भारत सरकार / **Government of India**
विद्युत मंत्रालय / **Ministry of Power**
केन्द्रीय विद्युत प्राधिकरण / **Central Electricity Authority**
विद्युत प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग - I
Power System Planning & Project Appraisal Division-I
सेवा भवन, आर.के.पुरम, नई दिल्ली - **110066**
Sewa Bhawan, R. K. Puram, New Delhi-110066 **[ISO: 9001:2008]**

No. 1/9/39th /PSP&A-I/2017 / 783 -802 **Dated: 28.7.2017**

-As per list enclosed-

विषय: उत्तरी क्षेत्र की विद्युत प्रणाली योजना पर स्थायी समिति की 29-30 मई 2017को आयोजित 39वीं बैठक के कार्यवृत्त

Sub: 39th Meeting of Standing Committee on Power System Planning of Northern Region held on 29-30th May, 2017- Minutes of the meeting

Sir/ Madam,

The 39th meeting of the Standing Committee on Power System Planning of Northern Region was held on 29-30th May, 2017 at NRPC conference Room, NRPC Katwaria Sarai, New Delh.

The Minutes of the meeting has been uploaded on CEA website: www.cea.nic.in (path to access – Home Page -Wing specific document/power system related reports/ Standing Committee on Power System Planning/ Northern region).

Yours faithfully,

28/7/2017

(अवधेश कुमार यादव) /(Awdhesh Kr Yadav)
निदेशक/ Director

1.	Member, Secretary, NRPC, 18-A Shajeed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi - 110016 (Fax-011-26865206)	2.	Director (W &P) UPPTCL, Shakti Bhawan Extn,3rd floor, 14, Ashok Marg, Lucknow - 226 001 (Fax:0522-2287822)	3.	Director (Projects) PTCUL, Urja Bhawan Campus, Kanawali Road Dehradun-248001. Uttrakhand Fax-0135-276431
4.	Director (Technical), Punjab State Transmission Corporation Ltd. (PSTCL) Head Office The Mall Patiala -147001 Fax-0175-2304017	5.	Member (Power) BBMB, Sectot-19 B Madhya Marg, Chandigarh-1 60019 (Fax-01 72-2549857	6.	Director (Operation) Delhi Transco Ltd. Shakti Sadan, Kotla Marg, New Delhi-110002 (Fax-01123234640)
7.	Director (Technical) RRVPNL, Vidut Bhawan, Jaipur-302005. Fax-:0141-2740794	8.	Director (Technical) HVPNL Shakti Bhawan, Sector-6 Panchkula-134109 Fax-0172-256060640	9.	Director (Technical) HPSEB Ltd. Vidut Bhawan, Shimla -171004 Fax-0177-2813554
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13.	Chief Engineer (Transmission) NPCIL, 9-S-30, Vikram Sarabahai Bhawan, Anushakti Nagar, Mumbai-400094 Fax-022-25993570	14.	Director (T&RE) NHPC Office Complex, Sector-33, NHPC, Faridabad-121003 (Fax-0129-2256055)	15	Director (Projects) NTPC, NTPC Bhawan, Core 7, Scope Complex-6, Institutional Area, Lodhi Road. New Delhi (Fax-011-24361018)
16.	Director (Technical) THDC Ltd. Pragatipuram, Bypass Road, Rishikesh-249201 Fax: 0135-2431519)	17	Director (Projects) POWERGRID Saudamini Plot no. 2, Sector - 29. Gurgaon-122 001 (Fax-0124-2571809)	18.	CEO, POSOCO B-9, Qutab Institutional Area, Katwaria Sarai New Delhi – 110010 (Fax:2682747)
19.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)				

Minutes of 39th Meeting of the Standing Committee on Power System Planning of Northern Region held on 29-30th May, 2017 at NRPC, New Delhi.

List of participants is enclosed at Annexure-I.

Chief Engineer (PSPA-I), CEA welcomed the participants to the 39th meeting of the Standing Committee on Power System Planning of Northern Region (SCPSPNR). He said that Member (PS), CEA has to attend a meeting on Standing Committee on Energy and he will be joining the meeting in the afternoon. He stated that the last meeting of SCPSPNR was held on 29.5.2016 and we are meeting after a gap of about one year. The agenda of the meeting is quite lengthy, therefore, the members are requested to be specific in deliberation and arrive at decision. He then requested Director (PSPA-I), CEA to take up the agenda items for discussions.

Director (PSPA-I), CEA welcomed the pariticapants and stated that agenda for the meeting has some important issues, which are under discussions from last 3-4 meetings of SPSPNR viz high short circuit level at various substations in Northern Region, upgradation of Rihand-Dadri HVDC link, issues related to Rajghat S/s in Delhi NCR etc. He requested the participants to discuss all the issues in holistic manner so that disicion could be arrived at through consensus.

1.0 Confirmation of the Minutes of the 38th meeting of the Standing Committee on Power System Planning of Northern Region held on 30.5.2016.

1.1 CEA stated that the minutes of 38th meeting of SCPSPNR were issued vide CEA letter no. 1/9/38/2016/PSP&PA-I/721-739 dated 8th June, 2016. Subsequently, POWERGRID vide letter no C/CTU/N/PLG dated 23-6-2016 and RRVPNL vide their letter no RVPN/SE (P&P)/PSS/D.596 dated 16.6.2016 had made some observations on the minutes of the meeting. Some of the observations made by PGCIL and RRVPNL were considered and CEA vide letters of even no. dated 20.7.2016 and 19.10.2016 had issued Corrigendum-I and Corrigendum-II to the minutes of the meeting (copy enclosed at Annexure-II & III). The other observations, which required further deliberations, have been included as the agenda items for this meeting. He requested members of the committee to confirm the minutes of the meetig along with the Corrigendum-I and II.

1.2 The minutes of the 38th meeting of SCPSPNR along with Corrigendum-I and II were confirmed.

2.0 Review of intra state transmission scheme for evacuation of power from western part of Rajasthan

2.1 CEA stated that following intra-state transmission system in Rajasthan was agreed to be implemented by RRVPNL for interconnection with inter-state transmission system viz. Bhuj-Banaskantha-Chittorgarh-Ajmer-Bikaner-Moga 765 kV D/C line under green energy corridor-I in the 38th meeting of SCPSPNR held on 30/05/2016:

i) Korna (RRVPNL)-Ajmer (PG) 765 kV D/c line with 2x240 MVAR, switchable line reactors at Korna and Ajmer substations (line and bays with line reactors at Korna to be implemented by RRVPNL).

ii) LILO of 2nd ckt. of 400 kV D/C Bhadla (RRVPN)–Bikaner (RRVPN) line at Bikaner (PG) (LILO line to be implemented by RRVPNL)

Note:

- *POWERGRID to provide 2 nos. of 765 kV line bays at 765/400 kV Ajmer (PG) along with 2x240 MVAR, 765 kV switchable line shunt reactors*
- *POWERGRID to provide 2 nos. of 400 kV line bays at 765/400 kV Bikaner (PG)*

RRVPN vide its letter dated 16/06/2016 has requested CEA to issue corrigendum stating that following elements mentioned at item no 19.6 of the minutes of 38th meeting of SCPSPNR may be implemented under ISTS:

(i) POWERGRID to provide 2 nos. of 765 kV line bays at 765/400 kV Ajmer (PG) along with 2x240 MVAR, 765 kV line type switchable shunt reactors

(ii) POWERGRID to execute LILO of 2nd ckt. of 400 kV D/C Bhadla (RRVPN)–Bikaner (RVPN) Quad Moose line at Bikaner 765/400 kV (PG) GSS (in addition to already approved first circuit in 36th meeting of SCPSPNR) and

(iii) POWERGRID to provide two nos. of 400kV line bays at 765/400kV Bikaner

In the minutes of 38th meeting of SCPSPNR, it is mentioned that item no (i) above would be implemented by POWERGRID and item no (ii) would be implemented by RRVPNL.

Subsequently, RRVPNL vide letter dated 16-02-2017 addressed to POWERGRID has mentioned that in view of implementation of 765 kV Fatehgarh pooling station (to be initially operated at 400kV) under ISTS, RRVPN has reviewed their RE evacuation plan from Western Rajasthan. RRVPN has now proposed the following 400kV interconnection in place of Korna 765/400 kV GSS and its connectivity with Ajmer:

- Jaisalmer –Fatehgarh 400kV D/C Quad Moose line
- Akal–Fatehgarh 400kV S/c Quad Moose line

Further RVPNL vide their letter dated 28.4.2017 has submitted that due to non-materialization of the solar and wind generations projects, which had earlier sought connectivity from RVPNL, following interconnections with PGCIL are not required: -

a) 2 no. of 765 kV line bays at 765/400 kV Ajmer(PG) S/S along with 2x240 MVAR, 765 kV switchable line shunt reactors for termination of RVPN's 765 kV D/C Korna-Ajmer line

b) 2 no. of 400 kV line bays at 765/400 kV Bikaner (PG) S/S along with LILO of second circuit of 400 kV D/C Bhadla-Bikaner line at Bikaner (PG).

c) 2 no. of 400 kV line bays at 765/400 kV Fatehgarh(PG) S/S along with 400 kV D/C Jaisalmer(2)-Fatehgarh(PG) line (Quad Moose)

d) 1 no. of 400 kV line bay at 765/400 kV Fatehgarh (PG) S/S along with 400 kV S/C Akal-Fatehgarh(PG) line (Quad Moose)

2.2 RVPN representative stated that initially the transmission system (PGCIL and RVPN) has been planned for evacuation of 15,231 MW capacity of wind and solar power projects to be installed in the State of Rajasthan by 2021-22. The 765/400kV Korna Substation alongwith associated lines was planned for 12,982MW capacity of RE power projects to be connected to RVPN system. Subsequently on the recommendation of Rajasthan Renewblw Energy Centre (RREC), RVPN has cancelled grid connectivity

approval for 417.5 MW Solar Power projects and 1178.1MW wind power projects. Further, the load growth in Rajasthan has also reduced and as per 19th EPS of CEA, Rajasthan peak demand for 2021-22 has been projected as 14,430 MW, as compared to 19,962 MW as per 18th EPS.

2.3 POSOCO representative emphasized the need to carry out revised system studies to check the adequacy of intra state and inter state Transmission system for evacuation of renewable generations without any constraint.

2.4 RVPNL representative stated that they have carried out system studies and no overloading of intra state transmission system has been observed. The transmission system planned is sufficient to cater to 10,000 MW of intra state RE Generation. Regarding LILO of 2nd ckt. of 400 kV D/C Bhadla (RRVPN)–Bikaner (RVPN) Quad Moose line at Bikaner 765/400 kV (PG) GSS, RVPNL stated that no significant unbalanced loading has been observed in the system studies.

2.5 CTU representative stated that the waiver of inter state transmission charges may be the reason for RE generation developers applying connectivity with ISTS instead of intra state Transmission system. He informed that POWERGRID has not made any investment for the implementation of two no. of 765 kV bays at 765/400 kV Ajmer (PG) and two no. 400 kV bays at 765/400 kV Bikaner (PG).

2.6 After further deliberations, due to non-materialization of the solar and wind generations projects, which had taken the connectivity from RVPNL network, following interconnections with inter state transmission system were agreed to be dropped: -

a) Korna – Ajmer (PG) 765 kV D/c line

b) LILO of 2nd ckt. of 400 kV D/C Bhadla (RRVPN) – Bikaner (RVPN) Quad Moose line at Bikaner 765/400 kV (PG) GSS (in addition to already approved first circuit in 36th meeting of SCPSPNR)

c) 2 no. of 765 kV line bays at 765/400 kV Ajmer(PG) S/S along with 2x240 MVAR, 765 kV line type switchable shunt reactors for termination of RVPN's 765 kV D/C Korna-Ajmer line

d) 2 no. of 400 kV line bays at 765/400 kV Bikaner (PG) S/S for LILO of second circuit of 400 kV D/C Bhadla-Bikaner line at Bikaner (PG).

e) 2 no. of 400 kV line bays at 765/400 kV Fatehgarh (PG) S/S along with 400 kV D/C Jaisalmer(2)-Fatehgarh(PG) line (Quad Moose)

f) 1 no. of 400 kV line bay at 765/400 kV Fatehgarh (PG) S/S along with 400 kV S/C Akal-Fatehgarh(PG) line (Quad Moose)

3.0 Delinking of up-gradation of Tehri Pooling Station–Meerut 765kV 2xS/c lines (operated at 400 kV) at its rated voltage with the commissioning of Tehri PSS generation scheme.

3.1 CEA stated that in the 18th meeting of SCSPNR, the transmission system for Tehri PSP, Lohari Nagpala (4x150 MW) and Pala Maneri (416 MW) was agreed, which inter-alia included charging of Tehri-Meerut 765 kV 2 x S/C line at 765 kV (to be taken up matching with first of the three generation projects). The system was again discussed in 27th meeting of SCPSPNR held on 11.06.2009, wherein, it was decided that charging of

Tehri Meerut 765 kV 2 x S/C line at 765 kV would be taken up with Tehri PSP Generation. Presently, these lines are operating at 400 kV level. THDC vide their letter dated 14.2.2017 has informed that constraints are being observed in evacuation of power from Tehri / Koteshwar generation complex under contingency condition. THDC had mentioned that during planned shutdown of one circuit of 400kV Tehri pooling station (also called Koteshwar pooling station)-Meerut line, oscillations were observed at Tehri and Kotsehwar hydro projects on 22.11.2016 at a power level of 1150 MW through single circuit. Subsequently, oscillations were damped on reduction of the generation. POWERGRID carried out the studies and observed that no oscillations were observed in the event of outage of one circuit of Tehri-Meerut 765 kV 2 x S/c lines, when the lines are operated at its rated voltage. Therefore, POWERGRID proposed that the up-gradation of this line at 765kV level may be de-linked with Tehri PSP generation and carried out on priority.

3.2 POWERGRID informed that Tehri PSP generation project is anticipated to be commissioned by August-September 2019 and the work on the upgradtion of these lines at 765 kV (including upgradtion of FSC) is already under progress and is expected to be completed by August/ Sep. 2018. The time gap between anticipated completion date of upgradation works and commissioning of Tehri PSP is about one year. Therefore, the proposal of delinking of upgradion of Tehri-Merrut 765 kV 2xS/C lines with the commissioning of Tehri PSP may be agreed.

3.3 POSOCO stated that the issue of oscillations was also discussed in recent OCC meetings of Northern Region. He enquired about the condition of FSC's on these lines. PGCIL informed that FSC's on these lines would be operational in next two three months.

3.4 UPPTCL observed that the performace of FSC's, wherever provided in the grid is not satisfactory. Therefore, we should avoid planning FSC in future.

3.5 Chief Engineer, PSPA–1, CEA stated that system studies carried out by POWERGRID indicate that in the event of outage of one circuit of Tehri-Meerut 765 kV 2 x S/C lines, when the lines are charged at 765 kV, no oscillations are observed. Therefore, the upgradation works may be completed at the earliest to overcome any power evacuation constraints.

3.6 After further deliberations, members agreed to the proposal of de-linking of up-gradation of Tehri-Meerut 765 kV 2 x S/C lines (presently operated at 400 kV) with the commissioning of Tehri PSP generation project alongwith reactive compensation.

4.0 Two number of 132kV bays at PGCIL's Balia (765) S/S:

4.1 CEA stated that UPPTCL vide their dated 12.09.2016 had informed that they had planned to connect their 132/33 kV, 2x40 MVA S/S at Bansdih (Balia) with Balia (765/400 kV, 3000 MVA and 400/132 kV, 200 MVA) of POWERGRID. For its connectivity to Balia (PG) two number of 132 kV bays are required at Balia (PG) S/S. 132/33 kV Bansdih substation alongwith 132kV lines is planned to be completed by March/April, 2018.

4.2 UPPTCL stated that they have taken up the scheme to utilize two numbers of equipped bays available at Balia (PG). They are planning to draw about 70-80 MW from Balia. The system is likely to be commissioned by May, 2018. POWERGRID confirmed the availability of 2 no. 132 kV equipped bays at Balia (PG) under ISTS.

4.3 After deliberations, Membres agreed to the proposal of UPPTCL for utilization of two numbers of bays at 132Kv Balia(PG) with following scope of works (to be carried out by UPPTCL):

(i) Construction of 132/33 kV, 2x40 MVA S/S Bansdih (Balia)
(ii) Balia (765/400/132)–Bansdih (Balia) 132 kV D/C line – 62 km.
(iii) Construction of LILO of one ckt of Balia (765/400/132)–Bansdih 132 kV D/C line at existing 132/33 kV 2x40 MVA substation Sikandarpur (Balia).

5.0 Requirement of 1 (one) no. additional 220kV bay at 400/220kV substation at Roorkee (Puhana), POWERGRID:

5.1 CEA stated that PTCUL vide their letter dated 26.11.2016 has intimated that presently four nos. of 220kV bays are available at 400/220kV S/s at Puhana. Out of which, 2 nos. of bays have been utilized for LILO of 220kV Haridwar-Roorkee line at Roorkee(PG) and 2 nos are proposed to be utilized for LILO of Roorkee-Nara 220kV S/c line at Roorkee (PG). PTCUL has proposed 2 nos. of additional bays for 220kV D/c line from Roorkee (PG) to Pirankaliyar. Therefore, total 6 (six) nos of 220 kV bays will be required by PTCUL. CEA further stated that in the 35th meeting of SCPSPNR held on 3.11.2014, PTCUL proposal of one additional 220kV bay (in addition to 4 nos. of existing 220kV bays) at 2x315 MVA 400/220kV Roorkee (PG) under ISTS was agreed. Considering RoW issue, termination of the three number of 220kV lines through cables at 400/220kV Roorkee (PG) was also agreed.

5.2 PTCUL stated that earlier they had planned Roorkee (PG)-Pirankaliyar 220 kV line (S/c on D/c). Now they are purposing to string second circuit of Roorkee (PG)-Pirankaliyar line. Therefore, they have requested for the sixth bay at Roorkee (PG). The line would be terminated through cable in view of RoW issues at 400/220kV S/s at Puhana. The length of the cable would be about 700-800 meters.

5.3 POSOCO representative stated that loading of 340 MW has been observed at 2x315 MVA 400/220 kV sub-staion at Roorkee (PG). The transformation capacity at Roorkee (PG) is not n-1 complaint. With the additional 220 kV interconnection, the drawal at Roorkee (PG) would further increase. Therefore, augmentation of the transformation capacity at Roorkee (PG) is required.

5.4 PTCUL stated that the loading at Roorkee (PG) substation may increased to 500-600 MW, therefore additional 400/220 kV transformer would be required at Roorkee (PG).

5.5 On a query about availability of space for additional transformer at Roorkee (PG), POWERGRID confirmed the availability of space for one number 400/220 kV ICT and one no. additional 220 kV line bay.

5.6 After deliberations, Members agreed for 1 (one) no. additional 220kV line bay and one no. of 1x500 MVA, 400/220kV transformer alongwith associated bays at Roorkee (PG) 400/220kV Substation as an ISTS scheme.

6.0 Requirement of 2 (two) nos. of additional 220kV bay at 400/220kV S/s at Patran:

6.1 CEA stated that 400/220 kV S/s at Patran has been implemented through Tariff Based Competitive Bidding (TBCB) route by M/s Patran Transmission Company Limited (PTCL). The scope of establishment of 400/220 kV S/s at Patran by PTCL, inter alia,

included construction of 6 nos. of equipped 220 kV line bays and space provision for 6 nos. 220 kV line bays. Punjab State Transmission Corporation Ltd (PSTCL) is presently implementing LILO of both circuits of existing Patran-Rajala 220 kV D/C line (LILO of one circuit of Patran-Rajala 220 kV D/C line already done at Kakrala) at Patran 400/220 kV S/s. This would occupy 4 nos. 220 kV bays at Patran (ISTS) 400/220 kV S/s. PSTCL had also proposed LILO of both circuits of existing Sunam-Mansa 220 kV D/C line (LILO of one circuit already done at Jhunir) at Patran 400/220 kV S/s. This would also require another 4 nos. of 220 kV bays at Patran 400/220 kV S/s. Out of this 4 nos. 220 kV line bays, two bays are already available at Patran 400/220 kV S/s and two more additional 220kV bays would be required at Patran S/s. PSTCL had requested for 2 nos. of extra 220kV line bays at Patran 400/220kV S/s. PSTCL had also furnished the load flow studies corresponding to 13th plan time frame. From the studies, it was observed that power flow is mostly towards Mansa, Jhunir and Patran sub-staions of PSTCL. Rajila and Sunam are mostly drawing their power from Patiala and Dhuri respectively. Therfore, CEA has suggested that alternative proposals like 220kV D/C line from Patran to Jhunir with LILO of second circuit of Sunam–Mansa at Jhunir or 220kV D/C line from Patran to Mansa or reconfigurations of the existing 220kV network may be considered. With this no additional 220 kV bays would be required at Patran.

6.2 PSTCL stated that there is space constraint at Masna and Jhunir sub-staions for implemnentation of 2 nos. of 220 kV bays at these sub-stations as suggested by CEA and enquired about the implementing agency for the additional 2 nos. 220 kV bays at Patran. CEA clarified that M/s PTCL would provide only the space for the 220 kV line bays and the bays needs to be implemented by PSTCL at its own cost.

6.3 HVPNL stated that while planning an ISTS substation, provision for expansion need to be kept for future load growth. As the asset is created for a life span of atleast 35 years, as per the existing tariff policy, the upgradation/augmentation works needs to be carried out through TBCB mechanism by another / new Transmission Service Provider (TSP), which involves a lot of issues relating to the use of common facilities. These issues become more complex when transmission asset is GIS. He suggested that provisions should be made in the Tariff policy for upgradation / augmentation in the existing sub-stations by the existing TSP under regulated tariff mechanism.

6.4 After deliberations, following was agreed:

i. PSTCL to implement 2 no. additional 220kV bays at Patran 400/220kV S/s for LILO of both circuits of existing Sunam-Mansa 220 kV D/C line at Patran 400/220 kV S/s

ii. M/s PTCL to provide space for the 2 no. 220 kV line bays.

7.0 Requirement of 4 nos. of 220kV bays and augmentation by 1x500MVA, 400/220kV transformer at 400kV Substation at Sonepat (Jajji), POWERGRID

7.1 CEA stated that HVPNL vide their letter dated 30.8.2016 has requested for four nos. of 220kV bays for LILO of both circuits of Mohana–Samlkha 220 kV D/C line at Sonepat (Jajji), POWERGRID 400/220kV S/S in year 2019-20. Further, HVPNL vide their letter dated 8.9.2016 has informed that HVPNL has planned three no. 220kV substations at Mohana (460 MVA), Samalkha (360 MVA) and Rai HSIIDC (520 MVA). From the letter, it is inferred that these substations would get their feed from 400/220kV S/S at Sonepat (PG). Therefore, HVPNL has requested to augment the

transformation capacity by 1x500 MVA at 400/220kV Sonepat (Jajji), POWERGRID substation under regional system strengthening scheme.

7.2 HVPNL stated that the 220 kV substations at Mohana and Samalkha S/s are existing and Rai HSIIDC S/s was planned earlier but its implementation could not be taken up due to some land issues.

7.3 POWERGRID stated that out of total 6 nos. of 220 kV bays, at present 2 nos. of 220 kV bays has been utilized by HVPNL for connectivity of Mohana 220 kV S/s and 4 no. of 220 kV furnished bays are available Sonepat (PG) 400/220 kV S/s.

7.4 HVPNL stated that out of 4 no. of 220 kV furnished bays, 2 no. of bays would be utilized for connectivity of Rai HSIIDC S/s, remaining two bays could be used for LILO of one circuit of Mohana–Samlkha 220 kV D/C line at Sonepat (PG). Therefore, two numbers of additional bays would be required for LILO of second circuit. About 360 MW of power drawl is anticipated from Sonepat (PG) S/s, therefore augmentation of the existing transformation capacity would be required.

7.5 POWERGRID confirmed the availability of space for additional 2 no. of 220 kV bays and 500 MVA, 400/220 kV transformer along with associated ICT bays.

7.6 After deliberations, following was agreed:

i) HVPNL to carry out LILO of both circuits of Mohana–Samlkha 220 kV D/C line at Sonepat (PG)

ii) Two (2) no. additional 220 kV bays at Sonepat (PG) for terminnation of LILO of both circuits of Mohana–Samlkha 220 kV D/C line at 400/220kV Jajji(PG) as ISTS scheme (two furnished bays are alredy available at Sonepat (PG))

iii) 1x500 MVA, 400/220 kV transformer along with associated ICT bays at 2 x315 MVA Jajji (PG) as ISTS scheme

8.0 220kV bays at Prithla 400/220kV sub-station being implemented through TBCB route:

8.1 CEA stated that 400/220kV, 2x500 MVA GIS S/s at Prithla along with 8 nos. of 220kV line bays is under implementation through Tariff Based Competitive Bidding (TBCB) route with commissioning schedule of May, 2019. HVPNL vide their letter dated 30.8.2016 has requested for the following 220kV bays at Prithla 400/220kV substation:

(i) Two no. 220kV bays for Prithla (400)-Prithla(HVPNL) 220kV D/c line

(ii) Four no of 220kV bays for LILO of both circuits of existing Palwal–Rangala Rajpur 220kV D/C line at Prithla (400) (FY 2019-20)

(iii) Two number of 220kV bays for Prithla (400)–Sector-78, Faridabad 220kV D/C line (FY-2020-21)

8.2 On a query about the time frame of implementation of the down stream, HVPNL stated that the element (ii) and (iii) are expected to be implemented in the matching time frame of the Prithla S/s and they are in the process of acquiring the land for Prithla (HVPNL) 220kV sub-station. CTU informed that tariff for the substation may have to be borne by the state utilities, incase of non utilisation of ISTS asset.

8.3 After deliberations, members agreed with the above proposal. HVPNL was requested to expedite the implementation of the 220kV outlets from Prithla 400/220kV S/s in the matching time-frame, so as to avoid creation of stranded assets.

9.0 Two nos. of 220kV bays at 400/220kV substation Abdullapur (PG), Yamunanagar for HVPNL

9.1 CEA stated that HVPNL has planned a 220kV substation at village Rajokheri, Distt. Ambala. The planned substation will be directly connected to 4x315 MVA, 400/220kV Abdullapur (PG) substation through a 220kV D/C line. Therefore, HVPNL has requested to provide two nos. of 220kV line bays at 400kV Abdullapur (PG) substation for feeding the proposed 220kV substation Rajokheri.

9.2 POWERGRID confirmed the availability of space for two nos. of 220kV line bays at 400/220kV Abdullapur (PG) substation. POSOCO raised the concern about overloading of the transformer in case of outage of Yamunagar Generation. POWERGRID stated that maximum loading on Abdullapur (PG) observed is of the order of 750 MW. HVPNL stated that they will divert load from existing feeders and establishment of Rajokari sub-staion would not cause increased loading on 400/220kV ICTs at Abdullapur (PG) sub-station.

9.3 After deliberations, following was agreed as an ISTS scheme:

i. Two nos. of 220kV line bays at 400/220kV, 4x315 MVA Abdullapur (PG) substation for feeding the proposed 220kV substation at Rajokheri in the matching time frame of Rajokheri sub-staion. For time frame of 220 kV line bays, POWERGRID to coordinate with HVPNL

10.0 Connectivity to Dhaulasidh Hydro Electric Power Project (66MW) of M/s SJVNL in Himachal Pradesh

10.1 CEA stated that the issue of connectivity to Dhaulasidh Hydro Electric Power Project with 66MW capacity (plus 10% overload capability) of M/s SJVNL in Himachal Pradesh was discussed in the 38th meeting of SCPSPNR, wherein, it was decided that a joint meeting would be called by CEA with CTU, SJVNL and HPPTCL/HPSEBL. Accordingly, a meeting was held in CEA on 10.1.2017, wherein representative from CTU and SJVNL has participated. In the meeting, it was decided that connectivity to Daulasidh HEP can be provided through Dhaulasidh HEP–Hamirpur (PG) 220 kV D/C line. The line along with two number of 220kV bays at Hamirpur (PG) would be constructed by SJVNL.

10.2 SJVNL stated that for connectivity of the project, earlier a meeting was held on 9.9.2015 with the officials of HPSEBL and SJVNL, wherein following three options were discussed:

(i) LILO of Dehra-Hamirpur 132kV D/c line at Daulasidh
(ii) Daulasidh –Mattansidh (HPSEB)132kV D/c line
(iii) Daulasidh –Mattansidh (PG) 220kV D/C line

He said that after deliberations, option (iii) i.e. Daulasidh –Mattansidh (Hamirpur) 220kV D/C line was found techno-economical, as the other options would also entail overhead charges like STU wheeling charges, SLDC/operating charges.

10.3 CTU representative stated that the nearest ISTS point to Daulasidh HEP is 400/220kV Mattansidh (Hamirpur) only.

10.4 After deliberations, following was agreed for providing connectivity to M/s SJVNL:

i. M/s SJVNL to construct Daulasidh–Hamirpur 220 kV D/C line along with the 2 no. of 220 kV bays at both ends of the line as dedicated line.

ii. POWERGRID to provide space for 2 no. 220 kV bays at Hamipur 400/220 kV S/s.

11.0 400/220kV substations at Rajghat (Maharanibagh-II) and Karampura in NCT of Delhi:

11.1 CEA stated that four (4) no. of 400/220kV substations viz. Rajghat, Dwarka, Tugalakabad and Karampura were approved in the 34th meeting of SCPSPNR held on 8th August, 2014 as inter state transmission system (ISTS). Further, Rajghat-Maharanibagh 400kV D/c (HTLS) line was agreed as "NRSS XXXIX" scheme for reliability of power supply to Delhi in the 36th meeting of SCPSPNR held on 13-07-2015. Out of four substations, Dwarka and Tugalkabad 400/220kV S/Ss along with its 400kV interconnection are under implementation by POWERGRID. Implementation of Karampura 400/220kV S/s could not take place due to non-availability of land and RoW problem in laying of 400kV interconnecting line. A meeting was held in CEA on 14.7.2016 with CTU, Delhi DISCOMs and DTL, wherein, it was agreed to drop the the proposed substation at Karampura due to non-availability of land.

DTL vide their letter dated 26-10-2016 had informed that land for Rajghat 400/220kV S/s at the earlier proposed location near IP Extn. was not feasible due to upcoming solar power complex and RoW constraint in laying of transmission lines associated with it. DTL suggested the land near existing 400kV Maharanibagh for construction of 400/220kV Rajghat substation. Subsequently, POWERGRID vide their letter dated 26-12-2016 had informed that DTL had proposed land near existing Maharanibag sub-staion for Rajghat sub-station. As the proposed 400/220kV Rajghat (Maharanibagh-II)(GIS) sub-station is contiguous to existing 400/220kV Maharanibagh (GIS) sub-station, POWERGRID has proposed that instead of NRSS XXXIX (400kV Rajghat–Maharanibagh D/C line with HTLS conductor alongwith two nos. of 400kV GIS bays each at Rajghat and Maharanibagh), the 400kV busbar of 400/220kV Maharanibagh (GIS) sub-station may be extended to Rajghat (Maharanibagh-II) and provision of a 400kV bus sectionaliser alongwith 400/220kV Rajghat (Maharanibagh-II) (GIS) sub-station may be kept. The 400kV bus sectionaliser between 400/220kV Rajghat (Maharanibagh-II) (GIS) sub-station and existing Maharanibagh (GIS) sub-station would be normally kept open to address the high fault level at both sub-station. The two 400kV buses can be interconnected through the bus sectionaliser to provide reliability of power supply in the event of anycontingency. This proposal was also discussed and agreed in the meeting held on 20-12-2016 at DTL office, New Delhi. Therefore, POWERGRID had requested for in-principle approval for provision of sectionaliser in proposed 400/220kV Rajghat (Maharanibagh-II) (GIS) sub-station and dropping of 400 kV D/C line between Rajghat and Maharanibagh. There was no change in the downstream 220 kV network for drawal of power by DTL.

