHPC Limited against requisite amount of Rs. 3.41 Crs. The balance amount of LC which was required to be renewed by 30.06.2013 has not been renewed so far.

ITEM NO. C.13	Status of LC Requirement against PoC Billing as per BCD Procedure of CERC Order No.L-1/44/2010-CERC, dt. 29.04.11 – PGCIL

The LC requirement and status of LC as on date (12.06.2013) of NER Beneficiaries is as under:

The Amount is in Rs. Lakhs

SN	Beneficiary	Av. first bill amount for the month of (Apr'12-March,13)	LC required (Avg. first bill amount X MF 1.05)	LC AVAI LABLE	VALIDITY UPTO	Balance to be enhanced and renewed annually
1	Arunachal Pradesh	204.00	214.20	252.00	31.03.14	
2	ASEB (Assam)	1283.00	1347.15	1348.00	14.01.14	
3	Manipur	194.00	203.70	213.13	31.03.14	
4	Me.ECL	328.00	344.40	250.00	10.12.10	94.40
5	Mizoram	134.00	140.70	132.61	04.05.13	8.09
6	Nagaland	183.00	192.15	192.15	21.03.14	
7	Tripura	156.00	163.80	183.00	14.02.14	

ITEM NO. C.14	Opening of LC against UI charges liability:

As per CERC Unscheduled Interchange charges and matters (Amendment) Regulations, NERLDC issued letters to all defaulter Regional entities who had at any time during the previous financial year (2012-13) failed to make payment of UI charges including Addl. UI charges within the time specified in the Regulations to open LC as per computed amount. Till date only NEEPCO, Tripura and Mizoram have opened LC against UI Charges liability.

All are also required to comply with CERC stipulation and open/revise LC as per amount below:

Constituent: **LC (Rs. In lacs)**

Ar. Pradesh **66.54 (DoP, Ar. Pradesh has written to SBI to open LC)**

Assam	**179.28**
Manipur	**59.55 (LC exists for Rs. 20.13 lacs)**
Meghalaya	**67.86**
Mizoram	**52.45 (LC exists for Rs. 48.27 lacs)**
Nagaland	**57.52**
Tripura	**125.93 (LC exists for Rs. 97.20 lacs)**

TCC members are requested to ensure that LC of requisite amount is opened / renewed as per CERC regulations at the earliest.

PART: D ITEMS FOR INFORMATION

ITEM NO. D.1	**Installation of Line Reactor at Kathalguri end of Misa - Kathalguri Line:**

The agreement between NEEPCO and POWERGRID has been signed on 29th May, 2012. LOA for Supply & Commissioning has been placed on CGL on 04.04.2013 with completion schedule of 27.05.2014.

For kind information only.

ITEM NO. D.2	**Diversion of various Transmission Lines on pile foundation due to change in river course:**

Various Transmission Lines of POWERGRID in NERTS are becoming vulnerable from time-to-time due to frequent change in river course. In such cases, PGCIL is providing temporary embankment protection as immediate measure through boulder sausage, spars, porcupine etc. However, in case the protection does not work, necessary diversion of line is done on pile foundation if safe space for normal foundation is not available.

The Tower Locations in the following transmission lines of NER had become vulnerable due to unabated erosion caused by change in river course.

Transmission Line	Location No.	Remarks
132KV S/C Gohpur-Nirjuli line	73, 74 & 75	Endangered due to erosion by River Chessa
220KV D/C Balipara-Samaguri line	29 & 30	Endangered due to erosion by River Jorasor
400KV D/C Ranganadi-Balipara line	42	Endangered due to erosion by River Dikrong

Despite implementation of various Temporary Bank protection works, erosion could not be arrested and the said tower locations became prone to collapse in the year 2011.

Considering the criticality of the above locations, immediate action for shifting the locations on Pile Foundation was taken by POWERGRID. As on date, the shifting work of above vulnerable locations in 132KV S/C Gohpur-Nirjuli line & 220KV D/C Balipara-Samaguri line has been completed while that for loc.42 in 400KV D/C Ranganadi-Balipara line is in progress & is expected to be completed by July'13.

Subsequently, the following tower locations have been rendered vulnerable by unpredicted change in course of rivers flowing in their vicinity resulting erosion in the year 2012 & 2013.

Transmission Line	Location No.	Remarks
400KV D/C Misa-Mariani line (charged at 220KV)	585,586,587	Endangered due to erosion by River Doyang
400KV D/C Balipara-Bongaigaon line	288	Endangered due to erosion by River Bhola
400KV D/C Ranganadi-Balipara line	45,58, 65,66,67	Endangered due to erosion by River Dikrong

Embankment protection provided i.r.o. these locations from time to time have failed to withstand the water surge & resultant erosion during monsoon. In order to avert tower collapse, POWERGRID has taken action for shifting these locations also on Pile Foundation.

Accordingly, the vulnerable stretch from loc.585 to loc.587 of 400KV D/C Misa-Mariani line & loc.288 of 400KV D/C Balipara-Bongaigaon line are being shifted on 2(two) No. Pile Foundations & work is presently in progress. Further, Pile foundation is also being adopted for locations 45, 58, 65, 66, 67 of 400KV D/C Ranganadi-Balipara line.

For kind information only.

ITEM No. D.3	Commissioning Schedule of Generation Projects in NER

The proposed dates of commissioning of various Generating Projects in NER are as below:

SN	AGENCY	PROJECT	COMMISSIONING SCHEDULE
1	NHPC	Lower Subansiri	12th Plan (as per 13th NERPC meeting)
2	NEEPCO	Kameng HEP	June, 2016 (as per 13th NERPC meeting)
3	NTPC	Bongaigaon TPS	U#1: 9/13, U#2: 7/14, U#3: 12/14 (as per 13th NERPC meeting)
4	OTPC	Pallatana GBPP	Module-I&2: 9/13 (as per 88th OCCM)
5	NEEPCO	Tuirial HEP	Aug., 2015 (as per 13th NERPC meeting)
6	NEEPCO	Pareh HEP	Dec., 2014 (as per 13th NERPC meeting)

ITEM NO. D.4	Transmission Lines of NETC:

The following is the status of three sections of 400 KV D/C transmission line of North East Transmission Company Ltd., (NETC) for evacuation of power from Gas Based Combined Cycle Power Project at Pallatana, Tripura (GBCCPP) of ONGC Tripura Power Company Ltd.

PALATANA-SILCHAR 247 Km. In commercial operation since 01.09.2012
SILCHAR-BYRNIHAT 215 Km. In commercial operation since 01.03.2013
BYRNIHAT-BONGAIGAON 201 Km. Expected commissioning on 01.01.2014

The delay in commercial operation date for Byrnihat-Bongaigaon sections is due to stoppage of work in large no. of locations involving court cases / stay orders of various courts, Right of Way issues, delay in forest clearance/ enumeration of trees in Assam. Frequent deterioration of law and order situation. An employee of the construction contractor KEC was reportedly to have been kidnapped while returning from project site in Goalpara District on 26.06.2013 and has not been released yet. The event has been hampering the progress of work.

For information only.

ITEM NO. D.5	Replacement of Defective Insulator Springs in Transmission Lines of POWERGRID in NER – PGCIL:

During 13th NERPC Meeting Hon'ble Power Minister, Govt. of Meghalaya stated that delay in replacement of insulators will create problem to grid and common people will be the sufferer. Accordingly, he suggested for forming a committee for carrying out detailed study.

After detailed deliberation, the Committee decided that a special committee should be constituted by NERPC to discuss the issue. Member Secretary, NERPC will be the convener for the special meeting.

In the special committee meeting held on 24th August, 2012 at Guwahati, POWERGRID highlighted that the numbers of tripping have reduced drastically over the years after the replacement of defective insulator strings and two-third (2/3) of defective insulators have already been replaced The replacement of rest defective insulators are required for reliable and safe operation of the system.

After detail deliberation the committee decided that the forum should not go for any 'Deemed Availability status" or against any guidelines of CERC. Keeping in view the requirement of system strengthening the committee agreed to consider it as a "force majeure" as per CERC regulation so that the power reaches to each corner of the States and it will be benefited to the NER States.

Member Secretary (I/C), reiterated that as per CERC (Terms & conditions of tariff) Regulation, 2009 under Appendix – IV clause 6, outage time of transmission elements beyond the control of transmission licensee shall be excluded from the total time of the element under period of consideration. However, onus of satisfying the Member Secretary, RPC that element outage was due to aforesaid event and not due to design failure shall rest with the transmission licensee. A reasonable restoration time for the element shall be considered by RPC and any additional time for restoration of the element beyond the reasonable time shall be treated as outage time attributable to transmission licensee. Accordingly, the Committee recommended for RPC approval.

For kind information of TCC members and to be put up for approval of RPC.

