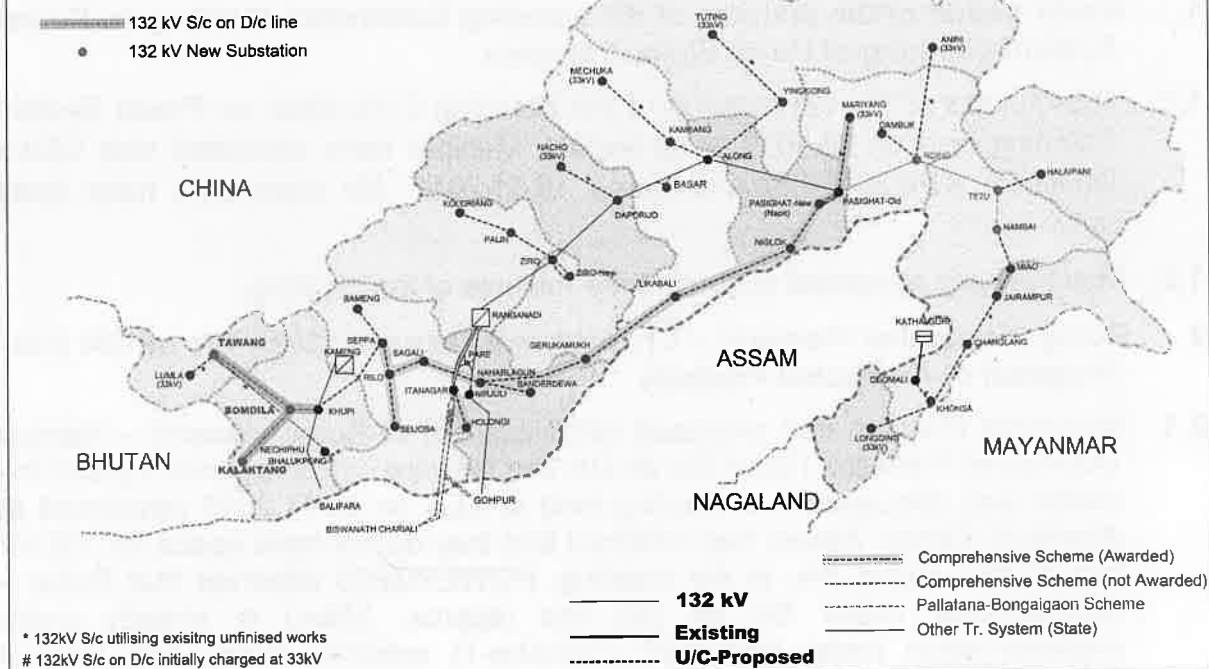


Agenda for 7th Standing Committee Meeting on Power System Planning of North Eastern Region (NER)

1. **Confirmation of the minutes of 6th Standing Committee Meeting on Power System planning of North Eastern Region**
 - 1.1. The minutes of the 6th meeting of the Standing Committee on Power System Planning held on 03.10.2016 at Imphal, Manipur were circulated vide CEA's letter no. 81/4/2016/PSPA-II/ dated 18.01.2017. No comments have been received.
 - 1.2. Members are requested to confirm the minutes of the meeting.
2. **Roing (Arunachal Pradesh) – Chapakhowa (Assam) 132kV S/c on D/c line– Proposal of Arunachal Pradesh**
 - 2.1. Arunachal Pradesh had proposed establishment of Rupai (Assam) – Namsai (Arunachal Pradesh) 132kV S/c on D/c line for reliability & redundancy and the matter was discussed in a meeting held at CEA on 25.11.2016 (**enclosed at Annex-I**). Earlier, Assam had informed that they do not have space for 132 kV bay at their Rupai S/s. In the meeting, POWERGRID informed that Rupai – Chapakhowa 132kV S/c on D/c line (approx. 35km) is already under implementation under NERPSIP (Tranche-1) scheme. Roing and Namsai substation are under construction by POWERGRID as part of Palatana – Bongaigaon scheme. Accordingly, in the meeting it was agreed that Roing (Arunachal Pradesh) – Chapakhowa (Assam) line may be taken up for implementation as ISTS instead of Rupai (Assam) – Namsai (Arunachal Pradesh) 132kV S/c on D/c line which passes through hilly terrains.
 - 2.2. The long existing/under construction 132kV network of Arunachal Pradesh viz. Ranganadi – Ziro – Daporijo – Along – Pasighat – Roing – Tezu – Namsai – Miao – Jairampur – Changlang – Khonsa – Deomail – Kathalguri would be fed from Ranganadi & Pare HEPs at one end and Kathalguri at other end. Thus, providing an additional feed (**Roing (Arunachal Pradesh) – Chapakhowa (Assam) 132kV S/c on D/c line**) to this long 132kV network would improve the reliability of power supply to Arunachal Pradesh. The matter was also deliberated in the 18th TCC/NERPC meetings held on 10th-11th Oct 2017, wherein the matter was recommended for approval of SCM.
 - 2.3. In view of the above, members may deliberate on implementation of Roing (Arunachal Pradesh) – Chapakhowa (Assam) 132kV S/c on D/c line as system strengthening works in NER under ISTS .