11.2 Further, a meeting was held in CEA on 04-01-2017 with representatives from DTL and POWERGRID, wherein, the above proposal was agreed. Accordingly, CEA vide their letter dated 1/9/38th/PSPA-I/23 dated 16-1-2017 had conveyed in-principle approval

for extending the 400kV busbar of 400/220kV Maharanibagh (GIS) sub-station to Rajghat (Maharanibagh-II) with a provision of a 400kV bus sectionaliser and dropping the NRSS-XXXIX scheme subject to concurrance of the members of SCPSPNR.

11.3 Subsequently, DTL vide their letter dated 24-04-2017 addressed to POWERGRID has requested to shift the Rajghat (Maharanibagh-II) 400/220 kV substation from Maharani Bagh to Gopalpur in North Delhi, in view of high fault level (beyond 60 kA) and severe RoW constraints in taking out 220 kV and 33 kV feeders. The additional land at existing 220 kV Gopalpur sub-staion can be utilized for constriuction of 400 kV substation (GIS). The connectivity with the ISTS i.e. LILO of both circuits of Mandola-Bawana 400 kV D/C line at Maharanibag, interalia, would be utilised to improve the reliability of power supply to Maharanibagh existing sub-station.

11.4 To discuss the proposal of DTL, a meeting was held in CEA on 18-05-2017 (minutes enclosed at Annexure –IV), wherein, it was decided that 4x500 MVA, 400/220 kV Rajghat sub-station would be shifted to Gopalpur instead of Maharanibagh-II. DTL was intimated that no futher change in location would be allowed. With regard to 400 kV connectivity of Gopalpur sub-station a number of options were deliberated. Considering the availabilty of only one no. corridor for constructing 400 kV line in Yamuna bed and minimum change in scope of already awarded contract, it was decided to implement LILO of both circuits of Mandaula-Bawana 400 kV D/C line at Maharanibagh (existing) substation on multi circuit tower and LILO of both circuits of Bawana-Maharanibagh 400 kV D/C line at proposed Gopalpur (GIS) sub-station. This would result in Bawana-Gopalpur-Maharanibagh 400 kV D/C line and Maharanibagh-Mandaula 400 kV D/C line. Further, to address the high fault level at Maharanibagh sub-station LILO of Samaypur (PG)-Dadri 400 kV line at Maharanibagh would be bypassed at Maharanibagh. The LILO would be operated in emergency condition only.

11.5 CTU stated that 400/220kV Rajghat substation was planned to meet the load demand of East Delhi, Kashmere Gate, Park Street and Electric Lane areas. Substation works were awarded in March 2015; however work could not start due to non availability of land. Subsequently, its location was shifted to near IP Extn., after which the 400kV ISTS network and 220kV intra-state transmission lines (as a part of Consultancy assignment) were awarded in March 16. However, in Oct. 16, DTL informed that the proposed land near IP Extn. was also not feasible due to upcoming Solar Power complex and RoW constraints. DTL proposed that land near existing Maharanibagh was available and handed over to POWERGRID in Dec.16.

11.6 Due to above developments, the earlier award for 400/220kV Rajghat substation were terminated and works for Maharanibagh-II substation were retendered. Price bids were opened and Maharanibagh-II substation was ready for award with modified scope including provision of a 400kV bus sectionaliser. The transmission line works for 400kV inter-state and 220 kV intra-state which was awarded in March 2016 was continued except that termination was changed from Rajghat to Maharanibagh-II.

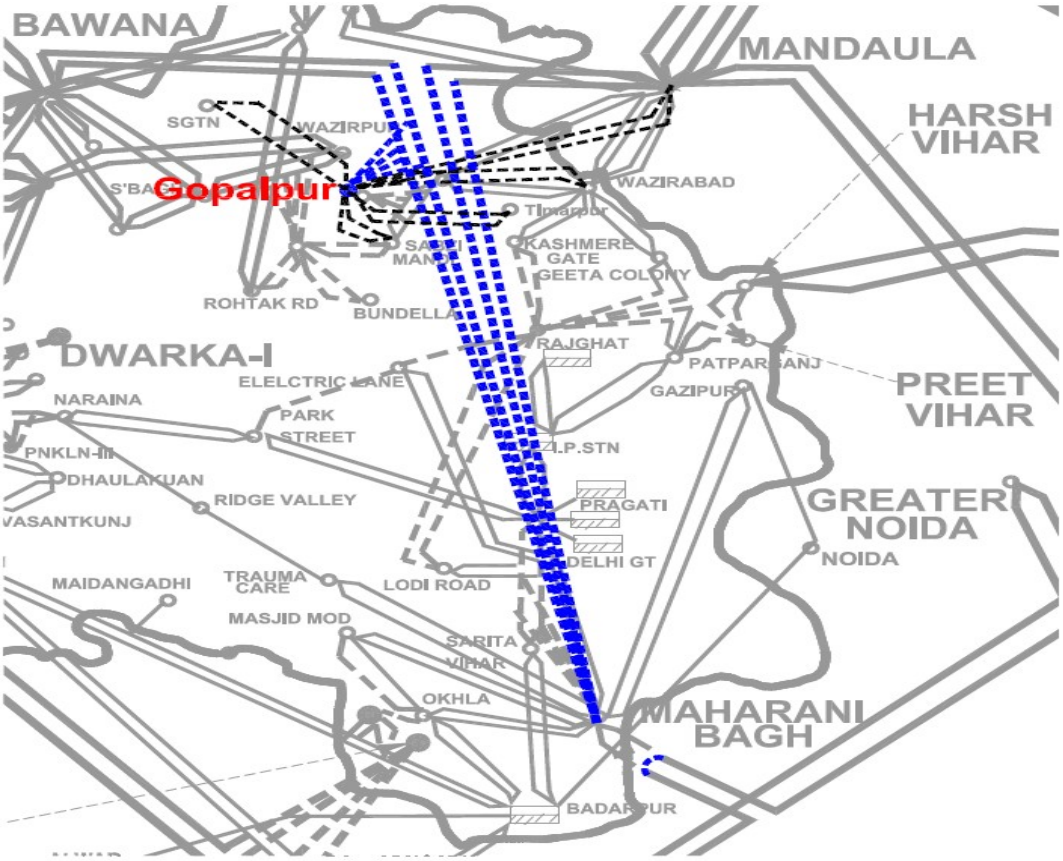
He added that four no. of 400/220 kV sub-stations were agreed keeping in view the peak demand of Delhi of the order of 10,400 MW by the end of 13th plan. In order to address the problem of high short circuit level, POWERGRID has suggested bus sectionaliser at 220 kV level and to address the RoW problem in taking out 220 kV lines, POWERGRID has proposed the route alignment of 220 kV lines through multi circuit line to DTL on 21-01-2017. He said that in addition to Maharanibagh (II),

Gopalpur could be the fourth 400/220 kV sub-station in place of Karampura, as proposed by DTL during a meeting held in MoP on 04-01-2017.

11.7 DTL representative stated that after the commissioning of 400/220 kV sub-station at Tuglakabad, the loading on existing Maharanibagh sub-station would be reduced substantially and there is no requirement of 4x500 MVA, 400/220 kV S/S at Maharanibagh (II). At present Maharanibagh is connected at 400 kV through LILO of one circuit of Samaypur (PG)-Dadri 400kV D/C line at Maranibagh. There is a requirement of additional 400 kV feed to Maharanibagh. Further, shifting of 400/220 kV Rajghat (Maharanibagh-II) to Gopalpur would help in catering the demand of North Delhi. Moreover, the additional land at existing 220 kV Gopalpur sub-station can be utilized for construction of 400 kV GIS substation and there is no change in the connectivity with the ISTS i.e. LILO of both circuits of Mandola-Bawana 400 kV D/c line at Maharanibagh.

11.8 CTU stated that DTL is frequently shifting the location of Rajghat 400/220 kV sub-station. With the shifting of Rajghat sub-station to Maharanibagh (II) and then to Goplapur (as now proposed by DTL), it becomes entirely a new scheme with different 220 kV outlets. Therefore, they do not intend to implement the same.

11.9 DTL stated that as POWERGRID is not inclined to take up the establishment of 400/220kV S/s at Gopalpur (relocation of 400/220kV ISTS Rajghat S/s) , they may be allowed to take up the construction of 400/220kV S/s at Gopalpur as an intra- state scheme. POWERGRID has stated that they have no reservation for establishment of Gopalpur S/s along with its 400kV inter-connection as an intra-state scheme .



11.10 After deliberations, following was agreed:-

ISTS Scheme (under PGCIL scope of already awarded scheme):

i) LILO of both circuits of Mandola-Bawana 400 kV D/C line at Maharanibagh (existing) with Twin HTLS conductor on multicircuit towers (already under construction by PGCIL).

(Note: This would take care the requirement of additional interconnection at Maharanibagh. In view of above LILO, NRSS-XXXIX scheme was agreed to be dropped.)

ISTS Scheme (to be taken up):

i) 4 no. of 400 kV bays at 400/220kV Maharanibagh (existing) substation

ii) By passing of LILO one circuit of 400 kV Dadri–Ballabhgarh D/C line at Maharanibagh (existing) (to be used during emergency)

Intra State Scheme (to be implemented by DTL):

i) Establishment of 4x500MVA, 400/220kV GIS Substation at Gopalpur along with 125 MVAR bus reactor - by DTL.

ii) LILO of Maharanibagh–Bawana 400 kV D/C line at Gopalpur 400/220 kV substation on multicircuit towers – by DTL

12.0 UT of Chandigarh's proposal regarding handing over of 220/66kV substation at Kishangarh (Manimajra) to PGCIL and to treat it as ISTS point:

12.1 CEA stated that UT of Chandigarh vide their letter dated 14.6.2016 has submitted the proposal of handing over of 220/66kV substation at Kishangarh (Manimajra) to POWERGRID and to treat this sub-stations as ISTS point. The 220/66kV Manimajra S/s and Nalagarh–Manimajra 220 kV D/C line is owned by UT of Chandigarh, however the project was executed by POWERGRID and since then is being operated and maintained by POWERGRID. UT of Chandigarh has also informed that metering is done at Nalagarh end and all applicable losses are borne by Chandigarh, which is a substantial amount. However, UT of Chandigarh vide their letter dated 26.05.2017 had requested for deletion of this agenda item due to administrative issues.

12.2 In the meeting representative of UT, Chandigarh confirmed the withdrawal of the agenda item.

12.3 Members agreed for the deletion of this agenda item.

13.0 Loading at Raebareli 220/132 kV Substation

13.1 CEA stated that the issue of overloading of all three 100 MVA transformers at Raebareli was deliberated in the 34th, 36th and 37th meetings of SCPSPNR held on 03-11-2014, 13-07-2015 and 20-01-2016 respectively. During 37th meeting of SCPSPNR, it was agreed 'in principle' to replace two nos. of 100 MVA, 220/132 kV ICTs with two nos. of 200 MVA ICTs, as space was not available for providing additional ICT at Raibareli. It was also proposed that one out of the two replaced transformers may be installed at Sitarganj S/s, to reduce the overloading of existing transformer and the other

unit may be used as the regional spare. Subsequently, the same was agreed in 38th meeting of NRPC held on 25-10-2016.

Further, in view of urgent requirement of replacement of transformers at Rabareli indicated by UPPTCL vide its letter dated 18.01.2017, CEA vide its letter no. dated 30.1.2017 has accorded prior approval under section 68 of Electricity Act-2003 for the replacement of the transformers at Raebareli and POWERGRID is implementing the scheme with the following scope of works:

a. Replacement of two nos. of 100 MVA, 220/132 kV ICTs at Raebareli S/s with two nos. of 200 MVA, 220/132 kV ICTs.

b. One out of the two replaced 100 MVA, 220/132 kV ICT from Raebareli S/s may be installed at Sitarganj S/s and the other may be used as the regional spare unit.

13.2 CTU informed that works of one ICT at Raebareli likely to be completed by August 2017, UPPTCL requested them to expedite the commissioning so as to avoid the constraints during summer peak.

13.3 Members noted the same.

14.0 Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer Rajasthan

14.1 CEA stated that the following transmission system for Ultra Mega Solar Park in Fatehgarh, Jaisalmer was agreed in the 38th meeting of SCPSPNR held on 30-05-2016:

i. Establishment of 400 kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level)

ii. Fatehgarh Pooling Station-Bhadla (PG) 765 kV D/C line (initially to be operated at 400kV)

iii. 2 Nos. of 400kV line bays at Fatehgarh Pooling substation

iv. 1x125 MVAR bus reactor at 400 kV Fatehgarh Pooling sub-station

Note: (i) Solar Park Developer to construct 400 kV line from M/s AREPL solar park to Fatehgarh pooling station and provide 1x125 MVAr bus reactor at generation switchyard.

Subsequently, based on the POWERGRID observations on MoM of 38th SCPSPNR regarding 400kV line bays at Bhadla (PG) for termination of 765kV Fatehgarh PS-Bhadla (PG) D/c line (initially op. at 400kV), CEA vide its letter dated 19.10.2016 has issued Corrigendum-II to the minutes of 38th meeting of SCPSPNR, which, inter-alia, included the following in the note of the scheme "Transmission system for Ultra Mega Solar Park in Fatehgarh, Jaisalmer":

Note: (ii) POWERGRID to provide two number of line bays at Bhadla (PG)

14.2 In the 36th meeting of the Empowered Committee on Transmission held on 26th July, 2016, the scheme was recommended for implementation through TBCB with the following scope of works:

i. Establishment of 400 kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level)

ii. Fatehgarh Pooling S/s-Bhadla (PG) 765 kV D/C line (initially to be operated at 400kV)

iii. 2 Nos. of 400kV line bays at Fatehgarh Pooling substation

iv. 1x125 MVAR Bus reactor at 400 kV Fatehgarh Pooling sub-station

v. Space for future 220 kV (6 Nos.), 400 kV (6 Nos.) and 765 kV (4 Nos.) line bays along with line reactors at Fatehgarh Pooling station

vi. Space for future 220/400 kV transformers (2 Nos.) 400/765 kV transformers (2 Nos.) along with associated transformer bays at each level

vii. Space for future 765 kV bus reactor along with associated bays

Note:

a) Park Developer to construct 400 kV D/C line from M/s AREPL solar park along with 1x125 MVAr bus reactor at generation switchyard.

b) POWERGRID to provide 2 nos. of 400 kV line bays at Bhadla (PG) for Fatehgarh Pooling Station- Bhadla D/C line (initially to be operated at 400 kV)

c) The Solar park developer (M/s AREPL) to provide adequate land for 765/400 kV pooling station adjacent to the proposed solar park for which, transmission licensee shall coordinate with M/s AREPL including commercial aspects for transfer of land.

d) Solar park developer (M/s AREPL) to provide 2 nos. of 400kV line bays at Fatehgarh Pooling Station for termination of 400kV D/C line from AREPL solar park to 400kV Fatehgarh Pooling station.

The commissioning schedule of the scheme was December 2018.

14.3 CTU informed that they have received no. of applications for connectivity from various renewable energy project developers at Fatehgarh viz.

a) **M/s Suzlon Power Infrastructure Limited** for

i) 900 MW (Wind-Solar Hybrid) ii) 300 MW (Wind Generation) and

b) **M/s Green Infra Wind Energy Limited** for

450 MW Wind and 450 MW Solar Generation.

The connectivities to these generators are proposed to be given at 220 kV. Therefore, there is a need to add 400/220 kV ICT at Fatehgarh. He also mentioned that all new applications recived for interconnection at Fatehgarh Pooling station are for connectivity only. When these generators would apply for LTA, Fatehgarh Pooling S/s-Bhadla (PG) 765 kV D/C line (initially to be operated at 400kV) may required to be upgraded at 765kV level.

14.4 Chief Engineer PSPA–1, CEA stated that the scheme "Transmission System for Ultra Mega Solar Park in Fatehgarh, Jaisalmer" is being implemented through TBCB route and presently under bidding process. The RfQ has been issued and for RfP the complete scope of the scheme needs to intimated to the prospective developer. However, for granting connectivity to new applicants, 220kV level needs to be created with addition of 1x500MVA, 400/220kV transformer at Fatehgarh S/s. The upgradation of Fathegarh sub-station to 765 kV level would be required as and when new RE project developers

apply for LTA to CTU. Further, as per the tariff policy in vogue, the upgradation work would be carried out through TBCB by new TSP, which involve lot of implementation issues such as sharing of common facilties, control room etc.

14.5 HVPNL stated that while planning a substation, upfront fixing of detailed scope of works is not always possible as STU may require outgoing feeder bays at differnt point of time. The transmission asset is created to serve for a life span of atleast 35 years and as per the existing tariff policy, the upgradation/augmentation works needs to be carried out by New Transmission Service Provider (TSP), which involves a lot of implementation issues. Therefore, provisions should be there for upgradation / augmentation in the scope of works to be done by the existing TSP under regulated tariff mechanism.

14.6 After deliberations, it was decided that CEA would call a separate meeting to decide the scope of works for the scheme "Transmission system for Ultra Mega Solar Park in Fatehgarh, Jaisalmer" in view of new applications received by CTU for grant of connectivity at Fatehgarh and implemention issues in upgradation of Fatehgarh sub-station to 765kV level.

15.0 Grant of Long Term Access (Revised) to NTPC Ltd. for its Tanda TPS Stage-II (2x660 MW) for 395.42 MW to NR Beneficiaries:

15.1 CEA stated that the intra state transmission schemes for evacuation of power from Tanda Ext. (2x500MW) along with Parichha TPS Extn. (2x250MW), Harduaganj Extn (2x250MW) were agreed in the 26th meeting of SCPSPNR held on 13.10.2008. The Intra-State Transmission schemes, interalia, included the following system for evacuation of power from Tanda-II generation project:

a) Tanda–Gonda 400kV quad D/C line

b) Gonda–Shahjahanpur (PG) 400kV quad D/C line

c) Establishment of 2x315 MVA, 400/200kV S/s at Shahjahanpur by LILO of both circuits of Lucknow (PG)–Bareilly (PG) 400kV D/C line.

d) LILO of Azamgarh–Sultanpur 400kV S/C line at Tanda

e) Establishment of 400kV substation at Gonda with 400/220kV, 2x315 MVA ICTs

In the 30th meeting of SCPSPNR / LTA meeting held on 19th December 2011, the connectivity for Tanda-II project was agreed through 2x 315 MVA, 400/220 kV ICT at Tanda by inter-connecting Tanda-II 400 kV generation switchyard with existing 220 kV bus of Tanda-I. It was also agreed that the interconnecting arrangement along with 400/220kV ICT at Tanda-II generating switchyard would be provided by NTPC.

NTPC had applied for LTA for 484.28 MW with Punjab, Delhi, Haryana, Rajasthan, HP, Chandigarh, J&K as beneficiaries. As per the LTA application, the beneficiaries of Tanda TPS were: PSEB (53.96MW), UPPCL (824.59MW), UPCL (27.88MW), Delhi Discoms (86.46MW), Haryana Discoms (36.96 MW), Rajasthan Discoms (74.56 MW), HPSEB (22.75 MW), PDD (46.72 MW), EDC (Union Territory of Chandigarh) (4.08MW). For drawing its share from Tanda-II generation project, UP is implementing its own system. Following transmission system was agreed in the 31st meeting of the SCPSPNR / LTA meeting held on 02.01.2013 for granting LTA to NTPC for 484.28 MW:

a) Tanda TPS–Sohawal 400 kV D/c line

b) Sohawal–Lucknow (New) (PG) 400 kV D/c line

Regarding LILO of Azamgarh-Sultanpur 400 kV S/c line at Tanda-II, it was mentioned in the minutes of the LTA meeting held on 02.01.2013, that it being an intra state system, the matter may be discussed between UPPTCL and NTPC.

Considering above, the transmission system for evacuation of power from Tanda–II as agreed in the SCPSPNR / LTA meeting in NR is given below:

I. Transmission system under scope of NTPC

a) Connectivity system

- 2x 315 MVA, 400/220 kV ICT at Tanda-II by connecting Tanda-II 400 kV generation with existing 220 kV bus
- 1x125 MVAR, 400 kV bus reactor at Tanda-II

b) For Power Evacuation

- 4 nos. of 400 kV line bays (2nos. for Tanda- Gonda 400 kV D/C line and 2 nos. for Tanda – Sohawal 400 kV D/C line)

II. Intra-State Transmission System under scope of UPPTCL: -

- Tanda–Gonda 400kV quad D/C line
- Gonda–Shahjahanpur (PG) 400kV quad D/C line
- Establishment of 2x315 MVA, 400/200kV S/s at Shahjahanpur by LILO of both circuits of Lucknow (PG) – Bareilly (PG) 400kV D/C line.
- Establishment of 400kV substation at Gonda with 400/220kV, 2x315 MVA ICTs.
- LILO of Azamgarh- Sultanpur 400 kV S/c line at Tanda (to be further discussed between NTPC and UPPTCL)

III. Inter State Transmission System (for LTA of 484.28):

Under TBCB scope

- Tanda TPS–Sohawal 400 kV D/c line
- Sohawal-Lucknow (New) (PG) 400 kV D/c line

Under POWERGRID scope

- 4 nos. of 400 kV bays at Sohawal
- 2 nos of 400 kV bay at Lucknow (PG)

15.2 CEA further stated that in the 34th meeting of Empowered Committee held on 13-04-15, the ISTS system associated with Tanda was decided to be implemented through TBCB route. In the bidding process M/s Essel Infraprojects Ltd. was the successful bidder (LOI issued on 09-10-2015). However, the SPV could not be transferred due to non-

signing of TSA by three LTCCs namely PSPCL, TPDCL and BRPL for the transmission project and implementation of the scheme was held up. The matter of non-signing of TSA was discussed in the 36th meeting of the Empowered Committee on transmission held on 26-07-16. In the meeting, it was decided that PFCCL (BPC) may take up the issue with MoP and MoP may direct NTPC to sign the TSA for balance portion of 140.42 MW for which the designated LTTCs i.e. i) PSPCL (53.96 MW) ii) Tata Power (51.79 MW) and iii) BSES Rajdhani (34.67 MW) have not signed the TSA. A meeting was held on 11.11.2016 in CEA, wherein, the issue of revised LTA quantum from 484.28 MW to 395.42 MW of Tanda Stage-II was discussed as PSPCL, TPDCL and BRPL had surrendered their allocated power from Tanda-II generation project and UP had given consent for purchasing the surrendered power. This additional power allocation to UP is under consideration of MoP, Government of India. In the meeting, it was decided that NTPC would submit the revised LTA application / formal request to CTU in line with the CERC Regulations and detailed procedures for grant of connectivity and LTA. Based on the request of NTPC, CTU would process the proposal of NTPC in consultation with CEA and other stakeholders. Subsequently, NTPC vide its letter dated 24-12-16 has revised the total LTA quantum from Tanda Stage-II to 395.42 MW from 484.28 MW (excluding the allocation to PSPCL, TPDCL and BRPL). Considering the change in quantum of LTA, CTU have circulated the agenda vide their letter dated 16-1-2107 to the Northern Region constituents for their observations. UPPTCL vide their email dated 27-01-2017 and 15-02-2017 had expressed certain reservations regarding requirement of ISTS facility.

Subsequently, a meeting was held in CEA on 11-04-2017 with CTU, UPPTCL, NTPC and PFCCL to deliberate the requirement of ISTS facilities, wherein the following was agreed:

a) Review of the Tanda–Sohawal–Lucknow 400 kV D/C line (Inter State Transmission system associated with Tanda-II TPS) as suggested by UPPTCL, and its implications on the ISTS beneficiaries (other than UPPTCL) of the Tanda-II generation project would be deliberated in the forthcoming meeting of SCPSPNR.

b) Keeping in view the present situation (review of ISTS system, issues in implementation of Tanda-Gonda-Shajahapur 400 kV D/C line under PPP mode by UPPTCL), taking up the implementation of LILO of 400 kV Sultanpur–Azamgarh S/C line at Tanda-II by UPPTCL was agreed in principle subject to ratification in next meeting of SCPSPNR to take care of evacuation requirements from unit 1 of Tanda-II. Further, NTPC would explore the implementation of 2 nos. of 400 kV additional line bays at NTPC switchyard.

15.3 NTPC stated that as per revised power allocation by MoP from Tanda-II, vide their order dated 18.5.2017, share of UP is 943.45 MW plus additional 5% from the unallocated power (5% of 1320=66 MW). It is also mentioned in the MoP's order that this additional allocation to UP from Central Sector Share unallocated power to the tune of 66 MW from the project shall be reviewed after every two years. Therefore, about 1010 MW capacity is allocated to UP.

15.4 CTU stated that they have carried out the system studies and it is observed that in absence of Tanda-Sohawal-Lucknow 400kV D/c line, the 220kV network at Tanda is getting overload and is not N-1 compliant. Therefore, atleast Tanda-Sohawal 400kV D/C line is required for reliable evacuation of power from Tanda-II generation.

15.5 CEA stated that the bidding process for the entire ISTS i.e. Tanda–Sohawal–Lucknow 400 kV D/C line has been completed except for transfer of the SPV to the successful bidder in view of the non-signing of TSA by three beneficiaries. As per NTPC, the anticipated synchronisation of 1st unit of Tanda-II is July, 2018 with its COD of January 2019. Therefore, the transmission system for evacuation of power from Tanda–II is required by July 2018. As on date, the time available for implementation of the ISTS scheme is only 13-14 months and any review of the transmission scheme would reuire re-initiation of the bidding process which would take another 9-12 months' time.

15.6 UPPTCL stated that augmentation at Tanda 220kV level is already being taken, which in turn would facilitate reliable evacuation of power from Tanda-II. About 1010MW has been allocated to UP by MOP. The injection on account of beneficiaries other than UP, would be about 289 MW (corresponding to normative auxiliary consumption of 5.75%) and intra state network system evolved in 26th meeting of SCPSPNR is sufficient to evacuate 100% power from Tanda-II irrespective of beneficiary. Further, in view of revised load generation scenario and strong 400 kV interconnections of Lucknow (PG) sub-station with Shahajahanpur (PG) and Sultanpur (UP) substations, the Sohawal-Lucknow 400 kV D/C section of the line is not justified. Impemenation of Tanda-Sohawal-Lucknow 400kV D/c link would increase the liability on ISTS users.

15.7 CTU stated that Tanda-Sohawal-Lucknow link was planned for evacuation of power to benificiaries (other than UP) of Tanda-II generation. In case of non-implementation of ISTS system, the other beneficiaries of the project may be required to pay additional STU charges/losses for using STU transmission system. Therefore, consent of the beneficiaries (other than UP) is required in case Tanda–Sohawal-Lucknow link is dropped. The benificairy states gave their consent for dropping of Tanda–Sohawal-Lucknow 400kV D/C line.

15.8 CEA enquired about the commissioning schedule of the UPPTCL intra state system associated with Tanda–II generation project, vis-a-vis commsioning schedule of Tanda-II generation project, UPPTCL informed that LILO of 400 kV Sultanpur-Azamgarh 400 kV S/C line at Tanda-II and Tanda-Gonda 400kV D/C line would be completed by May 2018 and September, 2018 respectively.

15.9 After detailed deliberations, following was agreed:

i) Dropping of the Inter State transmission scheme - ATS for Tanda Expansion TPS (2x660) MW, which included the following:

- Tanda TPS–Sohawal–Lucknow (New) 400 kV D/c line
- 4 nos. of 400 kV line bays at Sohawal, 2 nos. of 400 kV line bays at Lucknow (by POWERGRID)

(Connectivity application for Tanda-II of NTPC to ISTS to be closed by CTU. NTPC to apply to UPPTCL for connectivity)

ii) The two nos. of 400kV bays at Tanda-II associated with Tanda TPS–Sohawal 400 kV D/c line would be used for LILO of 400 kV Sultanpur-Azamgarh S/C line at Tanda-II.

iii) UPPTCL to implement the intra-state transmission system associated with Tanda-II generation project mentioned at 15.1 (II).

iv) NTPC to re-apply for LTA to CTU along with NoC from UPPTCL

v) UPPTCL to grant NoC to NTPC

16.0 Establishment of 220/66kV, 2x160MVA GIS Substation at Hallo Majra, Chandigarh.

16.1 CEA stated that establishment of 220/66kV, 2x160MVA GIS Substation at Hallo Majra, Chandigarh was approved in 36th meeting of SCPSPNR in July 2015 as ISTS project with following scope of work:

- Establishment of 2x160MVA, 220/66 kV over ground GIS S/s at Chandigarh (Hallo Majra)
- 220kV D/c line from Chandigarh to Panchkula (PG) substation (including cable in Chandigarh portion)

Implementation of the above scheme was allocated to POWERGRID by Ministry of Power under compressed time schedule. Subsequently, in Power for All meeting for Chandigarh in Ministry of Power in Feb. 2016, it was desired to explore the option for making this 220/66 kV S/s underground.

Establishment of Chandigarh 220/66 kV substation as underground station was discussed in 38th meeting of SCPSPNR held on 30-05-2016. In the minutes of the meeting and its amendment dated 20-07-16, it was suggested that POWERGRID may explore differential funding (for additional civil cost) either from UT of Chandigarh or through PSDF. POWERGRID discussed the matter with UT of Chandigarh and NLDC (the nodal agency for PSDF) for providing differential funding. NLDC vide their letter dated 04-08-2016 has informed the categories of projects, which are eligible for PSDF funding and it appeared that the proposal may not be eligible for PSDF funding. Similarly, UT of Chandigarh during the discussions have informed that additional funding may not be feasible from their side. In view of lack of clarity about the establishment of the underground substation in Chandigarh, POWERGRID could not go ahead with its implementation activities. Matter was further discussed and considering the time already elapsed since approval of this substation, POWERGRID decided to go ahead with over ground GIS substation in Chandigarh as approved earlier.

16.2 Chief Engineer, CEA enquired about the commissioning schedule of the S/s and its downtstream connectivity. CTU informed that the S/s is likely to be commissioned by Feburary 2019. Electricity Deptt, UT of Chandigarh informed that the process for preparation of Request for Proposal (RfP) for appointing a PSU to install 66kV outgoing feeders from this new 220kV Sub Station has been initiated. The tender will be floated after due approval from competent authority and the work would be executed before expected schedule of commissioning of 220kV GIS Sub Station by Feb, 2019.

16.3 Members noted the same.

17.0 Development of Transmission scheme for Solar Power Parks in Bhadla, Rajasthan

17.1 CEA stated that in the 37th meeting of SCPSPNR and 8th meeting of Connectivity & Long Term Access held on 20.01.16, common transmission scheme for solar power parks viz M/s Essel Saurya Urja Company of Rajasthan Ltd. (ESUCRL) (750MW), M/s. Surya Urja (500 MW) and M/s. Adani Renewable (250 MW) at Bhadla, Rajasthan was discussed and agreed. The agreed transmission scheme is as under:

(i) 765kV Bhadla (PG)–Bikaner (PG) D/c

(ii) 400kV Bhadla (PG)- Bhadla (RVPN) D/c (Quad)

(iii) Establishment of Pooling Station at Bhadla (PG) (765/400kV-3x1500MVA, 400/220kV-3x500MVA)

(iv) 2 nos. 400kV and 4 nos. 220kV line bays at Bhadla (PG) for interconnection of solar park interconnection

(v) 1x240 MVAr switchable line reactor at each end (each ckt) of 765kV Bhadla (PG)- Bikaner (PG) D/c line

(vi) 1x240 MVAr (765kV) and 1x125 MVAr (400kV) Bus reactors at Bhadla Pooling Station

The following Connectivity transmission system was agreed for the solar parks (to be implemented by project developers):

(i) M/s Essel Saurya generation switchyard–Bhadla 400 kV D/c line

(ii) M/s Adani Renewable switchyard–Bhadla 220 kV D/c line

(iii) M/s Surya Urja switchyard–Bhadla 220 kV D/c line

M/s Surya Urja and M/s Adani had gone ahead with implementation of their connectivity system, whereas M/s ESUCRL (750 MW) had informed that laying of 60 km long D/c line from Solar Park Pooling station upto 765/400/220 kV Bhadla Pooling station would impact the project cost and the project may become unviable.

