



Government of India
Ministry of Power
Central Electricity Authority
Power System Planning & Project Appraisal Division-I
Sewa Bhawan, R. K. Puram, New Delhi-110066
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No. 1/9/2015-SP&PA/4-22

Dated: 20th August, 2015

-As per List Enclosed-

Subject: Minutes of 36th Standing Committee Meeting on Power System Planning in Northern Region held on 13th July 2015, at NRPC, Katwaria Sarai, New Delhi.

Sir,

The Minutes of 36th Meeting of the Standing Committee on Power System Planning of Northern Region have been uploaded on the CEA website 'http://www.cea.nic.in/sppa_nr.html' for information and necessary action please.

Yours sincerely,

Chandra
(Chandra Prakash)
Director 20/8/2015

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Minutes of the 36th Standing Committee Meeting (SCM) on Power System Planning in Northern Region held at NRPC, Katwaria Sarai, New Delhi on 13th July, 2015

List of the participants is enclosed at **Annexure I**.

Member (PS), CEA welcomed the participants of the 36th Meeting of the Standing Committee on Power System Planning of Northern Region.

Chief Engineer (SP&PA), CEA stated that this Standing Committee Meeting is the first to be chaired by Shri S.D. Dubey, after taking charge as Member (PS), CEA. He briefly introduced Shri Dubey as having vast experience of power sector in the country and hydro power development in Bhutan. He stated that the last meeting of the Standing Committee was held on 3/11/2014 in Dehradun. This meeting is being held after 7 months and hence the agenda for the meeting is lengthy. He stated that Ministry of Power has circulated a time line for each activity from concept to commissioning of the transmission lines and this needs to be adhered at by all the stakeholders. Accordingly, there is a need for conducting the meeting at every 3-4 months interval.

1. Confirmation of the Minutes of the 35th meeting of the Standing Committee on Power System Planning of Northern region held on 3/11/2014.

1.1 Director (SP&PA), CEA stated that the minutes of the 35th meeting of Standing Committee on Power System Planning of Northern Region, held on 3rd November 2014 in Dehradun, Uttarakhand were circulated vide CEA letter No. 1/9/SP&PA-2013 / 648-666 dated 17.12.2014. Subsequently, CTU has suggested the following modifications in the minutes of the 35th Standing Committee Meeting of Northern Region. Accordingly, a corrigendum for Minutes of the 35th meeting was issued vide CEA letter No. 1/ 9/ SP&PA-2013/ 93-111 dated 13.02.2015. Subsequently, further changes as under are envisaged in the schemes:

1.1.1 Creation of 400/220 kV sub-stations in NCT of Delhi during 12th plan period.

(a) The establishment of Papankalan substation was earlier envisaged at Papankalan-I existing substation by replacing existing 220/66 kV substation of DTL. While working out the details it was observed that accommodating 400/220 kV S/S in existing Papankalan-I

substation will be difficult without disturbing the present set up in the compressed time schedule. Accordingly, after considering other constraints, an alternate site in Sector-5, Dwarka, close to Papankalan-I was identified which would be named as Dwarka-I 400/220kV ISTS substation. Right of Way for the LILO of one circuit of Bamnauli – Jhatikara D/C line at Dwarka-I is available and dismantling of existing 220kV D/C line would not be required. Accordingly, for LILO of one ckt. of Bamnauli – Jhatikara 400 kV D/C line, a new corridor with 400 kV D/C (Quad/HTLS) shall be constructed.

- (b) Provision of 1*125 MVAR Bus Reactor at each of the Rajghat, Tughlakabad, Karampura and Dwarka-I (earlier Papankalan-I) substations.
- (c) Deletion of Dwarka-I (earlier Papankalan-I) to Jhatikalan D/C line.
- (d) LILO of both circuits of Bawana - Mandola at Rajghat and construction of complete LILO in multi circuit (M/C) line.

Members agreed for the same.

1.1.2 Implementation of 220/66kV substation in Chandigarh along with Chandigarh–Panchkula (PG) 220kV D/C line.

It has been entrusted to POWERGRID under compressed time schedule. Now, the location of the substation site will be at Hallo Majra/ Raipur Kalan instead of Sector 47 as recorded in the minutes of Standing Committee. Therefore, the name of substation may be recorded as Chandigarh substation instead of Sector 47, Chandigarh. It was further informed that the 220kV D/C interconnection to Chandigarh shall be a combination of Overhead line and 220kV cable (considering the severe R-o-W issue in Chandigarh area). HVPNL stated that they have proposed multi circuit towers in Haryana portion and the stringing on the Multi circuit portion of Chandigarh – Panchkula 220 kV D/C line would be carried out later on by HVPNL for taking out line to 220 kV Substation. Members agreed for the same.

1.1.3 Koteshwar Pooling Station- Rishikesh 400kV D/C line with HTLS conductor

In the 35th SCM, Koteshwar Pooling Station- Rishikesh 400kV D/C line was proposed with HTLS (High temperature and low Sag) conductor considering the tower weight in such difficult hilly area. Accordingly, Koteshwar Pooling Station - Rishikesh 400kV D/C

(HTLS) line was agreed as strengthening scheme. However, the same has been inadvertently recorded as Quad line in the scope given in the corrigendum to minutes. The same may be corrected as HTLS conductor instead of quad conductors.

1.1.4 LILO of 220 kV Dhauliganga - Pithoragarh (PG) for construction of 400/220kV GIS S/S at Jauljibi, Pithoragarh and proposed 2x100 MVA, 220/132kV GIS S/S at Almora

LILO of 220 kV Dhauliganga - Pithoragarh (PG) for construction of 400/220kV GIS S/S at Jauljibi, Pithoragarh and proposed 2x100 MVA, 220/132kV GIS S/S at Almora in Kumaon region was approved in the 35th SCM. Under this, the following may also be included.

- (i) Disconnection of 220kV LILO of Dhauliganga -Bareilly at Pithoragarh and connection of Pithoragarh to Baram (Jauljivi) 400/220kV S/s.
- (ii) Due to transportation limitations in the hilly terrain in Uttarakhand, in place of 2X315MVA, 400/220kV 3 phase ICTs, 7X105MVA single phase ICTs may be considered at 400/220kV Baram(Jauljivi) substation.
- (iii) 2*63MVAr switchable line reactors in Bareilly - Baram (Jauljivi) 400kV D/C at Baram (Jauljivi) 400/220kV end is proposed for providing voltage control at Jauljivi end under various operating conditions. These 63MVAr line reactors shall be taken up as single phase units, if required.
- (iv) 2 Nos. of 400kV bays at Bareilly(PG) to be included in the scope for Bareilly-Baram(Jauljivi) 400kV D/C line
- (v) One no. of 220kV sectionaliser along with an associated bay at 400/220kV Baram Substation is proposed for reliability in accordance to the Transmission Planning Criteria of CEA.

Considering above modifications, the total scope is attached at **Annexure-II**. POWERGRID further informed that as per site feedback constraints are being faced in land identification for establishment of 400/220kV substation in Baram, therefore it was proposed that the substation may be established at Jauljivi instead of Baram. Members agreed for the same.

1.1.5 High short circuit levels at various nodes in Northern Region

UPPTCL stated that due to high generation in the Singrauli, Rihand, Anpara, Obra complexes, the short circuit level at Anpara/ Obra 400 kV bus is alarming. Accordingly, a detailed short circuit study may be carried out by CTU and put up in the next Standing Committee Meeting.

As no other suggestion for the modification to the minutes of meeting has been received, thereafter the Minutes of the 35th Standing Committee Meeting on Power System Planning in Northern along with the above modifications are confirmed.

2. 220kV interconnection from Samba and New Wanpoh 2x315 MVA, 400/220kV substations of POWERGRID in Jammu & Kashmir.

2.1 Director (SP&PA), CEA stated that 2x315 MVA, 400/220kV substations at Samba and New Wanpoh have been commissioned in 2013 by POWERGRID under ISTS. But for drawal of power from these substations, the underlying 220 kV network have not been constructed by PDD, J&K.

2.2 PDD, J&K has intimated that due to fund constraints they are not in position to construct the above 220 kV interconnection works in time resulting in non-utilization of both 400 kV substations of POWERGRID at Samba and New Wanpoh. They had requested that the downstream 220 kV transmission network for utilizing Samba and New Wanpoh 400/220 kV substations may be taken up as ISTS works.

2.3 The proposal was discussed. Director, HVPNL and Director, HPPTCL pointed out that this would create a wrong precedence as all the States suffer from funds constraints. Other States would quote this as precedence for construction of intra State works under ISTS. This would create high cost repercussions on the constituents as all these would be pooled in PoC charges.

2.4 Director, HVPNL also highlighted that J&K already owe huge amount of money to Haryana on reactive charge account and now taking up new infrastructure in J&K through ISTS would be an additional burden on the other states. The members also took a note of the absence of any representative from J&K in the consecutive meetings of the Standing Committee.

2.5 The proposal of PDD, J&K was in general not accepted and it was decided that PDD, J&K may be advised to approach the Government of India for funds.

3. Creation of 400/220 kV, 2x315 MVA S/S at Akhnoor and Kistwar

3.1 Director (SP&PA), CEA stated that system operation wing of Jammu has requested for creation of two nos. of 400 kV Substations in Jammu Area - one at Akhnoor by LILO of the under construction 400 kV Jullandhar – Samba - Amargarh D/C line of M/s Sterlite Ltd. and another at Kishtwar by LILO of the Dulhasti – Ratle - Kishenpur 400 kV line. He stated that PDD, Jammu has indicated that the existing 220 kV D/C line between Barn – Kishenpur is overloaded and there is no margin left on the line for meeting further load growth. With the load growth at Reasi, Akhnoor, Siotand, Rajouri district, there is a need for another reliable source of power supply to this area. Accordingly, PDD, Jammu has proposed for creation of 400/220 kV, 2x315 MVA S/S at Akhnoor.

3.2 PDD, Jammu has indicated that 400 kV S/S at Kishtwar may be created by LILO of the under construction Dulhasti/Ratle – Kishenpur 400 kV line. The proposed S/S would feed the existing S/S of that area as well as upcoming power projects like Kiru, Kawar, Pakaldul, Burser etc.

3.3 Director, HVPNL and Director, HPPTCL pointed out that as in the case of Samba and New Wanpoh S/S, these S/Stns would also meet the same fate as PDD, J&K would not construct the underlying 220 kV system and any facility without underlying system would be a wasteful expenditure. Further, the existing ICT capacity at 400/220 kV is 4410 MVA in J&K, this is adequate to meet the 12th Plan load of J&K. Considering this, the proposed S/S at Akhnoor and Kistwar may not be justified.