Comprehensive Strengthening Scheme : Arunachal Pradesh

Proposed to be included under the Comprehensive Scheme of Arunachal Pradesh



Upgradation/Augmentation of Transmission system

3. Reconductoring of 132kV Kopili – Khandong Line-1 with HTLS Conductor instead of ACSR Panther conductor - Agenda by POWERGRID

3.1. The transformation capacity at Kopili is being enhanced to 2x160 MVA, 220/132kV after installation of 2nd ICT which is under progress. However, there are two 132kV circuits between Kopili and Khandong HEPs. The Circuit # 2 is strung with ACSR Zebra conductor but, the Old Circuit # 1 is strung with ACSR Panther conductor. Thus, capacity of Circuit # 1 will limit the evacuation of power between Kopili and Khandong in the event of outage of Circuit # 2. Thus, to have (N-1) compliance between Kopili and Khandong HEP, the existing ACSR Panther Conductor needs to be replaced with HTLS conductor of ampacity of ACSR Zebra (about double the capacity of ACSR Panther conductor).

3.2. The issue was deliberated in 127th OCC Meeting and the requirement of re-conductoring was agreed by the members. The matter was again discussed and approved in the 18th TCC/NERPC meeting held on 10th-11th Oct 2017 and was further recommended for approval of SCM. The other circuit may also be replaced by HTLS conductor.

3.3. Members may like to discuss.

4. Reconductoring of Siliguri – Bongaigaon 400kV D/c Twin Moose line with Twin HTLS conductor- Agenda by POWERGRID

4.1. Presently the installed capacity of NER is about 3900MW (2300MW thermal and 1600MW Hydro+RE) and peak demand is of the order of 2500MW.

- 4.2. As per 19th EPS, the peak demand of NER is expected to be about 4500MW in 2021-22. Further, in the 14th JSC/JWG meetings held on 30th-31st Jan 2018, Bangladesh has informed that commissioning schedule of 500MW HVDC back-to-back station at North Comilla (Bangladesh) is Dec 2020. After commissioning of back-to-back station at North Comilla (Bangladesh), there would be an additional demand of 340MW for Bangladesh (presently 160MW is being exported to Bangladesh through Surajmaninagar(India)–North Comilla (Bangladesh) 400 kV D/c line (initially operated at 132 kV) . Thus, the total effective requirement of NER + Bangladesh would be about 5000MW.
- 4.3. Till 2021-22, some new major generations projects to be expected in NER viz. Kameng (600MW), Pare (110MW) and Bongaigaon TPS (3rd unit of 250MW) resulting in total installed capacity of about 4900MW (2550 thermal and 2350 (Hydro+RE)).
- 4.4. From above requirement, it may be observed that during peak demand and low hydro scenario in NER, there would be an import requirement of about 1700-1800MW (80% thermal and 50% hydro during peak: as per planning criteria) on ER to NER corridor. To meet this demand there are two 400kV lines viz. New Siliguri – Bongaigaon 400kV D/c line & Alipurduar – Bongaigaon 400kV D/c (Quad) line and Alipurduar – Bongaigaon 220kV D/c line. The Siliguri – Bongaigaon 400kV D/c line is designed to operate at maximum temp of 75°C, thus the thermal capacity of line would be about 875MVA per circuit (about 830MW at 0.95pf). Under N-1-1 of the Alipurduar – Bongaigaon 400kV D/c (Quad) line, loading on the remaining twin moose line would be close to/beyond thermal rating. Moreover, any further reduction in generation in NER during low hydro scenario shall only aggravate the situation under N-1-1. Accordingly, it is proposed that the Siliguri – Bongaigaon 400kV D/c line may be reconducted with Twin HTLS conductor (Ampacity of single HTLS shall be 1596A, which is equivalent to Twin ACSR Moose conductor for 45°C ambient and 85°C maximum conductor temperature) along with requisite modifications in line bay equipment at both ends.
- 4.5. Members may discuss.
5. **LILO of Kahilipara – Umtru 132kV D/c line at Killing S/s of Meghalaya – Agenda by AEGCL**
 - 5.1. To relieve the high loading on ICTs at Sarusajai GSS of AEGCL, and also to increase the reliability of power supply in greater Guwahati and its adjoining areas, AEGCL desires that the 132kV Kahilipara - Umtru D/c lines be LILOed at Killing GSS of MeECL. This reconfiguration of the network will also enhance the reliability of power supply in Umtru and Byrnihat areas of Meghalaya.
 - 5.2. Load flow studies have been carried out and it has been found that power flow on Umtru – Kahilipara 132kV D/c line is about 70MW per circuit towards Kahilipara and under N-1 condition, the power flow is about 110MW per circuit. With proposed LILO arrangement, the power flow on Killing – Kahilipara section is about 73MW per circuit and under N-1 the same is about 119MW on the remaining circuit. Thus, the subject proposal of AEGCL would not provide any relief. However, it was observed that with the implementation of 400/220kV substation at Sonapur by AEGCL, which is under planning stage, loading on

Umtru – Kahilipara 132kV D/c line is reduces to about 30MW per circuit towards Kahilipara.