17.2 CTU stated that M/s ESUCRL vide letter dated 15/02/16 had requested POWERGRID to take up the development of connectivity transmission system i.e. 400 kV D/c line from ESUCRL upto Bhadla Pooling station and delete the same from ESUCRL scope. In view of this, the intimations for connectivity and LTA could not be issued to M/s ESURCRL.

17.3 CEA stated that in view of M/s ESURCRL request, they may be given connectivity through 220kV D/C line with HTLS or twin moose conductor connectivity line (including terminating bays), which would save the expenditure required in creating 400/33kV or 400/220kV substation by the developer. M/s ESURCRL agreed for the same.

17.4 CTU informed that transmission scheme for solar power parks at Bhadla including 2 nos. 400kV line bays at Bhadla pooling station is already awarded and under implementation. Change in connectivity for M/s Essel from 400kV to 220kV shall vacate above 2 nos. 400kv line bays at Bhadla pooling station. CEA opined that vacated 2 nos. 400kV line bays can be utilized for termination of 765kV Fatehgarh PS-Bhadla (PG) D/c line (initially to be operated at 400kV) at Bhadla as part of Transmission scheme for Fatehgarh UMSPP.

17.5 CTU also ifnromed that 3 nos. connectivity applications of about 900MW were received from wind/solar developers at Bhadla in addition to 1500MW (M/s Saurya: 500MW; M/s Adani: 250MW; M/s Essel: 750MW). In view of good renewable potential in/near Bhadla, it is anticipated that more renewable projects may come up in this area. To provide connectivity to upcoming renewable projects, it is proposed to convert balance 220kV AIS bays into GIS bays, so that more renewable projects may be accommodated at Bhadla pooling station

17.6 Chief Engineer (PSPA-I) CEA stated that for injection of 750 MW of power at 220kV, the 400/220kV transformer augmentation would be required at Bhadla (PG).

17.7 After deliberations following was agreed:

i) M/s ESUCRL to construct 220kV D/c line from their generation switchyard to Bhadla Pooling point with HTLS or twin moose conductor (including terminating bays at both ends)

ii) Establishment of 1x500MVA, 400/220kV additional (4th) transformer at 765/400/220kV Bhadla Pooling Point as ISTS.

Note: 2 nos. vacated 400kV line bays at Bhadla pooling station shall be utilized for 765kV Fatehgarh PS-Bhadla (PG) D/c line (initially to be operated at 400kV) as part of Transmission scheme for Fatehgarh UMSPP.

18.0 Reconductoring of Badarpur–Ballabhgarh 220kV D/C line

18.1 CEA stated that the issue of reconductoring of Badarpur–Ballabhgarh 220kV D/C line had been discussed in 37th and 38th meetings of SCPSPNR held on 20-1-2016 and 30-5-2016 respectively. As no representative of BBMB was present in the 38th SCPSPNR, it was decided that CEA would convene a meeting with CTU, DTL, HVPNL and BBMB. Meetings were held on 8.7.2016 and 10.1.2017 in CEA, wherein, it was decided that a committee consisting of CEA, BBMB, HVPNL, CTU would carry out the system studies regarding Reconductoring of BadaRPUR-Balllabhgarh 220kV D/C line.

The studies were carried out and discussed with the representatives from CTU, BBMB, HVPNL and DTL in a meeting held on 30.01.2017 at CEA. As per the studies following conclusions were derived:

1. Without Badarpur generation, to meet the peak demand of Delhi, Samaypur–Ballabhgarh–BTPS 220kV lines are getting overloaded, till the commissioning of Tuglakabad 400/220 kV substation. In this scenario, reconductoring of Samaypur–Ballabhgarh–BTPS 220kV lines along with augmentation / replacement of line bay equipment at BTPS is required.
2. After the commissioning of 400/220kV Tuglakabad S/s, the loads of South Delhi area are mostly fed through Tuglakabad 400/220 kV sub-station and the power flows on 220kV Badarpur–Ballabhgarh D/c line gets reduced substantially. However, in case of outage of one ckt. of the 3 nos. 220 kV lines between Samaypur and Ballabhgarh, the remaining ckts are loaded to their capacity.
3. Issue of auto-reclosing at Badarpur end of the Ballabhgarh-Badarpur 220 kV D/C line may be discussed in the OCC forum of NRPC.

18.2 POWERGRID stated that earlier it was envisaged that the 400/220kV Tuglakabad S/s would be completed by June, 2018. Now in view of the request of DTL for implementaion of 220kV bays under DTL's scope, the commissioning may get delayed by 3-4 months and S/s would be available by Sep./Oct. 2018. Therefore, neither Tuglakabad S/s nor Badarpur generation would be available during the peak demand period of Delhi in 2018-19. To meet the peak demand, DTL is required to take up the reconductoring works of Samaypur-Ballabhgarh–BTPS 220kV lines at the earliest.

18.3 Members noted the same.

19.0 Connectivity (6x660 MW) and LTA (4x660MW) Application of Barethi STPS of NTPC Ltd.

19.1 CEA stated that connectivity and LTA application of NTPC Ltd. for Barethi STPS (6x660 MW) was discussed during the 38th meeting of SCPSPNR / 9th

LTA/Connectivity meeting of Northern Region Constituents held on 30-05-2016, wherein the representative from NTPC informed that the expected commissioning schedule of the project would be in 2021-22 timeframe. As per application, LTA has been sought for 25 years. The applications were also discussed during the 39th and 40th meeting of SCPSPWR held on 30-11-15 and 01-06-16 respectively for evacuation of power from the generation project. UPPTCL had certain reservations on the proposed system and it was agreed that the system may be reviewed jointly by CEA, UPPTCL, CTU and NTPC and the same may be finalized in the next NR Standing Committee meeting / LTA meeting.

19.2 Accordingly, a meeting was held on 23-11-2016 at UPPTCL office, Lucknow among CEA, POWER GRID and UPPTCL officials. During the meeting, following Transmission system was discussed for evacuation of power through Barethi STPP:

Transmission System for Connectivity:

- LILO of second ckt. of Satna-Gwalior 765 kV 2x S/C line at Barethi STPP

Transmission System for LTA:

- Barethi STPP-Orai (PG) 765 kV D/c line* # {LILO of first circuit of Satna–Gwalior 765 kV 2xS/c lines at Orai may be extended to Barethi STPS, so as to form Barethi STPS – Orai 765 kV D/c line and Satna – Gwalior 765 kV first S/c line may be straightened}
- Orai (PG) – Kanpur (PG) 765 kV D/c line
- LILO of one ckt. of Agra (PG)-Fatehpur (PG) 765 kV D/c line at Kanpur (PG)
- Aligarh (PG)-Modipuram (UP) 765 kV D/c
- LILO of Hapur (UP) - G. Noida (UP) 765 kV S/c line at Modipuram (UP) (765kV D/c)

** 765 kV line bays at Barethi STPP shall be provided by the applicant.*
 # Barethi STPS-Orai 765kV D/c line such formed shall have 240 MVAR fixed line reactor in one circuit at Orai end. 240 MVAR fixed line reactor in other circuit at Orai end needs to be provided under the present scheme.

19.3 NTPC informed that due to some environmental issues, the time frame of the project is uncertain.

19.4 After deliberations, it was agreed that the connectivity and LTA application of NTPC Ltd. for Barethi STPS (6x660 MW) may be closed and NTPC may apply afresh in future after resolution of environmental issues.

20.0 Operational Feedback (NR Region):

S. No	Corridor	Season/ Antecedent Conditions	Constraints	Deliberations in the 39th meeting of SCPSPNR
1	400kV Dadri-Greater Noida	All time	High MW loading. After the commissioning of 400kV Gr. Noida (765/400kV) - Gr. Noida (400kV) D/C, loading of 400kV Dadri-Gr. Noida would be reduced.	UPPTCL informed the the line would be commissioned by 15th June, 2017

2	400kV Mahendragarh-Dhanonda D/C	All time	Remarks: High Loading was observed during to less/outage of generation at CLP Jhajjar (35% of time, generation was under outage & 30% of time under less generation.	The line is a 5 km quad line, but the switchgears at both the ends are of 2000A, therefore, upgradation of switchgear should be taken up by HVPNL. HVPNL was requested to carry out the upgradion works at the earliest. HVPNL informed that the average load of about 700 MW (each ckt) is continuously running on the said line. However, they agreed for carrying out the equipment upgradation at both the sub-stations.
3	400kV Singrauli-Anpara	All time	Full generation at Singrauli / Rihand and with Rihand stage-3 Unit # 5 & 6 is also evacuating through the same complex, loading of Singrauli-Anpara becomes very high. Sometime due to low generation at Anpara – A, B & C and high generation at Rihand-Singrauli Complex, 400kV Singrauli-Anpara often get overloaded. Remarks: Multiple connectivity should be ensured for Singrauli-Anpara Or uprating of existing 400kV Singrauli- Anpara	CEA stated that the problem would be relieved after commissioning of connectivity line with WR. However, joint studies could be carried out for opening of 400kV Singrauli-Anpara line. Power evacuation from the complex needs review.
4	400kV Anpara-Obra	Some times	Connected to generating station. (Anpara-B & C). Remarks: Loading on the same lines has reduced after the commissioning of 660MW generating unit-1 at Bara. The loading may likely to be increased in case of N-1 contingency of 765kV Bara – Mainpuri ckt-2 or N-1 contingency of single 765/400kV ICT at Mainpuri	UPPTCL stated that after Anpara D-Unnao 765 kv line likely to be commissioned by Nov. 2017, these will be relieved. Further joint studies would involve this line also.
5	400kV Anpara-Sarnath-1 & 2	All time	Connected to generating station (Anpara-B & C). Remarks: The loading may be reduced after commissioning of Anpara D – Unnao S/c line.	
6	400 kV Bamnoli-Jhatikara D/C line	Some time	Connected to 765 kV Jhatikara S/S	DTL informed that the incidence of tower collapse occurred on this line, however the same is expected to be erected by 15.08.2017

7	Underlying network of following substation is not available : 220kV network not available		Bhiwani (Haryana)	➢ 220kV Bhiwani (PG)–Bhiwani (HVPNL) D/C line ➢ 220kV Bhiwani (PG)–Isherwal D/C line Status: The work for construction of lines awarded to M/s Isolux against package G-24A (Re-bid). The contractual completion date is 02.01.2018. Route Plans approved except for Railways, Transmission line crossing etc.
			.Jind (PG)	➢ LILO of both circuits of 220 kV D/C Narwana-Mundh line at Jind (PGCIL) Status: The work of construction of lines awarded to M/s Isolux against package G-24A (Re-bid). The contractual completion date 02.01.2018. Route Plans approved except for Railways, Transmission line crossing etc.
			Kurukshetra (PG)	➢ LILO of one circuit of 220 kV D/C Kaul-Pehowa line at HVDC Kurukshetra ➢ LILO of one circuit of 220 kV D/C Kaul-Bastara line at HVDC Kurukshetra Status: The work of construction of lines awarded to M/s Isolux against package G-24A (Re-bid). The contractual completion date 02.01.2018. Route Plans approved except for Railways, Transmission line crossing etc.
			Sohawal (PG)	➢ 2 nos of bays has already been utilized for sohawal 220kV UP. ➢ 2 nos for Tanda new 22O kV s/s Line in June 2017. Substation is already connected to Tanda NTPC and Sultanpur ➢ 2 nos for Barabanki 220 kV s/s under construction likely to be commissioned by August 17
			New Wanpoh (PG)	No representative was present from JKPDD
			Chittorgarh (RVPNL)	➢ LILO of 220 kV S/C Chittorgarh Debari line at 400 kV Chittorgarh GSS – Completed

				➢ 220 kV D/C Chittorgarh–Sawa Line:- Disc failure on line & 220kV bay work at 400 kV GSS Chittorgarh are pending. ➢ 220 kV D/C Chittorgarh-Pratapgarh line with one circuit LILO at Nimbahera:- under progress to be completed in 2017-18 ➢ 400/220 kV transformer not put on load due to telemetry issues to be commissioned by June 2017

ICT Constraints

S. No	ICT/Constraint	Season/ Antecedent Conditions	Constraints	Deliberations in the 39th meeting of SCPSPNR
1	765/400kV Phagi ICTs (2x1500 MVA)	December	Two ICTs of 1500MVA each capacity at 765/400kV Phagi S/s. and not N-1 compliant beyond 1700MW. On commissioning of 765kV Phagi- Bhiwani 2nd ckt on 29/09/2016, loading at 765/400kV ICTs has been reduced slightly. Afterwards, on commissioning 400kV Phagi-Heerapura D/C, the loading of 765/400kV ICTs at Phagi has been increased again and it would further increase after commissioning of upcoming 400kV Phagi-Ajmer D/C and generation at Chhabra Super Critical.	Remarks: 3rd ICT of 1500MVA capacity at Phagi should be expedited as Rajasthan experiences high load in winter. RRVPNL informed that the 3rd ICT is expected by November 2019.
2	765/400kV ICTs of Unnao (2x1000 MVA)	Security issues of 765 kV Anpara-Unnao or n-1 contingency of Unnao ICT	Evacuation of Anpara C thermal power station through 765 kV Anpara-Unnao. Unnao ICTs are loaded more than ~1100MW and not N-1 compliant.	UPPTCL stated that 1000 MVA ICT III will be commissioned in June-July 2017
3	400/220 kV Agra (UP) (2x315MVA +	All time	High loading at Agra and not N-1 compliant beyond 800MW.	UPPTCL informed that capacity has already been augmented as 1x315 + 2x500 MVA on, May 2 2017

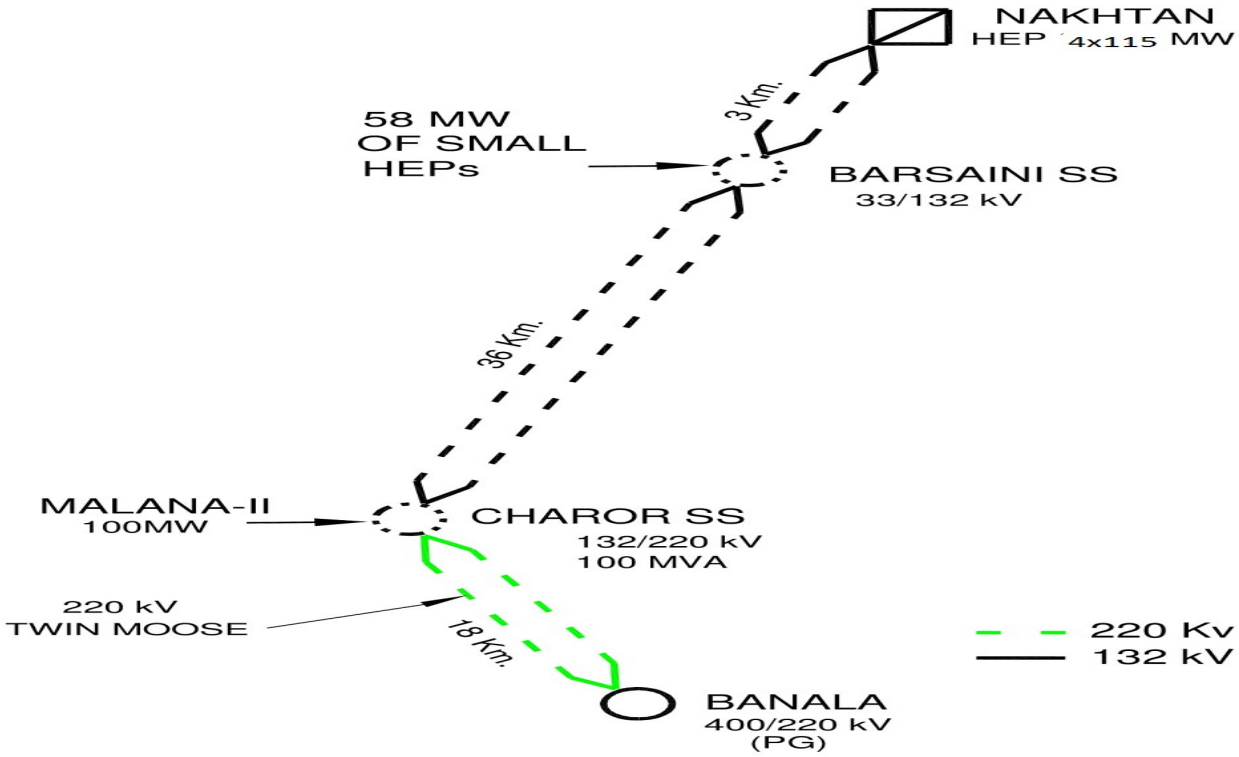
	1x500MVA)			
4	400/220kV Mainpuri (2x315 MVA)	All Time	Two ICTs of 315 MVA each loaded in the range of ~230 MW and not N-1 compliant. Remarks: To be expedited planned 3rd ICT of 500MVA at Mainpuri.	POWERGRID informed that the 3rd ICT is expected by July/August 2017
5	400/220kV Azamgarh (2x315 MVA)	October	Two ICTs of 315MVA each and loading of both ICTs is more than 400 MW, which is not N-1 compliant.	UPPTCL informed that Augmentation alredy done as 1x315+1x500 MVA on 25 May, 2017. Azamgarh II 220/132 2x160 MVA new substation is expected by August 17. It will be fed by 400/220kV Sarnath and later from Aurai Mirzapur 400/220kV S/s. It will reduce ICT loadings on 400/220 kV Azamgarh 400.
6	400/220kV Sultanpur (2x240 MVA)	All Time	Two ICTs of 240 MVA each. Loading at Sultanpur is in range of 300-330 MW, which is not N-1 compliant	UPPTCL informed that substation loadings have been considerably reduced after Sohawal PG(400)-Sohawal 220kv DC line. However, Augmentation has already been done as 2x240+1x315 MVA in May 2017
7	400/220kV Wagoora (4x315MVA)	Security issues of 220KV Network at Wagoora, only 4 ckts are there	Four ICTs of 315MVA each loaded in 200-225MW. 4 Ckts of 220kV level; 220kV Wagoora Pampore D/C, 220kV Wagoora-Zainkote D/C. All four lines are critically loaded.	No represntive from JKPDD was present in the meeting. CTU stated that after implementing drawl arrangement from New Wanpoh, relief is expected.
8	Single ICTs at following 400kV Nodes:		1. Chhabra (Rajasthan) – 1 x 315 MVA 2. Kalisindh (Rajasthan) – 1 x 315 MVA 3. Rajwest (Rajasthan) – 1 x 315 MVA 4. Bhiwani (BBMB) – 1 x 500 MVA 5. Agra(PG) – 1 x 315 MVA 6. Dehar (BBMB) – 1 x 250 MVA	• A subcommittee to be formed involving the members from Rajasthan GENCos so to sort out the issues related to single ICT at Chhabra (Rajasthan), Kalisindh (Rajasthan) and Rajwest (Rajasthan) • No representative from BBMB was present in the meeting • 2nd ICT already planned at Agra (PG)

21.0 Power evacuation plan for Nakhtan HEP (4x115 MW)

21.1 CEA stated that Himachal Pradesh Power Corporation Limited (HPPCL) vide their letter HPPCL/EC/Nakhtan/EoP/2016/2673-79 dated 11.1.2017 has informed that they are in the process of taking up Nakhtan HEP (4x115 MW) for execution in near fututre and the DPR of the same is in the final stage. Therefore, they have requested to finalize the power evacuation plan for the project.

21.2 Director, HPPTCL informed that this hydroelectric project is located on Tosh Nallah and Parbati river tributaries of Beas River in District Kullu of Himachal Pradesh. This project is 30-45 km away from Charor 132kV S/s. He further stated that the project is about 3km away from the Barsaini 132/33kV S/s, where 58 MW of small hydro projects are connected. Barsaini S/s is connected to Malana 220/132kV S/s through 132kV D/c line of 36km. 220 kV Charor-Banala D/C (Twin Moose) line (18 Kms) is under construction and is targeted for completion by 31.10.2017 on bests effort basis. The evacuation plan of the project was also considered while preparation of the report on "Transmission system for upper part of Satluj Basin and Chandrabhaga Basin and following was suggested for evacuation of power from Nakhtan HEP:

"*Nakhtan HEP (520 MW) is located in the upstream of Parbati–II (earlier it was identified as Parbati–I with a capacity of 750 MW. Due to environmental issues, the project capacity has been revised to 520 MW and named as Nakhtan). Regarding evacuation of power from Nakhtan* HEP*, some new pooling station is in the vicinity of Parbati – II or Parbati –III or Parbati Pooling Station would have to be developed and the scheme would be integrated with Parbati/Koldam system. While finalizing the scheme, the constraint in switching capacity of Parbati/Koldem HEP is to be taken into account.*



21.3 On a query about the time frame and LTA/connectivity application of project, Director (HPPTCL) stated that the time frame for the project is not certain and likely to be commissioned after 13th plan. They would apply for LTA/connectivity after getting certainity of the time frame. He further added that the project is located in very difficult terrain and RoW for construction of the line is very tough. Therefore, it is requested to work out the tentative system for evacuation of power from Nakhtan HEP.

21.4 CE (PSPA-I), CEA stated that if RoW constaint are there, the possibility of upgardion of Barsaini 132/33kV S/s along with Barsaini-Charor 132kV D/C line at 220kV level may be considered.

21.5 After deliberations, following was decided:

(i) A subcommittee consisting of CEA, CTU, HPSEB and HPPTCL to work out the transmission system in coordinated manner considering other projects along with the small hydro projects in that area.

(ii) HPPTCL to provide the information about the hydro projects existing/underconstruction/ planned in that area along with their evacuation system.

22.0 Creation of 220kV substation at Deoli Ahir (Mohindergarh) and associated transmission system:

22.1 CEA stated that HVPNL vide their letter dated 16.2.2017 has proposed establishment of 220 kV substation at village Deroli Ahir (in Mohindergarh District of Haryana) with a capacity of 2xl60 MVA (220/132kV) +2xl00 MVA (220/33kV) +lx5 MVA (33/11 kV) with following scope of works:

1. Establishment of 220/132/33/11kV S/s at Deoli Ahir with the capacity of 2xl60 MVA (220/132 kV) +2xl00 MVA (220/33 kV) +lx5 MVA (33/11 kV)
2. 220 kV D/C line from 400/220kV Substation, Dhanoda to proposed 220kV Deroli Ahir substation, with ACSR Moose conductor (25 Km).
3. 220 kV S/C Deroli Ahir-Narnaul line on D/C towers with ACSR Moose conductor (14 Km).
4. Augmentation of 220/132kV transformation capacity from 2xl00MVA to (lxl00+lxl60) MVA, at Dhanonda 220/132kV/33kV Substation

The studies furnished by HVPNL, shows that Dhanonda 400/220kV, 3x315 MVA, ICTs are overloaded and no augmentation in the transformation capacity at 400/220 kV level has been proposed.

22.2 HVPNL stated that if required, they would plan augmentation at 400/220kV, 3x315 MVA Dhanoda S/s.

22.3 After deliberations, the proposal of HVPNL for creation of 220kV substation at Deoli Ahir (Mohindergarh) and associated transmission system was agreed.

23.0 Issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.

23.1 CEA stated that M/s GMR Energy Ltd. is constructing Bajoli Holi HEP (3x60MW) on Ravi river in HP. Long Term access was granted to M/s GMR Bajoli Holi Hydropower

Pvt. Ltd. in March 2014 for 155 MW from August 2018 for 25 years through the following transmission system:

- Through 220 kV high capacity line from Bajoli Holi to Lahal Pooling Station of Himachal with Twin Moose conductor*
- 400 kV D/c line from Lahal Pooling Station to Chamera Pooling Station (PG)*

**As agreed earlier, above mentioned transmission system is to be implemented by HPPTCL.*

GMR had anticipated some delay in the implementation of connectivity system to be implemented by HPPTCL for evacuation of power from the generation project due to difficult terrain, delay in forest clearance and severe ROW problem. In view of above, GMR has proposed following temporary arrangement for evacuation of power from their project till the originally planned system is completed:

- To connect from Plant bus to Lahal pooling station through transmission line Bajoli Holi-Lahal P.S 220 kV D/c by expediting the commencement and completion of construction
- Lahal P.S–Budhil HEP 220 kV D/c line (nearing completion)
- Budhil HEP–Chamera-III 220 kV S/c line (existing)
- Chamera-III–Chamera Pooling station through existing ISTS transmission system.

23.2 HPPTCL stated that Lahal-Chamera–II line will be awarded by Aug. 17 with commissioning schedule of 2019-20. Lahal-Budil HEP is likely to be completed by mid of next year (June 2018). CEA/CTU stated that Lahal P.S–Budhil HEP 220 kV D/c line was not agreed in any meeting of SCPSPNR.

23.3 After deliberations, it was agreed that a separate meeting would be convened by CEA involving CTU, GMR, HPPTCL anhd HPSEB to deliberate on the issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.

24.0 Agenda proposed by PTCUL for consideration of Transmission Network up to 400kV S/s Srinagar of UITP Scheme developed by PTCUL as part of System Strengthening of Northern Region and modifications in the UITP scheme for Alakhnanda Basin.

24.1 CEA stated that PTCUL has proposed the following agenda for deliberations in SCPSPNR:

i) LILO of one circuit of 400kV Vishnuprayag–Muzzafarnagar line at proposed Pipalkoti 400kV S/s for evacuation of power of upcoming generators in Alakhnanda basin.

ii) Modification in the scope for evacuation of power from Vishnugarh HEP and Pipalkoti HEP as approved in the 38th meeting of SCPSPNR held on 30.5.2016.

iii) Consideration of transmission network upto Srinagr 400kV S/s of UITP scheme developed by PTCUL for evacuation of power from upcoming generators in Alakhnanda basin as a part of System Strengthening of Northern Region so as to ensure recovery of transmission charges.

a) 400 kV Srinagar S/s.

b) 400 kV D/C Transmission Line from Srinagar HEP to Srinagar S/s.

c) 400 kV D/C Transmission Line from Srinagar S/s to Kashipur.

d) 2 nos. 400 kV bays at Kashipur 400 kV S/s

e) Pipalkoti-Srinagar 400 kV D/C line.

f) Vishugad-Pipalkoti 400 kV D/C line.

g) LILO of one circuit of 400 kV D/C line from Vishnuprayag-Muzaffarnagar at 400 kV S/s Pipalkoti

h) 400 kV S/s at Pipalkoti

24.2 CEA stated that PTCUL is developing UITP scheme in Uttarakhand for evacuation of Power from mainly ISGS to the beneficiaries of Northern Region. CERC vide its order dated 31.01.2013 has granted deemed ISTS status to PTCUL to the UITP scheme. CTU being the Nodal Agency for granting Connectivity and Open Access, PTCUL has requested all Generators to approach POWERGRID for seeking Connectivity and Open Access on the deemed ISTS network. Accordingly, NTPC, THDC, Lanco and L & T have approached POWERGRID for Connectivity and Open Access. These developers are in the process of applying to POWERGRID for the same.

24.3 PTCUL stated that the UITP scheme was planned to the facilitate evacuation of power from the upcoming Generating Projects in the Uttarakhand to their beneficiaries in Northern Region. UITP Scheme is being developed by PTCUL as per concurrence received from CEA way back in 2007 and funded by financial institutions like ADB and PFC. Therefore, lots of Project Implementation activities were initiated by PTCUL from early 2008 for timely completion of UITP Scheme, in order to facilitate evacuation of Power from these generation projects. Some projects were awarded in 2010 like 400 kV Srinagar S/s and 400 kV D/C Transmission Line from Srinagar HEP to Srinagar S/s. NTPC was initially provided Open Access intimation in year 2009, w.e.f. Sep. 2011, however, now as per implementation agreement (IA) executed between PTCUL and NTPC, COD of 1st unit of Tapovan Vishnugad HEP (520MW) has been considered as March, 2019. Recently, Srinagar 400 kV S/s and 400 kV D/C transmission line from Srinagar HEP to Srinagar S/s has been commissioned by PTCUL as a part of deemed ISTS network and accordingly, petition for determination of Yearly Transmission Charges (YTC) for these elements were filed by PTCUL before the CERC. CERC in various hearings have directed PTCUL to enter into necessary Agreements with the Generators in order to securitize the recovery of Transmission Charges for the deemed ISTS network. CERC also has advised that PTCUL should take all necessary steps in order to ensure the recovery of the investment being made by PTCUL. Accordingly, UITP scheme for evacuation of power from Alaknanda basin has been proposed by PTCUL to be considered as NR system strengthening scheme.

24.4 CEA stated that in the 36th meeting of SCPSPNR held on 13.7.2015 UPPTCL, on the issue of modification of UITP scheme by PTCUL, has observed that LILO of one circuit of Vishnuprayag - Muzaffarnagar 400 kV D/C Line at Srinagar HEP (330 MW) was not indicated in the single line diagram, therefore, it was not clear which of the two circuits was being LILOed at Piplakoti 400kV S/s. Correction in the SLD along with load flow studies was requested by UPPTCL. In the meeting it was agreed that the observations of UPPTCL would be discuseed in next SCM. Therefore, LILO of one circuit of Vishnuprayag - Muzaffarnagar 400 kV D/C Line at Pipalkoti has been proposed by PTCUL to include it in the evacuation system of upcoming projects in

Alaknanda basin and the evacuation system of Vishnugarh and Pipalkoti HEP agreed in the 38th SCPSPNR may be modified.

24.5 Chief Engineer (PSPA-I), CEA enquired PTCUL about the basis for taking up construction of Srinagar HEP–Srinagar (PTCUL) 400 kV D/c line and Srinagar substation and its present utilisation. PTCUL stated as per the earlier scenario, some of the HEPs to whom connectivities provided by PTCUL were to come up by 2012-13 and looking into the available time for construction, PTCUL had taken up the construction. Regarding its utilisation, PTCUL stated that this system facilitates drawl of free power from Srinagar and Vishnuprayag HEP. It was also informed by PTCUL that Srinagar substation is also connected to 132 kV level through 132 kV lines.

24.6 CEA stated that at present, there is no utilisation of Srinagar (PTCUL)–Srinagar HEP 400kV D/c line and 400/220/132kV substation under ISTS. Further, Srinagar 400/220kV substation would be required, when any of the 5 generation projects of Alaknanda Basin gets commissioned. With regard to LILO of one circuit of 400 kV D/C line from Vishnuprayag-Muzaffarnagar at 400 kV S/s Pipalkoti, UPPTCL representative stated that Vishnuprayag-Muzzafarnagar 400 kV line (one circuit already LILOed at Srinagar HEP) does not have margins to evacuate additional power. The issue of the LILO was discussed earlier also and UPPTCL had requested PTCUL to submit the proposal with the studies, however no studies have been enclosed with the agenda. As such the proposal of LILO was not agreeable.