ITEM NO. D.6	**Proposal for Implementation of State of art PABX System:**

During the recent grid disturbance, operators at control center faced many problems in voice communication with other control centers and important stations due to non-availability of fast dialling, easy directory sorting and inter-regional voice connectivity etc. which consequently delayed the grid restoration process. Considering this, POWERGRID has proposed to install state of the art PABX system at all SLDCs, RLDCs and NLDC of the country with features such as computerized touch screen dialling, directory sorting, voice recording system etc. The proposal for implementation of state of art PABX system for NLDC/NERLDC & all SLDCs of North-Eastern region under the additional Fiber Optic Project requirements for central Sector of North Eastern Region was deliberated in 16th UCC meeting. The NIT for this requirement has already been floated and bids are under evaluation. This requirement is being included in the Additional Fiber Optic requirements for Central Sector project of North-Eastern Region approved by 12th NERPC meeting.

Further in the Special TCC meeting dated 09th February 2013, the members of the committee agreed for implementation of state of art PABX system.

For kind information of TCC members and to be put for approval of RPC.

ITEM NO. D.7	**Unified Real Time Dynamic State Measurement (URTDSM) Scheme:**

Unified Real Time Dynamic State Measurement (URTDSM) scheme for Wide Area Measurement/Monitoring(WAMS) was discussed and deliberated in Special TCC meeting of NER held at shilling on 9th February, 2013. The scheme covers placement of Phasor Measurement Unit(PMU) at sub-stations and both ends of transmission lines at 400kV and above level including generating stations at 220 kV level of STU, ISTS & IPP coming up by 2014-15 time frame on pan India basis. The scheme will be implemented in two stages. In the stage-I PMUs will be placed at those locations where fiber optic communication link is either available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in state, remote consoles at RPCs, CEA, CTU and other locations. In stage-II, PMUs would be installed at balance locations along with communications links. Estimated cost of the scheme is Rs. 655 Cr. WAMS technology has capability of measuring & monitoring the

system on real time, which would be helpful in better visualization of the system and utilization of existing transmission assets with reliability, security and economy.

In NER, 40 numbers of sub-stations/generating stations (ISTS – 18 and STU – 22) and 164 number of feeders (ISTS – 95 and STU – 69) have been identified for installation of 86 number of PMUs (ISTS– 50 and STU– 36), 6 nos. of Master Phasor Data Concentrator (MPDC) and 2 nos. Super Phasor Data Concentrator (SPDC) in two stages at an estimated cost of Rs. 50.77 Crores (Phase – I = Rs. 24.23 Crores and Phase – II = Rs. 26.54 Crores). The details of installation of PMUs and PDCs in constituent states of NER are as follows:

North Eastern Region (PMU &PDC)									
NER – Phase I				**NER – Phase II**			**PDC**		
	S/S	feeder	PMU	S/S	feeder	PMU	Nodal PDC	MPDC	SPDC
Ar. Pradesh	1	4	2	3	8	4	*	2	
Assam	4	20	11	10	27	14	0	2	
Tripura	0	0	0	1	2	1	*		
Meghalaya	0	0	0	2	6	3	*	2	
Nagaland	0	0	0	1	2	1	*		
Central	9	69	36	9	26	14			2
G. Total	**14**	**93**	**49**	**26**	**71**	**37**	**0**	**6**	**2**

The experience of Northern Region PMU pilot project and benefit derived from it was deliberated in the meeting with TCC members. In addition, possible utilization of PMU data through analytical software viz. supervised zone-3 blocking, dynamic (linear) state estimator, CVT parameter validation, CT validation, control schemes based on angular stability, voltage instability etc. was also deliberated for development of analytics in parallel with implementation of the URTDSM scheme, in association with premier academic institutions (like IITs).

During meeting Director, CEA informed that all the five regional grids are likely to be operated in synchronism by early 2014, forming one all India Grid. He added that huge hydro generation capacity addition in Arunachal Pradesh has been envisaged and a comprehensive scheme for transmission, sub-transmission and distribution system for all the States in the region have been planned. Some projects like Pallatana GBPP and Bongaigaon TPS and associated transmission system are also under various stages of completion. In this context, URTDSM scheme would provide the entire spectrum of system dynamics in millisecond and facilitate system operator to take timely decision and corrective action for efficient operation of the Grid

Regarding financial implication to the constituents of NER, POWERGRID clarified that in the joint meeting of the all five Regional Standing Committees on Power System Planning held on 5th March, 2012 in Gurgaon, it was decided that the scheme would be implemented as system strengthening scheme and transmission charges would be included in the National transmission pool and to be shared by all the Designated ISTS

Customers (DICs) as per the POC mechanism under the CERC regulation.

After deliberations, TCC agreed for implementation of the proposal and recommended for approval of RPC.

For kind information of TCC members and to be put for approval of RPC.

PART E ISSUE RELATED NERPC SECRETARIAT

ITEM NO. E.1	**Board Fund Contribution for FY 2013-14:**

As per decision of 9th NERPC meeting, Central Utilities and State Utilities of the region are to contribute an amount of Rs. 2 lakhs per annum and Rs. 50000 per annum (w.e.f 2010-2011) respectively to the board fund of NERPC to meet the expenses for hosting various sub-committee meetings and other expenses of Secretariat etc.

Mizoram has already paid the above amount for FY 2013-14. The contribution towards the Board Fund of NERPC for the FY 2013-2014 may kindly be made at the earliest.

For kind information only.

ITEM NO. E.2	**Auditing of Board Fund of NERPC:**

Audit of Board Fund of NERPC was completed for the F.Y from 2008- 2009 to 2010 – 11. The audit for FY 2011-12 and 2012-13 is pending and it is to be carried out by Auditing officers from Me. ECL, POWERGRID and NEEPCO as decided in the 10th NERPC meeting.

For kind information only.

ITEM NO. E.3	**Engagement of Security in new NERPC Complex:**

The Office-cum-residential complex of NERPC is almost ready and NERPC Secretariat is likely to shift to new complex soon at Lapalang adjacent to POWERGRID/NERLDC complex. In order to look after the complex, Chairman NERPC & Hon'ble Power Minister, Govt. of Tripura has agreed for engaging one person [monthly salary of about 10,000/- (approx.)] subject to approval by RPC.

For kind information of TCC members and to be put for approval of RPC.

ITEM NO. E.4	**Representation of Member Secretary, NERPC as Adviser(Power) in North Eastern Council (NEC)**

Member Secretary, NERPC was associated with NEC and was holding the post of Adviser (Power) of NEC till 2000. The representation of NERPC in NEC has been discontinued since then. A resolution in this regard, signed by all Ministers of Power,

NER was submitted to Hon'ble Union Power Minister, Govt. of India. NERPC (vide letter No. NERPC/OP/Committee/2013/4760 dt. 22/8/2013) has also requested the response of NEC in this regard.

TCC members may express their views on this issue.

PART: F	**ANY OTHER ITEMS:**

With permission of the Chair.

DATE & VENUE OF THE NEXT MEETING

The next meeting of TCC & NERPC is proposed to be held in January/February, 2014. As per roster, POWERGRID will be the host for the 15th TCC/RPC Meetings. POWERGRID has agreed to host the meeting in Goa. The exact date & venue will be intimated later.

****

Automated Defence Plans for secure operation of the Grids

S no	Logic	Control Action
1	Overdrawal > 12% of schedule or 150 MW (PLC based scheme at LDCs)	On day 1, Group 1 load is shed in the first instance of violation followed by Group 2 in the second instance and so on say upto Group 5 if there are five (5) violations On day 2, Group 6 would be shed for the first violation followed by Group 7 and so on. After Group 60, Group 1 would start.
2	Under-drawals > 12% of schedule or 150 MW (PLC based scheme at LDCs)	On day 1, signal would be sent to Power station 'A' in the first instance followed by station 'B' in the second instance and so on say upto Power station 'C' if there are three (3) violations. On day 2, signal would be sent to the Power station 'D' in the first instance and so on.
3	Voltage <200 kV for more than 5 minutes (Local or PLC installed at the nodes identified)	Under Voltage Load Shedding (UVLS) Relays would be installed at each of the twenty nodes. In case of UV at node 1 shed load in Group 1 and if the UV persists, shed Group 2 and so on.
4	ICT/line loading crossing limits (Local or PLC installed at select locations).	Choose appropriate Groups from 1 to 60 for each set of ICTs/lines.
5	Flows crossing TTC and overdrawal (PLC based scheme at RLDCs)	Choose Group 1 in state 1, Group 1 in state 2 and so on for the first instance violation followed by Group 2 in state 1, Group 2 in state 2 and so on Day 1. On Day 2 move to the group following day 1 for the respective states.
6	Loss of generation > 1000 MW. (PLC based scheme installed at power station end)	Choose appropriate ten (10) groups adjacent to the power station. Further the PLC can also be used to secure the power station in case of depletion of the network emanating from the power station.

S no	Logic	Control Action
7	Angular difference (PLC based scheme at RLDC level)	Choose appropriate two groups for each state located downstream of the angle pair.
8	Under-Frequency Relays UFR1: 49.0 Hz UFR2: 48.8 Hz UFR3: 48.6 Hz UFR4: 48.4 Hz	 20% of identified loads for shedding……12 Groups 20% of identified loads”””””””””””……12 Groups 30% of identified loads……18 Groups 30% of identified loads……18 Groups
9	Df/dt relays 49.9 Hz with 0.1 Hz/sec slope 49.9 Hz with 0.2 Hz/sec slope	 Overlap with UFR3 above Overlap with UFR4 above
10	Islanding at 47.9 Hz	Power station specific schemes to be formulated.