5.3. **AEGCL may provide the schedule date to commissioning of 400/220kV substation at Sonapur .**

5.4. Members may deliberate.

6. Implementation of 132kV line bay at Palatana generation switchyard

6.1. Palatana – Surajmaninagar 400kV D/c line (initially operated at 132kV) has been commissioned as part of Palatana-Bongaigaon Transmission System. At present, 2 nos. 132kV line bays are available at Palatana end. Palatana – Udaipur 132kV S/c line of Tripura has been terminated in one bay and one ckt. of Palatana – Surajmaninagar D/c line is terminated in the other bay. Other ckt. of Palatana – Surajmaninagar D/c line is hanging at Palatana end.

6.2. In a meeting held on 18-07-2017 (**enclosed at Annex-II**) under Chairmanship of Member (Power System) CEA, it was decided that Palatana – Udaipur line would be disconnected from Palatana end for termination of both circuits of Surajmaninagar – Palatana lines in the existing line bays and to avoid unnecessary investment for construction of 3rd 132kV line bay at Palatana. Upon upgradation of Surajmaninagar substation (awarded to M/s Sterlite under TBCB, RfP schedule July 2020) and operation of Palatana – Surajmaninagar line to 400kV under NERSS-V, the 132kV line bays released could be utilized for termination of Palatana – Udaipur line. Accordingly, it was decided that the scope of implementation of 3rd 132kV line bay at Palatana GBPP switchyard by OTPC may be deleted.

6.3. Subsequently, the matter was deliberated in the 18th TCC/NERPC meetings held on 10th-11th Oct 2017, wherein Tripura requested for deferment of decision of opening of Palatana – Udaipur line till Apr 2018 and the same may be opened after commissioning of Monarchak – Surajmaninagar and Rokhia – Surajmaninagar 132kV D/c lines. In the meetings it was noted that – *“decisions taken in CEA meeting could not be revoked and requested Tripura to write to CEA/MoP so that they may be agreed for deferment till April, 2018 and requested TSECL to strictly adhere to the time line agreed in the meeting.”*

6.4. TSECL may provide the expected commissioning schedule of Monarchak – Surajmaninagar and Rokhia – Surajmaninagar 132kV D/c lines.

6.5. Members may discuss about the date of opening of Palatana – Udaipur 132kV line so as to enable termination of 2nd circuit of Palatana – Surajmaninagar 400kV line(operating at 132kV) at Palatana end.

7. Reviewing of “Transmission system for Phase-1 generation projects in Arunachal Pradesh” Scheme:

7.1. The following transmission system for Phase-1 hydro generation project in Arunachal Pradesh was discussed and finalised in the 3rd and 4th Standing Committee Meeting on Power System Planning of NER held on 21-12-2011 and 13-12-2014 respectively. Subsequently, the system was also discussed in the 35th meeting of Empowered Committee on Transmission held on 14-09-2015.