24.7 After deliberation following was agreed:

i) 400/220kV substation at Srinagar would be required for effecting the connectivity to the first generation project out of 5 generation projects of Alaknanda Basin i.e. with the commissioning of first generation project, it would be considered under ISTS.

ii) Srinagar (HEP)–Srinagar (PTCUL) 400kV D/c is neither required for affecting the connectivity of any project in Alaknanda basin nor for evacuation of power. This line along with Srinagar 400/220 substation at present is facilitating Uttarakhand to draw their share of free power from Vishnuprayag and Srinagar HEP.

iii) Conversion of UITP scheme (for evacuation of power from HEPs in Alaknanda basin) as Northern Region System Strengthening Scheme was not agreed as the scheme is for evacuation of HEPs and in absence of generation projects there would be no utilisation of the Transmission elements under the scheme.

iv) The proposal of LILO of one circuit of Vishnuprayag – Muzafarnager 400 kV line at Pipalkoti would be discussed in separate meeting of CEA, CTU, PTCUL, NTPC and UPPTCL. PTCUL would submit the studies for the proposal.

25.0 Evacuation of New Generation Project in 13th Plan (2017-2022) in Uttar Pradesh:

25.1 CEA stated that during the 38th meeting of SCPSPNR, the proposal of UPPTCL on the transmission system for evacuation of power from 1x660 MW Panki Extension TPS, 1x660 MW Harduaganj Extn., 2x660 MW Obra "C" TPS and 2x660 MW Jawaharpur (Etah) TPS along with some 765 kV and 400kV Substations was agreed in-principle. In the meeting, POWERGRID had raised the concern about the high short circuit at various nodes in Northern region and it was decided that a detailed study on the short circuit would be presented in the next meeing of SCPSPNR and would be a part of outcome of committee constituted to look into the high short circuit levels in Singrauli, Anpara generation complexes as well as other nodes in the Northern Region.

25.2 In a meeting held on 23-11-2016 at UPPTCL office, Lucknow among CEA, POWERGRID and UPPTCL officials, the issue was discussed and it was found that evacuation system from 1x660 MW Panki Extension TPS, 1x660 MW Harduaganj Extn., 2x660 MW Obra "C" TPS and 2x660 MW Jawaharpur (Etah) TPS along with some 765 kV and 400kV substations was in order. However, it was observed that fault level at Bagpat and Modipuram is 41kA and 31kA respectively. With implementation of Modipuram–Bagpat 400kV D/C line the fault level at these buses increases to 48kA and 40 KA. Therefore, it was suggested to drop Modipuram –Bagpat 400kV D/C line.

25.3 CE (UPPTCL) stated that Modipuram–Bagpat 400kV D/C line was planned for reliability purpose. As per the studies, under normal condition, this line remains floating. If the fault studies show the increase in fault level with implementation of this line, this line could be dropped.

25.4 After deliberations, it was agreed to drop Modipuram–Bagpat 400kV D/C line approved in the 38th meeting of SCPSPNR under the scheme 'Evacuation of New Generation Project in 13th Plan (2017-2022).

26.0 Study to limit high Short Circuit level of various Substations in NR (Phase 2):

26.1 CTU stated that growth in network and generation has resulted in increase in short circuit level of the various substations in Northern Region. In many cases, the short circuit current has crossed the short circuit withstand capability of the substations. Study has been carried out in the 2019-20 timeframe for identification of substations with high short circuit level and measures required to mitigate this problem. From the results, it is seen that the problem of high short circuit level is prominent in few pockets (where each pocket consists of a group of substations having high fault level) in Northern Region. Few such pockets are given below:

i. Substation associated with high capacity D/c (Quad Moose) ring of NCR,
ii. Meerut, Bagpat, Abdullapur, Panchkula and Patiala,
iii. Bhiwani, Hissar, Mohindergarh & Dhanonda,
iv. Agra,
v. Kanpur, Panki, Fatehpur and Allahabad,
vi. Singrauli, Anpara and Rihand,
vii. Lucknow, Bareilly and Unnao

CTU stated that issue of short circuit level in NCR alongwith the remedial measures was discussed in the 32nd meeting of SCPSPNR held on 31/08/2013, wherein two nos. of series line reactors on Dadri–Mandaula 400 kV D/c line and two nos. of series bus reactors one each at Mandaula and Ballabhgarh 400 kV bus were approved. The studies have been carried out for 2019-20 time frame including approved series bus reactors and considering the fact that corrective measure taken at one substation will have a dispersed effect in reducing short circuit current in neighbouring substations, it is prudent to resolve the issue of high short circuit level in phases and attempt has been made to identify the mitigating measures in each pocket.

26.2 Member (PS) enquired about the status of series reactors approved in 32nd meeting of SCPSPNR. CTU stated that series reactors approved in 32nd meeting of SCPSPNR are

under implementation. Director (PSPA-I), CEA stated that as per the minutes of 32nd meeting, it was agreed that additional series reactors may be planned after gaining the operational experience and series reactors agreed are still to be installed. CTU representative stated that the problem of high short circuit level is very serious issue and any major fault may result into damages and requested to revisit the earlier decision.

26.3 UPPTCL representative suggested that in place of series reactors, bus splitting might be considered. CTU stated that at these substations, short circuit level is too high and bus splitting alone would not be sufficient.

26.4 HVPNL stated that high short circuit is a serious issue and should be addressed at the earliest. He further informed that Dhanonda substation also has high short circuit level.

26.5 Chief Engineer (PSPA-I) CEA suggested that reduction of short circuit level by reconfiguarion of feeders, wherever suggested, is a least cost and least time taking solution and may be taken up for implementation immediately. The other measures suggested such as bus sectionisation and series reactors may be taken for implementation subsequently in a phased manner. CTU stated that corrective measure taken at one substation will have a dispersed effect in reducing short circuit current in neighbouring substations. He further stated that if reactors are being implemented in a phased manner, the short circuit level may be higher than the study results and it will reduce further only when other proposed measures are taken up for implementation subsequently.

26.6 CTU made the presentation on the studies in line with the details as given in the agenda for the meeting.

26.7 After detailed deliberation, members agreed for the proposed arrangement in the two pockets i.e. i) Kanpur, Panki, Fatehpur and Allahabad ii) Bhiwani, Hissar, Mohindergarh and Moga. For other pockets, it was agreed that additional studies may be carried by CEA in association with CTU and respective STU.

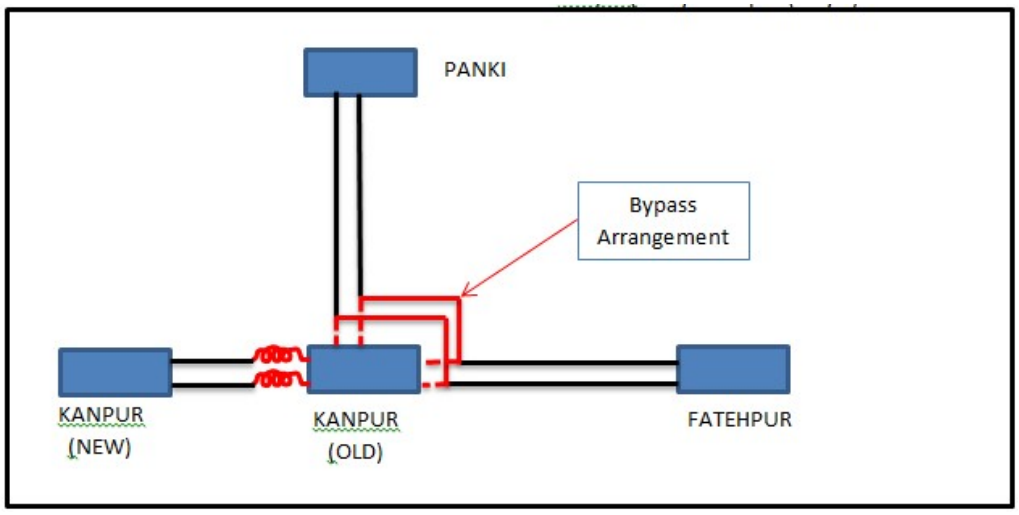
26.8 The summary of the discussions and details of the scheme which were agreed are given below:

A. Kanpur area:

Following re-arrangement option was agreed to contain the short circuit fault current at 400/220kV Kanpur substation.

a. Fatehpur–Kanpur (old) 400kV D/c and Kanpur (old)-Panki 400kV D/c lines to be disconnected at Kanpur (old) end and connected directly to form Fatehpur-Panki 400 kV D/C line.

b. Two 12 ohm series line reactors on both circuits of Kanpur (old)–Kanpur (New) 400kV D/c line at Kanpur (old) end.



CTU further informed that Panki is connected to a reliable power source from Unnao and Obra/Rewa Road, and after above re-arrangement, Panki would be directly connected to another reliable source Fatehpur instead of Kanpur (present case) for drawl of power. Considering the above, no constraint in power flow is envisaged. After considering the above reconfiguration and series reactors at Kanpur (old), the short circuit level of Kanpur (old), Panki and Kanpur (new) is as follows:

Substation	**3phase fault current**
Base Case	
Kanpur (new)	53kAmp
Kanpur (old)	58kAmp
Panki	52kAmp
With proposed re-arrangement	
Kanpur(new)	33kAmp
Kanpur (old)	36kAmp
Panki	26kAmp

B. <u>Bhiwani (PG), Hissar, Mohindergarh and Dhanonda Substations.</u>

CTU informed that as per 2019-20 base case, power flows from Mohindergarh to Moga (PG) via Bhiwani (PG) and Hissar (PG). There are four nos. of 400kV lines from Mohindergarh to Bhiwani (PG) (2 nos. existing and 2 nos. under construction), 4 nos. of 400kV lines from Bhiwani (PG) to Hissar (PG) (one line through Bhiwani BBMB) and 4 nos. of 400kV lines from Hissar (PG) to Moga (PG) (one line through Fatehabad).

Considering the above scenario, the following re-arrangements at Bhiwani (PG), Hissar (PG), Mohindergarh and Dhanonda (HVPNL) substations:

a) Mohindergarh–Bhiwani (PG) 400kV D/c line (one of two D/c lines) and Bhiwani (PG)-Hissar (PG) 400kV D/c line (one of two D/c lines) to be disconnected from Bhiwani end and directly connected so as form Mohindergarh–Hissar 400kV D/c line.

b) One circuit of Bhiwani (PG)–Hissar (PG) 400kV line and Hissar (PG)–Fatehabad (PG) 400kV line to be disconnected at Hissar end and directly connected so as to form Bhiwani (PG)–Fatehabad (PG) 400kV line.

c) Bhiwani (BBMB)–Hissar (PG) 400kV line and one circuit of Hissar (PG)–Moga (PG) 400kV line (ckt I) to be disconnected at Hissar end and directly connected so as to form Bhiwani (BBMB)–Moga (PG) 400kV line.

d) Bhiwani(PG) 400kV bus may be split into two sections (A&B) and can be connected through a 12 ohm series reactor as:

Section A:

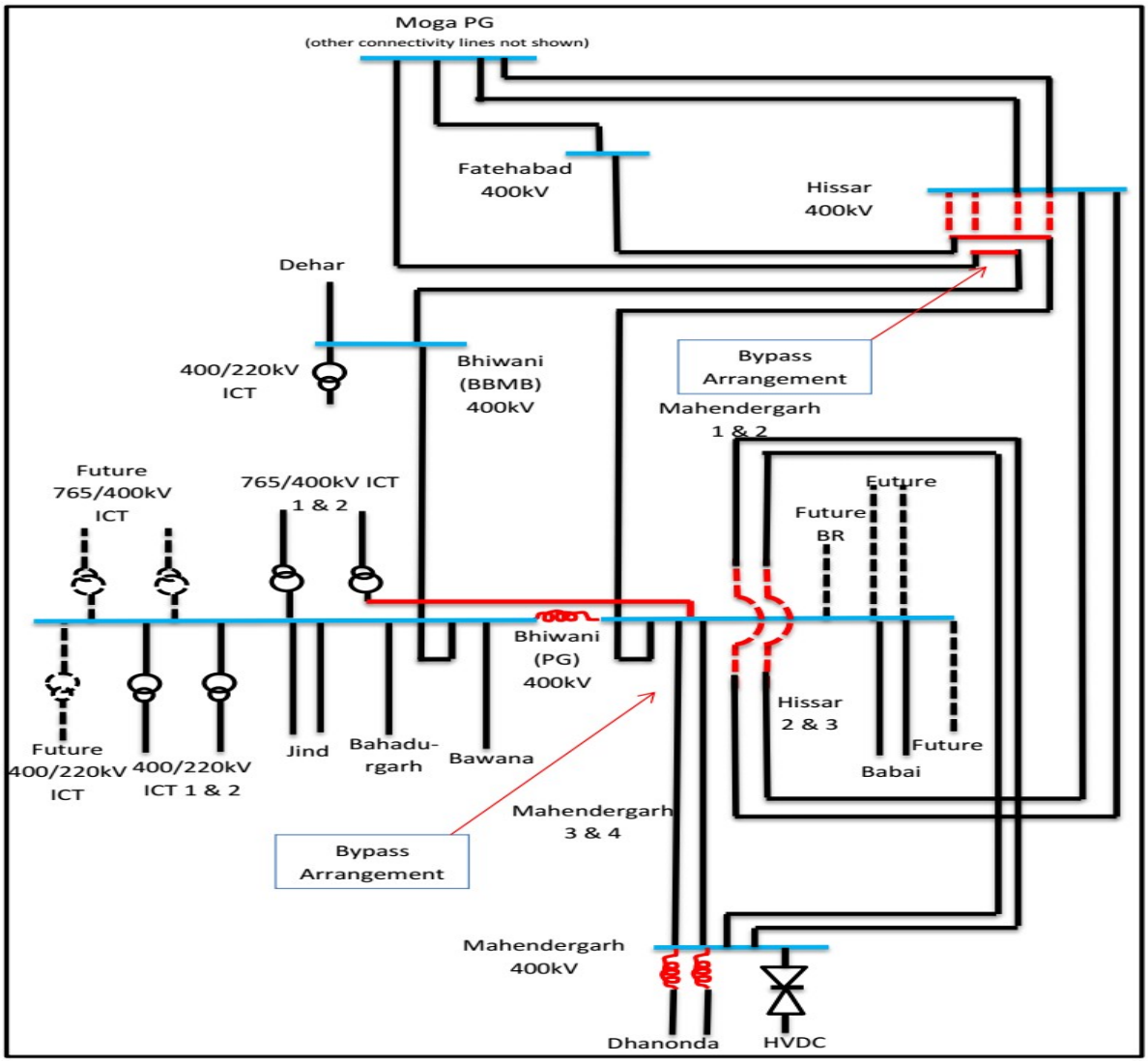
i. 400kV feed from 765/400kV ICT-I
ii. 2 nos. of 400/220kV ICT (I & II)
iii. Bhiwani(PG)-Jind 400kV D/c line
iv. Bhiwani(PG)–Bhiwani(BBMB) 400kV line
v. Bhiwani(PG)–Bawana 400kV line
vi. Bhiwani(PG)–Bahadurgarh 400kV line

Section B:

i. 400kV feed from 765/400kV ICT-II
ii. Bhiwani(PG)-Mohindergarh 400kV D/c line
iii. Bhiwani(PG)–Babai (RRVPNL) 400kV D/C line
iv. Space for future expansion

Section A and B is proposed to be connected using a 12ohm series reactor

e) 12 ohm series line reactor on both circuits of Mohindergarh–Dhanonda 400kV D/c at Dhanonda end.



Short circuit levels at Bhiwani (PG), Hissar, Mohindergarh and Dhanonda before and after above re-arrangement are given in table below:

Substation	**3phase fault current**
Base Case	
Bhiwani(PG)	62kAmp
Hissar	50kAmp
Mohindergarh	53kAmp
Dhanonda	54kAmp
After proposed re- arrangement	
Bhiwani(PG) Section A	39kAmp
Bhiwani(PG) Section B	38kAmp
Hissar	33kAmp
Mohindergarh	36kAmp
Dhanonda	46kAmp

26.9 CTU stated that from the study results, it can be observed that after the proposed re-arrangement works at Bhiwani (PG) and Hissar (PG) and series reactor in Mohindergarh– Dhanonda 400kV D/c line, the short circuit level would come down significantly. Further, from the studies, it was observed that at Dhanonda S/s, short circuit level is high. This is because Dhanonda is connected to Jhajjhar generation through Daulatabad 400 kV S/s. There is a significant contribution in fault current from Jhajjhar generating station. If suitable re-arrangement can be made, short circuit level of Dhanonda can be brought further down. It was agreed that CEA, CTU and HVPNL shall jointly study to evolve the mitigating measures for Dhanonda.

26.10 Regarding all the above mentioned proposals of series reactors and reorientation/bypass arrangements, CTU informed that it may not always be possible to implement this through AIS elements. So, a judicious combination of AIS and GIS (mainly GIS ducts) is proposed for implementation. With regard to bypass arrangement, CTU stated that wherever possible, provision would be kept to bring back the system to original configuration, in case of contingency or system requirement.

26.11 Keeping above in view, following was agreed:

(i) Scheme to control Fault Level in Northern Region (Phase-II):

a. At Kanpur

i) 12ohm Series Line reactors in Kanpur (old)–Kanpur (New), 400kV D/c line at at Kanpur (old) end

ii) Fatehpur–Kanpur (old) 400kV D/c and Kanpur (old)-Panki 400kV D/c lines to be disconnected at Kanpur (old) end and connecting them directly to form Fatehpur-Panki 400 kV D/c line.

b. At Bhiwani, Hissar and Mohindergarh

i) 12ohm Series Bus reactor at Bhiwani (PG) substation.

ii) 12ohm Series Line reactors in Mohindergarh–Dhanonda 400kV D/c line Ckt I & II at Dhanonda end (To be implemented by HVPNL / POWERGRID)

iii) Mohindergarh–Bhiwani (PG) 400kV D/c line (One of the two D/c lines) and Bhiwani (PG)- Hissar (PG) 400kV D/c line (D/c line which is Direct)) to be disconnected from Bhiwani (PG) end and directly connected to form Mohindergarh–Hissar 400kV D/c line.

iv) The remaining Bhiwani (PG)–Hissar (PG) 400kV D/c line (one circuit via Bhiwani BBMB) and Hissar (PG)–Moga (One circuit via Fatehbad) 400kV line to be disconnected at Hissar end and directly connected to form Bhiwani (PG)–Moga 400kV line (One circuit via Fatehbad and other circuit via Bhiwani (BBMB))

(ii) Combination of AIS and GIS (mainly GIS ducts) shall be used for implementation as per the site conditions. Further, in the bypass arrangement, whereever possible, provision may be kept to bring back the system to original configuration, in case of contingency or system requirement.

(iii) For evolving mitigating measures for remaining substations of NR, where the short circuit level has crossed the rated withstand capacity, the joint studies shall be carried out by CEA, CTU and respective STU and same will be taken up after deliberation in the next SCM of NR.

(iv) CEA, CTU and HVPNL shall jointly study to evolve the mitigating measures for Dhanonda.

27.0 Reactive Power Compensation Requirement Studies in Northern Region and High voltage at Kurukshetra

27.1 CEA stated that after the Grid Disturbance in July 12, the need for proper reactive power management was emphasised for reliable and secure operation of the grid. The issue of reactive compensation was discussed in 29th meeting of NRPC held on 13/09/2013, wherein, it was deliberated that adequate reactive compensation need to be provided at 400kV as well as at 220 kV level to contain the high voltages in the grid so as the opening of lines during light load conditions can be avoided. Accordingly, in the meeting, it was agreed that the studies may be carried out by CTU for installation of bus reactors at 400kV and 220 kV level.

27.2 CTU stated that they had carried out system studies to identify the requirement of reactive compensation at 400kV and 220kV voltage level. The same was discussed in 32nd meeting of SCPSPNR held on 02/01/2013, wherein, total 11nos. of 125 MVAR bus reactors at 400 kV level were agreed each at Hindaun, Panchkula (PG), Sultanpur, Gorakhpur (UP), Sonepat(PG), Manesar, Kaithal, Kanpur (PG), Jaipur, Bassi and Merta. Out of these, seven reactors have already been commissioned and four are likely to be commissioned by this year. Regarding 220kV bus reactors, it was agreed that the requirement would be firmed up by CTU in consultation with the States after the validation of network details for their respective state. Subsequently, based on the data provided by STUs and data available with CTU for 2018-19, system studies were carried out. Approach to the studies and analysis has been given in detail in the agenda for 39th meeting of SCPSPNR. Studies indicated the requirement of about 400 MVAr of shunt reactors at 220kV level at following stations:

S.No.	Bus Name	State	Reactors Proposed (MVAr)
220 kV			
1	Jind (PG)	Haryana	25
2	Fatehabad (PG	Haryana	25
3	Chamera Pooling Stn.	Himachal Pradesh	2x25
4	Kishenpur	J&K	25
5	Jalandhar	Punjab	2x25
6	Nakodar	Punjab	25
7	Amritsar	Punjab	25
9	Dhuri	Punjab	25
10	Akal	Rajasthan	25
11	Suratgarh	Rajasthan	2x25
12	Bikaner	Rajasthan	2x25
13	Barmer	Rajasthan	25

27.3 CTU further stated that while carrying out the studies, requirement of additional shunt reactors at 400 kV was also observed. Accordingly, studies were also carried out for evolving the requirement of shunt reactors at 400kV level for 2018-19 conditions along with above mentioned additional reactors at 220kV level. Based on the studies, Reactors at following locations at 400kV level are proposed:

S.No.	Bus Name	State	Reactors Proposed (MVAr)
400 kV			
1	Mandola(PG)	DELHI	125
2	Hissar(PG)	HARYANA	125
3	Kala Amb (Under TBCB)	HIMACHAL	125
4	Chamera Pooling Stn. (PG)	HIMACHAL	125
5	Kishenpur(PG)	J&K	125
6	Nakodar	PUNJAB	125
7	Jullandhar(PG)	PUNJAB	125
8	Moga(PG)	PUNJAB	125
9	Dhuri	PUNJAB	125
10	Patiala(PG)	PUNJAB	125
11	Ludhiana(PG)	PUNJAB	125
12	Ajmer(PG)	RAJASTHAN	125
13	Merta	RAJASTHAN	125
14	Ratangarh	RAJASTHAN	125
15	Chittorgarh(PG)	RAJASTHAN	125
16	Suratgarh(PG)	RAJASTHAN	125
17	Parichha	UP	125
18	Allahabad(PG)	UP	125
19	Mainpuri	UP	125
20	Unnao	UP	125
21	Gonda	UP	125
22	Meerut(PG)	UP	125
23	Kashipur	UTTARAKHAND	125
24	Srinagar	UTTARAKHAND	125

27.4 CE, UPPTCL stated that UPPTCL network do not inject reactive power instead, they are absorbing the reactive power. POSOCO stated that there might be some nodes in the UPPTCL system, which are injecting the reactive power but aggregate reactive power injected by UPPTCL stystem is negative. Therefore, there may be requirement to add reactors on those nodes, which are injecting the reactive power into the grid. After deliberations, it was agreed that reactive compensation requirement in the UP system may be studied separately by CEA, CTU and UPPTCL. HVPNL representatives said that overvoltage in off peak conditions is a serious problem for the reliable operation of the grid and should not be ignored.

27.5 POSOCO stated that these studies are carried out considering all the Shunt Capacitors at 220kV and below voltage level switched off, whereas this may not be the case in actual practice. This may also be the reason for high voltages in Nortthern Region, despite having so many reactors in the system. CTU stated that the scenario studied is without considering the shunt capacitors in the system and if we consider capacitor also, the requirement of reactors would increase further.

27.6 CTU stated that transmission system planned for meeting the peak load requirement with reliability criterion. There is a huge difference in their maximum and minimum load demand. Therefore, installation of reactors is the only solution available to control high voltage during ligh load condition.

27.7 RRVPNL stated that studies needs to be carried out considering load growth as per 19th EPS. At Merta S/s, they have already one reactor and space is not avialable for the second reactor. However, they have proposed 125 MVAR reactor at Jodhpur. At

400kV Ratangarh S/s they are already having 175 MVAr reactors (125MVAr-PG+ 50 MVAr - RVPNL). In place of Ratangarh, PGCIL may install/ plan reactor at PGCIL's 400kV Sikar S/s. RRVPNL agreed for installation of one 25 MVar reactor each at 220kV level at Akal, Suratgarh, Bikaner and Barmer (already under process) subject to availability of space at these sub-stations. However, RRVPNL mentioned that they would take up implementation of 220 kV reactors at Akal and Suratgarh in first phase. The second reactor as proposed at Bikaner and Barmer would be considered in the second phase. They would apply for PSDF funding for installation of thses reactors.

27.8 PTCUL stated that they have already put up the proposal for 80 MVAR bus reactor at Srinagar and Kashipur 400kV S/Ss insread of 125 MVAR due to transportation problems and they have proposed PSDF funding for installation of these reactors.

27.9 HVPNL and HPPTCL agreed for the above proposal.

27.10 CTU said that recently PSTCL has informed about the existing 80 MVAR bus reactors at Makhu and Nakodar, in line of which, revised studies have been carried out for Reactive power compensation requirement in Punjab. It has been seen from the studies that after considering 80 MVAR bus reactors at Makhu and Nakodar, the bus reactor at 220 kV at Makhu is not required. However, at Nakodar, requirement of 1 No. of 25 MVAr bus reactor still persists. Therefore, the same is proposed to be installed at Nakodar 220 kV bus.

27.11 CTU further added that during winter light load conditions in Northern Region, almost all hydro and thermal generations in Himachal Pradesh, Punjab and Haryana remains out of service most of the times and very high voltage is observed especially in Delhi, Haryana and Punjab area. It is anticipated that in future also during winter months, load generation scenario would remain same. The revised study for reactive power compensation was carried in consultation with DTL after the validation of network details and load generation scenario. Based on the revised studies with low load conditions, the following requirement of shunt reactors was observed and same was agreed:

S. No.	Bus Name	Voltage Level (kV)	Reactor Proposed
1	Maharanibagh (PG)	400	125
2	Mundka	400	125
3	Mandola (PG)	400	125
4	Narela	220	25
5	R.K Puram-I	220	25
6	Patparganj2	220	2x25
7	Maharanibagh (PG)	220	2x25
8	Bamnoli	220	25
9	Sabji Mandi	220	2x25
10	Gopalpur	220	2x25
11	Indra Prastha	220	2x25
12	Geeta Colony	220	2x25
13	Harsh Vihar	220	2x25
14	Wazirabad	220	2x25
15	Electric Lane	220	2x25
16	Mandola	220	25
17	AIIMS	220	2x25
18	Sarita Vihar	220	25
19	Bawana	220	25

20	Preet Vihar	220	25
21	Mundka	220	25
22	Masjid Moth	220	25

27.12 CTU representative stated that Pole one of Phase-I i.e. 1500MW pole of Champa-Kurukshetra HVDC link was commissioned in March 17 and the same is in operation and Phase-II of the same is to be commissioned shortly. During commissioning as well as operation of HVDC link, increase in the voltage profile at Kurukshetra 400 kV bus was observed. Further as the short circuit strength is low during light load conditions, large variation in voltage is observed with the switching of the filter banks. Also, as per the design of TOVC (Temporary Over Voltage Control) protection, whenever the voltage at Kurukshetra bus increases, the filter banks trips to bring down the voltage and automatic reduction in power flow occurs. This reduction of power flow result into voltage rise at Kurukshetra. Sudden reduction of power flow may also lead to increase the power transfer on Gwalior-Agra 2x S/c lines. Further, after drop in voltage, the filter bank switches on automatically leading to a voltage rise. Due to this, the operation of HVDC link may lead to serious operational constraints. Due to persistent high voltages, the 125 MVAr Bus Reactor is continuously in service. The Champa-Kurukshetra HVDC link is a very important link for import of power from Western Region generations to Northern Region load centres. This link also provides control on inter-regional power transfer. Considering this high voltage at Kurukshetra, system studies were carried out for smooth and reliable operation of HVDC link considering very low load in Northern Region. It has been seen from the studies that with total 1500 MW injection from HVDC link, about 500 MVAr reactive power support would be required to mitigate the operational constraints mentioned above. Therefore, to balance the MVAr requirement on real time basis, it was proposed to provide 500 MVAr TCR (Thyristor Controlled Reactor), which acts as a self-regulating device for Reactive VAR absorption and shall improve voltage regulation at Kurukshetra bus. It is seen from the studies that the operational constraints faced at Kurukshetra HVDC station would be alleviated by using TCR.

27.13 After detailed deliberations, TCR of capacity 500 MVAr was agreed to be installed at Kurukshetra 400 kV bus.

27.14 After further deliberation following was agreed:

a) TCR of capacity 500 MVAr at Kurukshetra 400 kV bus.

b) Bus Reactors at 220 kV and 400 kV level at following substations subject to the availability of space. It was also agreed that these reactors shall be provided by the owner of the substations:

S.No.	Bus Name	State	Reactors Proposed (MVAr)
220 kV			
1	Jind (PG)	Haryana	25
2	Fatehabad (PG)	Haryana	25
4	Kishenpur (PG)	J&K	25
5	Jalandhar (PG)	Punjab	2x25
6	Nakodar	Punjab	25

7	Amritsar (PG)	Punjab	25
8	Dhuri	Punjab	25
9	Akal	Rajasthan	25
10	Suratgarh	Rajasthan	2x25
11	Bikaner	Rajasthan	2x25
12	Barmer*	Rajasthan	25
13	Narela	Delhi	25
14	R.K Puram-I	Delhi	25
15	Patparganj2	Delhi	2x25
16	Maharanibagh (PG)	Delhi	2x25
17	Bamnoli	Delhi	25
18	Sabji Mandi	Delhi	2x25
19	Gopalpur	Delhi	2x25
20	Indraprastha	Delhi	2x25
21	Geeta Colony	Delhi	2x25
22	Harsh Vihar	Delhi	2x25
23	Wazirabad	Delhi	2x25
24	Electric Lane	Delhi	2x25
25	Mandola	Delhi	25
26	AIIMS	Delhi	2x25
27	Sarita Vihar	Delhi	25
28	Bawana	Delhi	25
29	Preet Vihar	Delhi	25
30	Mundka	Delhi	25
31	Masjid Moth	Delhi	25
400 kV			
1	Maharanibagh (PG)	Delhi	125
2	Mundka	Delhi	125
3	Mandola(PG)	Delhi	125
4	Hissar(PG)	Haryana	125
5	Kala Amb (TBCB)	Himachal	125
6	Chamera Pooling Stn. (PG)	Himachal	125
7	Kishenpur(PG)	J&K	125
8	Nakodar	Punjab	125
9	Jullandhar(PG)	Punjab	125
10	Moga(PG)	Punjab	125
11	Dhuri	Punjab	125
12	Patiala(PG)	Punjab	125
13	Jodhpur*	Rajasthan	125
14	Sikar (PG)	Rajasthan	125
15	Allahabad(PG)	U.P	125
16	Meerut(PG)	U.P	125
17	Kashipur	Uttarakhand	125
18	Srinagar	Uttarakhand	80

* These reactors are already included under the scheme proposed by RVPNL.

c) STU should ensure that shunt capacitors at 220 kV and below voltage level are switched off during light load conditions.

28.0 Installation of 400kV and 220kV Shunt Bus Reactors in Rajasthan:

28.1 CEA stated that RRVPNL vide their dated 31.3.2017 has proposed to install 450 MVAR, 400kV and 220kV shunt bus reactors in Rajasthan to mitigate the high voltage problems. Further, RVPN intends to pose the aforesaid shunt reactor installation programme from PSDF.