3.4 Director (SP&PA), CEA stated that out of 4410 MVA capacity in J&K, 2520 MVA is in Kashmir and 1890 MVA in Jammu. Even after the construction of 220 kV outlets from Samba, the loading in the western part of Jammu i.e. Reasi, Katra, Akhnoor and Burn is met through Kishenpur D/C line. In the event of outage of one circuit the loading on the remaining circuits gets critical. Further, the Kistwar pooling substation was in principle agreed for pooling evacuation of power from Chenab basin projects in J&K. The projects like Kirthi and Pakaldhul are likely to materialize by the middle of 13th plan so the substation at Kiswtar needs to be ready in the matching time frame.

3.5 After detailed deliberation the committee was of the view that, PDD, J&K should furnish the firm power evacuation plan from Samba and New Wanpoh and should also cover the 220 kV under lying evacuation system under State plan and after that the new proposals of Akhnoor and Kistwar substations would be considered in the next standing committee.

4. WR - NR 765 kV Strengthening Transmission Corridor

4.1 Director (SP&PA), CEA stated that a comprehensive study has been carried out for assessing the requirement of additional transmission system keeping in view the existing allocation/ LTA granted on the basis of target regions, firm PPAs and new LTA application submitted for transfer of power from various IPPs in Western Region to another Region. It has been observed that the total LTA quantum granted to NR from all the generation projects in WR and ER including the central sector allocation is about:

From WR Projects: 15200 MW

From ER projects : 11700 MW

Total : 26900 MW

4.2 Additional requirement (other than already granted) of about 2000MW power transfer from WR to NR is being envisaged from following generation projects in WR for which UP has already signed the PPA:

Sl No.	Generation Projects	Additional Allocation to NR (MW)	Commissioning Date
1	TRN Energy Ltd.	240	30-10-2016
2	Shirpur Power Pvt. Ltd.	35	01-02-2015
3	MB Power (MP) Ltd.	200	01-06-2015
4	MB Power (MP) Ltd.	98	30-10-2016
5	KSK Mahanadi Power Company Ltd	1000	30-10-2016
6	DB Power, Chhattisgarh Ltd.	235	30-11-2016
7	Maruti Clean Coal& Power Ltd	205	30-11-2016
	Total (MW)	2013	

4.3 In addition to above, following new generation projects coming up in Western Region have applied for connectivity / LTA :

Sl. No.	Generation Projects	Capacity (MW)	Remarks
1	KhargaonTPP(NTPC)	1320	Applied Connectivity <A for 1244 MW to WR
2	Surguja Power Pvt Ltd. (IPP)	600	Applied for connectivity for 490MW, LTA application to be submitted
3	Dwarkesh Energy Ltd. (IPP)	1320	Applied for connectivity(for 1240.8MW, LTA application to be submitted
	Total (MW)	3240	

Out of these new projects of 3240MW capacity, it is assumed that about 2000 MW power may be transferred to NR. Accordingly, total about 4000MW additional power needs to be transferred from WR to NR. With this, the power transfer requirement from WR and ER projects to NR is as given below:

From WR Projects	: 19200 MW
From ER projects	: 11700 MW
Total	: 30900 MW

4.4 Comprehensive Studies have been carried out by CTU with varying availabilities of generations including renewable and the following transmission system has been identified:

Proposed WR-NR Strengthening System

Part-A

- Indore(WR) – Chittorgarh(NR) 765kV D/C line

Part-B

- Vindhyachal Pool (WR) – Allahabad (NR) 765kV D/C line

- LILLO of Fatehpur – Sasaram 765kV S/C line at Allahabad
- Allahabad - Lucknow 765kV D/C line
- Allahabad (New) – Allahabad (PG) 400 kV D/C (Quad)
- Bareilly – Muzaffarnagar(S/s to be located between Meerut &Muzaffarnagar) 765kV D/C line
- Muzaffarnagar –Aligarh 765kV D/C line
- Shifting of Meerut – Bhiwani 765kV S/C line from Meerut to Muzaffarnagar to form Muzaffarnagar – Bhiwani 765kV S/C line
- Muzaffarnagar – Meerut(new)(UPPTCL) 400kV D/C (Quad) line
- Muzaffarnagar – Shamli(UPPTCL) 400kV D/C (Quad) line

4.5 POWERGRID informed that without any additional strengthening between WR and NR, Agra – Gwalior 765kV 2xS/C line remains the most loaded WR – NR interregional corridor in all the three combinations of renewable generations, with loading on it varying from 2800 MW in low renewables case to over 3500 MW in high renewables case.

- In high renewables generation case, in case of outage of one S/C of Agra – Gwalior line, loading on the parallel circuit is about 2600MW without any additional strengthening, 2400MW with Part-A of proposed strengthening and it reduces to 1850MW with both Part-A and Part-B of proposed strengthening.
- With the commissioning of Part-A of the proposed WR – NR interregional corridor, even under low renewable condition, the RE corridor gets moderately loaded.
- With the commissioning of Part-B of the proposed WR – NR interregional corridor, loading on the other WR-NR interregional transmission lines would be optimal.

4.6 CE, UPPTCL stated that they do object to the proposed WR- NR corridor, however, the ER-NR corridor which is lying underutilized should be put to use before proposing any new corridor in WR-NR. He pointed out that due to operational problems such as overvoltage problem during peak period and loop flows, there are underutilization of the existing assets and suggested that small investment may be made for the utilization of already constructed underutilized assets rather than making huge investment on new WR-NR corridor.

4.7 Director, HVPNL stated that if ER and WR both are surplus in generation, then the power would flow to the load centre through the least resistance path. As such, as long as adequate power flow takes place through WR-NR corridor, the focus should be on WR-NR rather than on WR-ER and ER-NR. Simultaneously, the work of modification in existing network for utilization of ER-NR corridor can be taken up.

4.8 AGM (Elect.), NTPC stated that the proposal of Vindhyachal Pool (WR) – Allahabad (NR) 765kV D/C line and the corridor upto Bareilly is an excellent proposal as this would provide an alternate route for evacuation of power near Vindhyachal pooling sub-station. He intimated that considering the present situation, it may clearly be seen that Gwalior –Agra 765 kV 2XS/C has provided path for power flow from Western to Northern Region. In the event of outage of any one of the circuit, the generation behind Gwalior gets stranded. Hence there is a need for requisite strengthening of WR-NR corridor.

4.9 Director (SP&PA), CEA stated that with the proposed LTA applications backlog vis-a-vis the existing corridor, considering the ATC, there is a need for a new corridor. Further the corridor now being proposed would only materialize in the 2020-21 timeframe. So until the new corridors are planned it would not be possible to accommodate fresh LTA allocations to any of the above generators in western region.

4.10 COO (CTU) stated that it is only a matter of time when the projects that has been assigned to ER-NR Corridor would come up. With power from Bhutan, Eastern Region would become a hub for transferring power from Bhutan. She also mentioned that until the new corridors are planned, it would not be possible to transfer any power from Western region to Northern region beyond 2018-19.

4.11 UPPTCL was of the view that without addressing the issue of under-utilization of the ER-NR corridor and loop flow between ER and NR, the present proposal for strengthening WR-NR corridor would be an exercise in adhocism. He further stated that 400 kV Muzaffarnagar S/S would not be required as UPPTCL Muzaffarnagar S/S would be coming soon.

4.12 POWERGRID informed that there is space problem at the existing Allahabad (PG) Substation so the alternative for Allahabad (New) - Allahabad (PG) is to LILO 400 kV Meja – Allahabad D/C line at Allahabad (New) Substation.

4.13 Since all other constituents except for UPPCL was in favour of the proposal so after further deliberation, it was finally decided to implement the following part of WR-NR corridor to be taken up as a system strengthening scheme between WR and NR :

Part-A

- Indore(WR) – Chittorgarh(NR) 765kV D/C line

Part-B

- Vindhyachal Pool (WR) – Allahabad (NR) 765kV D/C line
- LILO of Fatehpur – Sasaram 765kV S/C line at Allahabad
- Allahabad - Lucknow 765kV D/C line

Further, the matter of high loading on 400kV Singrauli - Lucknow line was discussed as additional agenda item and it was decided to LILO the 400 kV Singrauli - Lucknow line at new 765/400kV Allahabad substation which would be en-route the line. **The same was agreed.**

4.14 Powergrid stated that Lucknow - Bareilly Transmission line was planned to be implemented under private sector, however it is delayed due to litigation and may pose transfer constraints beyond Lucknow and this needs to be resolved.

4.15 Based on the deliberations, the following transmission elements were approved:

Part-A

- Indore(WR) – Chittorgarh(NR) 765kV D/C line

Part-B

- Vindhyachal Pool (WR) – Allahabad (NR) 765kV D/C line
- LILO of Fatehpur – Sasaram 765kV S/C line at Allahabad

4.16 Further it was decided that the balance part will form part of agenda for the next SCM.

5. Modification of UITP scheme by PTCUL

5.1 PTCUL had earlier proposed that for evacuation of power from Tapovan (Vishnugarh) HEP of NTPC and Pipalkoti HEP of THDC, there is a need for 400kV pooling S/S at Pipalkoti itself and from there power would be taken to Srinagar S/S of PTCUL. However due to agitation

by locals, PTCUL was not able to construct 400 kV substation and alternatively requested THDC to provide space in the land acquired by THDC for their generation project. However for construction of sub-station, land proposed by THDC was unsuitable.

5.2 Since the Commissioning schedule of Tapovan (Vishnugarh) HEP of NTPC is 2017-18, PTCUL informed that for evacuation of power from the NTPC project, 400 kV D/C line with quad conductors from Tapovan, Vishnugarh HEP project to Srinagar S/S would be constructed. Subsequently, as land is finalized or issue is resolved with THDC, the 400 kV Pooling station would be developed where the power from Tapovan, Vishnugarh HEP (NTPC) and Pipalkoti HEP (THDC) would be pooled together. The upstream power from Josimath would be taken to Pipalkoti S/S at 220 kV. THDC expressed their inability to make available the land adjacent to their switchyard citing that most of the land is for reservoir.

5.3 CEA was of the view that the problem needs to be resolved by THDC with PTCUL else there would be problem in evacuation of the power from Pipalkoti HEP.