Transmission System

- a. Dinchang- Rangia/ Rowta Pooling Point 400 kV D/C (Quad).
 - b. LILO of both ckts of Balipara- Bongaigaon 400 kV D/C (Twin Moose) line at Rangia/ Rowta (2x D/C)
 - c. Establishment of 7x166 MVA 400/166 MVA 400/220 kV Pooling station (GIS) at Dinchang
 - d. Establishment of 2x500 MVA 400/220 kV Pooling station at Rangia/ Rowta in Upper Assam
- 7.2. Keeping in view the progress of Gongri HEP (144MW) of Dirang Energy Pvt. Ltd. it was decided in the 35th Empowered Committee Meeting on Transmission that the above transmission system may be taken up for implementation after ascertaining that the generation project developer had made considerable progress on site. Accordingly, a visit was made by CEA, POWERGRID and RECTPCL (BPC) to Gongri HEP site to assess the actual progress of the project. Subsequently, a meeting was held at CEA on 03rd Feb 2016 wherein, outcomes of the site visit were discussed and further it was decided to implement the above transmission system in matching time frame with the Gongri HEP.
- 7.3. Further, a team comprising of CEA, POWERGRID and RECPTCL again visited Gongri HEP and proposed Dinchang substation site on 1st-2nd March 2017 to review the progress. The report of the site visit is **enclosed at Annex-III**. As per the report, the construction work has been started in only one project i.e. Gongri HEP (of Dirang Energy Pvt. Ltd.) and no development were observed in the remaining three projects of Sew Nafra Power Corporation Ltd, Adishankar Khuitam Power Pvt. Ltd, and KSK Dibbin Power Pvt. Ltd. The commissioning of Gongri HEP is uncertain due to non-availability of funds. Accordingly, it was decided to review implementation of the above transmission system of **“Transmission system for Phase-1 generation projects in Arunachal Pradesh”**. In the 37th meeting of Empowered Committee on Transmission held on 20-09-2017 it has been decided that *“The scheme would be taken up for implementation after ascertaining the progress of hydro projects by CEA”*.
- 7.4. The transmission scheme inter alia includes construction of Rangia 400/220kV substation. As informed by AEGCL in the 6th NER-SCM, the Rangia 400kV substation is also required to feed its upcoming new 220kV substations of AEGCL viz. Rangia (AEGCL), Amingaon (AEGCL) and Rowta (AEGCL). Accordingly, it is proposed that Rangia 400kV substation may be implemented independent of the hydro projects in Arunachal Pradesh to be taken off from the subject scheme and may be implemented as a separate system strengthening. As and when the hydro projects progresses, the balance system could be taken up for implementation.
- 7.5. Thus, the transmission system under the scheme **“Transmission system for Phase-1 generation projects in Arunachal Pradesh”** shall stand modified as mentioned below:
- Deleted:**
- (a) Establishment of 7x166 MVA, 400/220kV pooling station (GIS) at Dinchang in Arunachal Pradesh
 - (b) Dinchang - Rangia / Rowta Pooling station 400kV D/c line (with ACSR Quad Moose conductor)

Modified scheme:

- (a) Establishment of 2x500MVA, 400/220kV substation at Rangia / Rowta
- (b) LILO of Balipara - Bongaigaon 400kV D/c (Twin Moose) line at Rangia / Rowta Pooling station

7.6. AEGCL needs to confirm requirement of total no. of 220kV line bays at Rangia / Rowta 400/220kV substation. It is understood that presently two 220kV D/c lines one each to Rangia (Assam), Amingaon (Assam) and Rowta (AEGCL) substations has been identified.

8. Strengthening of transmission system in Assam including formation of second 400kV node in ER-NER corridor-Agenda by PowerGrid

8.1. In the 5th SCM of NER, it was agreed that there is a need for 2nd 400kV AC node in NER for interconnection with national grid to address the case of any eventuality at Bongaigaon S/s. Additionally, there was requirement for establishment of a substation in Assam for development of NER – Bangladesh – ER interconnection. Accordingly, in the 6th SCM of NER it was decided to build a new 400kV substation at Bornagar in Assam with Bornagar (Assam, NER) – Parbotipur (Bangladesh) – Katihar (Bihar, ER) 765kV D/c line (initially to be operated at 400 kV). In the 14th JSC/JWG meetings held on 30th-31st Jan 2018, it was decided that the proposal may be re-examined considering the short-term and the long-term power transfer requirement as well as benefits of India and Bangladesh. This proposal is under finalisation. Till the finalisation of the said proposal, to fulfil the requirements of establishment of second 400kV node in NER-ER corridor for improving reliability of NER grid, it is proposed that Bornagar substation may be implemented as a strengthening scheme for NER grid with following scope of works.

A. Establishment of second 400kV node in NER-ER corridor

- (a) Establishment of 400kV switching substation at Bornagar in Assam (upgradable to 765kV), about 50km away from Bongaigaon
- (b) LILO of Bongaigaon – Balipara 400kV D/c (Quad Moose) line at Bornagar
- (c) Extension of Alipurduar – Bongaigaon 400kV D/c (Quad Moose) line to Bornagar substation bypassing Bongaigaon

8.2. Members may deliberate on implementation of Bornagar substation would be as a part of NER-Bangladesh-ER interconnection instead of strengthening scheme for NER grid.

9. 500MW HVDC back-to-back station at North Comilla (Bangladesh) for transfer of power through Surjamaninagar – North Comilla link – Agenda by PowerGrid

9.1. In the 12th Joint Working Group (JWG) / Joint Steering Committee (JSC) meetings on Indo-Bangladesh Cooperation in power sector held on 10th-11th Dec 2016, the possibility for supplying 500MW power through Surjamaninagar – North Comilla link to Bangladesh by 400kV operation of the link along with establishment of 500MW HVDC Back-to-Back terminal at North Comilla (Horindhora) was discussed. The project report on the same was discussed in the 13th JSC/JWG meetings held on 27th-28th Sept 2017 and it was decided to take up implementation of the project. Accordingly, implementation of Indian