28.2 RRVPNL stated that issue of high voltage in Northern Region was discussed in the 32nd meeting of SCPSPNR held on 31-8-2013. In the meeting, it was decided that all states would carry out system studies to assess requirement of reactive power compensation at 220 kV voltage level in Intra State System. It was also discussed that Western Rajasthan faces high voltage problem and adequate reactors need to be provided at 220kV voltage level in pockets of renewable energy generation and this issue has also been discussed continuously in the NRPC and OCC meetings. Based on the operational feedback provided by State Load Despatch Centre, load flow studies, recorded high voltage and discussions in the various Standing and NRPC meetings, the Whole Time Directors (WTDs) of RVPN on dated 20.10.2016 have accorded administrative and financial approval for installation of 400kV and 220kV bus reactors at following substations to control the over voltage:

Name of sub-station	Nominal Bus Voltage (kV)	Recorded Maximum Voltage (kV)	MVAR Capacity of proposed Shunt Reactor
400 KV GSS Jodhpur	400	500	125
400 kV GSS Barmer	220	248	25
220 kV GSS Ratangarh	220	233	25
220 kV GSS Phalodi	220	250	25
220 kV GSS Dechu	220	263	25
220 kV GSS Dhorimanna	220	245	25
220 kV GSS Sanchor	220	254	25
220 kV GSS Balotra	220	255	25
220 kV GSS Dholpur	220	254	25
220 kV GSS Amarsagar	220	254	25
400 kV GSS Jodhpur	220	250	25
220 kV GSS Tinwari	220	250	25
220 kV GSS Badisid	220	248	25
220 kV GSS Jodhpur	220	255	25
			450

28.3 The matter was deliberated at length and the constituents were of the view that with the growth of state network at 400kV & above voltage level and more penetration of renewable generation, overall requirement of reactive compensation has increased. Hence more reactive compensation is required to control over voltages in the state network.

28.4 After deliberations, members agreed to the above reactive power compensation proposal of RRVPNL.

29.0 Early Commissioning of 400kV D/C Samba-Amargarh Transmission Line, 400/220 kV GIS Substation at Amargarh and LILO of both circuits of 400kV Uri-Wagoora at Amargath under NRSS-XXIX Transmission Limited Project.

29.1 CEA stated that the NRSS-XXIX scheme is under implementation through TBCB by NRSS-XXIX Transmission Limited, which is 100% subsidiary of Sterlite Power Grid Venture Limited (SPGVL). Element-I of the scheme i.e. Jalandhar-Samba 400kV D/c transmission line has been already commissioned in June 2016. M/s SPGVL intends to commission remaining elements i.e Samba-Amargarh 400 kV D/C line, 400/220 kV GIS substation at Amargarh and LILO of both circuits of Uri-Wagoora 400kV D/c line at Amargarh under NRSS-XXIX by July 2017 instead of scheduled COD of October 2018, which is 15 months ahead of the schedule. The downstream system of 400/220kV Amargarh S/s is LILO of Zainkote-Delina 220kV D/C line at 2x315 MVA, 400/220kV Amargarh (Kunzar) S/s which is to be implemented by JKPDD, however same would not be ready by July, 2017 as the same is yet to be awarded by JKPDD.

29.2 He added that M/s SPGVL in their proposal has also mentioned that progress of this project has been reviewed in the review meeting on 23-01-2017 chaired by Hon'ble Deputy Chief Minister (Minister I/c Power) of J&K at Civil Secretariat, Jammu. In the review meeting, POWERGRID and Power Development Department Jammu & Kashmir (JKPDD) hadconfirmed to meet the schedule of July 2017.

29.3 Members of the committee opined that as the scheme is for reliable power supply to J&K, its early commissioning was desirable but in the absence of downstream network at Amargarh, there would be no utilization of Amargarh 400/220kV S/s.

29.4 After deliberations, members agreed for early commissioning of Samba-Amargarh 400kV D/C line, 400/220 kV GIS Substation at Amargarh and LILO of both circuits of 400kV Uri-Wagoora at Amargath under NRSS-XXIX Transmission Limited Project in the matching time frame of the commissioning of downstream system at Amargarh (LILO of Zainkote-Delina 220kV D/C line at 2x315 MVA, 400/220kV Amargarh (Kunzar) substation).

30.0 Transmission system for connectivity to Bilhaur TPS (2x660MW) of NTPC:

30.1 CEA stated that the following transmission system for connectivity to Bilhaur TPS (2x660MW) of NTPC was agreed in 37th meeting of SCPSPNR held on 20.1.2016:

Bilhaur - Kanpur 400 kV D/C line.

During the 37th meeting of SCPSPNR, CTU stated that while discussing the transmission system for Ghatampur TPS, transmission system for connectivity to Bilhaur TPS (2x660MW) of NTPC was also agreed and the same was not mentioned in the minutes of SCPSPNR for grant of connectivity to Bilhaur TPS. The connectivity of Bilhaur TPS (NTPC) was agreed to be granted through Bilhaur-Kanpur 400 kV D/C line. POWERGRID vide their letter C/CTU/N/PLG dated 14.2.2016 had given the observations and accordingly, point no 1.2.2.3 of the minutes of 37th meeting of SCPSPNR were modified as follows:

Connectivity of Bilhaur TPS (NTPC):

- Bilhaur –Kanpur 400 kV D/C (quad) line

30.2 Susequently, POWERGRID vide their letter C/CTU/N/PLG dated 23-6-2016 has mentioned that 1x125 MVAr bus reactor at Bilhaur TPS (NTPC) generation switchyard

has not been indicated in the minutes of 38th meeting of SCPSPNR. Accordingly, POWERGRID has proposed the following for connectivity of Bilhaur TPS (NTPC)**:**

- Bilhaur –Kanpur 400 kV D/C (quad) line
- 1x125 MVAR Bus Reactor at Bilhaur generating stations

30.3 POWERGRID informed that connectivity application for Bilhaur TPS has been closed due to non-signing of Transmission Agreement by NTPC within the stipulated time.

30.4 Members noted the same.

31.0 Prime Minister Development Package for the state of J&K (PMDP-2015) / PMRRP-2015

31.1 MoP had forwarded three nos. of DPRs (Jammu, Kashmir and Ladakh) relating to transmission sector of J&K for examination and comments of CEA. A meeting was taken by Joint Secretary (Hydro), Ministry of Power on 21.09.2016 with Central Electricity Authority (CEA), Development Commissioner, Jammu & Kashmir Power Development Department (JKPDD) and POWERGRID to review the progress of DPR examination by CEA. Discussions were held with officials of JKPDD in CEA from 26.09.2016 to 28.09.2016 and transmission schemes for Jammu, Kashmir and Ladakh region for consideration under PMDP-2015/ PMRRP-2015 were technically finalized and conveyed to MoP.

JKPDD had submitted the cost estimate of transmission schemes under PMDP-2015 based on approved Schedule of Rates (SoR) for the year 2016-17, which was discussed with official from JKPDD in CEA from 14.10.2016 to 15.10.2016, the cost estimate of transmission schemes for Jammu, Kashmir and Ladakh region for consideration under PMRRP-2015 were finalized. JKPDD vide its letter dated 02.11.2016 has submitted the final DPRs comprising of transmission system of Jammu (costing Rs. 420.41 cr.), Kashmir (costing Rs. 414.44 cr.) and Ladakh (costing Rs. 354.74cr.) under PMDP-2015 incorporating our comments. The same were examined and found to be generally in order and recommended to MoP.

31.2 He further stated that transmission works covered in these three DPRs of Jammu, Kashmir and Ladakh under PMRRP-2015 are part of the transmission works proposed under DPR for system strengthening for Jammu and Kashmir region during 12th and 13th Five Year Plans. The balance transmission works proposed under DPR for system strengthening for Jammu and Kashmir region during 12th and 13th Five Year Plan needs to be vetted by CEA.

31.3 The summary of the schemes approved for Jammu, Kashmir and Ladakh Region under PMDP-2015 at an estimated cost of Rs. 1189.59 crore is attached at Annexure-V. Following are the lines connected to ISTS considered in the schemes approved for Jammu, Kashmir and Ladakh Region under PMDP-2015:

Jammu Region:

1. LILO of Hiranagar-Bishnah 220kV D/C line at 400/220kV Sambha (PG) S/s.

Kashmir Region:

1. New Wanpoh (PG) (400/220kV)-Mirbazar 220kV D/C line
2. Extension of Mirbazar-Alusteng 220kV D/C line upto 400/220kV New Wanpoh Sub-station (POWERGRID owned)

3. LILO of 220kV D/C Zainkote-Delina line at 2x315 MVA, 400/220kV Kunzar (Amargarh)S/s.(the s/s is being implemented by M/s Sterlite grid limited

Ladakh Region:

1. Phyang (Leh) (POWERGRID)-Diskit (Nubra) 220kV S/C line on D/C towers line
2. Kargil-Padum(Zanaskar) 220kV S/C line on D/C towers line

31.4 Members noted to the intra-state proposal of J&K and agreed to above inter-connections with ISTS.

32.0 Modification in scope of Intra-State transmission schemes under Green Energy Corridor planned for evacuation of Renewable energy addition in Renewable rich states.

32.1.0 Intra State Green Energy Corridor-I planned for evacuation of Renewable energy addition in Rajasthan:

32.1.1 CEA stated that the intra-state transmission system required for integration of RES generation in the state of Rajasthan was agreed in the 32nd meeting of SCPSPNR. Subsequently, RRVPNL has informed that due to inability of wind farm developers to get land for the proposed wind power projects in Banswara district and in view of new wind and solar power projects in Jaisalmer, Bikaner, Jodhpur and Barmer districts in Rajasthan, it has revised the scheme of RE Power Evacuation System.

32.1.2 RRVPNL had submitted the final DPR to CEA comprising revised list of intra-state transmission schemes costing about 1018.30 Crore in the State of Rajasthan to be funded from KfW and NCEF. Schemes costing around 522.19 crores are under execution. However, in light of changed scenario due to non-materialization of the solar and wind generations projects, which had earlier taken the connectivity from RVPNL network, they have deferred one 400 kV line, five number of 220kV GSS and five number of 132kV GSS costing around 496.10 crores. The updated Schemes under Intra State Green Energy Corridor-I planned for evacuation of Renewable energy addition in Rajasthan is attached at Annexure-VI.

32.2.0 Intra State Green Energy Corridor -I planned for evacuation of Renewable energy addition in Himachal Pardesh:

32.2.1 CEA stated that the transmission works amounting to Rs. 271 Crore for evacuation of RE Power in Himachal Pradesh were discussed and agreed in the 32nd meeting of SCPSPNR held on 31.08.2013 at NRPC, New Delhi. However, in view of Himachal Pradesh not meeting the minimum amount of loan to be disbursed to a State under KfW financing, Himachal Pradesh was requested to revise the schemes in a meeting taken by Additional Secretary, MoP on 08.05.2014.

32.2.2 Accordingly, HPPTCL vide its letter dated 3.7.2014 and email dated 09-03-2017 has submitted the revised scope of intra-state transmission schemes under Green Energy Corridor. The intra-state transmission schemes for Himachal Pradesh in its present form comprises of seventeen (17) packages amounting to Rs 909.46 Crore. The Intra State

Green Energy Corridor -I planned for evacuation of Renewable energy addition in Himachal Pardesh is attached at Annexure-VI.

32.3 Members noted the same.

33.0 Strengthening of Intra-State Transmission System - Operational Constraints

33.1 CEA stated that the Enquiry Committee constituted by Ministry of Power, Govt. of India, to analyze the causes of grid disturbances on 30th July, 2012 & 31st July, 2012 and to suggest measures to avoid recurrence of such disturbance in future had, interalia, recommended, "Intra-State transmission system needs to be planned and strengthened in a better way to avoid problems of frequent congestion".

In the NRPC meeting held on 30th November, 2012, it was decided that SLDCs should give half yearly feedback to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning. This exercise was to be completed by 10.10.2012 and thereafter repeated regularly at half yearly intervals i.e. on 1st January and 1st July of every year. All SLDCs were requested to submit copy of SLDC 's advice to their STUs and to NRPC Secretariat, even if no constraints were observed. NRPC is forwarding the same to CEA for further deliberatiosn in the SCMs.

33.2 This issue is being regularly monitored in OCC meetings of NRPC. SLDCs of all the states in Northern Region have submitted the details of the bottlenecks / constraints and overloading in their State transmission network.

33.3 CE (PSPA-I) stated that most of the constraints listed pertains to transformation capacity not meeting n-1 criterion or overloading of the existing network and in most of cases STU has already planned augmentation of transformers / alternative measures to reduce the overloading of existing network. It was suggested only those cases should be brought to the notice of SCPSPNR where concerned STU has not planned measure to remove the constraint or some inter-State strengthening is required or interface with ISTS system has been planned by STU or strengthening of intra-state network at 400/220kV has been planned by STU.

33.4 POSOCO stated that the effect of congestion in intra-State network on inter-State network and vise-versa may be studied and discussed in the meeting of the Standing Committee.

33.5 After deliberations, it was decided that SLDCs/RPCs may highlight only those operational constraints, which cannot be removed by strengthening the intra-state system and require deliberations in the meetings of the Standing Committee and the intra-state strengthening planned by STU may be intimated for information to SCPSPNR.

34.0 Connectivity & LTA to GHAVP Nuclear power plant (2x700MW) of M/s NPCIL in Haryana.

34.1 CEA stated that following evacuation system for Nuclear power generation (2x700MW) of M/s NPCIL for Gorakhpur Haryana Anu Vidyut Pariyojna (GHAVP) located at Fatehabad, Haryana was agreed in in the 37th meeting of SCPSPNR held on 20-01-2016

Connectivity:

- Fatehabad - NPCIL generation 400kV D/C line

Long Term Access:

- LILO of second circuit of Moga-Hisar 400kV D/C line at Fatehabad
- LILO of both circuits of Moga-Hisar 400kV D/C line at NPCIL generation switchyard

In the 38th meeting of SCPSPNR, NPCIL has informed that the commissioning schedule for unit 1 & 2 is August 2023 and time frame of 3rd and 4th unit is not firmed up. As the time frame of 2x700 MW generation is beyond 13th plan, CTU has suggested closing of the connectivity and LTA applications and NPCIL may re-apply subsequently. CTU vide its letter dated 23-06-2016 has observed that as CTU has received the application for 2x700 MW only and accordingly studies were carried out for that capacity only. As the NPCIL's application for the connectivity and LTA has been closed as of now. Revised studies would be carried out after receiving fresh connectivity / LTA application.

34.2 Chief Engineer, NPCIL stated that Government of India has recently sanctioned construction of 10 more Nuclear Power Stations of 700 MW each in addition to the six number of 700 MW units under construction at Kakrapar near Surat in Gujarat (2 Nos.), Rawatbhata near Kota in Rajasthan (2 Nos.) and Gorakhpur near Hisar in Haryana (2 Nos.).

The new units will be constructed at Gorakhpur near Hisar in Haryana (2 Nos.), Kaiga near Karwar in Karnataka (2 Nos.), Chutka in Madhya Pradesh (2 Nos.) and Mahi Banswara near Ratlam in Rajasthan (4 Nos.). After sanctioning of the above 10 more units, the total no. of units at Gorakhpur Haryana will be 4 nos (4x700 MW) for which construction yet to be started, Kaiga-6 units (4 are operating and 2 new units are to be constructed), Chutka and Mahi Banswara are new sites yet to be developed. The 700 MW units at Kakrapar and Rawatbhata are in advanced stage of construction and the 400 kV switchyard at these sites have been commissioned. In addition to the above, 2 Light Water Reactor technology based units of 1000 MW are in operation at Kudankulam Tamil Nadu and 2 more units of 1000 MW are being constructed in collaboration with Russian Federation.

Regarding Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP), NPCIL is working out on tentative schedule of completion of all the four units to arrive at the COD for submission of application for connectivity and LTA to CTU and based upon the inputs received from NPCIL corporate planning, the application will be initiated within a month or two. However, NPCIL informed that the commissioning of the project would be beyond 13th plan and they will aply for connectivity / LTA after firming of the commission schedule.

35.0 Power Evacauation of the projects in Chenab Basin and establishment of 400/132kV Substation at Kishtwar:

35.1 CEA stated that the perspective transmission system alongwith phased development for Hydro projects located in Chenab Basin of J&K was deliberated in 31st meeting of SCPSPNR. It was agreed in the meeting that the transmission plan is a conceptual plan and its updation / revision would be required based on the network topology and firm time schedule of the generation projects. It was also informed that it is necessary that the project developers need to apply to CTU for the connectivity & LTA so that the above plan could be firmed up and taken up for implementation.

JKPDC vide their letter dated 21.1.2017 has suggested some points to be considered before planning the transmission system like fixing of transmission line route, geo investigation and survey of tranmission line route, consideration of n-1 criteria for transmission of bulk power through hilly areas, identification of suitable land for pooling stations etc. JKPDC has requested for taking a coordinated action towards the above issues. Chenab Valley Power Projects Ltd has been making request for establishment of 400/132kV S/s at Kishtwar to provide construction power (approx. 40MW) for Pakaldul HEP(1000MW), Kiru HEP (624 MW) and Kwar HEP (540 MW).

35.2 The issue of establishment of 400/132kV S/s at Kishtwar was also discussed in 37th meeting of SCPSPNR, wherein establishment of Kishtwar 400/132 kV substation was agreed subject to feasibility based on load flow studies by CEA and CTU. CTU informed that substation cannot be constructed for providing construction power. It was also informed that there is no connectivity / LTA application for any of the project in Chenab Basin.

As per the perspective plan discussed and arrived at in previous meetings of SCPSPNR, the entire generations in Chenab valley falling in J&K is being pooled at Kishtwar pooling station. Also, Chenab Valley Power Projects Ltd has informed that they have taken up the tendering activities of Pakaldul, Kiru and Kwar HEPs, therefore, finalisation of the perspective plan, phasing of its various transmission elements along with setting up of 400/132kV Kishtwar S/s needs to be taken up in coordinated manner.

35.3 It was also stated by CTU that the assets which have been created in 2013 (Samba and New Wanpoh) are still to be fully utilised and suggested that once these are utilised, new investment may be taken up.

35.4 As no representative from JKPDD was present in the meeting, it was decided that issue may be taken up in the next meeting of SCPSPNR.

36.0 Down Stream network by State utilities from ISTS Station:

36.1 CEA stated that augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Northern Region. For utilization of these transformation capacities, implementation of down below 220kV system needs to be commissioned in matching time frame.

36.2 CTU stated that the issue of implementation of underlying 220 kV network by STUs was discussed in 38th NRPC meeting held on 25-10-2016. During the meeting representative of POWERGRID informed that Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, came into force with effect from date of publication in Official Gazette i.e. from 29.04.2016. Following new provisions (Clause 4(iii)) have been included w.r.t. transmission

"*Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavor to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement(IA)".*

36.3 CTU further stated that during NRPC meeting, members expressed that since all the bays provided at ISTS substations can only be utilised in a phased manner, the bays

should also be built in phased manner. NRPC suggested to discuss the issue in SCM. It was deliberated that addition of 220 kV bays in future would be difficult in TBCB due to implementation & coordination issues between the two TSPs. It was also stated that addition of 220 kV bays at any TBCB substation would be a small work and bidders may not participate. HVPN suggested that the matter may be discussed in next Empowered Committee Meeting and same was agreed.

36.4 The downstream system as informed by States is as follows:

S. No.	Substation	Downstream network requirement	Schedule	Deliberations in the 39th SCPSPNR
1	400/220kV , 3x315 MVA Samba	Partially utilized. Balance 4 Nos 220 kV bays to be utilized.	April 2013	No represntaive from JKPDD was present. However, downstream system has been planned under PMDP-2015
2	400/220kV, 2x315 MVA New Wanpoh station	6 Nos 220 kV bays to be utilized.	Oct. 2013	No represntaive from JKPDD was present.However, downstream system has been planned under PMDP-2015
3	400/220kV, 2x315 MVA Parbati Pooling Station	2 Nos 220 kV bays to be utilized.	Apr'17	HPPTCL informed that 220 kV Charor-Banala D/C (twin MOOSE) line (18 Kms) is under construction and is targeted for completion by 31.10.2017 on bests effort basis.
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	Downstream lines for 8 nos 220 kV bays to be expedited.	commissioned. March 2017	i). LILO of one circuit of Kaul-Pehowa 220kV D/C line at HVDC Kurukshetra. ii). LILO of one circuit of Kaul-Bastara 220kV D/C line at HVDC Kurukshetra The work of construction of lines awarded to M/s Isolux against package G-24A (Rd-bid). The contractual completion date 02.01.2018. Route Plans approved except for Railways, Transmission line crossing etc.
5	400/220kV, 2x500 MVA Bagpat GIS	3 nos. of 220 kV downstream lines to Shamali, Muradnagar and Bagpat already commissioned. Balance 5 Nos 220 kV bays to be utilized.	Commissioned.	UPPTCL informed the following: **(i)** Bagpat-Baraut 220kV S/c Line - Expected by mid July 2017 **(ii)** LILO of 220kV Moradnagar II-Baghpat (PG) at Baghpat UP - RoW issue, expected by Sep 17 **(iii)** .Bagpat(PG)-Modipuram New 220kV D/c Line - expected by Oct. 2018

S. No.	Substation	Downstream network requirement	Schedule	Deliberations in the 39th SCPSPNR
6	400/220 kV, 2x315 MVA Saharanpur	2 nos. 220 kV downstream lines commissioned. (Saharanpur (UP) and Nanauta) Balance 4 Nos 220 kV bays to be utilized.	Commissioned.	**(i)** LILO of 220 kV Khara-Shamli at Saharanpur PG - expected by Sep. 2017 **(ii)** Saharanpur PG - Sarsawa 220kV (new SS) D/C line- expected by Dec. 2017
7	400/220kV, 2x315 MVA Dehradun	Total 6 bays for PTCUL line. Only two bays commissioned. Balance 4 bays idle charged since long.	Commissioned.	PTCUL to submit the response
8	400/220kV, 2x315 MVA Kotputli	02 nos. 220kV downstream lines commissioned on 27.05.2015. Balance 2 Nos 220 kV bays to be utilized.	Commissioned	➢ Kotputli(PG) – Kotputti (RVPN) 220kV S/c line (existing) ➢ Kotputli(PG) – Manoharpur (RVPN) 220kV S/C line (existing) ➢ Kotputti(PG) – Bansur (RVPN) 220kV D/C line (completed but put on hold due to some telemetry issues)
9	400/220kV, 2x500 MVA Jaipur South	Partially utilized. Balance 4 Nos 220 kV bays to be utilized.	Commissioned	➢ 220kV S/c line to Chaksu (existing) ➢ 220kV S/c line to Duni (existing) ➢ 220kV S/c line to Sez (existing) ➢ 220kV S/c line to Goner (existing) ➢ 220kV D/c line to Vatika (completed but put on hold due to some telemetry issues)
10	400/220 kV, 2x315 MVA Sohawal (06 nos 220 kV bays)	6 Nos 220 kV bays to be utilized.		➢ 2 nos of bays have already been utilized for sohawal 220kV UP. ➢ 2 nos for Tanda New 220 kV s/s Line in June 2017. (Tanda New S/s is already connected to Tanda NTPC and Sultanpur) ➢ 2 nos for Barabanki 220 kV s/s under construction likely to be commissioned by August 17
11	Shahjahanpur, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos 220 kV bays to be utilized.		220 kV D/C line to Shajahpur and Lakhimpur from Shahjahanpur 400/220 kV SS was planned but they are yet to get the land for establishment of 220 kV substations at Shajahanpur and Lakhimpur

S. No.	Substation	Downstream network requirement	Schedule	Deliberations in the 39th SCPSPNR
12	Jalandhar, 1x 500 MVA 400/220 kV	Partially utilized. Balance 2 Nos 220 kV bays to be utilized.		PSTCL to submit the response.
13	02 nos. bays at Moga	Partially utilized. Balance 2 nos. of 220kV bays to be utilized.		PSTCL informed that Moga–Mehalkalan 220kV D/C line is under construction and likely to be completed by 31.5.2017
14	Hamirpur 400/220 kV 2x 315 MVA Sub-station	04 nos. 220 kV downstream lines commissioned under ISTS. Balance two bays to be utilised by HPSEBL		HPPTCL informed that 2x220 kV bays were to be utilized for connecting 220/132kV Kangoo substation of HPSEBL with 400/220 kV Hamirpur substation by construction of 220 kV Kangoo-Hamirpur D/C line. The matter regarding completion of down stream project is being pursued with HPSEBL and shall be intimated separately
15	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of Transformer from Ballabhgarh).		i). 220 kV Kaithal(PG)-Neemwala D/C line - Work awarded vide PO HDP 2157/58 dated 25.10.2016. the tentative date of completion is 23.05.2018. ii). 220 kV S/s Neemwala - Tenders against NIT dated 23.05.2016 stands opened.
16	Sikar 400/220kV 1x 315 MVA S/s		Jun-17	Status of downstream system for 2 Nos 220 kV bays. RRVPNL to update.
17	400/220kV 2x315MVA Jauljivi Sub-station		December 2019	Uttarakhand to respond
18	400/220kV Kota Sub-station (1 No. of 400 kV Bay)		Commissioned for Anta-Kota 400 kV S/c line of RRVPNL	RRVPNL to update

36.5 **Establishment of new 400/220kV substations in Northern Region:**

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States
1	400/220kV Rajghat GIS	4x 500	dropped	Attached at Annexure- VII
2	400/220kV Dwarka-I GIS	4x 500	Sep'18	
3	400/220kV Tughlakabad GIS	4x 500	June'18	
4	220/66kV Chandigarh	2x 160	Feb'19 (8 bays)	8 nos. 66 kV bays. UT Chandigarh, to submit detals
5	400/220kV Sohna Road S/s	2x500	May'19 (Under TBCB) (8 bays)	As informed by HVPNL, the down-stream system of 400kV Substation Sohna Road will be approved shortly as the detailed surveys of 220kV lines are yet to be finalized.
6	400/220kV Prithla S/s	2x500	May'19 (Under TBCB) (8 bays)	(i) Two no. 220kV bays for Prithla (400)-Prithla (HVPNL) 220kV D/c line (ii) Four no of 220kV bays for LILO of existing 220kV Palwal–Rangala Rajpur D/C line at Prithla (400) (FY 2019-20) (iii) Two number of 220kV bays for 220kV Prithla(400) – Sector-78, Faridabad S/S D/C line (FY-2020-21)
7	400/220kV Kadarpur S/s	2x500	May'19 (Under TBCB) (8 bays)	As informed by HVPNL, the down-line of 400kV Substation Kadarpur will be approved after the finalization of the location of substation site by M/s GPTL.
8	400/220kV Kala Amb GIS	7*105	Jul'17 (Under TBCB)-PG (6 bays)	HPSEBL has planned one no of 220kV D/c line from Kala Amb 400/220kV S/s to 220/132kV Kala Amb S/s, thus utilizing two number of220kV bays at

Sl. No.	Name of Substation	MVA Capacity	Expected Schedule	Downstream connectivity furnished by States
				Kala Amb. No details have been provided for utilization of remaining 4 nos. of 220kV line bays.
9	400/220kV Amargarh GIS	7X105	Oct'18 (Under TBCB) (Sterlite Grid planning to prepone)	No represntaive from JKPDD was present. However, it is mentioned that LILO of 220kV D/C Zainkote-Delina line at 2x315 MVA, 400/220kV Kunzar (Amargarh)S/s has been planned and included under PMDP-2015

37.0 400kV bays at 400kV substation Bhinmal and Sikar:

37.1 CEA stated that in the 30th and 38th meeting of SCPSPNR held on 19.12.2011 and 30.05.2016 respectively, following was agreed under ISTS:

- 2 nos. of 400 kV line bays at Sikar (PG) substation along with 2 nos. of 50 MVAr line reactors for termination of RVPN's under construction Bikaner- Sikar 400 kV D/C line
- 2 nos. of 400 kV line bays at Bhinmal (PG) substation for RRVPNL for termination of RVPN's under construction Barmer-Bhinmal 400 kV D/C line.

In the 38th meeting of SCPSPNR, RRVPNL has informed that the transmission agreement between RVPN and M/s KEC Bikaner Sikar Transmission Pvt. Ltd.(concessionaire) has been executed on 6.11.2015 for development of Bikaner-Sikar 400 kV D/c (Twin Moose) transmission line through Public Private Partnership (PPP) mode and according to the agreement the completion schedule is January 2018. CTU informed that implementation of bays would take about 24-30 months. However, CTU agreed to expedite the work of commissioning of bays in matching time-frame of the transmission lines and requested RRVPNL to inform time frame, in which bays would be required at Bhinmal S/s. Further, RVPN vide letter dated 6.05.2016 has intimated to PGCIL that completion schedule of 400 kV D/C Barmer-Bhinmal line is May 2018 and accordingly 2 nos. 400 kV bays at 400 kV Bhinmal GSS are required by May 2018.

37.2 RVPNL stated that 400 kV D/c Bikaner-Sikar (Twin Moose) line would be commissioned by October 2017. Therefore, 2nos. of 400kV line bays at Sikar are required by October 2017.

37.3 POWERGRID stated that they would try to complete the 400kV bays at Bhinmal (May 2018) and Sikar (October 2018) in the matching time frame on best effort basis.

37.4 Members noted the same.

38.0 Evacuation of power from 1x800 MW supercritical unit- 9 at PTPS, Panipat:

38.1 CEA stated that the power evacuation system for 1x800 MW supercritical unit-9 at PTPS, Panipat was agreed in the 36th meeting of SCPSPNR, which inter-alia included

the implementation of PTPS–Jind 400 kV D/C line. Regarding requirement of two nos. of 400kV bays for termination of this line at Jind (PG) S/s, it was agreed that these works would be carried out by POWERGRID on deposit work on behalf of HVPNL subject to availability of space at Jind.

38.2 HVPNL vide its letter dated 10.4.2017 has requested to defer the requirement of 2 nos. of 400kV bays at Jind S/s as Haryana Power Generation Corporation Ltd. (HPGCL) has intimated that various activities for setting up of 1x800MW supercritical unit-9 at PTPS, Panipat have been put on hold till further order.

38.3 POWERGRID agreed for the same and stated that HVPNL may intimate them as and when the bays would be required in future.

38.4 Members noted the same.

39.0 Interconnection of Manimajra and Hallomajra 220/66kV substations of UT Chandigarh

39.1 CEA stated that presently there is one existing 220/66kV S/s at Manimajra in UT of Chandigarh. Further, to improve the supply network and to provide ISTS interconnection to Chandigarh area, 2x160MVA, 220/66 kV overground GIS at Hallo Majra with Chandigarh (Hallo Majra)-Panchkula (PG) 220kV D/c line has been agreed and the same is under implementation by POWERGRID:

Further to increase reliability of the system, interconnection of 220/66kV Hallomajra S/s with 220/66kV Manimajra (considering N-1 reliability criterion) has been proposed by CTU in case of outage of 220kV Chandigarh (Hallo Majra)–Panchkula D/c line. But, interconnection of both substations would be through 220kV UG cable as laying of 220kV overhead line is not allowed in Chandigarh.

39.2 The matter was deliberated and it was decided that the proposal may be reviewed to form a 220kV ring around Chandigarh or a new 400kV S/s in/around Chandigarh may be planned with suitable 220kV inter-connections.

40.0 Connectivity of Railways' TSS with ISTS Network for Delhi – Bharuch route

40.1 CEA stated that Railway Board vide its letter dated 09.09.2016 requested for connectivity to Railways from various ISTS points along Delhi –Bharuch route. A meeting was held on 07.10.2016 in CEA to discuss the connectivity of Railways' TSS (Traction Sub Station) with ISTS network for two routes of Railways i.e. (i) Delhi (NR) – Bharuch (WR) route (ii) Mughal Sarai (NR) – Howrah (ER) route.