2.3. Digital Tele Protection Coupler (DTPC) system

Digital Tele Protection Coupler (DTPC) is required to transfer the trip command over Digital communication or receive the command from the Remote stations . The DTPC after receiving the command from either GSES or remote DTPC actuates the contacts of the relays of the loads or the generators. In case of back down of Generators the DTPC system actuates the contacts the MW output generation setting of the generator. According to the Target MW output settings , the Steam bypass (HP/LP) and coal firing is varied and the desired back down is achieved. The schematic diagram of the Command Transfer is shown below

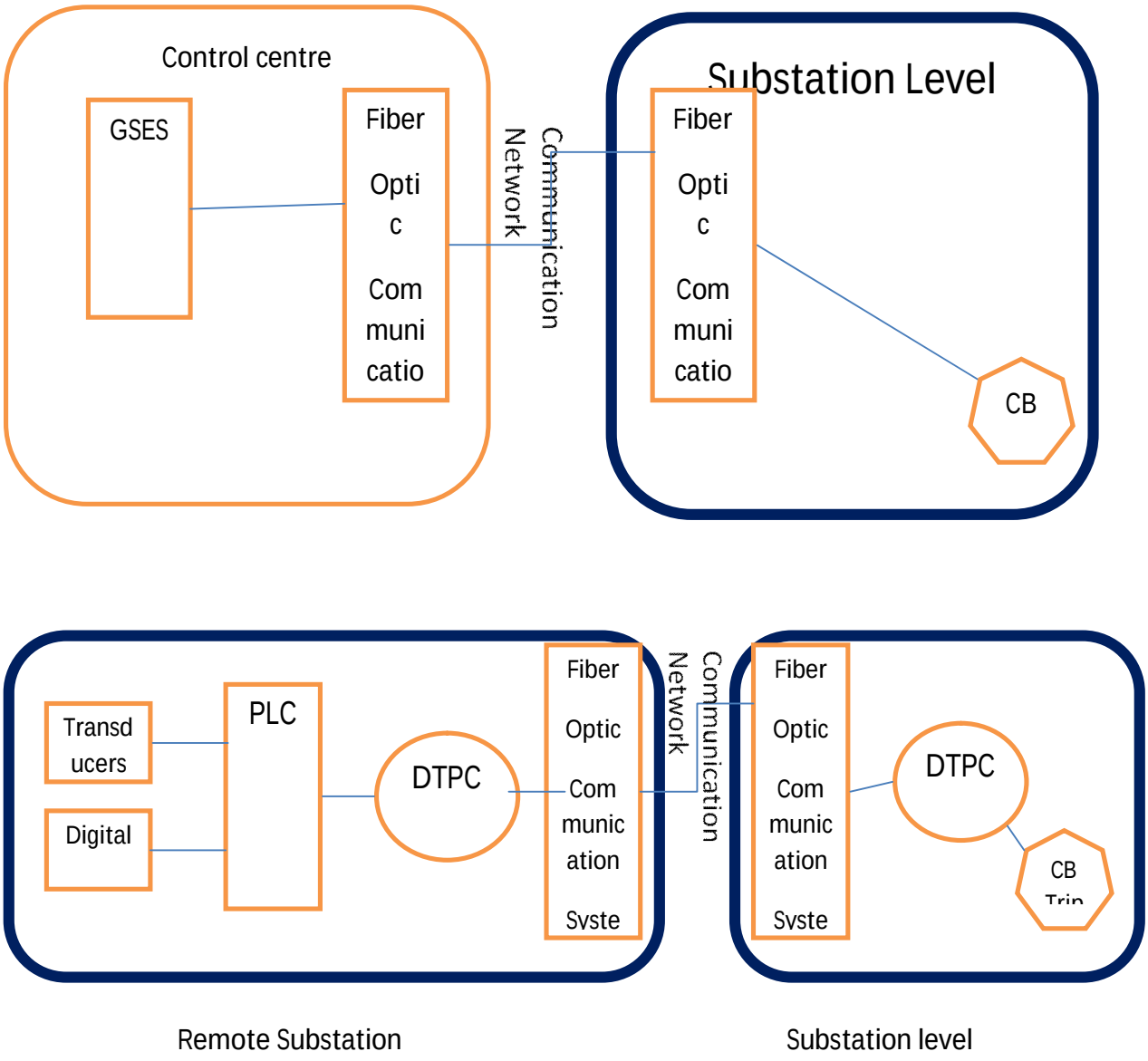

Figure 3.0 Tele Protection System

2.4. PLC System

The Programmable Logic Controller(PLC) shall be defined in the case of measurement the inputs would be taken from the local measurements and the tripping has to be executed on wide area. The typical PLC for the SPS design of Power Plant is given below.

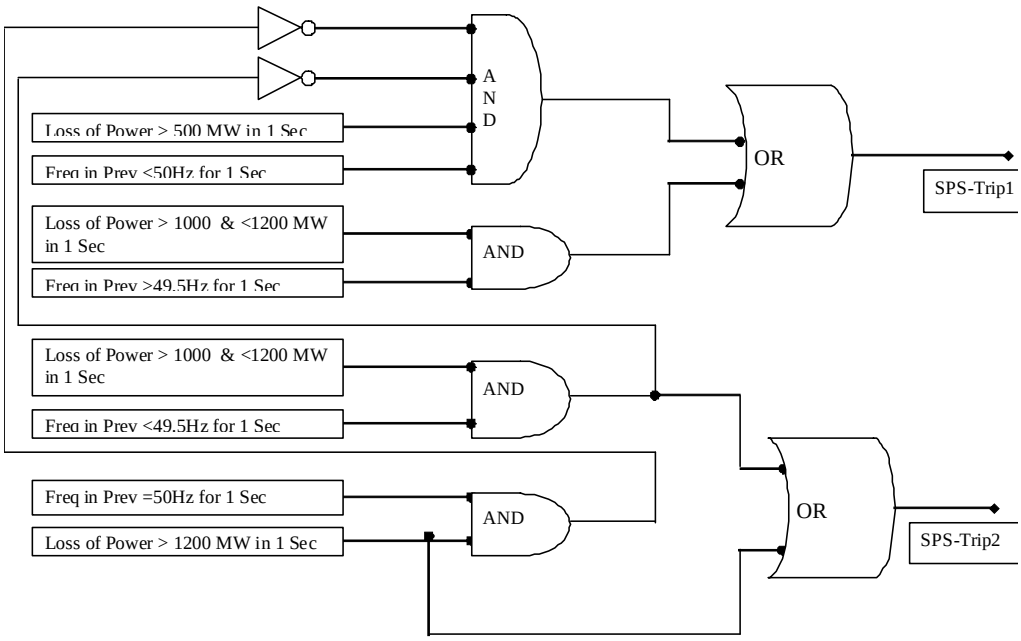

Figure 4.0 Typical PLC system

2.5. Features of Under Frequency Protection:

It is proposed to use Under Frequency Relay (UFR) on 132kV, 66kV and 33kV feeders based on loadability and importance of the feeders and type of load it feeds. The relay shall monitor the frequency of the bus and have a programmable feature to operate different output contacts based on different frequency values. UFR is required to be IEC 61850 complaint and on owner's communication network, a number of relays shall be connected to a server which may cater to requirement of a number of sub-station in the vicinity. This server along with a gateway if required may be located in Area load despatch centre where all the relays in the area shall be connected and monitored. The mode of communication shall be wide band.

2.6. Communication System for GSES system:

The communication system for GSES system shall have to be reliable, dedicated and fully secure system. Further the system shall have to be monitored and operated in real-

time and hence a fast and dedicated communication network based on Fiber optics would be required. The alternate communication network based on GSM/GPRS technology is although can be made dedicated for this system. But the drawback of this GSM/GPRS technology is based on IP technology and hence the security of this system shall be major concern wherever the control system is being utilized. Hence the GSM/GPRS communication system shall be limited to monitoring of the system. The Detailed Project Report for the Fiber Optic based communication system is being proposed separately.

ANNEXURE – B.2.1

REPORT ON PROTECTION AUDIT OF NER

1.0 INTRODUCTION

North Eastern Region is the smallest of the five regions in the country in terms of Installed generation Capacity. The installed generation capacity is about 2470 MW and caters to load demand varying from about 1300MW (off-peak demand) to 1800 MW (peak demand). 132kV system forms back bone of the transmission network of the region. North Eastern regional grid got synchronised with ER grid in 1991, with WR-ER in 2003, with NEW grid in 2006 and will be part of National Grid by 2014.

The North Eastern Regional (NER) power system covers geographical areas of seven (7) North Eastern states: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. At present NER power system comprises of nineteen (19) regional entities which includes four (4) generating companies, seven (7) drawee state utilities and two (2) inter-state transmission licensee. Seven (7) generating stations (AGBPP, AGTPP, Ranganadi, Kopili, Khandong, Kopili Stage-II, Doyang) belongs to NEEPCO, one (1) generating station at Loktak belongs to NHPC and one (1) generating station at Palatana belongs to OTPC. One more generating station at Bongaigaon belonging to NTPC is likely to be added during 12th Five Year Plan. The two (2) inter-state transmission licensees are POWERGRID and NETC.