- portion of the project was entrusted to POWERGRID. It was also decided that Bulk Power Transmission Agreement (BPTA) would be signed between POWERGRID and Bangladesh for sharing of transmission charges for Indian portion of the link by Bangladesh.
- 9.2. For 400kV operation of the Surjamaninagar – North Comilla link, the line needs to be shifted by POWERGRID from 132kV bus of Surajmaninagar (TSECL) 132kV S/s to 400kV bus of Surajmaninagar (ISTS) 400/132kV S/s (being implemented under NERSS-V) which shall involve construction of additional line section at Surjamaninagar end and 2nos. 400 line bays at Surajmaninagar (ISTS) S/s for termination of Surajmaninagar –North Comilla 400 kV D/c .
- 9.3. In the 14th JSC/JWG meetings held on 30th-31st Jan 2018, Bangladesh has informed that the expected commissioning schedule of Bangladesh portion of the link is Dec 2020.
- 9.4. System studies have been carried out for 2021-22 time frame considering 500MW (i.e. additional 340MW over and above 160MW, which is already being transferred with 132kV operation of the link) transfer to Bangladesh through 400kV operation of Surjamaninagar – North Comilla line. Under high hydro scenario in NER, and additional input from Bhutan and Sikkim line loading are generally in order, for transfer of 500MW to Bangladesh. However, under low hydro scenario, loading on Siliguri – Bongaigaon (Twin) and Bongaigaon – Azara 400kV D/c lines are increased, but loading is found to be within permissible limit.
- 9.5. Members may note and discuss.
- 10. Modification in scheme - Additional ± 800 kV HVDC Corridor in the chicken neck area under North East – Northern/Western Interconnector Project**
- 10.1. In order to avoid theft of tower members of the erected towers in the additional three HVDC corridors in the chicken neck area, Tack Welding up to Cross Arm Level was approved in the 6th NER-SCM.
- 10.2. Foundation works on the entire corridor (the three additional corridors) has been completed. However, tower erection is yet to be completed at seven locations (six locations in route-1 and one location in route-2) due to stiff resistance from local people. As the foundation work at all locations (including the seven locations) has already been completed, the objective of blocking the corridor for HVDC lines has been achieved. Accordingly, at this situation, it is proposed to delete the scope of tower erection at these seven locations in the chicken neck from the scope of works. However, tower erection of seven locations in the chicken neck area would be taken up at the time of erection of the lines in the corridors.
- 10.3. Members may discuss.
- 11. Strengthening of Khandong bus – Agenda by NERLDC**
- 11.1. The 2x25MW Khandong power station would complete its useful service life in April, 2019. NEEPCO is in the process of R&M of the power station for life extension. Accordingly, order has been placed with M/s CPRI for field study and DPR preparation. Khandong switchyard is having Double Bus & transfer facility and bus conductor is single Zebra and all the jack buses and jumpers are single Panther.

11.2. During 129th OCC meeting, NERLDC informed that the SC level at the Khandong 132kV bus is expected to be about 11kA after considering the future system upgradations, while the 3-phase SC level is expected to be 2000MVA. The forum recommended bus upgradation at Khandong. Therein, NEEPCO informed that prima facie, it appears that bus should be upgraded. Since the structure cannot support Twin Moose, HTLS Zebra would be considered for strengthening bus.

11.3. The matter was further discussed in 18th TCC/NERPC meeting held on 10th-11th Oct 2017, therein the matter has been recommended for approval of SCM. The three phase fault current at Khandong 132kV bus in future time frame has been found to be about 8525A (1950MVA).

11.4. Members may discuss.

12. Downstream system development by STUs from the various commissioned and on-going ISTS substations

12.1. Downstream system at 132/33kV Sihhmui S/s (P&E Dept, Mizoram)

12.1.1. POWERGRID is implementing 132kV switching station at Melriat along with (a) Silchar – Melriat 400kV D/c line (initially to be operated at 132kV), (b) Melriat – Sihhmui 132kV D/c line and (c) LILO of Aizawl – Zemabawk at Melriat under Palatana-Bongaigaon scheme. The line at (a) is expected to be completed by Mar 2018. The elements at (b) and (c) are ready for commissioning. However, the downstream network at Sihhmui (Mizoram) S/s which includes installation of 132/33kV ICTs and 33kV lines are not ready.

12.1.2. In view of the above, Mizoram is required to indicate the expected completion / commissioning schedule of downstream network at its Sihhmui S/s so as enable utilisation of under construction ISTS system, which is in advance stages of completion.

12.2. In the 6th SCM of NER, members agreed to drop the 2 nos. 132kV line bays at both Surajmaninagar and P.K. Bari and include space for 2 no. additional 132kV line bays at both Surajmaninagar and P.K. Bari substations for future usage of TSECL. Members also agreed to delete the 2 no. 220kV bays at New Kohima 400/220 kV S/S and accordingly agreed that space for future 220 kV bays may be increased by 2 numbers at New Kohima. Regarding Rangia / Rowta 400/220kV S/s, members agreed to increase the number of 220kV line bays from four to six on request of Assam. It was also agreed that 2 no. 220kV bays at Bongaigaon substation may be deleted (viz. from four to two bays).