In the meeting, following ISTS substations were preliminarily identified for giving connectivity to the Railways' TSS for its Delhi-Bharuch route:

(i) Ballabhgarh or Tughlakabad (under construction)

(ii) Agra or Bassi (Rajasthan)

(iii) Kota

(iv) Rajgarh (v) Dehgam / Pirana or Vadodara (in WR)

M/s PGCIL was requested to furnish the information regarding the availability of space for 2 nos. 220 kV bays and margins in 400/220 kV transformation capacity at each of the above substation. M/s Railways was requested to provide information about its

present connectivity (connectivity of TSS along this route) with STUs. PGCIL vide its email dated 09.11.2016 had intimated that space for two nos. 220 kV line bays (AIS) is available at Rajgarh, Dehgam, Pirana, Kota and Bassi substations and GIS bays at Vadodara. Railway Board vide its letter no. 2012 / Elect (G) / 150 / 1 Pt – II dated 19.10.2016 has furnished the information about its TSS points and their present connectivity with state utilities.

40.2 Railways stated that they have planned to contruct 220/132kV grid substations with connectivity from ISTS network. Further 4 to 5 numbers of 132kV TSSs would be fed through 132kV D/c line to be constructed in both directions (up and down) of the 220/132kV grid substation. These TSSs are presently getting their feeds from STU network. Connectivity from STU network would be disconnected after getting connection from ISTS. Therefore, two no. 220 kV bays would be required at the above ISTS substations. He further added that at present Railways are getting reliable power from the STU network and plan of getting connectivity from ISTS and disconnection from STU network is purely based on economics of getting cheaper power through ISTS network

40.3 Represenatives from STUs were of the view that Railway networks are already connected with STU networks and they are getting reliable power from STU network. Creating a parallel infrastructure through connectivity with ISTS network would not be economical. With Railways getting connected with ISTS network, the STU transmission assets supplying power to Railways would become stranded. Also, the maximum anticipated load of Railways at each ISTS point would be of the order of 80 to 100 MW, which means under utilization of ISTS asset.

40.4 Chief Engineer (PSPA-1) stated that in view of changed scenario (Railway declared as licensee, CERC direction to STUs to facilitate open access to Railways) and STUs now inclined / agreeing to provide open access to Railways through their network, therefore in order to avoid creation of stranded assets of STU and under utilisation of ISTS network, Railways needs to rework their cost economics.

40.5 After deliberations, it was agreed that Railways would once again look into the cost economics of connectivity to ISTS points vis-a-vis open access through STUs network and share the same with CEA. Further, it was also agreed that a separate meeting of Railways, CTU and CEA would be held with states (where connectivity with ISTS has been sought by Railways) to further deliberate on the issue.

41.0 Connectivity of Railways' TSS with ISTS Network for Ludhiana-Delhi-Sonnagar route:

41.1 CEA stated that Indian Railways is planning to connect its existing TSSs between Ludhiana-Delhi-Sonnagar routes of Railways by way of construction of associated infrastructure including transmission lines and bay extension work at ISTS points at 220kV.

41.2 Railway Board vide its letter no. 2012/Elect(G)/150/1 Pt-II dated 28.12.2016 has requested for connectivity to Railways from various ISTS points for Ludhiana-Delhi-Sonnagar, which is presently under construction. Power requirement of Railways from the nearby proposed ISTS points is given below:

CONNECTIVITY SCHEME OF TSS ALONG LUDHIANA-DELHI- SONNAGAR ROUTE

S. No	PGCIL GSS	Connectivity required at (kV)	Railway TSS to be supplied	Grid Voltage at TSS (kV)	Tentative load requirment (MW)
1	Abdullapur	220	Jagadhari-I	220	50
2			Jagadhari-II	220	
3			Tapri	132	
4			Muzaffarnagar	132	
5	Meerut	220	Jarauda Nara	132	50
6			Hapur	132	
7			Gulaothi	132	
8			Wair	132	
9	Pasauli (Sasaram)	220	Durgaoti	132	75
10			Deoria	132	
11			Chandiapur	132	
12			Gadhion	132	
13			Jeonathpur	132	
14			Chunar	132	

41.3 HVPNL informed that Railwyas has been provided with 2 no. 220 kV bays at Abdullapur 400/220 kV S/S of POWERGRID and Railways are not drawing more that 10 MW power from the S/S. Therfore they should utilize the existing 2 no. 220 kV bays instead of asking 2 more 220 kV bays for getting another 220kV connectivity.

41.4 After further deliberation it was decided that a separate meeting would be convened with the constituents of Northern Region for Connectivity of Railways' TSS with ISTS Network for Ludhiana-Delhi-Sonnagar route.

42.0 Second 400kV high capacity India – Nepal cross border corridor viz. New Butwal (Nepal) – Gorakhpur (New):

42.1 CEA stated that the peak load of Nepal is expected to be about 2000MW in 2019-20 time-frame and the power deficit is expected to be about 1000MW. Presently, only one high capacity Muzaffarpur (India)–Dhalkebar (Nepal) cross-border link exists between India and Nepal, which is presently being operated at 132kV and is expected to be operated to 400kV by Aug 2019. In case of outage of this 400kV line, Nepal might experience grid disturbance/blackout. Thus, to supply secure and reliable power to the Nepal, a second high capacity Cross-Border Interconnection line viz. Gorakhpur New (India)–New Butwal (Nepal) 400kV D/c (Quad Moose) line is proposed. The line has

been approved in the 3rd Indo Nepal Joint Working Group and Joint Steering Committee meetings held on 27th - 28th June 2016.

To ensure reliability in Nepal grid, strengthening of East – West Power Highway in Nepal is proposed through construction of New Butwal to New Hetauda 400kV D/c (Quad Moose) line via New Damauli and Naubise (under the scope of Nepal) in matching time-frame of Gorakhpur New(India)–New Butwal (Nepal). It has also been proposed to operate the New Hetauda–New Dhalkebar D/c (Twin Moose) line at 400kV in order to complete the 400kV India–Nepal ring (Gorakhpur New–New Butwal–New Hetauda–Dhalkebar–Muzaffarpur–Gorakhpur–Gorakhpur New). The following transmission system for the Gorakhpur (New)–New Butwal has been approved in the JSC/JWG meeting:

Indian Side

(a) Establishment of Gorakhpur-New 400kV switching station
- 4 nos. 400 kV line bays for the termination of LILO of Gorakhpur – Lucknow 400 kV (ckt-3&4)
- 2 nos. 400kV line bays for the termination of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line
- 2 nos. 420 kV, 125 MVAR bus reactors

(b) Indian Portion of Gorakhpur New–New Butwal 400 kV D/c (Quad) line [approx. 120km]

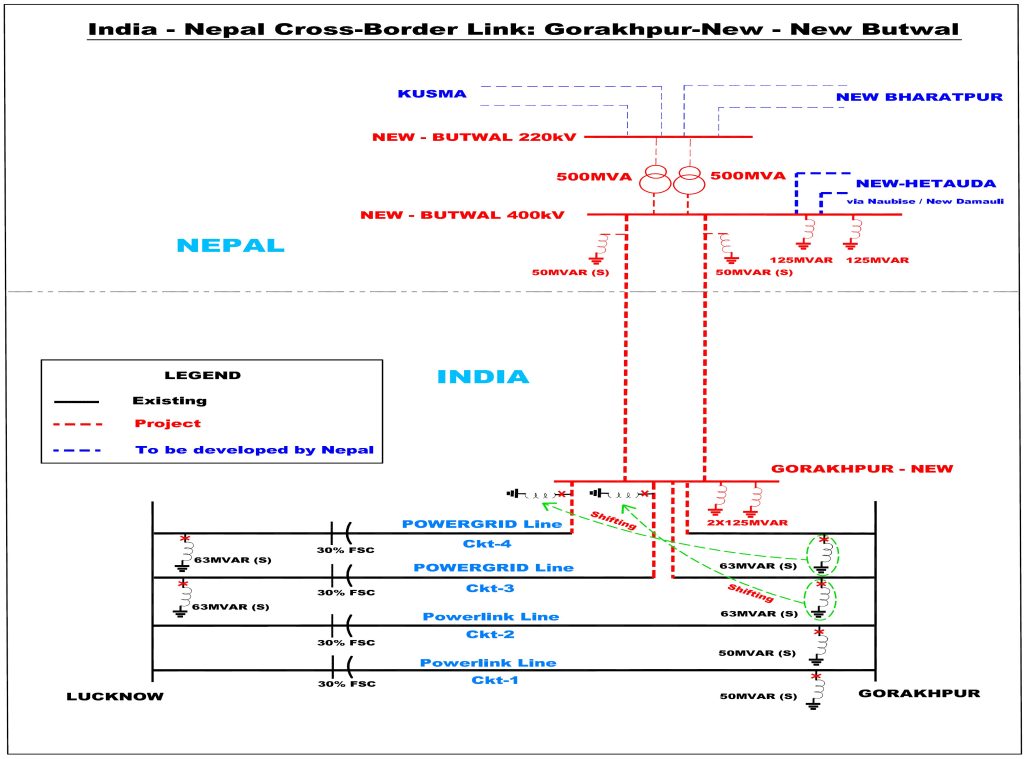
(c) LILO of Gorakhpur–Lucknow 400kV (ckt-3&4) at Gorakhpur-New [approx. 5km]

Nepal Side

(a) Establishment of 400/220 kV 2x500MVA (7x167MVA single phase units) New Butwal Substation
- 2 nos. 400 kV line bays along with 420 kV, 50 MVAR Switchable Line Reactors for the termination of Gorakhpur-New – New Butwal 400 kV D/c (Quad) line
- 2 nos. 420 kV,125 MVAR Bus reactors

(b) Nepal Portion of Gorakhpur New–New Butwal 400 kV D/c (Quad) line [approx. 20km]

42.2 CEA further stated thay a project report of the above scheme was submitted in the 4th JSC/JWG meeting held on 13th -14th Feb 2017. The schematic of the cross border interconnection is shown below.



42.3 POWERGRID representative stated that at this moment sharing of cost for the project between India and Nepal has not been finalised. As and when the cost sharing methodology between India and Nepal would be decided the proposal would be put up in the SCPSPNR for the consent of the constituents.

42.4 Members noted the same.

43.0 UITP Scheme by PTCUL and Grant of Connectivity and LTA to various generators in Uttarakhand (Agenda by CTU).

43.1 CEA stated that the Composite Transmission System viz. Uttarakhand Integrated Transmission Project (UITP) was evolved by PTCUL in association with CEA for evacuation of power from various hydro projects in Uttarakhand as intrastate transmission system. The UITP scheme, originally to be implemented as intra-state scheme by PTCUL, was approved by CEA vide their letter dated 09-01-07. This Transmission system in Uttarakhand was declared as deemed ISTS system vide CERC order dated 31-1-2013 in petition no. 133/MP/2012 and is being implemented by PTCUL. For some of the projects, LTA/LTOA was earlier granted by CTU beyond Kashipur and Connectivity was granted by PTCUL from their system. After this changed status from intra state to deemed ISTS, PTCUL had informed the generators that connectivity/LTA may be applied to CTU, with the change of scheme from intra-state to deemed ISTS. As discussed earlier, during previous SCM/LTA/Connectivity meetings of NR, after change in injection point, the revised LTA intimations are to be issued and LTA agreements needs to be signed/modified.

43.2 CTU stated that 5 Nos. of Connectivity applications have been received by CTU for hydro generation projects in Alaknanda river basin namely (i) Phata Byung (ii) Singoli Bhatwari (iii) Tapovan Vishnugarh (iv)Vishnugarh Pipalkoti and (v) Devsari HEP. In

addition to Alaknanda Basin, one connectivity application has been received for Natwar Mori HEP in Yamuna Basin also. Based on the discussions held in previous meetings, connectivity was granted to Tapovan Vishnugarh HEP (520 MW) of NTPC, Pipalkoti HEP (444 MW) of THDC and Singoli Bhatwari HEP (99 MW) of L&T.

In response to the connectivity intimations issued by CTU, PTCUL vide letter dated 28-09-2016 has expressed that 400/220kV Srinagar S/s and Srinagar-Srinagar HEP 400kV D/c line should also be included for the transmission system required for grant of connectivity to Tapovan Vishnugarh and Pipalkoti HEP, as it was part of UITP scheme, approved by CEA. CTU vide letter dated 11-11-2016 had informed that the connectivity to these three applications had been granted considering that 400/220kV substation at Srinagar and Srinagar-Srinagar HEP 400kV D/c line have already been completed. Hence, the same was not included in the connectivity intimation.

PTCUL has further requested to convert UITP scheme as system strengthening elements including Srinagar 400 kV substation and Srinagar-Srinagar HEP 400kV D/c line. Constituents has not agreed for the the conversion of the UITP scheme as NR System Strengthening Scheme, as the scheme was evolved primarily for evacuation from various hydro projects and in the absence of the generation projects, there would not be any utilisation of these transmission scheme.

43.3 CEA enquired PTCUL about the basis and indemnification agreements for taking up construction of Srinagar HEP–Srinagar (PTCUL) 400 kV D/c line and Srinagar substation and its present utilisation. PTCUL stated as per the earlier scenario, some of the HEPs to whom connectivity was provided by PTCUL were to come up by 2012-13 and looking into the available time for construction, PTCUL had taken up the construction. It was also informed by PTCUL that Srinagar substation is also connected to 132 kV level through 132 kV lines. CEA opined that at present, there is no utilisation of Srinagar (PTCUL)–Srinagar HEP 400kV D/c line and 400/220/132kV substation under ISTS. After detailed deliberations, following was agreed in regard to Srinagar 400/220/132 kV substation and Srinagar (HEP)–Srinagar (PTCUL) 400 kV D/c line:

i) It was agreed that 400/220kV substation at Srinagar would be required for effecting the connectivity to the first generation project out of 5 generation projects of Alaknanda Basin i.e. with the commissioning of first generation project, it would be considered under ISTS, although Srinagar substation is required for all five generation projects in Alaknanda Basin.

ii) Srinagar (HEP)–Srinagar (PTCUL) 400kV D/c is neither required for affecting the connectivity of any project in Alaknanda basin nor for evacuation of power, hence should not be included under UITP.

iii) It was also agreed that CTU may not revise the connectivity intimations on account of Srinagar 400/220/132 kV substation, as existing system is not given in intimations. Further, Srinagar substation would not be included while issuing the balance connectivity intimations.

43.4 CTU stated that as per the CERC order, the transmission system beyond the main transmission line/pooling point of Uttarakhand would be considered as a combination of intra-State transmission system and inter-State transmission system and shall be charged accordingly. The Yearly transmission charges of the various elements of such system would be divided into intra-State portion and inter-State portion, based on installed capacity of the generating stations using the common system. Charges for the ISTS would be shared by beneficiaries of ISTS. CEA enquired about the status of intra

state generation projects. PTCUL representative informed as of now, there is no intrastate generation project that would be utilising the UITP scheme.

43.5 CTU enquired about the status of signing of implementation agreement with these generators as per the CERC guidelines. PTCUL informed that the implementation agreement has been signed with M/s L&T for Singoli Bhatwari HEP, M/s Lanco for Phatabyung HEP and NTPC for Tapovan HEP. Implementation agreement is yet to be signed by THDC for Vishnugarh Pipalkoti HEP.

43.6 With the above background, the connectivity / LTA applications of Uttarakhand discussed and the following was agreed:

I. Connectivity & LTA to Phata Byung Hydro project (76 MW) of M/s Lanco Mandakini Hydro Energy Pvt. Ltd. in Uttarakhand and Connectivity to Singoli Bhatwari HEP (99MW) of M/s L&T Uttaranchal Hydropower Ltd.

i) CTU informed that for Phata Byung HEP Grant of Connectivity was discussed and agreed during the 9th meeting of Connectivity & Long Term for Northern Region held on 30-05-2016 from Sep. 2018 through following Transmission system:

- Phata Byung generation switchyard-Baramwari (PTCUL) substation 220 kV D/c - To be implemented by applicant
- Baramwari (PTCUL) S/s–Srinagar (PTCUL) S/s 220 kV D/c line - To be implemented by PTCUL

ii) However, during the meeting held on 25-07-2016 among CEA, CTU, PTCUL and generation developers, PTCUL had informed that as Baramwari substation may not come up in the time frame of Phata Byung & Singoli Bhatwari HEPs and Rambara HEP has also been dropped Therefore, Phata Byung generation shall be connected to Srinagar through 220 kV D/c line and one circuit of the same shall be looped in looped out at Singoli Bhatwari hydro generation switchyard of M/s L&T.

iii) Further, M/s L&T and M/s Lanco Mandakini were requested to confirm if the cables and the bus bar in their generating switchyard are capable to carry power of both generation plants, so as to meet the outage of one 220 kV circuit. Both the generators confirmed that cables and bus-bars ratings at generation switchyard are capable of handling power flow from both HEPs, in case of outage of one 220 kV circuit.

iv) PTCUL stated that the developer Singoli Bhatwari HEP has raised concerns over metering and losses, in case of common immediate evacuation system. PTCUL proposed that Baramwari 220 kV switching substation shall be required. The proposal of PTCUL for establishment of Baramwari 220 kV switching station was agreed. It was also agreed that commissioning of Baramwari switching station may be matched with the later of the two (2nd) generator. PTCUL may implement the required transmission system upto Srinagar substation, taking into consideration the commissioning schedules of both the generators.

v) Keeping above in view, the Transmission system for grant of Connectivity and LTA for Phata Byung HEP and connectivity for Singoli Bhatwar HEP is as given below:

A. Connectivity for Phata Byung Hydro project - 76 MW
Interim Connectivity:
Transmission system for grant of Connectivity to Phata Byung HEP

- Phata Byung generation switchyard–Proposed site of Baramwari sw. station 220 kV D/c line - To be implemented by applicant (including 220 kV bays at generation end).

Common transmission system required for Connectivity

- Proposed site of Baramwari (PTCUL) sw. station–Srinagar (PTCUL) substation 220 kV D/c line - To be implemented by PTCUL

Final Connectivity:

- Phata Byung generation switchyard–Baramwari S/s 220 kV D/c - To be implemented by applicant (including 220 kV bays at both ends).

B. **LTA for Phata Byung Hydro project - 76 MW:**

The LTOA and revised LTA was granted to Phata Byung HEP in July 2009 and March 2013 respectively subject to the availability of Lucknow-Bareilly-Meerut 765 kV S/c and Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c lines. However, considering the revised load-generation scenario, it is observed that Lucknow-Bareilly-Meerut 765 kV S/c line is not required for grant of Long Term Access to the generator and power can be evacuated through existing Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c lines only. Further, earlier granted LTA was beyond Kashipur and system required for transfer of power up to Kashipur was not considered in the LTA grant, now the system being deemed ISTS, therefore Srinagar–Kashipur 400 kV D/c line is to be included as transmission system required for LTA. Taking this into consideration, the revised LTA intimation shall be issued by CTU w.e.f 30th Sep. 2018 or availability of following transmission system, whichever is later.

Transmission system for Long Term Access (Phata Byung Hydro project (76 MW)

- Srinagar-Kashipur 400kV D/c line along with associated 400 kV bays – to be implemented by PTCUL

PTCUL was requested to match the implementation of above line with commissioning of generation project. However, PTCUL stated the time frame for Srinagar-Kashipur 400kV D/c line as Dec. 2019.

C. **Connecticity for Singoli Bhatwari HEP-99 MW:**

As per the Implementation agreement signed between PTCUL & M/s L&T for Singoli Bhatwari HEP, the revised commissioning schedule for the generation project is October 2018. The connectivity is as given below:

Interim Connectivity:

Transmission system for grant of Connectivity to Singoli Bhatwari HEP

- LILO of one circuit of Phata Byung–Srinagar 220 kV D/c line (LILO point at proposed Baramwari sw. station site) at Singoli Bhatwari – LILO to be implemented by applicant (including 220 kV bays at generation end).

Common transmission system required for Connectivity

- Proposed site of Baramwari (PTCUL) S/s – Srinagar (PTCUL) substation 220 kV D/c line - To be implemented by PTCUL

Final Connectivity:

- Singoli Bhatwari generation switchyard–Baramwari sw. station 220 kV D/c with the opening of LILO as mentioned above in Interim arrangement - To be implemented by applicant (including 220 kV bays at both ends).

Note: Baramwari 220 kV switching station and Baramwari–Srinagar 220 kV D/c line to be implemented by PTCUL as part of Common Transmission system for connectivity of Phatabyung and Singoli Bhatwari HEPs.

Connectivity grant shall be effective from 31st October 2018 or the availability of above mentioned transmission system, whichever is later.

II. Connectivity and LTA for Tapovan Vishnugarh Hydro project (520 MW) of NTPC Ltd.

i) CTU informed that the connectivity to NTPC for Tapovan Vishnugarh HEP was granted vide letter dated 06-08-16 through the following transmission system:

- Tapovan Vishnugad HEP–Proposed site of Pipalkoti 400 kV substation 400kV D/c (Twin Moose) line – To be implemented by PTCUL
- Proposed site of Pipalkoti 400 kV S/s-Srinagar 400kV D/c (Quad Moose) line - To be implemented by PTCUL

ii) Subsequently, PTCUL vide letter dated 29-12-16 has informed that the implementation agreement within NTPC and PTCUL has been signed. As per the signed implementation agreement, the commissioning schedule for the generation project is March 2019.

iii) As there is ***no change in transmission system for the connectivity of Tapovan Vishnugarh HEP***, no revision is required in the earlier connectivity intimation issued dated 06-08-2016 for Tapovan Vishnugarh HEP and connectivity system shall remain same.

iv) LTOA was granted beyond Kashipur to Tapovan Vishnugadh HEP subject to the availability of Lucknow-Bareilly-Meerut 765 kV S/c and Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c lines. However, considering the revised load-generation scenario, it is observed that Lucknow-Bareilly-Meerut 765 kV S/c line is not required for grant of Long Term Access to the generator and power can be evacuated through existing Bareilly-Kashipur-Roorkee-Saharanpur 400 kV (Quad) D/c lines only.

Further, earlier granted LTA was beyond Kashipur and system required for transfer of power up to Kashipur was not considered in the LTA grant, now the system being deemed ISTS, therefore Srinagar–Kashipur 400 kV D/c line is to be included as transmission system required for LTA. Taking this into consideration, the Revised LTA Intimation shall be issued by CTU.

v) It was agreed that revised LTA Intimation shall be issued by CTU for 513.76 MW w.e.f 1st April 2019 (as mentioned in NTPC Letter dated 03-08-16) or availability of following transmission system whichever is later:

Transmission system for revision in grant of Long Term Access

- Srinagar- Kashipur 400kV D/c line along with associated 400 kV bays - To be implemented by PTCUL

vi) PTCUL was requested to match the implementation of above line with commissioning of generation. However, PTCUL stated the time frame for Srinagar- Kashipur 400kV D/c line as Dec 2019.

vii) PTCUL stated that there are implementation issues for Srinagar-Kashipur 400kV D/c and requested committee for approval of LILO of one circuit of Vishnuprayag-Muzzafarnagar 400 kV line at Pipalkoti Substation. UPPTCL representative stated that Vishnuprayag-Muzzafarnagar 400 kV line (one circuit already LILOed at Srinagar HEP) does not have margins to evacuate additional power. It was further stated by UPPTCL that the issue of LILO was discussed earlier also and UPPTCL had requested PTCUL to submit the proposal with the studies, however no studies has been submitted by PTCUL till date. As such the proposal of LILO was not agreed. However, it was agreed that PTCUL shall submit the proposal alongwith the studies to UPPTCl and the same could be discussed in next meeting of SCPSPNR. It was also agreed that CTU may go ahead with the issuance of revised LTA intimation and incase this LILO is agreed at later date, the intimation may be modified accordingly

III. Connectivity to Vishnugarh Pipalkoti Hydro project (444 MW) of THDC Ltd.

i) CTU informed that the connectivity was granted to M/s THDC for Vishnugarh Pipalkoti HEP vide letter dated 09-08-16 through the following transmission system:

- Pipalkoti HEP-Pipalkoti switching station 400kV D/c line (twin moose) – to be implemented by PTCUL
- Establishment of the 400kV Pipalkoti Switching station - to be implemented by PTCUL
- Diversion of Tapovan Vishnugad HEP-Proposed site of Pipalkoti 400kV Substation D/c line at Pipalkoti switching station - to be implemented by PTCUL
- Diversion of Proposed site of Pipalkoti 400kV Substation-Srinagar 400kV D/c line at Pipalkoti switching station - to be implemented by PTCUL

ii) It was intimated by THDC representative, during the meeting, that the revised commissioning schedule for Pipalkoti HEP is 30th June 2020.

iii) As there is ***no change in transmission system for the connectivity of Vishnugarh Pipalkoti HEP***, no revision is required in the earlier connectivity

intimation issued dated 09-08-2016 for Pipalkoti HEP and Connectivity system shall remain same.

iv) It was also deliberated that THDC is required to sign Implementation Agreement with PTCUL in line with 4th amendment to CERC (IEGC) Regulations. As per CERC guidelines, 400 kV D/c line in hilly terrain is 40 months, therefore, considering the commissioning schedule of the generation project, THDC was advised to sign the implementation agreement with PTCUL. THDC assured to sign the same at the earliest.

v) Also, it was stated that mere connectivity does not assure adequacy of transmission system for transfer of power to target beneficiaries and the grant of connectivity does not entitle the applicant to interchange any power with the grid unless applicant obtains Long-Term Access or Medium Term Open Access. Hence, applicant was advised to apply for LTA.

vi) PTCUL to match the implementation of above line with commissioning of generation.

IV. Connectivity to Naitwar Mori HEP (2x30MW) of SJVN Ltd. in Uttarakhand.

i) CTU informed that the connectivity application of SJVNL for Naitwar Mori HEP was discussed during the 9th Connectivity / Long Term Access meeting with NR Constituents held on 30-05-2016 and it was proposed to grant connectivity of 60 MW (plus 10% overload) to Naitwar Mori HEP with effect from Aug. 2020 or the availability of transmission system whichever is later though system as below:

- Naitwar Mori generation switchyard–Mori 220/132 kV substation (PTCUL)– Khodri (PTCUL) S/s. 220 kV D/c line

ii) SJVNL stated that the revised commissioning schedule for Naitwar Mori HEP is 30th Nov. 2021.

iii) PTCUL informed that during the meeting held on 25-07-2016 among CEA, CTU, PTCUL and generation developers regarding grant of Connectivity & LTA to various hydro projects in Uttarakhand that Mori 220/132kV (PTCUL) substation is being constructed by PTCUL as a Pooling Station and Khodri 220/132kV substation has been dropped. Accordingly, PTCUL requested for modification in the above said scheme viz. instead of Khodri 220/132 kV (PTCUL) substation, the 220kV D/c line from Mori 220/132 kV (PTCUL) substation may be connected to 400/220kV Dehradun (PG) substation.

iv) Accordingly, connectivity to SJVNL for Natwar Mori HEP (2x30 MW) was proposed to be granted w.e.f 30th Nov. 2021 through the following Transmission system:

- Naitwar Mori HEP - site of Mori 220/132kV (PTCUL) S/s 220 kV D/c line (to be implemented by applicant incl. 2 no. 220 kV line bays at Mori)
- Site of Mori 220/132 kV(PTCUL) S/s–Dehradun (POWERGRID)220 kV D/c line along with 2 nos. of 220 kV line bays at Dehradun (to be implemented by PTCUL)

Note: Mori 220/132 kV substation is not required for connectivity of Naitwar Mori HEP

v) CTU stated that mere connectivity does not assure adequacy of transmission system for transfer of power to target beneficiaries and the grant of connectivity does not entitle the applicant to interchange any power with the grid unless applicant obtains Long-Term Access or Medium Term Open Access. Hence, applicant was advised to apply for LTA.

vi) SJVNL is required to sign Implementation Agreement with PTCUL in line with 4th amendment to CERC (IEGC) Regulations.

V. Transmission system for transfer of power beyond Srinagar.

i) Under UITP, power from various generation projects in Uttarakhand is to be pooled at 400/220kV Srinagar (PTCUL) substation and further to Kashipur (PTCUL) substation through Srinagar-Kashipur 400kV (Quad) D/c line to be implemented by PTCUL. During the meeting held on 25-07-2016 among CEA, CTU, PTCUL and generation developers regarding grant of Connectivity & LTA to various hydro projects in Uttarakhand, it was informed by PTCUL that the schedule of Srinagar–Kashipur 400kV D/c line is Dec. 2019.

ii) PTCUL informed that the line has already been awarded for implementation under PPP mode, however, due to some issues with the developer, there is no progress. CEA enquired about the timeline for resolution of the issues. PTCUL informed that if issues are not resolved by June-2017, the scheme would be retendered. CEA suggested that instead of going for retendering the scheme may be implemented under ISTS through TBCB route. PTCUL stated that they would consider the same in case of retendering of the scheme.

VI. Devsari HEP

i) CTU informed that Connectivity application was received by CTU from M/s SJVN Ltd. for Devsari HEP (252 MW plus 10% overload), located in Uttarakhand from 21st July'2022. The proposal of connectivity to Devsari HEP was discussed in the 9th Connectivity & Long Term for Northern Region held on 30/05/2016. As per agreed UITP scheme, Devsari HEP is to be connected through:

- Devsari HEP generation Switchyard - Karanprayag 400/220 kV S/s 220 kV D/c (Twin zebra) line: to be implemented by PTCUL
- Establishment of 2x315 MVA, 400/220 kV Karanprayag S/s of PTCUL by LILO of both circuits of Pipalkoti- Srinagar 400 kV (Quad) D/c line at Karanprayag: to be implemented by PTCUL

44.0 Connectivity to Luhri Hydro Electric Power Project (210 MW) of SJVN Ltd. in Himachal Pradesh (Agenda by CTU)

44.1 SJVNL had applied for connectivity of their 588 MW Luhri HEP (3*196MW) located in HP in Dec. 2013. However, there were some modifications in the capacity of the plant and it was decided to close the old connectivity application. Subsequently SJVNL submitted a new connectivity Application for Luhri Stage-I for 210 MW capacity. To discuss the issues regarding transmission system required for evacuation of power from Luhri HEP a meeting was held on 10/01/2017 at CEA among CEA, CTU, SJVNL and HPPTCL/HPSEB. During this meeting, representative from SJVNL informed that the

project layout was reviewed and it was decided to develop LHEP in three stages with capacity of 210 MW (St-I), 207 MW (St-II) and 363 MW (St-III). All three stages of LHEP are to be implemented by SJVNL only. The commissioning schedule for three stages are: Stage-I is expected by April'2023, Stage-II-by 2026 and Stage-III by 2024.

After discussions, it emerged that being the hilly terrain, there may be ROW constraints for implementation of the individual connectivity system for all three stages. Therefore, it was suggested that transmission system for grant of Connectivity for Luhri HEP may be taken up under integrated planning and one Pooling Station should be proposed for the same. Site visit for the same, if required can also be done by the officials from CEA, CTU & SJVNL.

Further, it was also agreed that the present Connectivity application for Stage-I may be taken up along with Stage-III for which SJVN may apply for Connectivity. Accordingly, the total quantum shall become more than 250 MW. Considering this transmission system for total 780 MW (all three stages) shall be taken up as integrated planning under ISTS. SJVN assured that they shall apply for Connectivity for Stage-III within three months.

45.0 Capacity enhancement of Rihand- Dadri HVDC from 1500MW to 2500MW

45.1 CEA stated that the proposal of capacity enhancement of Rihand-Dadri HVDC from 1500MW to 2500MW was discussed in 36th, 37th and 38th meetings of SCPSPNR held on 13-07-2015, 20-01-2016 and 30-05-2016 respectively. The proposal was agreed in principle during 36th and 37th SCPSPNR. However, as per the minutes of 38th meeting of SCPSPNR, additional studies were required to be carried out.