There was a major grid disturbance in Northern Region on July 30, 2012 and subsequently there was another Grid disturbance on July 31, 2012 resulting in almost total collapse of Northern, Eastern and North-Eastern regional grids. The total load of about 48,000 MW was affected in this black out. An Enquiry Committee was constituted by the Ministry of Power under the Chairmanship of Chairperson, CEA to look into the causes of these grid failures and to suggest remedial measures. The committee had 20 principal recommendations to be implemented in all five regions within a specified time frame in order to avoid recurrence of such incidences. The review of protection Systems was the primary recommendation of the committee. This includes third party protection audit, review of Zone-3 philosophy and load encroachment, use of synchrophasor measurement data of PMUs for protection system, deployment of System Protection Scheme (SPS) etc. In the meeting of Hon'able Union Power Minister with Chief Ministers / Power Ministers of Northern Region held on August 6, 2012, the issue regarding Independent third party audit of protection system of all the State Transmission Utilities and the Central Transmission Utilities was also underlined for time-bound action. Subsequently The Chairperson, CEA vide his D.O letter No. 7/AI/GD/GM/2012/397-407 dated 01-10-2012, addressed to Hon'ble

Chairperson, NERPC had requested the region to take up the issue in RPC forum of the region for completion of the audit of protection system within one month.

Due to fund constraint, independent third party protection audit of NER was planned taking representations from various state utilities, NERPC/NERLDC, and central utilities (NEEPCO/PGCIL/NHPC) in the region. In NER there are 132 Nos. of substations and generating stations of 132kV and above voltage class. The protection audit was planned in consultation with NERLDC, STU, CTU and Generating companies of NER. In OCC & PCC meeting it was decided to form teams each comprising of four (4) members from different state utilities/owner, PGCIL/NEEPCO/NHPC and NERPC/NERLDC. Because of geographical locations of different sites, the team had to cover most of the locations by road only. The PGCIL, NEEPCO, state constituents had provided required logistic support for the protection audit. The first phase of protection audit covering eleven (11) substations / generating stations in the State of Tripura was completed on 21st December, 2012. The protection audit in respect of rest of the substations / generating stations was completed in February, 2013.

The details of number of substations / generating stations of 132kV and above voltage class in seven (7) State Sector Utilities and four (4) Central Sector Utilities of the NE region are as follows:

State Utilitis / Central Sector Utilities in the Region	Number of substations / generating stations			Total No. of Stations
	400kV	220kV	132kV	
Arunachal Pradesh		1	4	5
Assam		9	39	48
Manipur			9	9
Meghalaya	1		19	20
Mizoram			7	7
Nagaland			6	6
Tripura			13	13
POWERGRID	4	2	9	15

NEEPCO	1	2	4	7
NHPC			1	1
OTPC	1			1
TOTAL	7	14	111	132

The findings of the Audit team in respect of various substations / generating stations of State Sector Utilities and Central Sector Utilities were enclosed with the reports of the respective constituents.

After completion of protection audit, the deficiencies in the NER system was highlighted and discussed in detail in OCC/PCC meetings. The general deficiencies in existing substations / generating stations and recommendation of Protection audit can be summarized as follows:

2.0 GENERAL DEFICIENCIES OBSERVED IN EXISTING SUBSTATIONS / GENERATING STATIONS OF NER:

1. The redundancy in transmission system is not adequate. Tripping of single critical line at 132kV level can cause over loading of other lines and may even lead to grid disturbance.
2. Some of the substations / generating stations are still operating with Single bus switching scheme at 132kV level and even at 220kV level resulting in unnecessary outage of transmission line / transformers / reactor during maintenance of major equipment like CBs.
3. Some of the transmission lines are operating with T-connection.
4. In some cases Loop-in-Loop-Out (LILO) arrangement is operating without Circuit Breaker.
5. The parallel operation of transformers of very small MVA ratings (5MVA, 7.5MVA, 10MVA, 20MVA) is more common in substations of 132kV level. In every 5 to 7 years, transformation capacity is being augmented due to over loading of transformers. This is unnecessarily resulting in increase in the fault level at the connected buses.
6. The DC system for station supply and telecommunication system is not adequate as per requirement of CEA's regulations. Most of the substations are provided with one set of battery and one set of associated charger. In some stations, two DC system voltages (i.e. 110V & 220V) are in operation for station supply.

7. Some of the substations / generating stations are still operating with MOCB and obsolete Gapped type Surge Arresters. Moreover, in some substations, CBs are quite old and the short time rating of SF6 CBs of 132kV class is much lower than the requirement of CEA's regulation (i.e 31.5kA for 1 sec).

8. The transmission lines and transformers in some of the substations / generating stations are still operating without Surge Arresters.

9. In most of the cases, the CT ratios are not suitable and number of cores are not adequate for bus bar protection. The existing CT ratio is also restricting the power flow in some of the lines.

10. In some substations, the Surge Arresters (SAs), CT, PT/CVTs are quite old and the accuracy Class of most of the CT, PT/CVT is not suitable for 0.2 or 0.2s class meters. CT ratios for line bay and transformer bay are different.

11. The relays being used for protection of transmission lines, transformers / reactors etc. are predominantly electromechanical / static type.

12. In majority of stations, bus PT/CVT is being used for protection and metering purpose for transformer as well as lines.

13. In some substations, existing relays are not healthy.

14. There is absence of reliable telecommunication link between stations (substations / generating stations). In most of the cases, there is no carrier intertrip facility

15. Some of the lines at 132kV level are operating with only one Over Current & Earth fault protection or only one distance protection against Distance protection and back up Over Current & Earth fault protection as per requirement of CEA's regulations. In some cases lines are even operating without protection.

16. In case of lines provided with two Distance protection, there is no provision of directional earth fault to take care of high resistive earth fault as per requirement of CEA's regulations.

17. Some of the 132kV class transformers are operating with only O/C & E/F protection or only differential protection. In some cases transformers are even operating without protection.

18. Most of the transformers have not been provided with Restricted Earth Fault (REF) protection.

19. The transformers have not been provided with over fluxing protection.

20. Some of the 220kV class substations are without bus bar protection and even LBB protection is absent at 220kV and 132kV level.

21. Most of the substations are operating without Disturbance Recorder (DR), Event Logger (EL) and Time Synchronising Equipment (TSE).

22. The conventional control and relay panels with long cable trenches in switch yard and huge quantity of cables between switchyard and control room etc. are being used for the control, protection and annunciation.

23. There is need for standardization of the protection schemes and relay settings including Zone-3 setting (taking into account load enchroachment).

24. In some of the substations, there is no ~~provision~~ trip transfer facility for transferring the protection of transformers / lines when operating in bus transfer mode.

25. The existing control and power cables need replacement in old substations.

26. Earthing system need improvement and relook because of increase in fault level over the years and further increase in fault level due to huge generation addition in future.

27. In most of the substations, single point earthing is more common against the normal practice of two point earthing.

28. The gravels spread in some of the substations are covered with grasses defeating the very purpose of spreading of such high resistive material.

29. In some of the stations, there is no provision for soak pit / oil collecting pit, fire fighting walls in between transformers (if separation between transformers are < 15m) and required fire fighting system (Hydrant system / Nitrogen Injection based Fire Protection system)for transformers as per requirement of CEA's regulations.

30. The relay settings, pre-commissioning test reports and factory test reports of various equipment including protecting relays is not available with operating person of substation / generating stations.

31. Adequate diagnostic tools are not available for condition monitoring of major equipment including protective relays in the substation / generating stations and transmission line material.
32. Shortage of man power in each and every station is a major concern. There is need for strengthening of human resources.

33. Proper training is not being imparted to operating personnels of substation / generating stations for operation & maintenance of the system.

3.0 RECOMMENDATIONS

Healthy protection systems and defense mechanisms are essential to ensure safe, secure and integrated operation of the grid. However, the objective of protection audit in NER was to bring to the notice the various deficiencies in the switching schemes, protection system as well as associated equipment / auxiliary system etc., which are also directly / indirectly responsible for smooth and reliable operation of the system, so that necessary action can be taken for improvement of whole system. Therefore, focus was also there to highlight the inadequacy of associated infrastructure in the existing system like type and rating of existing equipment, identifying obsolete equipment, condition of earthing system, provision of firefighting system/ arrangement for transformers / reactors, methodology of monitoring the healthiness of equipment including protective relays and availability of requisite modern diagnostic tools etc., The recommendation of Protection audit can be summarized as follows:

1. To improve reliability, availability of system and facilitating maintenance of equipment without outage of line / transformer, main and transfer bus switching scheme at 132kV level and DMT/double bus with / without bypass arrangement at 220kV level are desirable. Availability of space in some of the substations /generating stations may not be adequate for implementing proposed switching scheme / for upgradation. Compact GIS and hybrid technology option, which will improve safety, reliability and reduce maintenance cost, may be considered for upgradation / resolving such problems.