12.3. The downstream 220kV or 132kV system to be developed by ISTS licensee/ STUs from the various commissioned /on-going ISTS substations is as below:

Sl. No.	ISTS S/s	Voltage ratio, Trans. Cap	Voltage level (kV)	Total no. of Bays	Lines emanating from S/s	No. of circuit	Status of Lines	Remarks
1	Biswanath Chariali	400/132kV, 2x200MVA	132	2 - Existing	Biswanath Chariali- Pavoi	2	Existing	
				2 - to be awarded	Biswanath Chariali – Itanagar	2	Under TBCB	NERSS-II Part-B (RfP Schedule Mar 2020)
2	Bongaigaon	400/220kV, 1x315MVA +1x315MVA	220	2 - Awarded	Bongaigaon- Salakati	2	Under Const. by POWERGRID	NERSS-III (Exp. Comm. Mar 2018)

Sl. No.	ISTS S/s	Voltage ratio, Trans. Cap	Voltage level (kV)	Total no. of Bays	Lines emanating from S/s	No. of circuit	Status of Lines	Remarks
3	Surajmani-nagar	400/132kV, 2x315MVA	132	2 - (RfP Schedule Jul 2020)	Surajmaninagar (TSECL) – Surajmaninagar (TBCB)	2	Tripura to update	NERSS-V
4	P. K. Bari	400/132kV, 2x315MVA	132	2 - (RfP Schedule Jul 2020)	P. K. Bari (TSECL) – P. K. Bari (TBCB)	2	Tripura to update	NERSS-V
5	New Mariani	400/220kV, 2x500MVA	220	2 - to be awarded	New Mariani – Mariani	2	Assam to update	NERSS-VI
6	New Kohima	400/220kV, 2x500MVA	220	2 - (RfP Schedule Jul 2020)	New Kohima (TBCB) – New Kohima (Nagaland)	2	Nagaland to update	NERSS-VI
7	Rangia	400/220kV, 2x500MVA	220	6 - Rangia S/s implementation is being reviewed	Rangia (TBCB) – Rangia (Assam)	2	Assam to update	Trans. Sys. for Phase-1 I PPs in Arunachal Pradesh (Rangia S/s may be implemented as a separate project as proposed above)
					Rangia (TBCB) - Armingaon (AEGCL)	2	Assam to update	
					Rangia (TBCB) - Rowta (AEGCL)	2	Assam to update	

12.4. Mizoram (regarding Sihmui), Assam, Tripura and Nagaland may update the status of their respective scope.

13. Proposed scheme for relieved congestion in Agia sus-station of Assam – Agenda by AEGCL

13.1. The 220kV lines emanating from Agia GSS of AEGCL are being made to carry high quantum of load to the extent of more than the optimal limit due to additional loading on 132kV Agia - Mendipather line (50MW). On the other hand no tariff benefit accrues to AEGCL due to the conditions imposed by PoC regulations.

13.2. AEGCL desires that a 220kV GSS either in West Garo Hills district or in the East Garo Hills district of Meghalaya should be set up as ISTS and this S/s may be connected through construction of a new 220kV double circuit transmission line from Bongaigaon (PG) GSS. Later on, this GSS may be connected to other POWERGRID S/s in Meghalaya or elsewhere. This 220kV GSS will not only relieve high loading on the AEGCL transmission lines but will also enhance the reliability of the system in the western parts of Meghalaya.

13.3. Meghalaya may indicate requirement of 220kV substation in western part of the state.

14. Implementation of Additional 132 kV Scheme Proposed by Arunachal Pradesh under Comprehensive Scheme of Arunachal Pradesh- Proposal by Ar. Pradesh

14.1. A proposal of Ar. Pradesh was discussed in the meeting held on 05.12.2017(**enclosed at Annex-IV**) under the Chairmanship of Member (Power System) to discuss about implementation of Additional 132 kV Scheme.

14.2. In the meeting, it was agreed that the following additional transmission links and substations are technically required for development of Arunachal Pradesh:

- (i) *Khupi – Bomdila – Tawang 132kV S/c line on D/c tower alongwith 7x5MVA 132/33kV S/s each at Bomdila & Tawang*
- (ii) *Bomdila – Kalaktang 132kV S/c line on D/c tower alongwith 4x5MVA 132/33kV S/s at Kalaktang*

14.3. Considering importance of the above proposed lines and substations, implementation of the same may be taken up initially and subsequently implementation of following high altitude lines may be taken up.

- a) 132 kV S/C Ziro – Palin (S/C on D/C Tower)
- b) 132 kV S/C Palin – Koloriang (S/C on D/C Tower)
- c) 132 kV S/C on D/C Tower Along – Kambang
- d) 132 kV S/C on D/C Tower Kambang – Mechuka
- e) 132 kV S/C on D/C Tower Roing – Dambuk
- f) 132 kV S/C on D/C Tower Tezu – Halaipani
- g) 132 kV S/C on D/C Tower Roing – Anini
- h) 132 kV S/C on D/C Tower Along – Yingkiang
- i) 132 kV S/C on D/C Tower Yingkiang – Tuting

14.4. It was also agreed that the matter may be taken up with Ministry of Power for approval in regard to inclusion of the above scope of work in the ongoing Comprehensive Scheme of Arunachal Pradesh. Based on approval of MoP, POWERGRID shall award the works covered under new scope mentioned above.