45.2 AGM, CTU stated that 1500MW HVDC Rihand-Dadri Bipole is in operation since 1992 and presently is under R&M. It is an important transmission link for evacuation of bulk power from pit head generating units in Rihand and its vicinity. This HVDC link transfers bulk power from the Rihand–Singrauli-Vindhyachal generation complex to National Capital Region (NCR) which is load centre. The upgradation would provide additional 1000MW from pit head generating station to NCR with no extra land / transmission corridor cost. This up-gradation facilitates the System Operator to enable economic despatch function by utilizing the HVDC system to its full capacity for most of the times. Quick load control feature including the run back control in the event of outage of the Rihand generators in the Rihand-Dadri HVDC system in the past has been effectively utilized for enhancing the stability of the underlying AC network during extreme grid loading conditions. Dadri generating station in NCR has an installed capacity of about 2450 MW- (Dadri (thermal) - 840 MW, Dadri (Gas) -830 MW, Dadri-II (980 MW)). However a large quantum of the generation at Dadri does not operate due to economic reasons. Delhi has a very limited generation capacity as on date and also ther is no plan to add generation capacity in the state in near future. Accordingly, the increasing demand in Delhi is required to be met by importing power from outside. In addition, entire Badarpur generation project is planned for permanent closedown in near future due to environmental norms.

45.3 Considering the above generation scenerio, capacity enhancement of Rihand-Dadri HVDC bipole by 1000MW has been studied to utilize the margin available in Rihand-Dadri HVDC bipolar line built with Quad-Bersimis conductor. From the studies, it has been observed that some of the transmission lines in Singrauli / Rihand / Anpara / Obra complex get critically loaded under contingencies without augmentation of the bipole

capacity. Further N-1-1 from such a large complex of about 9000 MW has also been studied.

45.4 As far as the the dispersal of power beyond Dadri is concerned, studies show that there is no constraint in dispersal of power beyond Dadri. In view of the above, addition of parallel converters of 2x500MW at Rihand and Dadri HVDC station to enhance the capacity of Rihand- Dadri HVDC line to 2500 MW (from existing 1500MW capacity)has been proposed.

45.5 CEA stated that in the studies, the connectivity of Rihand generation complex with WR grid (through Rihand-III- Vindhyachal Pool link) has not been considered. Also, in the studies low generations in Anpara complex has been assumed and in most of the contingencies the interconnecting lines between Rihand and Anpara complex are overloaded.

45.6 The issue was further deliberated and it was decided that the studies may be reviewed considering following:

a) Rihand-III –Vindhyachal link (1000 MW)

b) Relieve the overloading of Singrauli-Anpara 400 kV line

c) To reduce the high short circuit level in Singrauli –Anpara complex.

46.0 Converting Fixed Line Reactors into Switchable Line Reactors in Over Compensated lines

46.1 CTU stated that due to the reduction in line lengths after LILO of a line at certain substation, the fixed reactive compensation that was initially provided for the parent line (line before LILO) has reached such a value, that there is a requirement of switching of the reactors during different operating conditions. Considering the fact that there is a huge variation in load / generation pattern in Northern Region, these line reactors are very much required in the system during light load conditions and need to be taken out of service during peak load conditions. Initially these line reactors were implemented as fixed line reactors (considering the initial line length), switching on/off the line reactor based on requirement is not possible. Following table shows the lines in Northern Region for which reactive compensation has reached such critical value:

Sl. No.	Name of the Line	Length in km	Capacity		Switchable (S) / Non-Switchable (F)		%Comp-ensation (Present)
			End I	End II	End I	End II	
1	Sohawal - Ballia I	229	50	63	F	F	81
2	Sohawal - Ballia II	229	50	63	F	F	81
3	Kankroli - Zerda	234	50	50	F	F	71
4	Abdullapur-Panchkula I	63	50	--	F	--	126

5	Abdullapur-Panchkula II	63	50	--	F	--	126
6	Bassi – Kotputli	106	50	--	F	--	71

46.2 The DOV studies, (with these reactors are in switched off condition), have also been carried out and as per the study results, it is observed that DOV is within limit. (studies are enclosed at Annexure-VIII). Accordingly, POWERGRID has proposed conversion of fixed Line Reactors installed at Sohawal, Kankroli, Abdullapur and Bassi, in the above mentioned lines to switchable line reactors.

46.3 POSOCO stated that provision should be there to use these line reactors as bus reactors in case the line is not in operation.

46.4 After deliberations, members agreed to the POWERGRID's proposal of converting the following fixed Line reactors to switchable line reactors:

Sl. No.	Name of the Line	Substation (sending end)	Reactor (MVAR)	Substation (receiving end)	Reactor (MVAR)
1	Sohawal - Ballia I	Sohawal	50	Balia	63
2	Sohawal - Ballia II	Sohawal	50	Balia	63
3	Kankroli - Zerda	Kankroli	50	Zerda	50
4	Abdullapur-Panchkula I	Abdullapur	50		--
5	Abdullapur-Panchkula II	Abdullapur	50		--
6	Bassi – Kotputli	Bassi	50		--

47.0 Ownership of newly installed 63MVAr Reactor, GIS bay & 4x105MVA ICT BBMB Dehar Power House

47.1 CEA stated that POWERGRID had carried out augmentation (replacement of 250 MVA transformer) of transformer capacity by 315MVA and installation of 2x63 MVAr bus reactors controlled through a single 400 kV bay in line with the approval of 30th meeting of SCPSPNR held on 19-12-2011, at Dehar PH BBMB under ISTS as system strengthening scheme. During the 133rd OCC meeting of NRPC held on 17/03/2017, BBMB had opined that as the system strengthening under ISTS was done at 400kV Dehar substation of BBMB, therefore the ownership of 315MVA ICT and 2x63 MVAr reactors should remain with BBMB only. However POWERGRID mentioned that all the funding / investment has been made by POWERGRID and therefore ownership shall remain with POWERGRID. The tariff petition for the said assets was also filed by POWERGRID in CERC. Earlier also BBMB has raised similar issue regarding ownership of LILO portion of Dehar – Bhiwani and Dehar – Panipat 400 kV lines. To resolve the ownership issue meetings were held in CEA and it was decided that the

ownership shall remain with POWERGRID as the investment has been made by POWERGRID.

47.2 The matter was deliberated and the members recommended that the ownership of the newly installed 63MVAr Reactor, GIS bay and 4x105MVA ICT at BBMB Dehar Power House should remain with POWERGRID. There was no representation from BBMB in the meeting.

48.0 Creation of 400/220kV Substation at Etawah

48.1 Director (PSPA-I), CEA stated that the issue of establishment of 400/220 kV substation at Etawah alongwith Morena–Etawah 400 kV D/c line was discussed in 33rd meeting of SCPSPNR held on 23-12-2013, wherein, it was decided that the proposal would be studied in detail and put up in subsequent standing committee meeting.

48.2 AGM, CTU stated that Etawah is an important load centre in Western Uttar Pradesh and in order to meet the present and future load demand a 400/220 kV substation at Etawah is proposed. Three 400kV circuits viz. Kanpur-Ballabhgarh (PG) S/c line (386km) and Kanpur-Ballabhgarh (PG) D/c lines (370km) are passing near Etawah and to provide connectivity to Etawah LILO of one circuit of Kanpur- Ballabhgarh (PG) S/c line (386km) is proposed. Auraiya-Agra (Sikandra) 220 kV D/c line is also passing close to Etawah area. The follwoing scheme for creation of 400/220kV S/s at Etawah is proposed under ISTS:

(i) Establishment of 2x315MVA, 400/220kV Substation at Etawah through LILO of 400kV Kanpur-Ballabhgarh S/c (386km) line

(ii) LILO of 220kV Auraiya-Agra(Sikandra) D/c at Etawah

48.3 CE, UPPTCL stated that not much load growth has been anticipated in and around Etawah and the network which is existing and planned in that area would be able to meet the future load demand of Etawah. Therefore, presently the substation in not required.

48.4 After deliberations, the proposal of creation of 400/220kV Substation at Etawah was agreed to be dropped.

49.0 765kV D/c interconnection of Lalitpur TPS with Bina(PG)

49.1 CEA stated that Lalitpur STPS (3x660 MW) generation project is connected to 765/400 kV Agra (UP) substation via two nos. of 765kV S/c lines. The dynamic studies show oscillations under N-1 contingency conditions. In order to overcome the issue of oscillations, various options like LILO of 765kV Jabalpur-Orai line at Lalitpur, Lalitpur-Bina (WR) 765kV D/C line, Fixed Series Compensation (FSC) at Agra (UP) end of Lalitpur –Agra 2xS/C lines, Thyristor controlled series compensation (TCSC) at Agra (UP), LILO of 400kV Parichha-Orai at Lalitpur and Lalitpur-Orai 765kV D/c line were studied and discussed in the various meetings of SCPSPNR. However, there was no unanimity on any of the above proposal. UPPTCL was in favour of the provision of PSS tuning vis-a-vis the requirement of FACTS device on the Lalitpur-Agra 765kV 2xS/C lines, however CTU was not agreeable to it. UP being the sole beneficiary of the Lalitpur Generation, it was left to UPPTCL to decide on the above issue.

49.2 NRLDC stated that the oscillations in the system may propagate to other part of the grid and the issue needs to be addressed. Recently, there was an incident in the grid, wherein

after tripping of both the circuits of Lalitpur –Agra 765kV lines, the power rushed towards 220kV level through 765/220kV ICTs, which resulted in tripping of transmission outlets from Parichha generating station, thus resulting in loss of generations from Lalitpur and Parichha generation complex. Therefore, the evacuation system from large generating complexes needs to be N-2 compliant.

49.3 CEA stated that the issue of providing another anchoring to Lalitpur TPS was also discussed during last meeting of SCPSPNR, wherein, it was decided that joint study among CEA, CTU and UP may be carried out. A joint study for the evacuation system was carried out with UPPTCL in which the option of interconnection of Lalitpur with Bina (PG) in Western Region was also studied. The study indicated that the oscillations are well damped, when Lalitpur is connected to Bina 765 kV substation in Western Region.

49.4 POWERGRID informed about the space constraints at Bina (PG). Chief Engineer (PSPA-I), CEA stated that Lalitpur is an intra state generating station with UP being sole beneficiary. Lalitpur-Bina (PG) being an ISTS inter-regional line, it also needs to be deliberated in the meeting of SCPSPWR. Normally inter-regional line connects two ISTS points in two different regions, but in this case Bina in WR is an ISTS point and Lalitpur in NR is an intra-state point. Further, Lalitpur is not drawal point, it is an injection point and power needs to be further transferred towards Agra. This link involves many commercial issues and implementation issues also.

49.5 Members opined that adequate inter-regional capacity has been planned and as of now, there is no need of additional capacity and line should not be constructed under ISTS

49.6 UPPTCL stated that the PSS tuning of generator at Lalitpur has been done and no osscilations have been observed so far. But, interconnection of Lalitpur- Bina is a very good proposal as it provides anchoring to Lalipur as well as it provides additional WR-NR inter-regional capacity. This proposal has already been deliberated in the meeting held at Lucknow with CEA and CTU. CEA stated that for Lalitpur- Bina to provide additional WR-NR capacity, necessary strengthening beyond Agra(UPPTCL) would also be required. Further, Bina-Lalitpur 765kV D/C line cannot be implemented as intra state scheme as the line would transverse through two states in two different regions. In addition to the PSS tuning done at lalitpur TPS for damping out the osscilations, SPS to trip Lalitpur units could be implemented in case of outage of one/ two circuit of Lalitpur- Agra 765kV 2xS/C lines to avoid unit osscilations as well as to avoid overloading of 220kV lines due to power flow from Lalitpur TPS in case of outage of 765kV lines. If incidents of unit osscilations are observed even after provision of SPS, then additional anchoring needs to be taken up by UPPTCL.

49.7 After deliberations, it was agreed that SPS to trip Lalitpur generation units in case of outage of one/ two circuit of Lalitpur- Agra 765kV 2xS/C lines to avoid unit osscilations as well as to avoid overloading of 220kV lines due to power flow from Lalitpur TPS in case of outage of 765kV lines needs to be implemented at Lalitpur TPS. As PSS tuning has already been done at Lalitpur TPS and no oscilltions have been observed after that, members agreed not to take up the proposal of 765kV D/c interconnection of Lalitpur TPS with Bina (PG). It was also agreed that in case incidents of unit osscilations are observed even after provision of SPS, then additional anchoring may to be taken up by UPPTCL.

50.0 Connectivity of UPPTCL Moradnagar-II (new), 400/220 kV, 2x240 MVA sub-station by shifting of 400,220 kV lines from Moradnagar 400 kV UPPTCL S/S to Moradnagar –II

50.1 CEA stated that the following connectivity to Moradnagar–II, 400/220 kV 2x240 MVA substation was approved in 37th meeting of SCPSPNR by way of shifting of some 400kV and 220 kV feeders from existing 400/220kV, 3x315 MVA Moradnagar substation subject to certain conditions raised by NRLDC:

(A) <u>400 kV Lines shifting: -</u>

(i) Shifting of Agra–Moradnagar 400 kV S/C line to Moradnagar-II.

(Already shifted, charged and line is also LILO at Fatehabad, Agra 765kV S/S)

(ii) Shifting of Dadri-Moradnagar 400kV S/C line to Moradnagar-II
(Necessary shifting construction work complete but not yet actually shifted)

(B) <u>220 kV Lines shifting: -</u>

(i) Shifting of Moradnagar–Barut 220 kV SC line to Moradnagar–II
(Already shifted and charged)

(ii) Shifting of Moradnagar–Loni 220 kV SC line to Moradnagar–II (not yet shifted)

(iii) Shifiting of Moradnagar–Shamli line to Moradnagar–II
(Already shifted, charged and further LILO at Baghpat 400 PG)

50.2 The above was agreed subject to following: -

(i) Completion of 2x500 MVA Baghpat (PG) S/S with LILO of Meerut (PG)-Kaithal 400 kV S/C line at Baghpat (PG) (Baghpat PG S/S and LILO already completed and charged)

(ii) Completion of 220/132 kV 2x100 MVA Baghpat UP substation with LILO of Moradnagar (II)–Shamli 220 kV S/C line at Baghpat UP. (220 kV Baghpat UP S/S already completed and charged but small LILO portion is held up due to RoW issue)

(iii) Baghpat (PG)–Baghpat UP 220 kV D/C line (Already completed and charged)

(iv) Baghpat (PG)-Baraut 220 kV D/c line

(v) 765/400/220 kV Hapur S/S with LILO of Moradnagar-Moradnagar 400 kV S/C PGCIL line at Hapur (Already completed and charged)

50.3 UPPTCL stated that Dadri-Moradnagar 400kV S/C shifting works are held up subject to completion of pending works as listed abovewhich need to be completed. Most of these works have now already been completed. In view of high loadings on existing Moradnagar 400 kV S/S and existing Moradnagar (II) S/S presently radially connected, UPPTCL requested to allow shifting of following pending lines.

(i) Dadri–Moradnagar 400 kV S/C line to Moradnagar (II)
(ii) Moradnagar –Loni 220 kV S/C line to Moradnagar (II)

UPPTCL further informed that the existing 400/220 kV, 3x315 MVA Mordanagar S/S is having high loadings while Moradnagar (II) is lightly loaded. Shifting of lines will result in equitable loadings on both the substations.

50.4 CEA enquired about the status of completion of Bagpat- Baraut 220kV D/C line and LILO of Moradnagar-II- Shamli 220kV S/C line at Bagpat(UP). UPPTCL stated that these lines were held up due to RoW issues and would be implemented soon after RoW resolution.

50.5 After deliberations, Members agreed with UPPTCL proposal of shifting

(i) Dadri–Moradnagar 400 kV S/C line to Moradnagar (II)
(ii) Moradnagar –Loni 220 kV S/C line to Moradnagar (II)

51.0 Connectivity of 400/220/33 kV 2x500, 3x60 MVA Indirapuram (Ghaziabad) sub-station:

51.1 CEA stated that connectivity of 400/220/33 kV 2x500MVA, 3x60 MVA Indirapuram (an Intra state substation) and a part of ring system around Ghaziabad and NCR region was approved in 26th meeting of SCPSPNR dated 13.10.2008 and was amended in 29th meeting of SCPSPNR dated 29.12.2010, as given below:

(i) Hapur (765)–Ataur, Ghaziabad 400 kV D/C (Quad) line – (Actual length 52.5km)

(ii) Ataur–Indirapuram 400 kV D/C (Quad) line – (Actual length 15.83 km)

(iii) LILO of Muzaffarnagar-Moradnagar 400 kV S/C line at Ataur – (Actual length 15km)

(iv) LILO of Moradnagar-Muradabad 400 kV S/C line at Hapur (765) - (Actual LILO length 2.2 km)

(v) G. Noida – Hapur 765 kV S/C line - (Actual length 65.5 km)

220 kV downstream system being implemented by UPPTCL for the 220/33 kV, 3x60 MVA sub-station at Indirapuram is as below:

- LILO of Sahibabad–Noida Sec. (62) 220 kV S/C line at Indirapuram (Work already completed on Multicircuit Towers)

51.2 UPPTCL informed that all the above 400 kV network is nearing completion under PPP mode except, Ataur 400/220 kV substation, which is delayed due to some constraints in substation work. However, Indirapuram 400 kV substation alongwith Hapur-Ataur–Indirapuram 400 kV D/C Quad line have been completed. In order to meet the load around Ghaziabad, Noida and adjoining Delhi region, it is planned to connect 400kV Indirapuram S/S as below:

- Hapur 765kV–Indirapuram 400 kV D/C line (line bypassed at Ataur S/S)
- LILO of Sahibabad–Noida Sec.62 220kV S/C line at Indirapuram

51.3 UPPTCL also informed that 220/33 kV transformation capacity at Indirapuram will meet around 100MVA load of discom as 33 kV feeders are already connected to it. Besides 220 kV LILO connectivity will provide support to Sahibabad (220), Noida Sec.62 (220), Moradnagar (400) and G. Noida (400) substations.

51.4 Members agreed for the above interim arrangement, proposed by UPPTCL. UPPTCL agreed that on completion of Ataur 400 kV S/S, the system as approved in 26th & 29th SCM would be implemented.

52.0 Augmentation of transformation capacity at Gorakhpur, Lucknow and Fatehpur

52.1 CEA stated that Fatehpur, Lucknow and Gorakhpur substations are major load centres in UP. The existing transformation capacities at Fatehpur and Gorakhpur 400/220kV S/Ss, are 2x315MVA and at Lucknow (1x315+1x500) MVA. UPPTCL has proposed augmentation of transformation capacity at these substations of POWERGRID. As per the existing maximum loading observed on these sub-staion, the transformation capacity is not n-1 compliant.

POWERGRID has submitted the following datails about the availability of bays and space for the three substations:

Sl. No.	**Information**	**Lucknow S/s (1x315 +1x500) MVA**	**Gorakhpur S/s** (2x315) MVA	**Fatehpur S/s** (2x315) MVA
1	Total nos. of 220kV line bays and utilized	6 nos. line bays and 4 nos. are utilized	4 nos. line bays and 2 nos. are utilized	4 nos. line bays utilized and 2 no. would be utilized for Sarh 220 kV ss.
2	Availability of balance 220kV furnished bays	2 nos. (already assigned for Hardoi line 1 & 2)	2 nos. (would be utilized For termination of 220kV lines to Gola S/S)	2 no. (would be utilized for Sarh 220 kV S/S)
3	Space availability for future 220kV line bays	Available for 220kV level only.	Space available for 1 no. line bay	Space available for 4 no. line bay
4	Maximum loading observed	460 MW	430	530
5	Availability of space for future augmentation of ICT along with ICT bays	No space available for ICT at 400kV side.	Space available for 1 no. ICT (both on 400kV & 220kV side is available)	Space available for 1 no. ICT. However, in such case, space for one no. of line bay (out of 4 nos.) will get utilized for ICT bay
	Summary	Augmentation of ICT is not feasible and space for 220kV bays available	Augmentation of ICT can be taken up	Augmentation of ICT and 2 nos. of 220kV line bays can be taken up

52.2 UPPTCL requested provision of 2 nos. 220 kV bays at Gorakhpur along with the ICT augmentation for feeding Maharajnagar/ Anandnagar 220 kV substation which is under implementation (expected by December 2018). POWERGRID stated that options would be explored for creation of 2 nos. 220 kV line bays at Gorakhpur (through GIS or reorientation).

52.3 UPPTCL also requested for augmentation of the 400/220 kV ICT at Lucknow as its drawal capacity is restricted to 315 MVA in case of N-1 condition. In view of space

constraint at Lucknow for provision of additional ICT, it was suggested that the the existing 315 MVA ICT may be replaced with a new 500 MVA ICT and the 315 MVA ICT from Lucknow could be shifted to Gorakhpur as the third ICT (after refurbishment, if required).

52.4 After deliberations, the following was agreed:

(i) Replacement of 1X315 MVA ICT by 1X500 MVA along two nos. of 220 kV line bays at Lucknow

(ii) 1X315 MVA, 400/220 kV ICT (to be shifted from Lucknow after refurbishment if required) with 2 nos. of 220 kV line bays at Gorakhpur (subject to confirmation of line bays by POWERGRID).

(iii) 1X500 MVA, 400/220 kV ICT with 2 nos. of 220 kV line bays at Fatehpur.

53.0 Upgradation of existing 220/132 kV Sahupuri Substation to 400/220 kV, 2x500 MVA.

53.1 CEA stated that UPPTCL vide its letter dated 15.05.2017 has proposed upgradation of their existing 220/132 kV, (1x160+2x200) MVA Sahupuri (Chandauli) sub-station with 400/220 kV, 2x500 MVA capacity in view of high loadings observed on Sahupuri (Chandauli) 220/132 kV s/s, 400/220 kV Varanasi S/s, Pasauli-Sahupuri 220 kV S/c line and other 400 kV lines feeding these sub-stations.

53.2 UPPTCL informed that land adjoining to existing 220 kV Sahupuri sub-station is adequate to upgrade it into 400/220 kV GIS and Varanasi PG (765)–Biharshariff 400 kV D/c (Quad) line of POWERGRID is passing near to Sahupuri S/s, which can be considered to feed the proposed sub-station. The above upgradation will help in reducing the loading of 400 kV Varanasi (Sarnath) S/s and also help in meeting increasing load of Sahupuri and adjoining areas. He said that other approved 400 kV substations namely Jaunpur, Rasra, Aurai (Bhadohi) in Poorvanchal area of state may take 2-3 years' time for completion, which are delayed due to non availability of land & other issues and thus may not provide timely relief to 400 kV Sarnath and 220 kV Sahupuri sub-stations.

53.3 CTU stated that instead of LILO of both circuits of Biharshariff-Varanasi PG (765) 400 kV D/C (Quad) PGCIL lines at 400 kV Sahupuri, a direct D/c line from Varanasi can be planned. It was also suggested, if desired 400/220 kV ICTs can be provided at Varanasi (PG) and construction of a new substation can be avoided. UPPTCL stated that they have explored this option also, but it involves crossing of river Ganga.

53.4 On a query from POSOCO regarding the line reactors on Varanasi PG (765)–Biharshariff 400 kV D/c (Quad) line, CTU informed that line reactors are provided at both ends of this line.

53.5 CTU stated that the capacity rating of switchgear should be 3150 Amps (equivalent to Quad conductor line) with 50 kA fault current rating.

53.6 After deliberations, following was agreed to be implemented by UPPTCL:

i) Upgradation of existing 220/132kV (1x160+2x200) MVA, Sahupuri Substation to 2x500 MVA, 400/220 kV level

ii) LILO of both circuits of Biharshariff-Varanasi PG (765) 400 kV D/C (Quad) lines at 400 kV Sahupuri (GIS) - 30 kms along with 50/63 MVAR line reactor at Sahupuri end.

iii) Extension of 220 kV bus of 400/220kV Sahupuri Substation for interconnection with Sahupuri 220/132 kV substation with twin moose conductor.

iv) 1X125 MVAR, 400 kV bus reactor at 400/220 Sahupuri.

54.0 Compilation of ICT augmentations and 220 kV line bays agreed in the meeting

54.1 The ICT augmentations and 220kV line bays agreed in meeting, which are to be implemented under ISTS as System strengthening Scheme in Northern Region, are listed below:

S.no	SCHEME	Deliberation at Item no.
(1)	1x500MVA, 400/220kV ICT along with ICT bays and 1 nos. of 220kV line bays at 400kV Roorkee(PG) S/s	5
(2)	1x500MVA, 400/220kV ICT along with ICT bays and 2 nos. of 220kV line bays at 400kV Sonepat(PG) S/s	7
(3)	2 nos. of 220kV bays at 4000kV Abdullapur (PG) S/s	9
(4)	1x500MVA, 400/220kV ICT along with ICT bays at Bhadla pooling stattion	17
(5)	Replacement of 1X315 MVA ICT by 1X500 MVA along two nos. of 220 kV line bays at Lucknow	52
(6)	1X315 MVA, 400/220 kV ICT (to be shifted from Lucknow after refurbishment if required) with 2 nos. of 220 kV line bays at Gorakhpur (subject to confirmation of line bays by POWERGRID).	52
(7)	1x500MVA, 400/220kV ICT along with 2 nos of 220kV line bays at 400kV Fatehpur(PG) S/s	52

55.0 Various LTA/ Connectivity applications discussed in 10th Connectivity/Long-Term Access meeting of Northern Region held along with 39th SCM of NR.

55.1 Connectivity and Long Term Access (LTA) applications from various applicants were discussed and agreed during 10th Connectivity/ Long-Term Access meeting of Northern Region held along with the 39th SCM of NR. The detailed Minutes for the same are being issued by CTU seperately.

Meeting ended with thanks to the chair.

Annexure-I

List of Participants of the Meeting on the subject Standing Committee on Power System Planning in Northern Region (39th SCM) Dated 29th & 30th May, 2017

Sl. No.	Name Shri/Smt	Designation
I.	**CEA**	
1.	P.S. Mhaske	- Member (Power System)
2.	Ravinder Gupta	- Chief Engineer, (PSPA-I)
3.	Awdhesh Kumar Yadav	- Director (PSPA-I)
4.	Manjari Chaturvedi	- Dy. Director
5.	Priyam Srivatava	- Asstt. Director
6.	Jitesh Srivas	- Assistant Director
II.	**Ministry of Railway**	
6.	Punit Agarwal	Director
III.	**POSOCO**	
7.	P. K. Agarwal	- GM
8.	D.K. Jain	- AGM
9.	Rajeev Porwal	- DGM
10.	Suruchi Jain	- Manager
IV.	**HVPNL**	
11.	Rakesh Jolly	- CE
12.	J.K. Juneja	- Consultant
13.	M.M. Matta	- SE
V.	**DTL**	
14.	H. Vyas	- Executive Director
15.	R.S. Meena	- DGM
16.	Pradeep Katiyar	- DGM (T)
17.	Amit Singh	- Manager (T) Plg.
18.	Naveen Kumar	- AM (T)
VI.	**UPPTCL**	
19.	Suman Guchh	- Chief Engineer (Trans Planning)
VII.	**RVPN**	
20.	Kamal Jain	- Chief Engineer
21.	Anjana Agrawal	- Executive Engineer
22.	M.P. Sharma	- AEN
VIII.	**HPPTCL**	
23.	Keshav Singh Attri	- Director(P&C)
24.	Sandeep Sharma	- DGM (Plg.)
IX.	**SJVN Ltd.**	
25.	Chandan Mehta	- Dy. Manager

X. NTPC Ltd.

26.	Subhash Thakur	- Addl. GM
27.	V.K. Jain	- DGM

XI. Electricity Deptt. UT of Chandigarh

28.	Rohit Kumar Sekhri	- Ex. Engineer

XII. PTCUL

29.	Deep Sah	- CE (Project)
30.	S.P. Arya	- S.E.
31.	Lalit Kumar	- SE (Engg. S/S)
32.	Ashok Kumar	- EE (SS)

XIV. POWERGRID

33.	Subir Sen	- COO
34.	Mukesh Khanna	- AGM
35.	Dilip Rozekar	- AGM
36.	Jyoti Prasad	- DGM
37.	V. Thiagarajan	- DGM
38.	Kashish Bhambhani	- CM (SS)
39.	Rashmi Pant Joshi	- Manager
40.	Sandeep Kumawat	- D. Mgr (SG)
41.	Ankita Singh	- Dy. Manager
42.	D. Khan	- Engineer
43.	Yatin Sharma	- Engineer

XV. NRPC

44.	M.A.K.P. Singh	- MS
45.	Upendra Kumar	- Director
46.	B.S. Meena	- EE
47.	Soniya	- ASE

XVI. REMCL

48.	Dr. N.S. Saxena	Expert
49.	Vishalakshi M.	Sr. Engineer

Annexure-II

Corrigendum-I to Minutes of 38th Meeting of
Standing Committee on Power System Planning in Northern Region (SCPSPNR)
held on 30th May, 2016 at NRPC, Katwaria Sarai, New Delhi

The Minutes of **38th meeting** of the Standing Committee on Power System Planning of Northern Region were issued vide 1/9/38/2016/PSP&PA-I/721-739 dated 8th June, 2016. Following corrigendum is issued based on the observations/Comments received from PGCIL.

Corrigendum # 1

Powergrid vide their letter No C/CTU/N/PLG dated 23-6-2016 had given the observations on **para no. 26.7 under the item no. '26.0 Underground GIS at UT Chandigarh'**

As per the minutes of 38th meeting of the Standing Committee on Power System Planning of Northern Region the para 26.7 is as under:

26.7 Member (Power System), CEA stated that team of CEA and Powergrid jointly visited the proposed site and recommended option with GIS underground and ICTs over ground. The proposal may be agreed. After detailed deliberations, it was decided that Powergrid would explore differential funding from UT of Chandigarh.

Based on Powergrid observations, **the para 26.7 is modified as under**:

26.7 Member (Power System), CEA stated that team of CEA and Powergrid jointly visited the proposed site and recommended option with GIS underground and ICTs over ground. The proposal may be agreed. After detailed deliberations, the option with GIS underground and ICTs (oil filled) over ground for establishment of 220/66kV GIS at Chandigarh was agreed. It was also decided that Powergrid would explore the possibility of funding either from UT of Chandigarh or through PSDF for the additional civil cost.

Annexure-III

Corrigendum-II to Minutes of 38th Meeting of
Standing Committee on Power System Planning in Northern Region (SCPSPNR)
held on 30th May, 2016 at NRPC, Katwaria Sarai, New Delhi

The Minutes of **38th meeting** of the Standing Committee on Power System Planning of Northern Region were issued vide 1/9/38/2016/PSP&PA-I/721-739 dated 8th June, 2016. PGCIL vide letter No C/CTU/N/PLG dated 23-6-2016 and RRVPNL vide their letter no RVPN/SE(P&P/PSS/D.596 dated 16.6.2016 had given the observations on the minutes. Following corrigendum is issued based on the observations/Comments received from PGCIL and RRVPNL:

Corrigendum-II# 1

Observations on the Minutes of 38th Standing Committee Meeting on Power System Planning held on 30/05/2016 made by RRVPNL:

10.0 Operational Feedback on Transmission Constraint: April 2016

In the minutes of 38th SCPSPNR following has been mentioned Under Item No. 10.1 I (8) regarding **Under lying 220 kV network of Bhiwadi:**

220 kV Bhiwadi (Pg) - Bhiwadi (Raj) D/C line to be commissioned by July, 2016

The above sentence of the minutes under Item No. 10.1 I (8) is replaced as:

Second circuit of Bhiwadi(PG) – Bhiwadi(RVPN)D/C line to be commissioned by July 2016

Corrigendum-II# 2

Observations on the Minutes of 38th Standing Committee Meeting on Power System Planning held on 30/05/2016 made by Powergrid

11.0 OPGW on main transmission line being LILOed

Under para 11.2 (a) **OPGW** following has been mentioned:

"Thus, it is proposed that the provision of OPGW in the main line may be taken up by the respective owner of the transmission system to provide communication connectivity to these new substations."