5.4 **The issue was further discussed in detail and Member (PS), CEA desired that a committee comprising of THDC, PTCUL, CEA and PGCIL would visit the THDC site to get first hand information on the land availability at Pipalkoti and based on the report of the committee the issue would be discussed in the next SCM of NR. This was agreed by members.**

5.5 CE (Trans), UPPTCL stated that in the 35th SCM, based on PTCUL presentation, the UITP network re-planning proposal was agreed, wherein LILO of one ckt. of 400kV Vishnuprayag-Muzaffarnagar line at Pipalkoti (THDC) S/S was agreed. The Single line diagram, however, did not indicate the approved LILO of one circuit of Vishnuprayag-Muzaffarnagar 400 kV D/C line at Srinagar 4x82.5 MW HEP. It is thus not clear which of two circuits is being LILOed at Pipalkoti (THDC). Correction in SLD alongwith load flow study was also requested by UPPTCL in the meeting. Considering the observations of UPPTCL as well as land issues for Pipalkoti substation, it was decided that the proposal would be discussed again in the next SCM after the site visit by the committee consisting of THDC, PTCUL, CEA and CTU.

6. Additional 1X500 MVA, 400/220kV ICTs at Fatehabad(PG) 400/220kV substation

6.1 Director (SP&PA), CEA stated that the present transformation capacity at 400/220 kV Fatehabad Substation in Haryana is of 2x315 MVA. The S/S is presently catering to about 800 MVA load installed at 220kV Fatehabad, Sirsa area in Haryana. Further, with increase in load demand, substation at Hukrnawali (460 MVA) will also be fed from 400kV Fatehabad substation. Thus there is a need for an additional 1x500 MVA, 400/220kV ICT at Fatehabad.

6.2 AGM, CTU stated that as per directions of CERC, the transformers which are to be replaced needs to be de-capitalized. Since the life of these transformers are left, it was proposed that instead of augmenting the capacity by 1x500 MVA ICT, it would be better to utilize one of the 1x315 MVA transformer from Ballabhgarh or Mandola which are going to be replaced.

The committee agreed with the proposal.

7. VSC from Jhatikara to Karampura in place of establishment of 400/220kV GIS substation at Karampura alongwith two associated 400kV D/C lines

7.1 Director (SP&PA), CEA stated that 4x500MVA, 400/220kV GIS Karampura substation was approved as a part of ISTS network in the 34th and 35th Standing Committee Meeting for Power System planning in Northern Region. The S/Stn was planned to be constructed near central Delhi by taking 400kV D/C line from 765/400 kV Jhatikra substation on M/C towers and 400kV D/C line from Bawana substation on M/C towers. The work was entrusted to POWERGRID on compressed time schedule under regulated tariff. POWERGRID while carrying out the survey of both the line routes observed that the construction of transmission lines, both from Jhatikra and Bawana substations were not feasible as the line routes were passing through dense habitation and the transmission line has to be taken along Najafgarh Nallah where the issues would be heavy pile foundation, inadequate space for tower footing and approval of Flood Control Board as some portion of the line has to be taken through the Nallah. Accordingly, POWERGRID expressed their inability for construction of the line. Alternatively, POWERGRID identified an site near Rithala (Sec 25, Rohini). For finalization of location of Karampura substation, a meeting was held in CEA on 16/04/15, where the proposal of locating the substation at Rithala (Sec 25, Rohini) was not agreed as the load demand is in Karampura i.e. Anand Parbat/ Karol Bagh area and by locating the S/S at Rithala, it would not be possible to meet the load demand of Karampura and adjoining areas.

7.2 Accordingly, another alternate measure to take the power to supply to Karampura area was discussed and considering that Karampura substation is very important for providing grid connectivity to Central Delhi, the general opinion was that instead of planning through HVAC it may be possible to provide grid connectivity to Karampura area through HVDC and the proposal of voltage source converter (VSC) was identified. VSC Terminal would be set up at Jhatikalan S/S and from there an underground D/C cable would be taken to Karampura . Since the underground cable would not have any issue of reactive power, so it was found to be the only feasible solution for feeding power to central Delhi area.

7.3 Director, HVPNL raised the issue of high cost repercussions of implementing the above technology and suggested for other cost effective solution or part funding by Delhi Government, as the tariff implication would be high due to high cost of VSC.

7.4 HVPNL was in favour of the proposal subject to part funding as grant. After detailed discussion, it was finally agreed that even through VSC is the only technical solution for the scheme to fructify, however economics have to be considered and hence there is a need to revisit the entire proposal by a team comprising of PGCIL, CEA and DTL. The route further need to be re-surveyed to see if the route length of the DC cable could be reduced or any other possibilities i.e. combination of overhead line and cable may be considered. Since the work relates to 12th plan work of Delhi so to expedite the approval process, a special meeting may be convened immediately after arriving at a solution for ROW/technology to be used.

It was finally decided to constitute a Committee comprising CEA, PGCIL and DTL to explore various possibilities for feeding Karampura S/S.

8. Modification in the evacuation System for Lalitpur (3x660 MW) STPS

8.1 Director (SP&PA), CEA stated that for evacuation of power from Lalitpur TPS, Lalitpur-Agra 765kV 2xS/C lines (about 378km long) had been planned by UPPTCL. Considering long line length 50% FSC on both circuits of Lalitpur - Agra 765kV 2*S/C were agreed in 32nd Standing Committee Meeting of Transmission Planning in Northern Region held on 31/08/13. Additionally, LILO of one circuit of Jabalpur - Orai 765 kV D/C at Lalitpur TPS was also proposed for stability purpose at a later date.

8.2 As implementation of the transmission system for Lalitpur TPS was entrusted by UP to POWERGRID, they suggested following changes in 765 kV transmission lines.

S. No.	Approved Earlier by SCM	POWERGRID suggestion vide letter dt. 15.01.2015
1	50% Fixed Series Compensation (FSC) in 765 kV Lalitpur-Agra (UP) 2xS/C lines (approx. cost Rs 100 cr.)- by year 2016	35%FSC + 15% TCSC
2	LILO of one circuit of 765kV Jabalpur-Orai D/C at Lalitpur to provide stable operation of the Lalitpur generation. (approx. cost Rs 500 cr. for 100 km LILO)- by year 2017	Not required
	Total Cost of system approved earlier: Rs 600 cr.	Total cost of suggested system: Rs 150-200 Cr.

8.3 However, UPPTCL vide their letter dated 18-02-2015 intimated that above suggestions made by POWERGRID shall leave Lalitpur TPS generators unanchored from grid and there is no historical experience of installation and functioning of FSC or FSC+TCSC on 765kV lines in India. So, UPPTCL proposed following modification for evacuation of power from Lalitpur TPS:

- With proper tuning of PSS in AVR system of the Lalitpur machines the provision for 50% FSC or 35% FSC+15% TCSC may not be required. As such Lalitpur TPS developers shall be directed to ensure proper PSS tuning in all conditions.
- 765/400kV, 1x630MVA AIS S/S to be developed near Lalitpur TPS to anchor the generators to Grid.
- LILO of one circuit of existing Parichha-Orai 400kV D/C UPPTCL line at Lalitpur TPS (120km LILO approx. cost Rs. 150 Cr.) Orai 400kV UPPTCL is likely to get strongly connected to grid through Orai UP- Orai 765 kV (POWERGRID)and Orai-Banda 400kV UPPTCL lines.
- Additional reactor 330MVA at Lalitpur TPS is not required

8.4 AGM, CTU stated that as per the dynamic studies carried out by CTU, it was observed that with 35% FSC + 15% TCSC, the Lalitpur machine is more stable. The reliability/ tuning of Power System Stabilizers (PSS) in Indian power sector is not yet proven, PSS installed on the

generating machines may not be able to provide the required damping under outage and power evacuation constraints for Lalitpur TPS may occur. Further, to avoid unbalanced loading due to LILO of one circuit of existing Parichha-Orai 400 kV D/C line (UPPTCL) at Lalitpur TPS, it would be prudent to have direct 400 kV D/C line from Pariccha – Lalitpur. Further, the additional 330 MVAR switchable bus reactor would help in absorption of MVAR during low load period. As regard to the use of FSC and TCSC combination at 765 kV for the first time, he intimated that use of FSC plus TCSC at 400 kV is already there in India. The only difference between at 765 kV and 400 kV is the insulation level, i.e., the height of the platform from the ground, which is more for 765 kV FACTS device. Further, for stability reason, he suggested for 2x500 MVA ICT at Lalitpur instead of 630 MVA as this would not meet the n-1 contingency under outage condition.

8.5 CE, UPPTCL stated that when PSS is available in the machine then it is the responsibility of the generator to arrange for proper tuning of the PSS. With proper tuning of PSS, there may not be requirement of any FACTS device on the transmission line. As regard to 400 kV direct D/C line between Pariccha – Lalitpur, he stated that the suggestion of POWERGRID is well taken. However, due to non-availability of space at Pariccha it would not be possible. However he agreed with the suggestion of CTU for having additional 330 MVA switchable bus reactor at Lalitpur. Regarding the provision 2*500 MVA ICT's at Lalitpur, he stated that provision is there for 4x210 MVA single phase transformers. So there would not be much problem.

8.6 NRLDC stated that the oscillations in the system would propagate to the integrated grid and the issue needs to be addressed. CTU informed that the stability would remain a concern with LILO of one circuit of Paricha-Orai 400kV D/C line.

8.7 The members were in general in agreement with the proposal of UPPTCL except for POWERGRID who was in disagreement with the provision of PSS tuning vis-a-vis the requirement of FACTS device on the Lalitpur-Agra 765kV 2xS/C lines. After detailed discussion the committee was of the view that since UP is the sole beneficiary of the Lalitpur Power and UPPTCL being the STU may decide on the above issue. As regard, Standing Committee is concerned; **the issue has reached its final conclusion.**

The committee agreed with the proposal.

9. 220 kV line bays at 400/220kV ISTS Substation (PGCIL) in U.P.

9.1 POWERGRID stated that two nos. of bays as requested by UPPTCL at Mainpuri have been included in the DPR of the scheme “Augmentation of transformation capacity at Mainpuri and Sikar” and the same needs the concurrence from the committee.

9.2 Director (SP&PA), CEA pointed out that UPPTCL has proposed 220kV S/C line from 400/220 kV Allahabad and Meerut S/S of PGCIL, which is technically not correct. UPPTCL may consider to construct 220kV D/C line from 400/220 kV PGCIL’s substations considering the future load growth and for better use of RoW.

9.3 UP consented for D/C line from this S/S and intimated that its 220kV Jagriti Vihar S/S is also coming which it wants to connect with Meerut. So, it requires 1 additional bay at Meerut. Moreover, they need one additional bay in Allahabad too. As such, two additional 220 kV bays one at Meerut and one at Allahabad would be required. It was agreed to provide two nos. of bays each at Mainpuri (PG), Meerut (PG) and Allahabad (PG).

9.4 POWERGRID stated that the implementation of bays would take about 24-30 months and in case UPPTCL desires these bays on urgent basis, UPPTCL may take the implementation on their own. UPPTCL agreed with the proposed time frame.