2. In some substation / generating station, the existing MOCB and gapped type surge arresters are to be replaced by SF6 type CB and heavy duty station class gapless (Metal oxide) type Surge arresters of suitable rating respectively. In some cases, SF6 CBs are to be replaced with higher short time current rating as per CEA's regulations. The SA, CT, and PT/CVT, which are more than 20 years old, need to be tested to ensure their healthiness and may be considered for replacement, if required, as early as possible.
3. In substations / generating stations, the transmission lines and transformers / reactors, which are still operating without Surge Arresters, shall be provided with gapless type SAs to provide protection against lightning and switching over voltages.
4. The CTs and PTs / CVTs of suitable ratios, accuracy class and adequate number of cores need to be provided in place of old ones to meet the requirement of bus bar protection and enhancement of power flow in the line. Dedicated line PT/CVT may be provided for distance protection of lines. The accuracy class of CT, PT/CVTs shall be as per CEA's regulations. Identical CT ratios may be selected for line bay/ transformer bay / bus coupler bay in order to reduce spares and for interchangeability.

5. The protection schemes for transmission lines, transformer / reactor etc. and relay settings need to be standardized and bus bar protection is to be put in place for 220kV and above voltage class substations as per CEA's regulation. The substations /

generating stations of 132kV class should be provided with LBB protection and even important stations of 132kV class may be provided with bus bar protection.

6. The existing electromechanical / static type relays, being used for protection of transmission lines, transformers / reactors etc., are to be replaced by Numerical relays complying to IEC 61850 protocol. The inbuilt feature of Numerical relays can be used for Disturbance Recording and Event Logging. The inbuilt Under Frequency Relays (UFR) can be used for UFR based load shedding. For the control, protection and annunciation, the conventional control and relay panels with long cable trenches in switch yard and huge quantity of cables between switchyard and control room may be replaced by Bay Control & Protection unit (BC&PU) with Fibre Optic link and Substation Automation System, which is the need of hour. Provision of TSE may be made at each substation / Generating station.

7. Carrier intertrip facility is to be established using PLCC / FO communication link, wherever possible to implement.

8. Transformers/reactors are to be provided with oil soak pit / oil collecting pit. The fire fighting wall in between transformers/reactors is to be provided, wherever required and fire protection system (Hydrant system / Nitrogen Injection based Fire Protection system) has to be provided for transformers/reactors in the substation as per requirement of CEA's regulations.

9. Proper design of Earthing system is required for safety of equipment and person (i.e. man and machine). The fault level at different substations might have increased over the years and is also likely to increase in future due to addition of generations in near future. Hence suitability of existing earthmat in the existing substations needs to be checked for the increased fault level. The earthing connections and size of risers are also to be rechecked. Duration of monsoon is quite long in NER and hence growth of grass in substation area is very common. The gravels spread in substation area are likely to be covered with grasses defeating the very purpose of spreading of such high resistive material. The safety of man and equipment is also lost in substation / switchyard area as the design of earthmat has been done taking into account the high resistive surface layer i.e. gravels. Gravels may be spread over PCC to restrict the growth of grass.

10. DC battery system plays vital role in control, protection and communication system of substation. Number of substations / generating stations is still operating with one set of DC battery and battery charger. Two sets of 220V/110V DC batteries with associated chargers for station supply and two sets of 48V DC batteries with associated charges for reliable communication system should be in place for 132kV and above voltage class substations. The old battery and battery charger sets may be replaced by

new ones. In a station, the mixing of two DC system voltages (i.e. 110V & 220V) should be avoided for station supply.

11. The existing T-connections are to be converted to proper LILO arrangement. The LILO arrangement should be provided with required number of CBs, other associated equipment and protective relays etc.

12. The relay settings, pre-commissioning test reports and factory test reports of various equipments including protecting relays are to be made available with operating person of substation / generating stations.

13. At present no standard maintenance practice is being followed by most of the constituent state. The Condition Based Maintenance (CBM) practice using modern diagnostic tools may be adopted to assess healthiness of transmission line and various substation equipment/material including protection relays. For maintenance of equipment and materials, provision of three / four sets of following diagnostic tools may be kept for the state of Assam and two sets of similar tools for other states [Ar. Pradesh, Manipur, Mizoram, Meghalaya, Nagaland and Tripura] to cater to the requirement of entire state.

a) Transformer Winding resistance meter and turns ratio meter
b) Insulation Resistance (IR) tester [10kV]
c) Automatic Capacitance & Tandelta Measuring Instrument
d) Break Down Voltage (BDV)Test kit for oil
e) Dissolved Gas Analyser [Portable]
f) Frequency Response Analyser (FRA) test set
g) Partial Discharge (PD) Measuring Instrument
h) Circuit Breaker operational Analyser and Dynamic Contact Resistance Meter (DCRM) test kit
i) SF6 Gas leakage detector
j) Dew point measuring instrument
k) SF6 Gas Handling Plant (for Evacuation, filling, filtering of SF6 gas)
l) Static Contact Resistance Measuring instrument
m) Leakage Current Meter (LCM) for Surge Arrester
n) Earth tester for measurement of soil resistivity and ground resistance
o) Automatic Relay test kit suitable for testing elctromechanical / static / numerical relays
p) Thermovision camera for detection of hot spots
q) Thermal Scanner (for Transformer / Reactor)
r) Transmission line Response Analyser
s) Puncture Insulator Detector (PID)
t) CT & PT Analyser kit
u) CT primary injection test kit

The diagnostic tools mentioned at Sl. No. (a), (c), (e), (f), (h), (m), (o), (p), and (s) are as per requirement of CEA's regulation.

14. The operation and maintenance staffs are not well equipped with adequate modern Diagnostic tools. Operating and maintenance staff of substation / generating station needs to be trained properly to handle various modern diagnostic tools and to interpret the test results for taking remedial action.

15. Shortage of man power in each and every substation / generating station is a major concern. There is need for strengthening of human resources for efficient management of the system.

4.0 TIME FRAME FOR IMPLEMENTATION OF RECOMMENDATIONS OF PROTECTION AUDIT

As directed by the Ministry of Power and communicated by CEA, the Detailed Project Report (DPR) with cost estimate and action plan for implementation etc. has to be prepared by STUs and Generating companies for rectification of various deficiencies highlighted by the Protection audit team and other improvement required.

For implementation of recommendation of protection audit and other improvement required, the fund requirement in respect of each substation / generating station of state utility and Generating companies would be worked out based on findings of protection audit team and taking into account following broad areas.

a) Modification in switching Scheme
b) Replacement of existing EM/Static relays by numerical relays / Bay Control and Protection Units (BC&PUs) & Substation Automation System (SAS) and providing TSE, DR & EL
c) Replacement of old obsolete equipment (CB, Surge Arrester, Isolators, Earthing switches, CTs, PTs/CVTs) and material
d) Establishment of reliable communication link and Providing carrier intertrip facility
e) Improvement in DC system and providing DG set
f) Improving existing Earthing system
g) Providing required Fire Fighting system/ arrangement for transformers / reactors
h) Providing Modern diagnostic tools.
i) Any other improvement required

Funding is the major constraint for implementation. However, if funds is made available from PSDF / funded by Govt. of India / any other source, the works can be executed in two (2) to three (3) years time. Moreover, without financial support it would not be possible by the constituent states to take up work for rectification of various deficiencies.

The some of the relevant pages of CEA's regulations were enclosed with the reports of the respective constituents.

Annexure B.4

A. Multiple tripping of elements in and around Imphal and Ningthoukhong areas

1. Apr'13 (1 No. of Case)

At **1429 Hrs on 04.04.13,** 132 kV Loktak – Jiribam II, 132 kV Dimpaur – Imphal, 132 kV Imphal – Imphal(PG), 132 kV Imphal – Ningthoukhong, 132 Loktak - Imphal & Loktak Unit III tripped.

2. May'13 (6 No. of Cases)

At **0535 Hrs on 03.05.13,** 132 kV Dimapur – Imphal S/C , 132 kV Loktak – Imphal S/C ,132 kV Loktak – Jiribam II ,132 kV Imphal(PG) – Imphal I & II and 132 kV Loktak – Ningthoukong S/C.

At **2305 Hrs on 21.5.13,**132 kV Loktak – Imphal S/C, 132 kV Loktak-Ningthoukong S/C and 132 kV Imphal(PG) – Imphal I tripped leading to power interruption in Manipur system

At **1508 Hrs on 22.5.13,**132 kV Loktak – Jiribam II tripped followed by tripping of 132 kV Loktak – Imphal S/C and 132 kV Loktak – Ningthoukong S/C at *1537 Hrs,*which was again followed by tripping of 132 kV Imphal(PG) – Imphal S/C at *1544 Hrs.*

At **0348 Hrs on 27.5.13,** 132 kV Loktak – Imphal S/C, 132 kV Loktak – Ningthoukong S/C, 132 kV Loktak – Jiribam II and 132 kV Imphal (PG) – Imphal I tripped, affecting Manipur power system.

At 1404 Hrs on 29.05.13, 132 kV Loktak-Jiribam II and 132 kV Loktak-Ningthoukhong tripped, followed by tripping of 132 kV Loktak-Imphal, 132 kV Loktak-Rengpang lines and all units of Loktak, at 1407 Hr.

At 1243 Hrs on 31.05.13, 132 kV Loktak–Jiribam II, 132 kV Loktak–Imphal, 132 kV Loktak-Ningthoukhong lines and all units of Loktak tripped.