Powergrid has made the observation that in the above, provision of Approach Cable, FODP and Communication Equipment at both ends needs to be added. Accordingly, the above sentence of the minutes under para 11.2 (a) **OPGW** is replaced as:

Thus, it is proposed that the provision of OPGW in the main line along with Approach Cable , FODP and Communication Equipment at both ends may be taken up by the owner of the transmission system to provide communication connectivity to these new substations.

Similarly, under para 11.2 (b) **Communication equipment** following has been mentioned:

"In these cases, end to end communication establishment will not be possible unless the communication equipment including for other end is commissioned."

In the above also, Powergrid has made the observation that provision of approach cable and FODP needs to be added. Accordingly, the above sentence under para 11.2 (b) **Communication equipment** is replaced as:

In these cases, end to end communication establishment will not be possible unless the communication equipment including approach cable and FODP for other end is provided.

Also the following is included in para 11.2:

'POWERGRID further informed that for some of the lines being implemented under TBCB, it has been observed that planning for OPGW is considered between Gantry of one station to Gantry of other station under RfP document but FODP, approach cable and Communication Equipment at end stations is not covered. In these cases, end-to-end communication establishment will not be possible. Hence provision of FODP, approach cable is required to be made accordingly by the respective owners.

Members deliberated on above points and agreed for the same.'

In addition to above POWERGRID provided the status update of URTDSM Project and the same is enclosed at Annexure-I.

15.0 Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer, Rajasthan

Powergrid has made the observation that the 400kV line bays at Bhadla (PG) for termination of 765kV Fatehgarh PS- Bhadla (PG) D/c line (initially to be op at 400kV) has been missed out from the transmission scheme's scope mentioned in para 15.5 of the 38th SCM minutes. Accordingly, the scope of the scheme '**Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer, Rajasthan'** to be taken up for implementation under ISTS through TBCB route **is as follows:**

i). 765 kV Fatehgarh Pooling station - Bhadla (PG) D/C line (initially to be operated at 400kV)
ii). Establishment of 400kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level)
iii). 2 nos of 400kV line bays at Fatehgarh Pooling station
iv). 1x125 MVAR Bus reactor at 400kV Fatehgarh Pooling station

Note: (i) Park Developer to construct 400 kV line from M/s AREPL solar park to Fatehgarh Pooling station.
(ii) Powergrid to provide two number of line bays at Bhadla(PG)

18.0 220kV bays at 400/220 kV Baghpat (PG) and Saharanpur (PG) substations:

PGCIL has made the observation that the time frame of the 220 kV works informed by UPPTCL, has been missed out in the Minutes. Accordingly, Para 18.3 and Para 18.5 of the minutes are modified as follows:

18.3 In addition to above, UPPTCL plan to connect further as follows:

(i) Stringing of 220kV IInd ckt of Baghpat (PG) to Baghpat (UP) 220kV line – July 2016

(ii) Stringing of 220kV IInd ckt from Baghpat (PG) to Baraut (UP) 220kV line – July 2016

(iii) Baghpat (PG) – Modipuram (II) 220kV D/c line(to be commissioned alongwith Modipuram II which is expected by Mar.'17)

(iv) LILO of Moradnagar II (UP) – Shamli 220kV S/c line at Baghpat (PG) – July 2016

Thus, remaining 8 nos 220 kV would be utilised.

18.5 CE, UPPTCL further informed that for utilization of bays at Saharanpur (Pg), the following downstream elements are planned:

(i) LILO of Saharanpur -Nanauta 220kV S/c line at Saharanpur PG (400kV) S/s: commissioned

(ii) LILO of Khara - Shamli 220kV S/c line at Saharanpur (PG) (by July 2016)

(iii) Saharanpur(PG) - Saherswa (UPPTCL 220kV) 220kV D/c line (by July'17)

(iv) LILO of one ckt. of Khodri-Saharanpur 220kV D/c line at Saherswa (220/132/33 kV 2x160, MVA Saherswa S/s is under construction)

(v) Thus, the remaining 4 nos 220 kV would be utilised.

21.0 Mismatch of network at the time of deceleration of Date of Commercial Operation (DOCO)

The expected schedule of 7x105 MVA Kala Amb S/S mentioned at Sl. No.8 of Para 21.4 has been in inadvertently recorded as Oct', 2018, which is corrected as *July 2017*.

31.0 Augmentation of 400/220 kV Agra (PG) substation

Following is included as **para 31.3** of the minutes**:**

31.3 CTU informed that that second 315MVA ICT at Agra (PG) has been agreed under NRSS XXXIV and is under implementation. It is expected to be commissioned by July 2017. Keeping this in view, it was there is no requirement of 500 MVA ICT. **Members agreed to the same.**

Annexure I

Status of URTDSM Project for 38th Standing Committee meeting of Power System Planning of Northern Region:

- **Engineering Progress:**
  - Engineering completed.
- Present Status of Supply and Installation of PMUs, Control Center equipment:

S.No	Region	PMUs (No of Substations)				Development System PDS (No of Control Centers)			Remark
		Total	Supplied	Commissioned	Integrated	Total	Supplied	Installation	
1	NR	113	72	54	10	13	13	10	

- Balance supply of PMUs in NR likely to be completed by Aug'16
- Plan for Commissioning of Substations – average of 6 substations per month in NR
- Number of trained personnel in NR: 46
- Control center Development system (PDS) commissioned and integration testing of PMUs in progress
- Demo testing of Control Center software applications is in progress by ALSTOM R&D and Project teams.
- Control Center Integrated FAT likely by: Oct-Nov 2016

- Development of Analytical Tools Using PMU Based Phasor Measurements by POWERGRID in association with IIT-B

Sr. No.	Analytics	Status
1.	Line Parameter Estimation	Prototype Completed
2.	On line vulnerability analysis of distance relays	Prototype Completed
3.	Linear State Estimator	Under development
4.	Supervised Zone-3 distance protection scheme to prevent unwanted tripping	Prototype completed, Pilot Scheme under implementation
5.	CT/CVT Calibration	Under development
6.	Control for improving system security (Based on angular, voltage & frequency stability)	Under development

Annexure-IV

Minutes of the meeting taken by Member (PS), CEA on 18-05-2017 to discuss about Relocation of 400/220 kV Rajghat (Maharanibagh II) sub-station

1.0 List of participants is attached at **Annexure-I**.

2.0 Member (PS), CEA welcomed the participants to the meeting. He asked Chief Engineer (PSPA-I), CEA to brief the issue regarding the relocation of 400/220 kV substation from Rajghat (Maharanibagh-II) to Gopalpur.

3.0 Chief Engineer (PSPA-I), CEA stated that establishment of 400/220kV Rajghat S/s along with Dwarka, Tugalakabad and Karampura were agreed as part of the scheme "400/220kV substation in NCT of Delhi during 12th Plan period" in the 34th meeting of Sttanding Committee on Power System Planning of Northern Region (SCPSPNR) held on 8th Aug., 2014. Subsequently, in the 36th meeting of SCPSPNR held on 13-07-2015, Rajghat–Maharanibagh 400kV D/c (HTLS) line was agreed as "NRSS XXXIX" scheme for reliability of power supply. MoP vide its letter dated 10th Dec., 2014, interalia, allocated the implementation of the 4 no. 400/220 kV under compressed time schedule to POWERGRID. Dwarka and Tuglakabad 400/220kV sub-stations along with its 400kV interconnection are under implementation by POWERGRID. Implementation of Karampura 400/220kV S/s could not be taken due to non-availability of land for the S/s and RoW problem in laying of 400kV interconnecting lines. A meeting was held in CEA on 14.7.2016 with CTU, Delhi DISCOMs and DTL, wherein, it was agreed to drop the proposed substation at Karampura due to non-availability of land for the S/s.

4.0 He further stated that due to non-availbility of land for Rajghat 400/220kV S/s, in view of upcoming solar power complex, DTL has suggested an alternate land near the existing 400kV Maharanibagh for construction of 400/220kV Rajghat substation. As the proposed 400/220kV Rajghat (Maharanibagh-II) (GIS) sub-station was contiguous to existing 400/220kV Maharanibagh (GIS) sub-station, POWERGRID proposed that instead of 400 kV Rajghat – Maharanibagh D/C line with HTLS conductor alongwith two nos. of 400kV GIS bays each at Rajghat and Maharanibagh, (proposed under "NRSS-XXXIX" for reliability of power supply in the 36th meeting of SCPSPNR), the 400kV busbar of 400/220kV Maharanibagh (GIS) sub-station may be extended to Rajghat (Maharanibagh-II) and provision of a 400kV bus sectionaliser alongwith 400/220kV Rajghat (GIS) sub-station may be kept. The 400kV bus sectionaliser between 400/220kV Rajghat (GIS) sub-station and 400/220kV Maharanibagh (GIS) sub-station was proposed to be normally kept open to address the high fault level at both the sub-stations. It was also proposed that the two 400kV buses could be interconnected through the bus sectionaliser to provide reliability of power supply in the event of contingency only.

5.0 He further added that DTL vide their letter dated 24.04.2017 has now requested to shift the Rajghat (Maharanibagh II) 400/220 kV S/Stn from its present location at Maharanibagh to Gopalpur in North Delhi, in view of high fault level (beyond 60 kA) and severe RoW constraints in taking out 220 kV and 33 kV feeders.

6.0 AGM (CTU, Plg) stated that shifting of 400/220 kV sub-station from Rajghat to Maharanibagh as proposed by DTL was given 'in-principle' approval in a meeting held

at CEA on 4.1.2017. Subsequent to that, POWERGRID did the retendering and has gone ahead with the implementation of 400/220 kV Rajghat (Maharanibagh-II) sub-station along with construction of associated 400 kV transmission line. Four no. of 400/220 kV sub-stations were agreed keeping in view the peak demand of Delhi to the order of 10,400 MW by the end of 13th plan. In order to adress the problem of high short circuit level, POWERGRID has suggested bus sectionaliser at 220 kV level. He said that for RoW problem in taking out 220 kV lines, POWERGRID has proposed the route alignment of 220 kV lines through multi circuit line to DTL on 21-01-2017. He added that Gopalpur could be a 4th 400/220 kV sub-station in place of Karampura, as proposed by DTL during a meeting held in MoP on 04/01/2017.

7.0 Director (Operation), DTL stated that after the commissioning of 400/220 kV sub-station at Tuglakabad, the loading on existing Maharanibagh sub-station would be reduced substantially and there would be no requirement of 4x500 MVA, 400/220 kV S/S at Maharanibagh (II). At present Maharanibagh is connected at 400 kV through LILO of one circuit of Samaypur (PG)-Dadri 400kV D/C line at Maranibagh. There is a requirement of additional 400 kV feed to Maharanibagh. Further, shifting of 400/220 kV Rajghat (Maharanibagh-II) to Gopalpur would help in catering the demand of North Delhi. Moreover, the additional land at existing 220 kV Gopalpur sub-station can be utilized for construction of 400 kV GIS substation and the connectivity with the ISTS would remain the same i.e. LILO of both circuits of Mandola-Bawana 400 kV D/c line.

8.0 Addl GM (POWERGRID) stated that they have carried out a site visit of the additional land at existing 220 kV Gopalpur sub-station. It is found that the land will be adequate for construction of 400/220 kV GIS Substation at Gopalpur subject to the removal of already existing 33 kV yard at Gopalpur.

9.0 Director (Operation), DTL informed that the existing 33 kV yard and 220 kV AIS sub-station at Gopalpur would be demolished and pave way for creating 400/220 kV GIS sub-station at Gopalpur. He stated that five no. of 220 kV D/C outgoing lines to SabziMandi, Timarpur, Wazirabad, Mandola/Budhpur and SGTN will be used to evacuate power from the proposed 400/220 kV GIS sub-station at Gopalpur.

10.0 After, further deliberations, it was decided that 4x500 MVA 400/220 kV Rahjghat sub-station would now be shifted to Gopalpur instead of Maharanibagh-II. DTL was informed that no futher change in location would be allowed. With regard to 400 kV connectivity of Gopalpur sub-station a number of options were deliberated. Considering the availabilty of only one no. corridor for constructing 400 kV line in Yamuna bed and minimum change in scope of already awarded contract, it was decided to implement LILO of both circuits of Mandaula-Bawana 400 kV D/C line at Maharanibagh (existing) substation on multi circuit tower and LILO of both circuits of Bawana-Maharanibagh 400 kV D/C line at proposed Gopalpur (GIS) sub-station. This would result in Bawana-Goplapur-Maharanibagh 400 kV D/C line and Maharanibagh-Mandaula 400 kV D/C line. Further, to address the high fault level at Maharanibagh sub-station LILO of Samaypur(PG)-Dadri 400 kV line at Maharanibagh can be bypassed at Maharanibagh. The LILO would be operated in emergency condition only.

11.0 Chief Engineer (PSPA-I), CEA stated that DTL has also requested that ownership of 220 kV line bays at the Goplapur, Tuglakabad and Dwarka 400/220 kV ISTS sub-stations may be given to DTL. He said that normally the 220 kV line bays at 400/220 kV ISTS sub-staions are part of ISTS system whose tariff is recovered through PoC

tariff mechanism. He enquired why, DTL want to take over the 220 kV line bays at the above ISTS sub-stations.

12.0 Director (Operation), DTL stated that in order to have operational flexibility, they have decided to take over 220 kV line bays at these sub-stations

13.0 After detailed deliberations in the meeting, the following was decided:

i) Establishment of 4x500 MVA, 400/220 kV GIS Substation at Gopalpur instead of Rajghat / Maharnibagh (II).

ii) LILO of both circuits of Mandaula-Bawana 400 kV D/c line at 400/220 kV Maharanibagh - 400 kV 2xD/C quad/Twin HTLS line on multi circuit tower

iii) LILO of both circuits of Bawana–Maharanibagh 400kV D/c line at 400/220 kV Gopalpur (GIS) S/stn - 400 kV 2xD/C quad/Twin HTLS line on multi circuit tower.

iv) Bypassing arrangement of LILO of Samaypur(PG)-Dadri 400 kV line at existing 400/220 kV Maharanibagh S/s at Maharanibagh.

v) The no. of bays and ICTs at 400/220 kV GIS Substation at Gopalpur is to be kept same as was proposed earlier for 400/220 kV Rajghat (Maharanibagh II) i.e.

<u>400kV</u> (Under ISTS)

a) Line Bays: 4 Nos.
b) 500 MVA, 400/220kV ICTs: 4 Nos.
c) 125MVAr Bus Reactor: 1 Nos.
d) Transformer Bay: 4 Nos.
e) Reactor bay: 1 Nos.

<u>220 kV (Under ISTS)</u>

Transformer Bays: 4 Nos. for 400/220 kV ICTs
Space for Line Bays: 14 Nos. (12 nos. for DTL and 2 nos. for future)
Space for Transformer Bays: 4 Nos. for 220/33 kV ICTs
Space for Bus Coupler Bays: 2 Nos.
Space for Bus Sectionaliser Bays: 2 Nos.

<u>220kV</u> (Under STU scope)

20 Nos. of Bays:

a) Line Bays: 12 Nos (includes 2 spare bays)
b) Transformer Bays: 4 Nos. for 220/33kV ICTs
c) Bus Coupler bays: 2 Nos.
d) Bus Sectionaliser bays: 2 Nos.

14.0 Meeting ended with thanks to chair.

Annexure-V

Summary of the schemes approved for Jammu, Kashmir and Ladakh Region for Jammu, Kashmir and Ladakh Region under PMDP-2015 at an estimated cost of Rs. 1189.59 crore

Region	Discription	Quantity	Base Cost (in Rs. Lacs)	Escalated Cost @5% per annum(in Rs. Lacs)	Remarks
Jammu	New 220/66 KV Kathua and Samba Grid Sub-station	160 MVA (each)	14316	14889	4 nos. 220kV line bays, 4x53.33MVA, 220/66kV trasnformer and 5 nos. 66kV line bays
	New 220/33 KV Chowadhi Grid Sub-station	160 MVA	6578	6841	2 nos. 220kV line bays, 4x53.33MVA, 220/33kV trasnformer and 6 nos. 33kV line bays
	New 220/33 KV Nagrota Grid Sub-station	100 MVA	5720	5949	2 nos. 220kV line bays, 2x50MVA, 220/33kV trasnformer and 4 nos. 33kV line bays
	New 132/33KV Chattha Grid Sub-station	100 MVA	4124	4289	4 nos. 132kV line bays, 2x50MVA, 132/33kV trasnformer and 4 nos. 33kV line bays
	Augmentation of 132/66kV Kathua Grid Sub-station	50 MVA	441	458	with miscellaneous works
	Augmentation of 132/33 kV Janipur and Poni Chak Grid Sub-station	50 MVA (each)	1308	1360	with associated bays and miscellaneous works
	Augmentation of 132/33 kV Sidhra and Miran Sahib Grid Sub-station	50 MVA (each)	1706	1774	with miscellaneous works
	New 220kV D/C transmission lines (5 nos.)	33 km	3268	3399	-
	New 132kV D/C transmission line (1 no.)	8 km	584	607	-
	Reconducturing of 132kV line by HTLS	76 ckm	2280	2371	-
	Twinning of bus bar of 220kV bus at Hiranagar from double zebra to double moose and strengthening of structures.	-	100	104	-
	Sub-total		**40425**	**42041**	

	New 220/33 KV Batpora Tailbal Grid Sub-station (GIS)	160 MVA	6481	6808	2 nos. 220kV line bays, 4x53.33MVA, 220/33kV trasnformer and 6 nos. 33kV line bays
	New 220/33 KV Lassipora Grid Sub-station (GIS)	160 MVA	7251	7617	4 nos. 220kV line bays, 4x53.33MVA, 220/33kV trasnformer and 6 nos. 33kV line bays
	New 132/33 KV Khanyar Grid Sub-station (GIS)	100 MVA	4311	4642	4 nos. 132kV line bays, 2x50MVA, 132/33kV trasnformer and 6 nos. 33kV line bays
	New 132/33 KV Tengpora Grid Sub-station (GIS)	150 MVA	4998	5382	4 nos. 132kV line bays, 3x50MVA, 132/33kV trasnformer and 6 nos. 33kV line bays
Kashmir	Augmentation of 132/33 kV Zainakote, Bemina, Chadoora and Khrew Grid Sub-station	50 MVA (each)	2615	2879	with associated bays and miscellaneous works
	Augmentation of 132/33 kV Cheshmashahi Grid Sub-station	50 MVA	441	459	with miscellaneous works
	New 220kV D/C transmission lines (5 nos.)	34.4 km	3407	3556	-
	New 132kV D/C transmission Cables (2 nos.)	18 km	8640	9214	-
	Reconducturing of 132kV line by HTLS	28 km	840	887	-
	Sub-total		**38984**	**41444**	
	New 220/33 KV Diskit (Nubra) and Padum (Zanskar) Grid Sub-station	50 MVA (each)	7127.8	7413	1 no. 220kV line bay, 4x16.67MVA, 220/33kV trasnformer and 1 no. 33kV line bay
	New 220kV S/C transmission lines on D/C Towers (2 nos.)	307 km	25969.13	27008	-
Ladakh	220kV line bay at 220/66kVPhyang (PGCIL)LEH S/S and 220/66kV Kargil (PGCIL) S/S	1 no. (each)	591.96	616	-
	25 MVAr, 220/33kV bus reactor at Padum alongwith 220kV bay	1 no.	420.98	438	-
	Sub-total		**34110**	**35474**	
	Total (in Rs. Lacs)		**113519**	**118959**	-
	Total (in Rs. crore)		**1135**	**1189.59**	

Annexure-VI

The updated Schemes under Intra State Green Energy Corridor-I planned for evacuation of Renewable energy addition in Rajasthan is as follows:

S.No.	Name of the Scheme	Route Length (in km)	Estimated Cost (excluding IDC) (in Rs. Lacs	Estimated Cost (including IDC) (in Rs. Lacs)
1	400/220 kV, 2x500 MVA GSS at Jaisalmer-2 alongwith 1x125 MVAR, 400 kV Bus Type Reactor	—	15030.74	19379.76
2	400 kV D/C Jaisalmer (2)-Barmer line (Twin Moose)	130	10469	13498.12
3	400 kV D/C Barmer-Bhimnal(PGCIL) line (Twin Moose)	140	11204	13902.43
4	400 kV Terminal Bay Equipment at 400/220 kV GSS Barmer (for termination of 400 kV D/C Jaisalmer (2) - Barmer line at Barmer end)	—	2807.02	3619.21
			39510.76	**50399.52**

Intra State Green Energy Corridor -I planned for evacuation of Renewable energy addition in Himachal Pardesh:

The revised scope of works is as follows:

Package No.	Package Details	Total Estimated Cost (in Rs. Crores)
1	132 kV D/C Line from Tangnu Romai to 132/220 kV Sunda P.S	26
2	22/132 kV, 2x31.5 MVA sub station at Tangnu Romai HEP in Distt. Shimla	50
3	132/220 kV, 2x100 MVA GIS sub station at Dehan and 220 kV D/C Line between Dehan and 400/220 kV sub-station at Hamirpur (PGCIL)	227
4	33 kV GIS Switching station at Palchan, Distt. Kullu	8.4
5	132 kV D/C Line from Rupin S/s to 132/220 kV Sunda P.S	38
6	33/132 kV, 31.5 MVA GIS sub station in the yard of Rupin HEP	28.5
7	66/220 kV, 80/100 MVA sub station in the yard of 132/220 kV Sunda sub station with 66 kV Sunda-Andhra D/C Line	77
8	Providing additional 132/220 kV, 100 MVA Transformer at 132/220 kV, 100 MVA GIS sub station at Charor (ADB funded) in Distt. Kullu	39
9	66/220 kV, 100 MVA sub station at Heling by LILO of 220 kV Bajoli Holi- Lahal D/C line	90
10	Additional 400/220 kV, 315 MVA transformer at of 400/220 kV, 1x315 MVA sub station at Gumma(ADB funded) in Distt. Shimla.	70

11	Providing additional 33/132 kV, 31.5 MVA Transformer at 33/132 kV, 31.5 MVA GIS sub station at Pandoh in Distt. Mandi	24
12	33 kV Palchan – Prini line	8
13	220 kV Snail – Hatkoti line	30
	TOTAL	**715.9**

Detail of packages in respect of works to be executed by HPSEBL under KfW Scheme

Package A: - Executing Agency – CE (ES), HPSEBL, Hamirpur

	Package Details	**Total Estimated Cost (in Rs. Cr.)**
1	Providing additional 10 MVA, 66/22 kV power transformer a/w spare bay at 10 MVA, 66/22 kV Nogli for evacuation of power from SHEPs in Andhra Nogli Zone	5.93
2	Augmentation of Kotla- Nogli-Samoli 66 kV line with AL59 conductor (60 Km)	19.62
3	Augmentation of 2nd 66/22 kV, 10 MVA transformer at Samoli to 20 MVA	2.7
4	Construction of 66/22 kV, 2x10 MVA sub station at Hatkoti alongwith 66 kV S/C line on D/C towers (20 Kms) from Hatkoti to Samoli	21.94
5	Augmentation of 66 kV D/C line between Ghanvi-II to Kotla with HTLS conductor (8 Kms)	2.18
6	Construction of 66 kV S/C line from Nathpa to Wangtoo a/w terminal bays	10
7	C/O 66/22 kV 2x25/31.5 MVA S/St at Andhra and 22kV Controlling Substation at Gumma(22kV D/C line Andhra to Gumma 6 km)	19.74
8	Construction of 66/22 kV, 1x10 MVA sub station Rukti at Shaung alongwith 22 kV S/C line(4 Km) from the Yard of Rukti I to yard of Shaung Power House.	11.88
9	Construction of 66/22 kV, 1x10 MVA sub station at yard of Pooh alongwith 66 kV S/C line.	15.47
	Total Package A	**109.46**

Package B.1: - Executing Agency – CE (Op), South, HPSEBL, Shimla.

	Package Details	**Total Estimated Cost (in Rs. Crores)**

1	Augmentation of transformer from 2.5 MVA to 6.3 MVA and construction of 33 kV S/C line on D/C structures between Shillai and Sataun a/w terminal bays (20 Kms)	3.5
2	33 kV S/C line between Sataun & Paonta	3.2
3	22KV S/C line on D/C structures and cross arms (0.15Sq. In "WOLF" cond.) between Hatkoti and Kotkhai a/w terminal bays and space for spare feeder bay	6.36
4	22KV D/C line (0.15Sq. In "DOG" cond.) between Jhakri and Rampur i/c terminal bays	4.32
5	22KV S/C line on Double structures (0.15Sq. In "DOG" cond.) between Rampur and Nogli i/c terminal bays	2.16
6	22KV D/C line ACSR 0.15Sq. In "WOLF" cond.) between Karcham (existing control point) and 22/66/220 KV Karcham P.S. a/w terminal bays and space for spare feeder bay	3
7	Augmentation of 33 KV existing line between Dadahu and Dhaula Kuan & Dhaula Kuan and Giri with WOLF conductor	1.22
	Total Package B.1	**23.76**

Package B.2: - Executing Agency – CE (Op), Central Zone, HPSEBL, Mandi.

	Package Details	**Total Estimated Cost (in Rs. Crores)**
1	33 kV line from Prini to 220/33 kV sub station in the yard of Allain Dhuangan HEP with 33 kV XLPE cable.	4.37
2	LILO of 33 KV Pandoh- Bijni line at proposed 33/132 KV Pandoh Sub-Station.	0.7
3	Strengthening of 33 KV D/C Pandoh-Bijini line with WOLF conductor.	3.58
4	Interlinking of 33 kV Naggar Bajora Feeder at six pole structure laranketo under Electrical S/Div HPSEBL Naggar	0.1
5	Conversion of 33 kV Bajora Naggar feeder S/C line into D/C with AL 59 Dog 2 Conductor under ESD Naggar. (32.613 Kms)	7.74
6	Conversion of 33 kV Double Circuit Overhead line to Underground cable from Dhunkara (Jari) to Manikaran under Electrical Sub Div. Jari (13 Kms)	12.98
7	Reconductring &strengthening of 11 KV Barshani &manikaran feeder from 33/11 kV Substation Barshaini and 33/11 kV Substation Dunkhara under ESD Jari	0.2
8	Strengthening of 33 KV S/C Padhar to Bijini line with WOLF conductor.	1.27
	Total Package B.2	**30.94**

Package B.3: - Executing Agency – CE (Op), North, HPSEBL, Dharamshala.

	Package Details	Total Estimated Cost (in Rs. Crores)
1	C/O 33 kV S/C line with WOLF conductor from 33 kV sub station Jassore a/w terminal bay at Sihunta and Jassore	5.43
2	Augmentation of existing 33 kV Gharola to LILO point at Karian with WOLF conductor of 33 kV line from Gharola to Chamba (48.5 Kms)	4.17
3	LILO of 33 kV Bharmour-Gharola line at Lahal	0.58
4	Strengthening / Up-gradation of existing S/C 33 kV feeder No.II from Baner Power House to 132/33/11 kV Sub-Station Dehan under ESD No.II Palampur	3.47
5	LILO of one circuit of 33 KV D/C line from Shahpur to Kangra at proposed 33/132 KV CHAMBI Sub-Station and LILO 33kV S/C line from Gaj to Shahpur at 33/132kV sub-stastion Chambi along with reconductoring of Gaj-Shahpur Line (New line 9.5 Km, reconductoring 18.5 Km)	6.79
6	33KV D/C line with WOLF conductor from Salooni to Koti i/c terminal bays	3.09
7	C/o 33 kV S/C link alongwith terminal equipment from 33/11 kV s/stn Darkata (Ranital) to 33/11 kV un-manned S/Stn Lunj under ED HPSEBL Shahpur	2.19
8	Augmentation of existing 33 kV line from Gaj Powerhouse to Kangra with WOLF conductor. (18.5 Kms)	3.68
	Total Package B.3	**29.4**
	Total (A+B1+B2+B3)	**193.56**

Annexure-VII

Evacuation Plan of 220kV downward Network from Proposed network form 400kV Tuglakhabad & 400kV Dwarka (ISTS)

S. No.	Name of S/Stn.	MVA Capacity	Expected Schedule	No. of 220kV Bays	Name of feeder Bays	Proposed commissioning year
1	400/220kV Rajghat GIS	4 x 500	--	12	--	--
2	400/220kV Dwarka GIS	4 x 500	Sept. 18	12	(1) 220kV Dwarka-Budella Ckt.-I	2018-19
					(2) 220kV Dwarka-Budella Ckt.-II	2018-19
					(3) 220kV Dwarka-Janakpuri Ckt.-I	2019-20
					(4) 220kV Dwarka-Janakpuri Ckt.-II	2019-20
					(5) 220kV Dwarka-Bamnauli Ckt.-I	2019-20
					(6) 220kV Dwarka-Bamnauli Ckt.-II	2019-20
					(7) 220kV Dwarka-Naraina Ckt.-I	2019-20
					(8) 220kV Dwarka-Naraina Ckt.-II	2019-20
					(9) 220kV Dwarka-Papankalan-I Ckt.-I	2019-20
					(10) 220kV Dwarka-Papankalan-I Ckt.-II	2019-20
					(11) 220kV Dwarka-Papankalan-II Ckt.-I	2019-20
					(12) 220kV Dwarka-Papankalan-II Ckt.-II	2019-20
3	400/220kV Tuglakabad GIS	4 x 500	June -18	16	(1) 220kV Tuglakabad-BTPS Ckt.-I	2018-19
					(2) 220kV Tuglakabad-BTPS Ckt.-II	2018-19
					(3) 220kV Tuglakabad-Mehrauli Ckt.-I	2018-19
					(4) 220kV Tuglakabad-Mehrauli Ckt.-II	2018-19
					(5) 220kV Tuglakabad-Masjid Moth	2018-19

					Ckt.-I	
					(6) 220kV Tuglakabad-Masjid Moth Ckt.-II	2018-19
					(7) 220kV Tuglakabad-Okhla Ckt.-I	2018-19
					(8) 220kV Tuglakabad-Okhla Ckt.-II	2018-19
					(9) 220kV Tuglakabad-R.K.Puram Ckt.-I	2019-20
					(10) 220kV Tuglakabad-R.K.Puram Ckt.-II	2019-20
					220/66kV 160MVA Pr. Tr. –I	2018-19
					220/66kV 160MVA Pr. Tr. –II	2018-19
					220/66kV 160MVA Pr. Tr. –III	Future proposed
					220/66kV 160MVA Pr. Tr. –IV	Future proposed
					Future bays	Future proposed
					Future bays	Future proposed

AnnexureVIII

DOV studies for Converting Fixed Line Reactors into Switchable Line Reactors in Over Compensated lines

Name of the Line	Reactor made switchable at	MW flow through Line (aprox)	Over Voltage recorded when line opened from (Peak in kV)		Over Voltage recorded when line opened from (Peak in PU)		MW flow through Line (aprox)	Over Voltage recorded when line opened from (Peak in kV)		Over Voltage recorded when line opened from (Peak in PU)	
			End I	End II	End I	End II		End I	End II	End I	End II
Sohawal - Ballia I	Ballia	75	338	344	0.985	1.003	765	-	441	-	1.286
Sohawal - Ballia II	Ballia	75	338	344	0.985	1.003	765	-	441	-	1.286
Kankroli - Zerda	Kankroli	130	364	341	1.061	0.994	750	490	-	1.429	-
Abdullapur - Panchkula I	Abdullapur	130	337	340	0.983	0.991	780	350	359	1.020	1.047
Abdullapur - Panchkula II	Abdullapur	130	337	340	0.983	0.991	780	350	359	1.020	1.047
Bassi - Kotputli	Bassi	100	338	328	0.985	0.956	700	398	352	1.160	1.026