14.5. Members may discuss.

15. North East – Northern / Western Interconnector-I Project

15.1 In view of huge hydro potential in NER, Sikkim and Bhutan it was envisaged to construct a high capacity HVDC line connecting NER with rest of the Indian grid along with provision of three additional corridors in the Chicken Neck area for future HVDC lines. Keeping in view the construction of Lower Subansiri (2000MW) and Kameng (600MW) hydro projects in NER and availability of surplus power in NER, ± 800 kV Biswanath Chariali – Agra HVDC Bipole line along with other AC system was planned as part of the subject project. For implementation purpose the scheme was divided into three parts, however, single investment approval from POWERGRID's Board of Directors was taken for the complete scheme as per the following scope of works:

➤ **Part-A: North East – Northern / Western Interconnector – I**

- (i) Biswanath Chariyali – Agra ± 800 kV, 6000MW HVDC bipole line

(This includes 22km of four (4) nos. of corridors with ± 800 kV HVDC towers in the chicken neck area. Two of the corridors would be utilised by stringing of the Biswanath Chariyali – Agra HVDC bipole line (one pole in each corridor) while the other two corridors would be strung with single panther conductor per corridor charged at 132kV. Further, this would include Earth Electrode line of 50km length at Biswanath Chariyali end and of 40km length at Agra end.)

- (ii) Balipara – Biswanath Chariyali 400kV D/c line
- (iii) LILO of Ranganadi – Balipara 400kV D/c line at Biswanath Chariyali (the existing 2x50MVAR line reactors at Balipara end to be made switchable after LILO)
- (iv) Biswanath Chariyali – Biswanath Chariyali (AEGCL) 132kV D/c line
- (v) Establishment of 400/132kV Pooling Station at Biswanath Chariyali with 2x200MVA, 400/132/33 kV transformers alongwith associated line bays

- (vi) HVDC rectifier module of 3000MW at Biswanath Chariyali and inverter module of 3000MW capacity at Agra
- (vii) Augmentation of 400kV Agra substation by 1x315MVA (4x105MVA), 400/220/33kV transformer alongwith associated bays
- (viii) Extension of 400kV line bays at Balipara substation
- (ix) Extension of 132kV line bays at Biswanath Chariyali (AEGCL) substation
- (x) 420kV, 2x80MVA bus reactor at Biswanath Chariyali
- (xi) 420kV, 1x80MVA bus reactor at Bongaigaon

➤ **Part-B: Transmission System for immediate evacuation of power from Kameng HEP**

- (i) Kameng – Balipara 400kV D/c line
- (ii) Balipara – Bongaigaon 400kV D/c line (Quad conductor) with 30% Fixed Series Compensation (FSC) at Balipara end
- (iii) 400/220kV, 315MVA 2nd ICT at Misa
- (iv) Extension of 400kV line bays at Bongaigaon and Balipara substations
- (v) 420kV, 1x80MVA bus reactor at Balipara
- (vi) 1x63MVA fixed line reactor at both ends on each circuits of Balipara – Bongaigaon 400kV D/c line (total 4 no. of reactors)

➤ **Part-C: Transmission System for immediate evacuation of power from Lower Subansiri HEP**

- (i) Lower Subansiri – Biswanath Chariyali (Pooling Point) 400kV 2xD/c line with twin lapwing conductor
- (ii) Extension of 400kV line bays at Biswanath Chariyali Pooling Substation
- (iii) 1x63MVA switchable line reactor at Biswanath Chariyali end on each circuits of Lower Subansiri – Biswanath Chariyali 400kV 2xD/c line (total 4 no. of reactors)

15.2 (a) All the elements of Part-A have been commissioned.

(b) Under Part-B, expect Kameng – Balipara 400kV D/c line (and associated bays) all other elements have been commissioned. The line has been delayed in view of delay in commissioning of Kameng HEP by NEEPCO. The transmission line and generation project are expected to be commissioned shortly in matching time-frame.

(c) Part-C inter alia includes immediate evacuation line for Lower Subansiri HEP (2000MW) of NHPC viz. Lower Subansiri – Biswanath Chariyali 400kV 2xD/c line with twin lapwing conductor. The Lower Subansiri HEP is delayed and in the latest CEA quarterly (July - Sept 2017) progress report of hydro projects, status of the hydro project has been mentioned as 4 years from restart of works. The

transmission line scheme is being short closed on account of uncertainty in implementation of the associated generation project.