3. Jun'13 (6 No. of Cases)

At 1037 Hr on 01.06.13, 132 kV Loktak-Jiribam II, 132 kV Loktak-Imphal and 132 kV Loktak-Ningthoukhong lines and all units of Loktak tripped again.

At 0505 Hrs on 05.06.13, 132 kV Loktak – Ningthoukhong, 132 kV Loktak – Imphal line & Loktak Unit II tripped.

At 1152 Hrs on 16.06.13, all three units of Loktak, 132 kV Imphal(PG) – Imphal, 132 kV Loktak – Ningthoukhong, 132 kV Loktak – Imphal & 132 kV Loktak – Jiribam II tripped.

At 1210 Hrs on 17.06.13, 132 kV Loktak – Jiribam II, 132 kV Dimapur – Imphal, 132 kV Loktak – Ningthoukhong ,132 Loktak - Imphal & all three units of Loktak tripped.

At 1250 Hrs on 17.06.13, 132 kV Loktak – Jiribam II & 132 kV Dimapur – Imphal & all three units of Loktak tripped.

At 0630 Hrs on 19.06.13, all three units of Loktak , 132 kV Loktak – Jiribam II & 132 kV Dimapur – Imphal line tripped.

At 1336 Hrs on 29.06.13,132 kV Loktak - Jiribam II , 132 Loktak - Imphal, 132 kV Loktak - Ningthoukhong, 132 kV Loktak - Jiribam I & all three units of Loktak tripped.

4. Jul'13 (3 No. of Cases)

At 1835 Hrs on 14.07.13, 132 kV Loktak - Jiribam II, 132 kV Loktak - Imphal S/C, 132 kV Loktak - Ningthoukong S/C, 132 kV Dimapur - Imphal S/C and 132 kV Imphal(PG) - Imphal S/C and all units of Loktak HEP tripped.

At **0910 Hrs on 16.07.2013**, 132 kV Loktak - Jiribam II, 132 kV Loktak - Imphal S/C, 132 kV Loktak - Ningthoukong S/C, 132 kV Dimapur - Imphal S/C and 132 kV Imphal(PG) - Imphal S/C and all three units of Loktak HEP tripped.

At **1947 Hrs 17.07.2013**, 132 kV Loktak - Jiribam II, 132 kV Loktak - Imphal S/C, 132 kV Loktak - Ningthoukong S/C, 132 kV Dimapur - Imphal S/C and 132 kV Imphal(PG) - Imphal S/C and all three units of Loktak HEP tripped.

5. Aug'13 till 18.08.13 (4 No. of Cases)

At **0817 Hrs on 09.08.13,** 132 kV Loktak - Jiribam II and 132 kV Loktak - Ningthoukong S/C lines and all units of Loktak HEP tripped.

At **1314 Hrs on 15.08.13,**132 kV Loktak - Imphal S/C ,132 kV Dimapur - Imphal S/C and all three units of Loktak HEP tripped.

At **1436 Hrs on 15.08.13,** 132 kV Loktak - Imphal S/C, 132 kV Loktak - Ningthoukong S/C , 132 kV Dimapur - Imphal S/C and all three units of Loktak HEP tripped.

At **1111 Hrs on 17.08.13,** 132 kV Loktak - Imphal S/C , 132 kV Loktak - Ningthoukong S/C , 132 kV Loktak - Jiribam S/C and all three units of Loktak HEP tripped.

B. Multiple tripping of elements in and around Khliehriat (MePTCL) area

1. Apr'13 (5 No. of Cases)

At **0953 Hrs on 04.04.13**, 132 kV Badarpur – Khliehriat & 132 kV Khandong – Khliehriat II line tripped, followed by repeated tripping of 132 kV Badarpur – Khleihriat S/C at 1515 Hrs on 04.0.13.

At **0140 Hrs on 12.04.13**, 132 kV Badarpur – Khliehriat, 132 kV Khandong – Khliehriat I and 132 kV Khandong – Khliehriat II lines tripped.

At **1556 Hrs on 14.04.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I, 132 kV Khandong – Khliehriat II & 132 kV Badarpur – Khliehriat line tripped.

At **1640 Hrs on 15.04.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I and 132 kV Khandong – Khliehriat II lines tripped.

At **0415 Hrs on 17.04.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I, 132 kV Khandong – Khliehriat II lines tripped along with entire generation of Leshka HPP.

2. **May'13 (12 No. of Cases)**

At **2128 Hrs on 06.05.13,** 132 kV Khliehriat – Khliehriat I and 132 kV Khliehriat – Khliehriat II lines tripped.

At **0437Hrs on 07.05.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I, 132 kV Khandong – Khliehriat II lines tripped along with entire generation of Leshka HPP.

At **1015 Hrs on 07.05.13,** 132 kV Khliehriat – Khliehriat I and 132 kV Khandong – Khliehriat I lines tripped.

At **2300 Hrs on 08.05.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I and 132 kV Khandong – Khliehriat II lines tripped.

At **1410 Hrs on 09.05.13,** 132 kV Khliehriat – Khliehriat I, 132 kV Khliehriat – Khliehriat II, 132 kV Khandong – Khliehriat I and 132 kV Khandong – Khliehriat II lines tripped.

At **1237 Hrs of 16/5/13,** 132 kV Khandong – Khleihriat I and II tripped along with 132 kV Khleihriat (PG) – Khleihriat I and II.

At **1422 Hrs of 16/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

At **0802 Hrs of 22/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

At **2250 Hrs of 23/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

At **1745 Hrs of 28/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

At **1434 Hrs of 29/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

At **1606 Hrs of 31/5/13** 132 kV Khleihriat(PG) – Khlerihiat I and IIlines tripped.

3. **Jun'13 (3 No. of Cases)**

At 1100 Hrs on 14.06.13, 132 kV Khliehriat(PG) – Khliehriat D/C tripped.

At **1620 Hrs on 18.06.13**, 132 kV Khliehriat(PG) – Khliehriat I & 132 kV Khliehriat(PG) – Khliehriat II line tripped.

At **1904 Hrs on 29.06.13,** 132 kV Khandong – Khliehriat I and 132 kV Kopili – KhandongIIlines tripped.

4. **Jul'13 (3 No. of Cases)**

At **1128 Hrs on 08.07.13,** Leshka HEP and132 kV Khleihriat(PG)-Khliehriat II tripped.

At **0932 Hrs on 09.07.13,** Leshka HEP, 132 kV Khandong-Khliehriat D/C & 132 kV 132 kV Khandong-Haflong lines tripped.

At **2149 Hrs on 30.07.13,** 132 kV Khleihriat – Badarpur S/C, 132 kV Khandong – Kopili I and II tripped.

C. Multiple tripping of elements in and around Sarusajai area

1. Jun'13 (2 No. of Cases)

At **1759 Hrs on 11.06.13**,220 kV Bus at Sarusajai S/S tripped, leading to tripping of 220 kV Sarusajai – Langpi D/C, 220 kV Sarusajai – Samaguri D/C, 220 kV Sarusajai – Agia S/C, 220 kV Sarusajai – Boko S/C & 220/132 kV ICT I, II & III.

At **1251 Hrs on 23.06.13,** 220 kV Sarusajai – Boko, 220 kV Sarusajai – Agia ,Samaguri – Sarusajai I & II, 220 kV Sarusajai – Langpi I & II, and 220/132 kV ICT, 3 x 100 MVA tripped.

2. Jul'13 (2 No. of Cases)

At**2008 Hrs on 25-07-2013**, 220/132 kV ICT-I,II and III at Sarusajai tripped.

At**1915Hrs on 26-07-2013**, 220/132 kV ICT-I,II and III at Sarusajai tripped.

SN	Name of Element	Owner	Tripping		Loss of load
			Date	Time	
May'13					
1	132kV Dimapur-Imphal	POWERGRID	03.05.13	05:35	Manipur Load : 40
	132 kV Jiribam-Loktak II				
	132 kV Loktak-Imphal				
	132 kV Imphal(PG)-Imphal I				
	132 kV Imphal(PG)-Imphal II	Manipur			
	132 kV Loktak-Ningthoukong				
2	132 kV Loktak-Imphal	POWERGRID	21.05.13	23:05	Manipur Load : 72
	132 kV Loktak-Ningthoukong	Manipur			
	132 kV Imphal(PG)-Imphal I				
	Loktak Unit III	NHPC			Loktak Gen - 35
3	132 kV Loktak-Imphal II	POWERGRID	22.05.13	15:37	Manipur Load : 50
	132 kV Jiribam-Loktak II				
	132 kV Loktak-Ningthoukong	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
4	132 kV Imphal-Imphal I	Manipur	22.05.13	15:44	Manipur Load : 33
5	132 kV Jiribam-Loktak II	POWERGRID	27.05.13	03:48	Manipur Load : 40
	132 kV Loktak-Imphal II				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Imphal - Imphal - I				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105 MW
6	132 kV Jiribam-Loktak II	POWERGRID	29.05.13	14:04	Manipur Load : 30
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Loktak - Rengpang				
	132 kV Loktak-Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
7	132 kV Loktak - Jiribam II	POWERGRID	31.05.13	12:43	Manipur Load : 20
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 90 MW
Jun'13					