The committee agreed with the proposal for two additional 220 kV bays one each at Meerut (PG) and Allahabad (PG).

10. LILO of one ckt. of NAPP - Khurja 220 kV DC line at 220 kV Debai (UPPTCL) S/S

10.1 Director (SP&PA), CEA stated that UPPTCL is constructing 220/132 kV substation at Debai which is nearing completion and 220 kV connectivity is planned by LILOing one ckt of NAPP-Khurja 220 kV D/C (UPPTCL) line at Debai. However, NPCIL have made objections on the LILOing proposals of UPPTCL, because this LILO will disturb the “operational islanding scheme” of NAPS - 1&2, which was decided based on detailed discussions and subsequent approval by NRPC. Moreover, this proposal is not in line with the transmission planning criteria formulated by CEA. He, however, stated that there are other three circuits belonging to UPPTCL from NAPP, as under:

- NAPP-Atrauli 220 kV S/C line
- NAPP-Sambhal 220 kV S/C line

- NAPP-Simbhauri 220 kV S/C line

As such LILO of NAPP – Khurja at Debai is not going to affect the power evacuation from NAPP. However, the issue of disturbance to the Islanding scheme due to the LILO can easily be addressed by resetting the relays in coordination with UPPTCL.

10.2 MS, NRPC stated that islanding scheme would have to be revised and approval from NRPC would be required.

The proposal of UPPTCL was agreed by all constituents.

11. LILO of Kashipur-Rishikesh 400 kV S/ C line at Nehtaur 400/132 kV S/S:-

11.1 Director (SP&PA), CEA stated that the LILO of Kashipur-Rishikesh 400 kV S/C line at Nehtaur 400/132 kV with 2x200 MVA S/S was approved in 26th SCM of NR. LILO work is being done by M/S WUPTCL under PPP mode. At that time, the line was jointly owned by UPPTCL and PTCUL. Now PTCUL is not agreeing with the proposal indicating that there could be stability problems in case of outage of 400 kV Nehtaur-Rishikesh section of Kashipur – Rishikesh 400kV line. PTCUL cited that they have their substations at both Kashipur and Rishikesh and further they are planning another S/S by LILOing this line. So, they don't agree to the aforementioned LILO at Nehtaur by UPPTCL.

11.2 UPPTCL stated that the LILO at Nehtaur is being done as the same has already been agreed in the Standing Committee. Moreover, the stability concern raised by PTCUL has been addressed as Bareilly- Kashipur- Roorkee 400 kV (quad) line would be commissioned shortly. Further Rishikesh and Roorkee are presently being fed by Meerut - Muzzafarnagar line. The problem anticipated at Rishikesh due to outage of Nehtaur-Kashipur section would not arise as Muzzafarnagar has now been well connected with Vishnuprayag and Srinagar.

11.3 PTCUL suggested that UPPTCL can obtain connectivity for Nehtaur from Moradabad instead of the LILO.

11.4 CTU suggested that UPPTCL can get connectivity from Moradabad-Kashipur line, so as the line connecting two substations of Uttarakhand is not disturbed. UPPTCL stated that Nehtaur is being developed under private sector and it may not be feasible to change the scope of the implementing agency at this stage.

After detailed deliberations, Member (PS) observed that already approved scheme in SCM need not be disagreed due to change in circumstances. However, any revised scheme worked out mutually by UPPTCL and PTCUL can be considered.

12. Evacuation System for Ghatampur Thermal Power Station (3X660 MW)

12.1 Director (SP&PA), CEA stated that the proposal of the transmission system for evacuation of power from Ghatampur TPS (3x660 MW) was discussed in the 35th SCM. UPPTCL has proposed following transmission system for evacuation:

- (i) 21/765 kV Generator Transformers, 2x1500MVA, 765/400kV & 3x200MVA, 400/132kV ICTs at Ghatampur TPS along with 6-8 Nos. of 132 kV outlets.
- (ii) Ghatampur TPS -Agra(UP) 765kV S/C Line- 320 km (with Line reactors of 189 MVAR at both end)
- (iii) Agra(UP) -Greater Noida(UP) 765kV S/C Line - 200 km (with Line reactor of 240 MVAR at Agra end)
- (iv) Ghatampur TPS -Hapur 765kV S/C Line - 400 km with line reactors of 330 MVAR at both end.
- (v) Ghatampur TPS- Kanpur(PG) 400kV D/C line- **60km**

12.2 During 35th SCM, Powergrid stated that further load flow studies need to be carried out considering the injection of NTPC generation at Bilhaur on the loading of the transmission line beyond Kanpur with power flow through Ghatampur TPS to Kanpur.

12.3 Load flow studies were, accordingly, carried out considering the generation at Ghatampur (1980 MW) as well as Bilhaur (1320 MW). The studies showed that even in case of outages, power flow in other circuits are within permissible limits. Accordingly the above evacuation system from Ghatampur may be considered.

12.4 The proposal was agreed Members of the Committee. CTU, however cited the need for additional strengthening beyond Kanpur for evacuation of power from Bilhaur and requested NTPC to apply for LTA so that transmission system for integration of Bilhaur can be planne

12.5 UPPTCL pointed out that in the load flow studies provided, connectivity between Greater Noida and Meerut is not considered which can provide additional relief in case of outage of Agra-Greater Noida section.

12.6 NTPC stated that for Bilhaur TPS, they will apply for LTA in a month or two.

The constituents agreed for the implementation of the proposal.

13. Power evacuation from Sainj HEP 2x50 MW

13.1 Director (SP&&PA), CEA stated that evacuation arrangement for Sainj HEP (100 MW) was finalized as LILO of Parvati-II - Banala 400 kV D/C at Sainj HEP. The work of LILO of 400 kV circuit has now been taken up. In this context, following situation has emerged:

- Sainj HEP is located upstream of Parvati-II HEP (350 meters away) and 400 kV circuit from Parvati-II HEP to Parvati-III HEP faces the Sainj HEP pothead yard. For LILO, the circuits from Sainj HEP shall have to be routed below the Parvati-II –Parvati III 400 kV D/C which will reduce the ground clearance for which the local community located upstream to LILO point were showing resentment. In this context a team comprising of officers from CEA, PGCIL, HPPTCL, HPPCL and PKTCL visited the site and observed that taking the line from below the Parvati-II- Parvati-III for LILOing the Sainj Evacuation System into Parvati-II – Banala Circuit would be a difficult proposition
- The Team was of the view that it would be technically feasible to LILO Parvati-II to Parvati-III Line at Sainj HEP. Accordingly, the line from Sainj HEP may be LILOed at Circuit No. -1, which is Parvati-II to Parvati-III-Banala, instead directly between Parvati-II and Banala. The proposal was in principally agreed by CEA as well as CTU.

The constituents agreed to the above proposal.

14. Conversion of line reactors to Bus reactors at Karcham Wangtoo end of Karcham Wangtoo Abdullapur line

14.1 The issue was briefly discussed and the members agreed to discuss this agenda item in presence of JP Power in next SCM.

15. Maharanibagh–Rajghat 400kV D/C additional line

15.1. Director (SP&PA), CEA stated that 400kV Maharaniabagh (PG) substation is the main ISTS link for supplying power to Central and South Delhi areas. Maharaniabagh substation is presently linked connected through LILO of Dadri - Samaypur 400kV line at Maharaniabagh. Some portion of the line towards Maharaniabagh is on D/C tower. The S/s has become a life line for supply of power to Delhi, any tower outage would cause blackout in half of Delhi area. Considering this, it is proposed to strengthen the connectivity of Maharaniabagh S/s by linking it with alternate 400kV source from ISTS Rajghat S/s through 400 kV D/C line with HTLS conductor(about 5 km). This would provide uninterrupted power supply to this S/s even under tower outage condition of one of the lines. Accordingly the following works are proposed as a part of system strengthening scheme **NRSS XXXIX**

- (i) 400 kV Rajghat – Maharaniabagh D/C line with HTLS conductor
- (ii) Two nos. of 400kV GIS bays each at Rajghat and Maharaniabagh

Members of the Committee agreed to the above proposal.

16. Modification of Suratgarh Substation Location in Green Energy Corridor

16.1. Director (SP&PA), CEA stated that a comprehensive Inter State Transmission System for Renewable in Northern Region was agreed to be implemented in compressed time schedule in 32nd meeting of Standing Committee of Northern Region. The details of the system are as under.

Northern region

- (i) Chittorgarh-Ajmer (New) 765 kV D/C
- (ii) Ajmer (New)-Suratgarh (New) 765 kV D/C
- (iii) Suratgarh (New)-Moga (PG) 765 kV D/C
- (iv) Chittorgarh-Chittorgarh (RVPN) 400 kV D/C (Quad)
- (v) Ajmer (New)- Ajmer (RVPN) 400 kV D/C (Quad)
- (vi) Suratgarh (New)- Suratgarh 400 kV D/C (Quad)
- (vii) 2x1500 MVA, 765/400 kV sub-station each at Chittorgarh, Ajmer (New) and Suratgarh (New)
- (viii) Associated reactive compensation (Bus reactors & line reactors)

16.2. The elements at (i), (iv), (v), (vii) and (viii) of the above scheme have already been approved under KfW funding and is being implemented by POWERGRID under compressed time schedule. The balance part of the scheme is as under:

- (i) Establishment of 2x1500 MVA, 765/400 kV substation at Suratgarh (New)
- (ii) Ajmer (New) – Suratgarh (New) 765kV D/C
- (iii) Suratgarh (New) – Moga 765kV D/C
- (iv) Suratgarh (New) – Suratgarh (RVPN) 400kV D/C (Quad)

16.3. Subsequently, Rajasthan Rajya Vidyut Prasaran Nigam Ltd (RRVPN) through its letter dated March 24, 2015 requested that substation may be established near Bikaner in place of Suratgarh due to Solar generation potential near Bikaner. Accordingly, the revised scope of works proposed under the scheme is as under:

- (i) Establishment of 2x1500 MVA, 765/400 kV substation at Bikaner (New)
- (ii) Ajmer (New) – Bikaner (New) 765kV D/C
- (iii) Bikaner (New) – Moga 765kV D/C
- (iv) Bikaner (New) – Bikaner (RVPN) 400kV D/C (Quad)

16.4. RRVPNL stated that due to space problem at Bikaner Rajasthan, instead of proposed interconnection of Bikaner (New) – Bikaner (RVPN), one circuit from Badla to Bikaner can be LILLOed at Bikaner (New).

The proposal for the change in location was agreed to by the members of the committee.

17. Development of ISTS system for evacuation of power from new Solar parks and Solar power projects in Rajasthan

17.1 Director, RVPNL informed that Govt. of Rajasthan has signed MOUs for development of 32,000 MW renewable generation capacity (26,500MW solar and 5,500 MW wind) by 2022. Out of above renewable capacity addition plan, about 8,600MW renewable generation would be consumed within Rajasthan and balance 23,400 MW capacity proposed to be evacuated outside the State.