The Lower Subansiri – Biswanath Chariyali lines were planned along with 4x63MVAR line reactors at Biswanath Chariyali end. In order to control high voltage in the NER grid under off-peak or low hydro scenarios, out of four 63MVAR line reactors at Biswanath Chariyali, two reactors were approved to be installed as bus reactors at Biswanath Chariyali S/s itself in the 6th SCM of NER held on 03-10-2016. The said 2x63MVAR reactors have been commissioned as bus reactors.

- 15.3 Under the subject project, in the 6th SCM of NER held on 03-10-2016 it was agreed to delete stringing and anti-theft charging of other three corridors in the chicken neck area. In place of this, it was approved to only tack weld up to cross arm level on the towers erected in three additional corridors in the chicken neck area to avoid theft of tower members.
- 15.4 In the 33rd and 34th SCM of NR held on 23-12-2013 and 08-08-2014 respectively it has been approved to replace the 50MVAR line reactors at Agra end of Agra – Sikar 400kV D/c line with 80MVAR line reactors as part of North East – Northern / Western Interconnector-I Project. The same has been commissioned.
- 15.5 In view of the above, it is proposed that Part-C of the project except the 2x63MVAR switchable line reactors (installed as bus reactor) at Biswanath Chariyali may be delinked from the main scheme and may be taken up as an independent scheme as “**Transmission System for immediate evacuation of power from Lower Subansiri HEP**”. The revised name and scope of works of two scheme would be as follows:

(a) North East – Northern / Western Interconnector-I Project

➤ **Part-A: North East – Northern / Western Interconnector – I**

- (i) Biswanath Chariyali – Agra ± 800 kV, 6000MW HVDC bipole line
(This includes 22km of four (4) nos. of corridors with ± 800 kV HVDC towers in the chicken neck area. One corridor is to be utilised by the above HVDC bipole line. In the other three corridors, tack-welding upto cross-arm level needs to be carried out to avoid theft of tower members. Further, this would include Earth Electrode line of 50km length at Biswanath Chariyali end and of 40km length at Agra end.)
- (ii) Balipara – Biswanath Chariyali 400kV D/c line
- (iii) LILO of Ranganadi – Balipara 400kV D/c line at Biswanath Chariyali (the existing 2x50MVAR line reactors at Balipara end to be made switchable after LILO)
- (iv) Biswanath Chariyali – Biswanath Chariyali (AEGCL) 132kV D/c line
- (v) Establishment of 400/132kV Pooling Station at Biswanath Chariyali with 2x200MVA, 400/132/33 kV transformers alongwith associated line bays
- (vi) HVDC rectifier module of 3000MW at Biswanath Chariyali and inverter module of 3000MW capacity at Agra
- (vii) Augmentation of 400kV Agra substation by 1x315MVA (4x105MVA), 400/220/33kV transformer alongwith associated bays
- (viii) Extension of 400kV line bays at Balipara substation

- (ix) Extension of 132kV line bays at Biswanath Chariyali (AEGCL) substation
- (x) 420kV, 2x80MVA bus reactor at Biswanath Chariyali
- (xi) 420kV, 1x80MVA bus reactor at Bongaigaon

➤ **Part-B: Transmission System for immediate evacuation of power from Kameng HEP**

- (i) Kameng – Balipara 400kV D/c line
- (ii) Balipara – Bongaigaon 400kV D/c line (Quad conductor) with 30% Fixed Series Compensation (FSC) at Balipara end
- (iii) 400/220kV, 315MVA 2nd ICT at Misa
- (iv) Extension of 400kV line bays at Bongaigaon and Balipara substations
- (v) 420kV, 1x80MVA bus reactor at Balipara
- (vi) 1x63MVA fixed line reactor at both ends on each circuits of Balipara – Bongaigaon 400kV D/c line (total 4 no. of reactors)
- (vii) Installation of 2x63MVA switchable line reactor of Biswanath Chariyali end of Lower Subansiri – Biswanath Chariyali 400kV 2xD/c line as bus reactor at Biswanath Chariyali S/s
- (viii) Replacement of 50MVA line reactors at Agra end of Agra – Sikar 400kV D/c line with 80MVA line reactors (total 2 reactors)

(b) Transmission System for immediate evacuation of power from Lower Subansiri HEP

- (i) Lower Subansiri – Biswanath Chariyali (Pooling Point) 400kV 2xD/c line with twin lapwing conductor
- (ii) Extension of 400kV line bays at Biswanath Chariyali Pooling Substation
- (iii) Installation of new 2x63MVA switchable line reactor at Biswanath Chariyali end on each circuits of Lower Subansiri – Biswanath Chariyali 400kV 1st D/c line.
- (iv) The existing 2x63MVA switchable line reactors installed as bus reactors at Biswanath Chariyali end (under the North East – Northern / Western Interconnector-I Project) are to be reinstalled as switchable line reactors in the Lower Subansiri – Biswanath Chariyali 400kV 2nd D/c line.

15.6 Members may approve.