1	132 kV Loktak - Jiribam II	POWERGRID	01.06.13	10:37	Manipur Load : 26
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
2	132 kV Loktak - Jiribam II	POWERGRID	16.06.13	11:52	Manipur Load : 63
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Imphal - Imphal - I				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100
3	132 kV Loktak - Jiribam II	POWERGRID	17.06.13	12:10	Manipur Load : 70
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100 MW
4	132 kV Loktak - Jiribam II	POWERGRID	17.06.13	12:50	Manipur Load : 28
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100 MW
5	132 kV Loktak - Jiribam II	POWERGRID	19.06.13	06:30	Manipur Load : 81
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105 MW
6	132 kV Loktak - Jiribam II	POWERGRID	29.06.13	13:36	Manipur Load : 75
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Loktak - Rengpang				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105

Jul'13

1	132 kV Loktak - Jiribam II	POWERGRID	14.07.13	18:35	Manipur Load : 106
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 91
2	132 kV Loktak - Jiribam II	POWERGRID	16.07.13	09:10	Manipur Load : 75
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			

2	132 kV Dimapur - Imphal	POWERGRID	16.07.13	09:10	
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
3	132 kV Loktak - Jiribam II	POWERGRID	17.07.13	19:47	Manipur Load : 105
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
4	132 kV Jiribam-Loktak II	POWERGRID	17.07.13	23:46	Manipur Load : 5
	132 kV Jiribam - Badapur				

	132 kV Jiribam - Haflong				
	132 kV Jiribam - Aizawl				
5	132 kV Loktak - Jiribam II	POWERGRID	30.07.13	10:05	Total Load Loss : 214 Manipur Load : 70 Loktak Gen - 68 MW
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			
6	132 kV Jiribam-Loktak II	POWERGRID	31.07.13	18:52	Manipur Load : 5
	132 kV Jiribam - Badapur				
	132 kV Jiribam - Haflong				
	132 kV Jiribam - Aizawl				

Aug'13

1	132 kV Loktak - Jiribam II	POWERGRID	09.08.13	0817	Manipur Load : 25
	132 kV Loktak - Ningthoukong	Manipur			
7	132 kV Loktak - Ningthoukong	POWERGRID	15.08.13	1102	Manipur Load : 68 Nagaland Load : 12
	132 kV Imphal (PG) - Imphal	Manipur			
	132 kV Karong - Kohima	Manipur/Nagaland			
8	132 kV Loktak - Imphal	POWERGRID	15.08.13	1314	Manipur Load : 69 Loktak Gen - 72
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			
9	132 kV Loktak - Imphal	POWERGRID	15.08.13	1436	Manipur Load : 40 Loktak Gen - 72
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			
10	132 kV Loktak - Imphal	POWERGRID	17.08.13	1111	Manipur Load : 20 Loktak Gen - 72 MW
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Loktak - Jiribam	POWERGRID			
	Loktak Unit I, II and III	NHPC			

SN	Name of Element	Owner	Tripping		Loss of load
			Date	Time	
May'13					
1	132kV Dimapur-Imphal	POWERGRID	03.05.13	05:35	Manipur Load : 40
	132 kV Jiribam-Loktak II				
	132 kV Loktak-Imphal				
	132 kV Imphal(PG)-Imphal I				
	132 kV Imphal(PG)-Imphal II	Manipur			
	132 kV Loktak-Ningthoukong				
2	132 kV Loktak-Imphal	POWERGRID	21.05.13	23:05	Manipur Load : 72
	132 kV Loktak-Ningthoukong	Manipur			
	132 kV Imphal(PG)-Imphal I				
	Loktak Unit III	NHPC			Loktak Gen - 35
3	132 kV Loktak-Imphal II	POWERGRID	22.05.13	15:37	Manipur Load : 50
	132 kV Jiribam-Loktak II				
	132 kV Loktak-Ningthoukong	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
4	132 kV Jiribam-Loktak II	POWERGRID	27.05.13	03:48	Manipur Load : 40
	132 kV Loktak-Imphal II				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Imphal - Imphal - I				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105 MW
5	132 kV Jiribam-Loktak II	POWERGRID	29.05.13	14:04	Manipur Load : 30
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Loktak - Rengpang				
	132 kV Loktak-Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
6	132 kV Loktak - Jiribam II	POWERGRID	31.05.13	12:43	Manipur Load : 20
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 90 MW
Jun'13					
1	132 kV Loktak - Jiribam II	POWERGRID	01.06.13	10:37	Manipur Load : 26
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
2	Loktak Unit I, II and III	NHPC	01.06.13	1132	Loktak Gen - 105
3	Loktak Unit II	NHPC	05.06.13	0525	Loktak Gen - 35
4	132 kV Loktak - Jiribam II	POWERGRID	16.06.13	11:52	Manipur Load : 63
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Imphal - Imphal - I				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100
5	132 kV Loktak - Jiribam II	POWERGRID	17.06.13	12:10	Manipur Load : 70
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100 MW
6	132 kV Loktak - Jiribam II	POWERGRID	17.06.13	12:50	Manipur Load : 28
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 100 MW
7	132 kV Loktak - Jiribam II	POWERGRID	19.06.13	06:30	Manipur Load : 81
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105 MW
8	132 kV Loktak - Jiribam II	POWERGRID	29.06.13	13:36	Manipur Load : 75
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Loktak - Rengpang				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105

Jul'13

1	132 kV Loktak - Jiribam II	POWERGRID	14.07.13	18:35	Manipur Load : 106
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 91
2	132 kV Loktak - Jiribam II	POWERGRID	16.07.13	09:10	Manipur Load : 75
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
3	132 kV Loktak - Jiribam II	POWERGRID	17.07.13	19:47	Manipur Load : 105
	132 kV Loktak - Imphal				
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 105
4	132 kV Loktak - Jiribam II	POWERGRID	30.07.13	10:05	Total Load Loss : 214
	132 kV Loktak - Ningthoukong	Manipur			Manipur Load : 70
	132 kV Dimapur - Imphal	POWERGRID			
	132 kV Imphal - Imphal	Manipur			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 68 MW

Aug'13

1	Loktak Unit I,II	NHPC	04.08.13	1342	Loktak Gen - 70
2	Loktak Unit II	NHPC	04.08.13	1559	Loktak Gen - 35
3	132 kV Loktak - Jiribam II	POWERGRID	09.08.13	0817	Manipur Load : 25
	132 kV Loktak - Ningthoukong	Manipur			
4	Loktak Unit II	NHPC	09.08.13	1559	Loktak Gen - 35
5	Loktak Unit II	NHPC	12.08.13	2126	Loktak Gen - 35
6	132 kV Loktak - Ningthoukong	POWERGRID	15.08.13	1102	Manipur Load : 68
	132 kV Imphal (PG) - Imphal	Manipur			Nagaland Load : 12
	132 kV Karong - Kohima	Manipur/Nagaland			
7	132 kV Loktak - Imphal	POWERGRID	15.08.13	1314	Manipur Load : 69
	132 kV Dimapur - Imphal				
	Loktak Unit I, II and III	NHPC			Loktak Gen - 72
8	132 kV Loktak - Imphal	POWERGRID	15.08.13	1436	Manipur Load : 40
	132 kV Loktak - Ningthoukong	Manipur			
	132 kV Dimapur - Imphal	POWERGRID			
	Loktak Unit I, II and III	NHPC			Loktak Gen - 72
9	132 kV Loktak - Imphal	POWERGRID	17.08.13	1111	Manipur Load : 20
	132 kV Loktak - Ningthoukong	Manipur			Loktak Gen - 72 MW
	132 kV Loktak - Jiribam	POWERGRID			
	Loktak Unit I, II and III	NHPC			

SN	Name of Element	Owner	Tripping		Loss of load (MW)
			Date	Time	
May'13					
1	132 kV Khliehriat-Khlieriat I	POWERGRID	06.05.13	21:28	Meghalaya : Gen Loss - 127 MW, Load Loss - 127 MW
	132 kV Khliehriat-Khlieriat II	MePTCL			
2	132 kV Khliehriat-Khlieriat I	POWERGRID	07.05.13	04:37	Meghalaya : Gen Loss - 42 MW, Load Loss - 42 MW
	132 kV Khliehriat - Khlieriat-II	MePTCL			
	132 kV Khandong-Khlieriat I	POWERGRID			
	132 kV Khandong-Khlieriat II				
3	132 kV Khandong-Khlieriat I	POWERGRID	07.05.13	10:15	Meghalaya : Gen Loss - 42 MW, Load Loss - 42 MW
	132 kV Khliehriat-Khlieriat II	MePTCL			
4	132 kV Khliehriat - Khlieriat-I	POWERGRID	08.05.13	23:00	Meghalaya : Gen Loss - 42 MW, Load Loss - 42 MW
	132 kV Khliehriat - Khlieriat-II	MePTCL			
	132 kV Khandong - Khlieriat-I	POWERGRID			
	132 kV Khandong- Khlieriat-II				
5	132 kV Khliehriat - Khlieriat-I	POWERGRID	09.05.13	15:21	Meghalaya : Gen Loss - 42 MW, Load Loss - 76 MW
	132 kV Khliehriat - Khlieriat-II	MePTCL			
6	132 kV Khandong-Khlieriat I	POWERGRID	16.05.13	12:35	Meghalaya : Gen Loss - 64 MW, Load Loss - 101 MW
	132 kV Khandong-Khlieriat II				
	132 kV Khliehriat-Khlieriat I				
	132 kV Khliehriat - Khlieriat-II	MePTCL			
7	132 kV Khliehriat-Khlieriat I	POWERGRID	16.05.13	14:22	Meghalaya : Gen Loss - 70 MW, Load Loss - 76 MW
	132 kV Khliehriat - Khlieriat-II	MePTCL			
9	132 kV Khliehriat-Khlieriat I	POWERGRID	26.05.13	16:40	Meghalaya : Gen Loss - 108 MW, Load Loss - 108 MW
	132 kV Khliehriat - Khlieriat-II	MePTCL			
10	132 kV Khliehriat-Khlieriat I	POWERGRID	29.05.13	14:34	Meghalaya : Gen Loss - 35 MW, Load Loss - 41 MW
	132 kV Khliehriat-Khlieriat-II	MePTCL			
13	132 kV Khliehriat-Khlieriat I	POWERGRID	31.05.13	16:03	Meghalaya : Gen Loss - 112 MW, Load Loss - 126 MW
	132 kV Khliehriat-Khlieriat-II	MePTCL			
Jun'13					
	132 kV Khliehriat-Khlieriat I				