17.2 It was informed that RVPNL has already planned an evacuation system of 8000 MW for Solar and Wind Power Projects and with the planning of additional two(2) 765kV grid substation

(GSS) at Jaisalmer-2 (Up gradation) and Jodhpur and two(2) 400 kV GSS viz. Kolayat and Pokhran along with associated lines under intra State transmission scheme.

17.3 For export of envisaged 23,400MW of solar capacity outside Rajasthan by 2021-22, it is envisaged that there would be tentative requirement of five(5) to seven(7) 765/400kV GSS. RVPNL also stated that out of the envisaged 23,400 MW of Solar power, Rajasthan renewable energy corporation ltd. (RRECL) has identified the land for development of 13,700MW solar parks at Bhadla (Jodhpur), Parewar (Jaisalmer), Fatehgarh (Jaisalmer), Pokaran (Jaisalmer) and Pugul (Bikaner). RVPNL proposed following inter-State transmission scheme for evacuation of solar power (13,700MW) from above identified solar parks.

- 765 kV D/C Parewar-Bhadla line (initially to be charged at 400kV)
- 765 kV D/C Fatehgarh -Bhadla line (initially to be charged at 400kV)
- 765 kV D/C Bhadla -Ajmer(PG-765 kV GSS) line (initially to be charged at 400kV)
- 765 kV D/C Bhadla-Bikaner(PG-765 kV GSS) line (initially to be charged at 400kV)
- 765 kV D/C Nokh -Bhadla line (initially to be charged at 400kV)
- 765 kV D/C Pugul-Bhadla (PG-765 kV GSS) line (initially to be charged at 400kV)
- 765 kV D/C Ajmer(PG-765 kV GSS) –Jaipur South(RVPN 765 kV GSS) line
- 400kV D/C Bhadla(RVPN) – Bhadla(PG) line(Quad)
- New 765 kV D/C line from PGCIL's 765 kV GSS Bikaner towards Northern India
- 3x1500MVA,765/400 kV & 8x500 MVA, 400/220 kV substation at Parewar
- 2x1500MVA,765/400 kV & 5x500 MVA, 400/220 kV substation at Fatehgarh
- 2x1500MVA,765/400 kV & 2x500 MVA, 400/220 kV substation at Bhadla
- 5x500 MVA, 400/220 kV substation at Pugul
- 2x500 MVA, 400/220 kV substation at Nokh
- Associated Reactive Compensations

17.4 Director, RVPNL stated that gestation period of solar power plant is much less than transmission network development. Therefore, it is necessary to take up implementation of transmission system much ahead of start of solar generation projects. He proposed that keeping above facts in view, committee may give in-principle approval for the above inter State transmission scheme. Depending upon the progress of solar parks, implementation of transmission elements from above scheme may be taken up in phases.

17.5 POWERGRID stated that MNRE/MOP has indicated development of 3000MW solar power parks in Jodhpur (Bhadla Ph-III: 1000MW) and Jaisalmer Ph-I & II (2000MW). Accordingly, the following inter State transmission scheme have been identified as part of transmission scheme proposed by RVPNL for evacuation of 3000MW solar capacity:

- (i) 765kV Parewar – Bhadla(PG) D/C (initially to be charged at 400kV)
- (ii) 765kV Fatehgarh – Bhadla(PG) D/C (initially to be charged at 400kV)
- (iii) 765kV Bhadla (PG) – Bikaner(PG) D/C
- (iv) 400kV Bhadla (PG)- Bhadla (RVPN) D/C (Quad)
- (v) Establishment of 3x500MVA, 400/220kV Pooling Station at Parewar (with a provision to upgrade at 765kV level)
- (vi) Establishment of 3x500MVA, 400/220kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level)
- (vii) Establishment of Pooling Station at Bhadla (PG) (765/400kV : 3x1500MVA & 400/220kV : 3x500MVA,)
- (viii) 220kV line bays at Parewar, Fatehgarh&Bhadla (PG) for interconnection of solar plants
- (ix) Associated reactive compensation (both bus & line reactor)

17.6 POWERGRID also stated that Ministry of Power, vide letter dated 08.01.15 nominated POWERGRID to take up the construction of transmission lines including pooling station from nine (9) solar parks being set up in seven(7) States including solar parks in Rajasthan on compressed time schedule.

17.7 PGCIL also stated that considering short gestation period of solar park, land has to be identified in contiguous to solar power park for development of Pooling Station and allotted to POWERGRID by Government of Rajasthan/Solar park developer to facilitate timely implementation of ISTS. RVPNL agreed to expedite the allocation of land to POWERGRID in Parewar, Fatehgarh and Bhadla contiguous to solar park for establishment of pooling station

17.8 POWERGRID stated that M/s Surya Urja Company of Rajasthan Ltd (JVC of Govt of Rajasthan & IL&FS) has applied for connectivity of 1000MW solar parks each at Jaisalmer (Parewar) and Jodhpur (Bhadla) with commissioning schedule of Dec'16 to CTU. Regarding

Long Term Access application, POWERGRID also requested MNRE to impress upon the solar park developer to apply for long term access to CTU for above solar parks at the earliest.

17.9 Members noted the transmission scheme as mentioned above for evacuation of 3000MW of solar power parks in Jaisalmer (Parewar & Fatehgarh) & Jodhpur (Bhadla) in Rajasthan is technically in order. However, implementation of same shall be taken up only after receipt of application for LTA at least 25% of their installed capacity from Solar park developers.

17.10 After deliberation the following was agreed :

(i) The ISTS scheme mentioned at S.No 17.5 for evacuation of 13,700 MW in the identified complex is in-principally agreed by the committee. Depending upon the progress of solar parks and grant of LTA, implementation of transmission elements may be taken up in phases.

(ii) The following ISTS transmission scheme for evacuation of 3000MW of solar power in Jaisalmer (Parewar and Fatehgarh) and Jodhpur (Bhadla) in Rajasthan is technically in order and in principally agreed to.

- 765kV Parewar – Bhadla(PG) D/C (initially to be charged at 400kV)
- 765kV Fatehgarh – Bhadla(PG) D/C (initially to be charged at 400kV)
- 765kV Bhadla (PG) – Bikaner(PG) D/C
- 400kV Bhadla (PG)- Bhadla (RVPN) D/C (Quad)
- Establishment of 3x500MVA, 400/220kV Pooling Station at Parewar (with a provision to upgrade at 765kV level)
- Establishment of 3x500MVA, 400/220kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level)
- Establishment of Pooling Station at Bhadla (PG) (765/400kV : 3x1500MVA 400/220kV : 3x500MVA,)
- 220kV line bays at Parewar, Fatehgarh&Bhadla (PG) for interconnection of solar plants
- Associated reactive compensation (both bus & line reactor)

17.11 However, the implementation of transmission scheme shall be taken up only after receipt of application for LTA of at least 25% of their installed capacity from respective Solar park developers.

- Govt. of Rajasthan/RVPNL shall expedite allocation of land contiguous to solar park to POWERGRID for establishment of pooling station in Parewar, Fatehgarh and Bhadla
- RVPNL shall impress upon the solar park developer to apply for LTA to CTU at the earliest

18. Transmission system for Ultra Mega Solar Power Park in Jalaun, UP (370MW)

18.1. POWERGRID stated that as per the information received from MNRE, a Solar power park of 370 MW is envisaged to be developed in Jalaun district in Uttar Pradesh. Jalaun Solar Power Park (370 MW) is being developed by JVC of SECI and UPNEDA and is scheduled for commissioning in 12-15 months.

18.2. For evacuation of power from Jalaun solar park, it is proposed to establish a 400kV Pooling station at Jalaun (400/220kV, 2x500 MVA or 400/132kV, 3x200 MVA, depending on generation interconnection voltage level) along with its interconnection with 765/400kV Kanpur (new) substation. Further, to address reactive power management issues especially during low / no generation periods like in evening/night hours, 1x125 MVAR Bus reactor at 400kV Jalaun Pool is proposed. In this way, proposed transmission system shall facilitate transfer of power from solar generation of Jalaun solar park with reliability.

18.3. Accordingly, following Inter-State Transmission System (ISTS) is proposed for evacuation of 370 MW Solar capacity

- a) Jalaun Pool – Kanpur(new) 400kV D/c line
- b) Establishment of 400kV Pooling station at Jalaun (400/220kV, 2x500 MVA or 400/132kV, 3x200 MVA) along with 1x125MVAR bus reactor
- c) Line bays (220kV or 132 kV) at Jalaun Pooling station (for its interconnection with solar park)

18.4. POWERGRID also informed that Ministry of Power, vide letter dated 08.01.15 assigned POWERGRID to take up the construction of transmission lines including pooling station from nine (9) solar parks being set up in seven(7) states including Jalaun solar park in Uttar Pradesh on compressed time schedule.

18.5. POWERGRID stated that in case of early commissioning of Jalaun Solar park, LILO of one ckt of Kanpur (existing) - Kanpur(new) 400kV line at Jalaun Pool is proposed till the 400kV bay availability at Kanpur(new). Once the bays will be available at Kanpur(new) substation, the LILO shall be restored to its original configuration

18.6. POWERGRID informed that considering short gestation period of solar park, land has to be identified contiguous to solar power park for development of Pooling Station & allotted to POWERGRID by Government of UP/Solar park developer to facilitate timely implementation of ISTS scheme matching with the commissioning schedule of solar parks.

18.7. Members agreed that the transmission scheme as mentioned above for evacuation of 370MW of solar power parks in Jalaun in Uttar Pradesh is technically in order, however implementation of same shall be taken up only after receipt of application for LTA of at least 25% of their installed capacity from Solar park developers.

18.8. POWERGRID informed that the CTU is yet to receive the Connectivity/Long Term Access (LTA) application from solar park developer. Regarding connectivity/LTA application, POWERGRID informed that they have already requested MNRE to impress upon the solar park developer to apply for connectivity/LTA to CTU for above solar park at the earliest.