1	132 kV Silchar - Panchgram	POWERGRID	02.06.13	17:15	Meghalaya : Gen Loss - 70 MW, Load Loss - 123 MW
	132 kV Badapur - Panchgram				
	132 kV Panchgram - Lumshnong	AEGCL/ MePTCL			
2	132 kV Khliehriat-Khlieriat I	POWERGRID	14.06.13	11:00	Meghalaya : Gen Loss - 70 MW, Load Loss - 102 MW
	132 kV Khliehriat-Khlieriat-II	MePTCL			
3	132 kV Khliehriat-Khlieriat I	POWERGRID	14.06.13	11:55	Load Loss - 24 MW
4	132 kV Khliehriat-Khlieriat I	POWERGRID	18.06.13	16:20	Meghalaya : Gen Loss - 86 MW, Load Loss - 128 MW
	132 kV Khliehriat-Khlieriat-II	MePTCL			
5	132 kV Khliehriat-Khlieriat II	MePTCL	18.06.13	19:20	Meghalaya : Gen Loss - 42 MW, Load Loss - 52 MW
6	132 kV Khliehriat-Khlieriat I	POWERGRID	22.06.13	23:15	Meghalaya : Gen Loss - 70 MW, Load Loss - 89 MW
Jul'13					
1	132 kV Khliehriat- Khliehriat II	MePTCL	08.07.13	11:28	Meghalaya : Gen Loss - 119 MW, Load Loss - 133 MW
2	132 kV Khandong-Khliehriat I	POWERGRID	09.07.13	09:32	Total Load loss: 245 Meghalaya : Gen Loss - 123 MW, Load Loss - 80 MW
	132 kV Khandong-Khliehriat II				
	132 kV Khandong-Haflong				
3	Leshka Units		27.07.13	0035	Meghalaya : Gen Loss - 136 MW, Load Loss - 213 MW
	Umiam St-I Units				
	Umiam St-II Units				
Aug'13					
1	132 kV Dimapur - Imphal	POWERGRID	13.08.13	1602	Total Load Loss : 505 Meghalaya Load : 210 Meghalaya Gen : 160
	220 kV Misa - Byrnihat I	MePTCL		1559	
	220 kV Misa - Byrnihat II			1602	

I. State - Nagaland

SN	Name of Element	Owner	Tripping		Loss of Load / Generation (MW)
			Date	Time	
May'13					
1	132 kV Dimapur - Dimapur	Nagaland	12.05.13	14:40	Nagaland : 18
Jun'13					
1	Doyang Units II and III	NEEPCO	19.06.13	0630	Doyang Gen - 50
2	132 kV Doyang – Dimapur II	POWERGRID	26.06.13	1307	Nagaland : 15
	Doyang Units I, II and III	NEEPCO			Doyang Gen - 50
Jun'13					
1	132 kV Dimapur - Dimapur	Nagaland	17.07.13	13:37	Nagaland : 43
2	Doyang Units I, II and III	NEEPCO	20.07.13	1155	Doyang Gen - 64
Aug'13					
1	132 kV Dimapur - Dimapur	Nagaland	04.08.13	11:34	Nagaland : 36
2	132 kV Dimapur (Nagaland) - Kohima	Nagaland	09.08.13	2030	Nagaland : 20
3	132 kV Dimapur - Dimapur	Nagaland	09.08.13	19:50	Nagaland : 51
4	132 kV Dimapur - Doyang I	POWERGRID	11.08.13	1521	Nagaland : 15
	132 kV Dimapur - Doyang II				
	Doyang Unit II	NEEPCO			Doyang Gen - 70
	132 kV Doyang - Mokokchang	Nagaland			
5	Doyang Unit II	NEEPCO	11.08.13	2337	Doyang Gen - 27

I. Utility- AGBPP

SN	Name of Element	Owner	Tripping		Loss of Generation (MW)
			Date	Time	
May'13					
1	AGBPP Unit 2,4 & Gas Compresser 4	NEEPCO	03.05.13	0931	130
2	AGBPP Unit 1,2,3,5,7,8,9		05.05.13	1432	165
3	AGBPP Unit 2,4 & Gas Compresser 2		08.05.13	0542	100
4	AGBPP Unit 5,6,7,8,9		09.05.13	0220	110
5	AGBPP Unit 2,4 & Gas Compresser 1		12.05.13	1245	130
6	AGBPP Unit 2,4 & Gas Compresser 1		15.05.13	0515	125
7	AGBPP Unit 2,4 & Gas Compresser 1			0740	125
8	AGBPP Unit 2,4 & Gas Compresser 2		21.05.13	1012	85
9	AGBPP Unit 2,4 & Gas Compresser 4			1635	95
10	AGBPP Unit 2,4 & Gas Compresser 2		28.05.13	0655	90
11	AGBPP Unit 2,4 & Gas Compresser 4			0915	95
Jun'13					
1	AGBPP Unit 2,4 & Gas Compresser 3	NEEPCO	03.06.13	0145	120
2	AGBPP Unit 2,4 & Gas Compresser 1			0413	110
3	AGBPP Unit 1,2 & Gas Compresser 4			1125	90
4	AGBPP Unit 1,2,4 & Gas Compresser 1		04.06.13	2145	105
5	AGBPP Unit 4 & Gas Compresser 4		07.06.13	0631	80
6	AGBPP Unit 2,4 & Gas Compresser 3			0906	70
7	AGBPP Unit 2,4 & Gas Compresser 4		10.06.13	0716	95
8	AGBPP Unit 3,4 & Gas Compresser 3			1629	75
9	AGBPP Unit 2,5 & Gas Compresser 2		12.0613	1001	65
10	AGBPP Unit 2 & Gas Compresser 3			1540	80
11	AGBPP Unit 2 ,4 & Gas Compresser 2		22.0613	2055	130
12	AGBPP Unit 2 ,4 & Gas Compresser 4		29.06.13	1545	115
Jul'13					
1	AGBPP Unit 1,2,3,4,5,6,7,9 & Gas Compresser 2,3,4	NEEPCO	01.07.13	1855	230
2	AGBPP Unit 2 & Gas Compresser 3		03.07.13	0551	100
3	AGBPP Unit 1,2,3,4,5,7 & Gas Compresser 2,4		10.07.13	0917	205
4	AGBPP Unit 8 & Gas Compresser 3		11.07.13	1200	140
5	AGBPP Unit 2,4,7,9 & Gas Compresser 1,3			1841	160
6	AGBPP Unit 2,4 & Gas Compresser 4		12.07.13	1102	135
7	AGBPP Unit 2,3,4 & Gas Compresser 4		15.07.13	1756	125
8	AGBPP Unit 2 & Gas Compresser 4		16.07.13	1255	130
9	AGBPP Unit 2 & Gas Compresser 4			1535	130
10	AGBPP Unit 2,4 & Gas Compresser 3		17.07.13	1410	130
11	AGBPP Unit 2,4 & Gas Compresser 3		18.07.13	2251	135
12	AGBPP Unit 1,4 & Gas Compresser 4		20.07.13	0120	135
13	AGBPP Unit 1,2,3,4,5,7 & Gas Compresser 1,4		25.07.13	1241	160
14	AGBPP Unit 2,4 & Gas Compresser 3		31.07.13	0836	130
Aug'13					
1	AGBPP Unit 2,4 & Gas Compresser 3	NEEPCO	01.08.13	1655	110
2	AGBPP Unit 2,3,4 & Gas Compresser 3		03.08.13	1745	80
3	AGBPP Unit 2,4 & Gas Compresser 4			1940	75
4	AGBPP Unit 2,7 & Gas Compresser 4		04.08.13	0912	95
5	AGBPP Unit 2,4,7 & Gas Compresser 2			1458	80
6	AGBPP Unit 2,3,7 & Gas Compresser 4			1556	80