18.9. After deliberation following was agreed to:

- a. The following transmission scheme as earlier mentioned at S.No.21.2 for evacuation of 370MW of solar power from Jalaun solar park in Uttar Pradesh is technically in order and taken up for implementation by POWERGRID on compressed time schedule

- Jalaun Pool – Kanpur(new) 400kV D/c line
 - Establishment of 400kV Pooling station at Jalaun (400/220kV, 2x500 MVA or 400/132kV, 3x200 MVA) along with 1x125MVA bus reactor
 - Line bays (220kV or 132 kV) at Jalaun Pooling station (for its interconnection with solar park)
- b. In case of early commissioning of Jalaun Solar park, LILO of one ckt of Kanpur (existing) - Kanpur(new) 400kV line at Jalaun Pool is proposed till the 400kV bay availability at Kanpur(new). Once the bays will be available at Kanpur(new) substation, the LILO shall be restored to its original configuration
 - c. However, implementation of above transmission scheme shall be taken up only after receipt of application for LTA of at least 25% of their installed capacity from Solar park developers.
 - d. As assigned by Ministry of Power, the implementation of above ISTS scheme (S.No. a) shall be done by POWERGRID on compressed time schedule basis
 - e. Govt. of Uttar Pradesh/Solar park developer shall expedite allocation of land contiguous to solar power park to POWERGRID for establishment of pooling station.
 - f. UPPTCL shall expedite the solar park developer to apply for connectivity & LTA to CTU at the earliest

19. Evacuation of transmission system for proposed 1x800MW (Unit 9) supercritical unit at PTPS, Panipat, Haryana

19.1. Director (SP&PA), CEA stated that Power Generation Corporation Limited (HPGCL) has planned to setup 1x800MW (Unit-9) at PTPS, Panipat. After its commissioning, unit-1 to 4 (110MW each) at would be phased out. At present, the installed capacity of generating units at PTPS, Panipat is as under:

- Unit-1 to 3 110MW each
- Unit-4 117.8MW
- Unit-5 & 6 210MW each
- Unit-7 & 8 250MW each

19.2. The 220kV bus of Unit-1 to 4 and Unit-5 to 8 has been spltd to limit short-circuits current. Haryana VidyutPrasaran Nigam Limited (HVPNL) has proposed the following transmission system for evacuation of power from the proposed 1x800MW unit at PTPS Panipat (Unit-9):

1. Provision of 2x500MVA, 400/220kV ICTs in the switchyard of PTPS Panipat (Unit-9) generating station
2. New 400kV at PTPS (Unit-9) – 400kV Jind (PGCIL) D/C twin moose line (approx. length 75km).

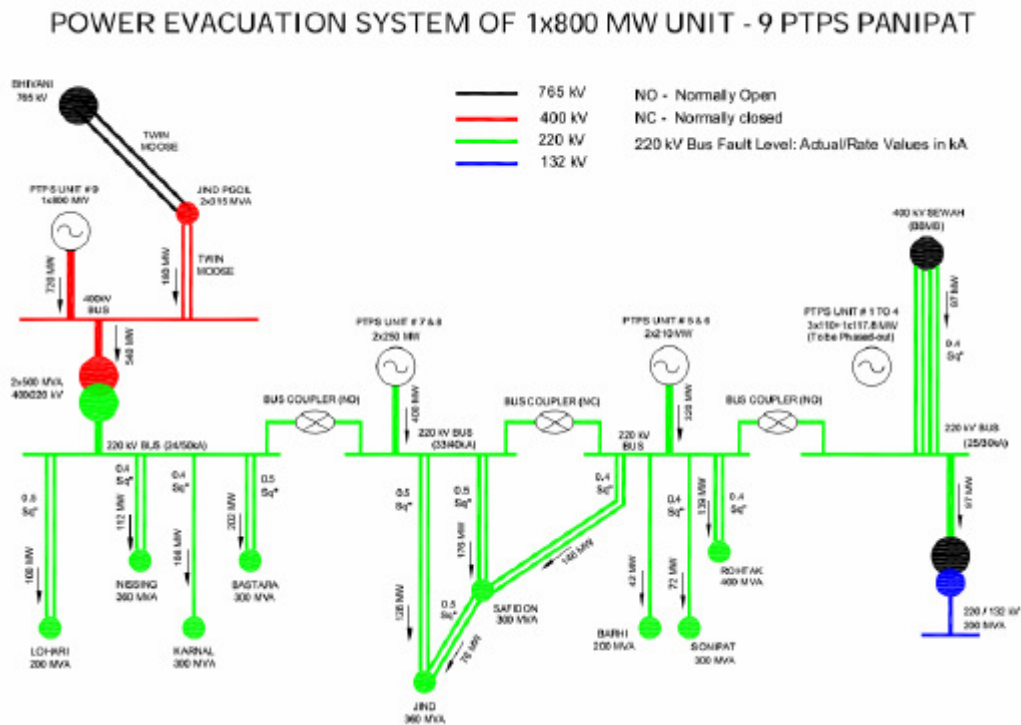
Besides aforesaid 400kV transmission system, following new and existing 220kV transmission system has also been envisaged for evacuation of power from PTPS Panipat unit-9:

3. New 220kV Lohari substation with 2x100MVA, 220/132kV transformers to be fed from 220kV bus-section-III## of PTPS switchyard through 220kV moose D/C line (approx. length 10km)
4. Existing 220kV Nissing and Karnal substation have to be fed from 220kV bussection-III## of PTPS switchyard (Presently, Nissing and Karnal are being fed from 220kV bus-section-IIA##)
5. Existing 220kV Bastara substation to be fed from 220kV bus-section-III## of PTPS switchyard through new D/C line
6. Clubbing of bus-section-I, IIA and IIB of Unit-1 to 8 switchyard

Note: ##

- 220kV PTPS Panipat Bus-section-I
- Unit-1 to 4 connected 220kV PTPS Panipat Bus-section-IIA
- Unit-5&6 connected 220kV PTPS Panipat Bus-section-IIB
- Unit-7&8 connected 220kV PTPS Panipat Bus-section-III
- Unit-9 connected through 2x500MVA, 400/220kV ICTs

19.3. Considering the above transmission elements , load flow studies have been carried out and it was found that loading on various lines are generally in order and as such, there is no overloading on any line except in interconnecting line between Unit-1-4 and Unit-5-8 (about 310 MW). It was also found that the fault level at the 220kV Panipat bus-section connected to Unit-1 to 8 is 54 kA, which is higher than its maximum capacity of 30 kA and power flow through 400 kV PTPS – Jind D/C line was about 190 MW. The high fault level at 220kV bus connected with Unit-1 to 8 was discussed with HVPNL official. Subsequently, the bus arrangement was revised in consultation with HVPNL to contain the fault current. The revised proposed bus arrangement at 220kV circuits is given as under:



19.4. With above bus arrangement, the modified transmission system for evacuation of power from the proposed 1x800MW at PTPS Panipat (Unit-9) is as under:

- (i) 2x500MVA, 400/220kV ICTs 2. New 400kV at PTPS (Unit-9) – 400kV Jind (PGCIL) D/C twin moose line (approx. length 75km) Besides aforesaid 400kV transmission system, following new and existing 220kV transmission system has

also been envisaged for evacuation of power from PTPS Panipat generating station:

- (ii) New 220kV Lohari substation (2x100MVA, 220/132kV ICTs) fed through 220kV PTPS – Lohari moose D/C line (approx. length 10km)
- (iii) Existing 220kV Nissing and Karnal substation fed from 220kV bus-section III## of PTPS
- (iv) Existing 220kV Bastara substation fed from 220kV bus-section-III## of PTPS through new 220kV PTPS – Bastara D/C line
- (v) Existing 220kV Sonipat and Barhi substation to be fed from 220kV bus-section-IIA## of PTPS. Further, in view of ageing of PTPS Unit-1 to 4, these may be decommissioned.

19.5. With the above modified configuration, load flow study has been carried out. It was found that the loading on various lines are generally in order. Diagram for power evacuation system of 1x800 MW Unit-9 PTPS Panipat along with respective power flow and actual and rated fault level at each 220 kV PTPS bus is shown above. The fault level at the various 220kV Panipat buses connected to Unit-1 to 4, Unit-5 to 8 and Unit-9 are 25kA (Maximum capacity 30kA), 33kA (Maximum capacity 40kA) and 24kA (Maximum capacity 50kA) respectively and power flow through 400 kV PTPS – Jind D/C line is about 180 MW.

19.6. As such, the proposed transmission system for evacuation of power from the proposed 1x800MW at PTPS Panipat (Unit-9) with the modified bus arrangement is in order. HVPNL has suggested to request PGCIL for 2 nos. of 400kV line bays at its Jind sub-station for termination of 400 kV PTPS – Jind D/C line. POWERGRID stated that these works would be carried out on deposit work on behalf of HVPNL subject to availability of space at Jind. It is also suggested that HVPNL may change the mode of bus coupler (i.e. from NO to NC or vice versa) between each 220kV bus-section of PTPS as per operational requirement to feed power to connected loads.

The above proposal was agreed by the committee. The committee also agreed for the provision of 2 nos. of 400 kV bays at 400 kV Jind (PG) S/S.

Additional Agenda

20. LILO of 220kV D/C Bhakra – Jamalpur line of BBMB for proposed 220 kV Sub-station at Tahliwala of HPSEBL

20.1 Director (SP&PA), CEA stated that Himachal Pradesh State Electricity Board Limited (HPSEBL) has proposed for LILO of 220kV D/C Bhakra – Jamalpur line at Tahliwal S/S for up-gradation of 132kV Tahliwal sub-station to 220kV level. The proposed 132/220kV Tahliwal sub-station would be LILOed at 16 km from Bhakra end. The power drawl by HPSEBL from the 220kV Bhakra – Jamalpur line shall be 80 MVA only. HPSEBL shall be installing 2 nos. 220/132kV, 80/100 MVA ICT on the said sub-station.

20.2 It is also known that re-conductoring of 220kV D/C Bhakra – Jamalpur line with AAAC 465 mm conductor is under process by BBMB through PSTCL. The above re-conductoring with AAAC 465 mm conductor was necessitated to take care of the proposed connection of one no. Bhakra (Left) machine after its uprating from existing 108 MW to 126 MW based on the load flow study done in year 2003 ending Xth Plan by CEA.

20.3 Based on the above information furnished by BBMB, the load flow study has been carried out considering the system proposed by Punjab State Transmission Corporation Limited (PSTCL) to check n-1 contingency condition with 2017 Plan conditions in the event of proposal of HPSEBL to draw 80 MVA load after LILO of 220kV D/C Bhakra – Jamalpur line at Tahliwal. Further, as informed by BBMB, one machine of Bhakra (Left) of 126 MW has been taken on Bhakra (Right) bus and following networks from Bhakra (Right) has been considered:

- 220kV Bhakra (Right) – Jamalpur D/C line
- 220kV Bhakra (Right) – Ganguwal D/C line
- 220kV Bhakra (Right) – Mahilpur D/C line

20.4 From the result of the study, loading of the line from Bhakra (Right) are as under

Sl. No.	Line	Line Loading (MW)
1	220kV Bhakra (Right) – Jamalpur D/C line	340
2	220kV Bhakra (Right) – Ganguwal D/C line	210
3	220kV Bhakra (Right) – Mahilpur D/C line	320

20.5 Considering the power requirement of HPSEBL of 80 MW from Tahliwala and further discussion with Director (Technical), HPSEBL, the following changes has been made in 220kV Bhakra (Right) – Jamalpur D/C line:

- (i) 220kV Bhakra (Right) – Tahliwala D/C line with HTLS conductor (cost to be borne by HPSEBL)
- (ii) 220kV Tahliwala – Jamalpur D/C line with AAAC conductor (as a part of re-conductoring program of 220kV Bhakra (Right) – Jamalpur D/C line)

20.6 With the above changes, studies has been again carried out (Diagram shown below) and it is observed that loading on 220kV Bhakra (Right) – Tahliwala D/C line is 390 MW. With the outage of one circuit of 220kV Bhakra (Right) – Tahliwala D/C line, loading on the 2nd circuit of 220kV Bhakra (Right) – Tahliwala D/C line becomes very high (about 345 MW).

20.7 Director (SP&PA), CEA stated that the HPSEBL has agreed for LILO of 220kV Bhakra (Right) – Jamalpur D/C line at Tahiliwala with HTLS conductor and also for re-conductoring the portion of the line between Bhakra(R) –LILO point with HTLS conductor at their own cost. They have also agreed for restricting the load at Tahiliwala to 80 MW only by installing SPS at Tahiliwala end. He stated that with this provision, there would be no problem on the 220kV Bhakra (Right) – Jamalpur D/C line due to the drawl by HPSEBL. Problem of over loading would arise only in case of N-1 contingency outage on Bhakara – Tahiliawla line. Even if LILO at Tahiliwala is not done, the problem under N-1 contingency would still persist.

20.8 Considering the fact that even with re-conducoring of 220kV Bhakra (Right) – Tahliwala D/C line with AAAC conductor and without any drawal at Tahliwala, loading on 220kV Bhakra (Right) – Jamalpur D/C line remain high and outage of one circuit of this line would led to heavy overloading of 2nd circuit of 220kV Bhakra (Right) – Jamalpur D/C line. As such BBMB is advised to take one additional Double Circuit from Bhakara(R) in case of shifting of 126 MW Bhakra (L) machine to Bhakra(R).

20.9 In view of the above, it is observed that

- (i) In case HPSEBL desires to draws 80 MW power at Tahliwala, LILO of 220kV Bhakra (Right) – Jamalpur D/C line at Tahiliwala and re-conductoring of the portion

- of the line between Bhakra(R) –LILLO point with HTLS conductor be carried out by HPSEB at their own cost .
- (ii) HPSEB should restrict the loading on the LILLO portion to 80 MW by installing SPS.
 - (iii) If one generator of Bhakra (Left) to be operated from Bhakra (Right), than, there is a strong need for constructing another D/C line from Bhakra (Right).

The members of the committee agreed with the above proposal.

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

21.1 Rihand- Dadri HVDC Bi-pole is operating at 1500MW capacity since 1992. Based on the operational feedback from POSOCO, CTU proposed that the capacity of the bipole can be enhanced by 1000MW by utilizing the existing additional loading capability margin available on the HVDC bipolar transmission line. The thermal capacity of ± 500 kV HVDC Quad bersimis conductor line for maximum conductor temperature of 70°C at 45°C ambient temperature is approx. 2350MW. Further, at ambient temperature below 43°C, the thermal capacity can be higher than 2500MW. In view of above, 2X500MW parallel converters at Rihand and Dadri HVDC station were proposed. POWERGRID stated that augmentation of NTPC Bus bar, connectivity at Rihand- Dadri terminal and up-gradation of existing control and protection of Rihand- Dadri HVDC bi-pole link would be required. However, with no extra land/ transmission line requirement, the continuous 1000MW additional capability of the bi-pole can be used during any exigency and would provide operational flexibility.

21.2 Constituents agreed to the proposal in-principally. However, HVPNL stated that life of HVDC terminals is about 25 years and enquired about the future plans of existing utilisation of HVDC terminals at Dadri and Rihand ends. POWERGRID stated that R&M for Rihand Dadri is being planned and upgradation can be taken up along with that.

21.3 It was decided that a comprehensive detailed proposal would be prepared for consideration in the next standing committee meeting.

22. LILLO of Dehradun-Bagpat 400kV D/C line at Saharanpur under NRTSS

22.1 POWERGRID stated that in order to strengthen the power supply arrangement in Western UP area, the following transmission elements were taken up for implementation by POWERGRID under various strengthening schemes:

- 400kV Dehradun- Bagpat D/C line (under NRSS XVIII)
- 400kV Roorkee-Saharanpur D/C line (Under NRSS XXI)
- LILO of 400kV Dehradun -Bagpat at Saharanpur (Under NRTSS)

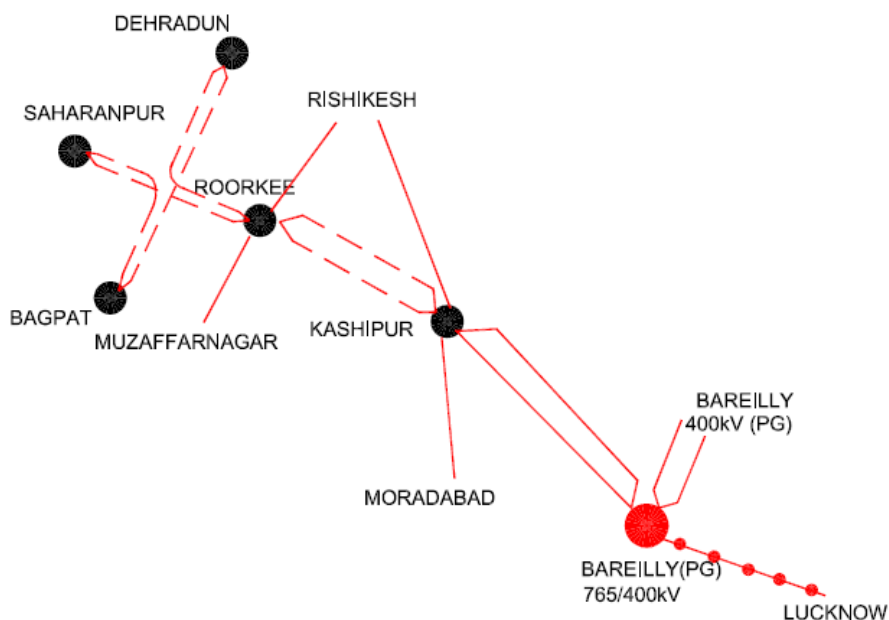
22.2 POWERGRID stated that they faced stiff resistance from farmers especially in Saharanpur, Muzafarnagar, Bagpat, Shamli and Meerut and work was almost stopped from Jan.'11. In order to resolve the issue of R-o-W, a meeting was taken by Special Secretary, Ministry of Power, wherein POWERGRID requested for deployment of police force by the DM (Saharanpur) so that work can be initiated. Keeping in view severe R-o-W issue and public protest, DM (Saharanpur) opined that POWERGRID may drop LILO of 400kV Dehradun-Bagpat D/C Line at Saharanpur and assured to provide police force for completion of other two lines.

22.3 Considering the prevailing severe RoW problem in Saharanpur and importance of commissioning of Saharanpur substation for meeting the load demand in Western UP, POWERGRID proposed that commissioning of Saharanpur 400/220kV substation may be taken up by constructing Roorkee-Saharanpur 400kV D/C line and implementation of the LILO of 400kV D/C Dehradun-Bagpat Line at Saharanpur may not be taken up. Members agreed to the above.

22.4 Further, it was deliberated that though load requirement at Saharanpur can still be met, yet reliability shall be a concern as without the LILO at Saharanpur, the Saharanpur substation would be radially connected to the ISTS grid. Therefore, two alternate arrangements at Saharanpur shall be required. Considering the situation, two alternate re-arrangements at 400kV Saharanpur substation were studied and Alternative-II was proposed. Alternative II comprises of 400kV Roorkee-Dehradun S/C, 400kV Roorkee-Saharanpur S/C, 400kV Saharanpur-Bagpat S/C and 400kV Dehradun- Bagpat S/C lines after the re-arrangement.

22.5 A schematic diagram of the Alternative-II is given below:

Re-orientation at Saharanpur- Alternative II



Members of the committee agreed to the proposal.

23. POSOCO report on Operational Feedback on Transmission Constraints

Operational feedback given by POSOCO and the remedial measures for the constraints were discussed and are described below:

23.1. High loading in 400kV Dadri Muradnagar line in Western UP during peak loading condition.

23.1.1. During low hydro generation and increased load in Western UP, 400kV Dadri-Muradnagar gets overloaded with high MW and MVar loading. POWERGRID stated that the issue has been raised in earlier meetings also and additional 765kV substations such as Hapur and Greater Noida have been planned by UPPTCL which will relieve the constraint. POWERGRID requested UPPTCL to update the status of the substations.

23.1.2. UPPTCL stated that the overloading issue is mainly for Muradnagar S/s for which a new 400kV Muradnagar-II substation is under implementation and would be commissioned by Aug.'15. With the commissioning of Muradnagar-II substation there would be realignment of the feeders and the over loading issue would be resolved. For the reactive power drawal, Discoms in Western UP have been advised to install capacitors of 2200MVar capacity under transmission head to which the Western UP Discoms have agreed.

Committee noted the same.

23.2. All time high loading in Dadri-Greater Noida 400kV line

23.2.1. CTU, POWERGRID stated that 400kV Dadri- Greater Noida remains overloaded all the time. The issue has been earlier discussed in 31st and 33rd Northern Region Standing Committee meetings wherein 2X500MVA 400/220kV G.Noida (New) GIS substation and 400kV Ballabhgarh - G.Noida (New) D/C line were agreed. UPPTCL stated that in view of the 765/400 kV Greater Noida (UPPTCL) substation under implementation, additional 400/220kV substation at Greater Noida is not required. UPPTCL also stated that 765/400 kV Greater Noida would be commissioned by Oct.'15 and 765/400 kV Hapur substation is expected by Dec.'15. For connectivity to G. Noida S/s, UPPTCL requested that Mainpuri -Greater Noida 765kV lines and G. Noida substation are ready and the formal procedure for ISTS connectivity through LILO of Agra-Meerut 765kV line may be intimated for charging the G. Noida substation. It was decided that the regulatory issues may be dealt separately by UPPTCL with CEA, POWERGRID and POSOCO. CTU further stated that drawal arrangement from Greater Noida 765kV Substation also needs to be made alongwith commissioning of Greater Noida Substation.

Committee noted the same.

23.3. High loading in Meerut- Muzaffarnagar 400kV line

23.3.1. During high load in Uttarakhand and UP and low hydro (at Vishnuprayag) in Uttarakhand, 400kV Meerut- Muzaffarnagar line gets overloaded. POWERGRID informed that Bareilly- Kashipur- Roorkee-Saharanpur 400kV (Quad) D/C lines have been taken up by POWERGRID under NRSS-XXI to give relief. 400kV Bareilly- Kashipur has already been commissioned. Kashipur- Roorkee would be commissioned by Oct.'15 and Roorkee-Saharanpur is expected to be commissioned by Mar'16.

Committee noted the same.

23.4. All time high loading in 400kV Singrauli- Anpara 400kV S/C line

23.4.1. POWERGRID stated that due to low generation at Anpara and high generation at Rihand - Singrauli complex, 400kV Singrauli- Anpara S/C often gets overloaded upto 900MW. In the 34th Standing committee meeting of NR, Rihand- Anpara 400kV D/C line had been proposed for relieving the constraint. The line was initially proposed by UPPTCL.

23.4.2. To address the N-1 contingency and to relieve all-time high loading of the S/C line, POWERGRID again proposed 400kV Rihand- Anpara D/C line. As seen in the load flow studies, the proposed line helps in interconnecting the two generating complexes in addition to relieving the high loading of the 400kV Singrauli- Anpara S/C line. However, UPPTCL agreed to the alternate suggestion of POSOCO of uprating the 400kV Singrauli- Anpara line capacity by re-conductoring the line.

23.4.3. CTU stated that the uprating may not be considered as an option as already the line is not N-1 compliant. Uprating such a highly loaded line would require shutdown of the line for a longer period. POSOCO stated that shutdown of Singrauli-Anpara line may lead to backing down of Rihand, Singrauli and Vindhyachal generating stations. UPPTCL did not agree to the proposal of the 400kV Rihand- Anpara D/C line considering that it would further aggravate the high short circuit level at Anpara. **It was discussed that the short circuit level at many substations in NR grid has increased for which suitable measures to control short circuit level would be proposed for consideration of the constituents in the next standing committee meeting of NR.**

The proposal of the 400kV Rihand - Anpara D/C line may be considered alongwith the solution for high fault levels in Rihand, Singrauli, Anpara, Obra generation complexes.

23.5. All time high loading in 400kV Unnao- Panki 400kV S/C line

23.5.1. **POWERGRID** stated that the line is loaded up to 600-700MW and is connected to Anpara(C)-Unnao 765kV S/C line which is usually loaded to 900-1000 MW depending upon Anpara-C generation. To relieve the constraint, a strong 400kV D/C inter-connection between Kanpur and Lucknow was planned under NRSS XXXII in the 34th Standing Committee Meeting of Transmission Planning of Northern Region. Kanpur -Lucknow 400kV D/C line is expected by June' 16.

Committee noted the same.

23.6. High loading on 400kV Anpara-Obra, 400kV Anpara-Mau & 400kV Anpara-Sarnath-I&II transmission lines

23.6.1 The lines are connected to generating station (Anpara-B & C). UPPTCL stated that transmission system is delayed causing the congestion. UPPTCL informed that the Anpara – Unnao line would be available by Oct.’15.

Committee noted the same.

23.7. 400kV Rosa-Bareilly line

23.7.1. POWERGRID informed that Shahjahanpur substation has been completed. POSOCO stated that Rosa TPS is still directly connected to Lucknow Bareilly and the termination at Shahjahanpur substation through the LILO portion of Lucknow- Bareilly has to be done. For downstream connectivity at Shahjahanpur, UPPTCL informed that Shahjahanpur- Hardoi 220kV line is under construction and is likely to be commissioned by Nov.’15.

Committee noted the same.

23.8. High loading on 400kV Singrauli- Lucknow line

23.8.1. It was discussed that 400kV Singrauli- Lucknow line is an old and long line of 408.6 km with twin moose conductors. Its loading remains in the range of 450-550 MW. POSOCO had proposed that LILO of Singrauli- Lucknow at Unchahar would decrease the line length of Singrauli- Lucknow and also enhance the connectivity of Unchahar. However, CTU (Planning) stated that Unchahar is already connected to Fatehpur. Alternately, it was suggested by CTU to LILO the line at new 765/400kV Allahabad substation which would be en-route the line.

Members of the committee agreed to the proposal.

23.9. HVDC Mundra Mahindergarh bipole power order-Mohindergarh Bhiwani

23.9.1. CTU stated that two nos of 400kV outlets exist from HVDC Mundra Mahindergarh bipole. Loadability of HVDC is being restricted. Already two more 400kV Mahindergarh-Bhiwani lines have been approved, the commissioning of which needs to be expedited. The bays at both ends are ready. Lines are to be implemented under TBCB. RfP documents were issued in

April'15. Only one bidder has purchased the RfP documents and Bid submission date has been extended by 2 months. The 40-50km short line is critical. CEA agreed to expedite the process.

Members of the committee noted the same.

23.10. Underlying 220kV network of Bhiwadi

23.10.1. POWERGRID stated that 400/220kV Bhiwadi has three ICTs($3 \times 315 = 945$ MVA). The 220kV network connectivity at Bhiwadi is Bhiwadi-Bhiwadi Raj D/C, Bhiwadi-Khuskhera D/C, Bhiwadi - Rewari (Bus split) and Bhiwadi-Mau. Import of power from Haryana is restricted through bus split. 220kV Bhiwadi-Bhiwadi Raj D/C always loaded to about 200MW each. Any N-1 contingency at 220kV network would cause further tripping at 220kV Bhiwadi.

23.10.2. The issue was also discussed in 33rd Standing Committee Meeting of Power System Planning of Northern Region held on 23/12/13. RVPN had stated that the load at Bhiwadi would soon be diverted to Neemrana and Alwar which were going to be commissioned. POSOCO informed that some load has come at Alwar. RVPNL was requested to intimate the planned system and the status to CEA and CTU.

Members of the committee noted the same

23.11. Non availability of downstream network of the listed substations and under utilization of ICTs

23.11.1. POWERGRID stated that 220kV network is required at the following substations:

- Haryana: Manesar (lines partly commissioned-Mau and Badshahpur), Bhiwani and Jind (lines to be commissioned in 1 year)
- Rajasthan: Kotputli, Neemrana and Jaipur South - Commissioned
- UP: Sohawal (Sohawal 1 year, Tanda Oct 15, Barabanki 1 year), Shahjahanpur (Oct. 15)
- Jammu & Kashmir: New Wanpoh and Samba
- Delhi: Mundka (additional drawal required)
- Haryana: Sonapat (partly being utilised due to less load)
- Punjab: Makhu (partly commissioned)

23.11.2. STUs were requested to inform the planned augmentation at these substations and the status to CEA and CTU.

Members of the committee noted the same.

24. ICT Constraints in Northern Region:

24.1. It was agreed to use the earlier 4x315 MVA dismantled ICTs from Ballabgarh and Mandola, wherever required, provided useful life is remaining.

24.2. POWERGRID stated that Agra UP has three ICTs of 315MVA each out of which one ICT has been replaced with 500MVA ICT. The present total transformation capacity is 1130 MVA. However, the power flow over the three ICTs is about 950 MW (for three ICTs in parallel). Since the maximum loading should be 80% of the rated capacity, the same is not n-1 compliant. Accordingly, an additional 1X315MVA, 400/220 kV ICT at Agra (PG) has been planned under NRSS XXXIV and is expected to be commissioned by July '17. POWERGRID was requested to expedite the addition of ICT.

24.3. The loading on the three nos. of 315 MVA ICTs at Bhiwadi is in range of 700 MW and underlying network of Bhiwadi is also constrained due to skewed loading at Bhiwadi, Rajasthan. The issue has been discussed in 33rd Standing Committee meeting of Northern Region held on 23/12/13, in which RVPNL had stated that the load at Bhiwadi would soon be diverted to Neemrana and Alwar which are going to be commissioned. RVPNL was requested to inform the planned augmentation and the status to CEA and CTU.

24.4. It was discussed that there is all time high loading at Mandola and Ballabgarh ICTs. There are four ICTs of 315MVA each, total loading is 950-1000MW (for four ICTs in parallel, for which the max. loading should be 80% of rated capacity) which is not n-1 compliant. POWERGRID stated that the augmentation of transformation capacity at 400/220kV Mandola and Ballabgarh substations by replacing existing 4x315MVA ICTs with 4x500MVA ICTs has already been planned under NRSS-XXXII. The ICT augmentation at Mandola and Ballabgarh is expected by Jun.'16.

24.5. POWERGRID stated that load drawal from New Wanpoh substation was required to relieve the loading at Srinagar (Wagoora). In winter, Kashmir Valley load is being fed through Wagoora ICTs (4X315MVA) and the total loading of ICTs is in the range of 1000 MW. J&K may be requested to inform the planned augmentation of downstream system of New Wanpoh S/S and the status to CEA and CTU.

24.6. It was discussed that all the three ICTs (2X240 MVA & 1X315 MVA) at Muradnagar are not n-1 compliant as these remain fully loaded all the time with total loading in the range of 800-900MW. There is a need for commissioning additional substations at Saharanpur, Hapur etc. in Western UP. POWERGRID stated that Saharanpur S/s is expected by Oct.'15. UP informed that Hapur S/s is expected to be commissioned by Dec.'15.

24.7. POWERGRID stated that there is a network on security issue of Anpara - Unnao line under n-1 contingency as evacuation of Anpara-(C) TPS is through 765kV Anpara - Unnao 765kV S/C line and 2X1000 MVA 765/400kV ICTs at Unnao. UPPTCL informed that the 765/400 kV ICTs of Unnao would be available by March'16 and Unnao - Mainpuri 765kV line is expected by Dec.'15. UPPTCL was requested to inform the detailed status to CEA and CTU.

24.8. POWERGRID stated that there is a single ICTs at the following 400kV Nodes in Bikaner, Barmer, Chhabra, Kalisindh and Rajwest substations of RRVPNL; Dehar and Bhiwani substations of BBMB and Gorakhpur substation of UP. STUs were requested to inform the planned augmentation for each of the substation and the status to CEA and CTU.

25. Establishment of new 400/220kV substations in Northern Region:

25.1. POWERGRID informed the capacity and expected schedule of the new 400/220kV substations which are under implementation under various transmission schemes. These are 400/220kV Kurukshetra(GIS), Dehradun, Bagpat(GIS), Saharanpur, Rajghat(GIS), Papankalan-I(GIS), Tughlakabad(GIS), Kala Amb, Amargarh, Patran, Kadarapur(GIS), Sohna Road(GIS), Prithala(GIS) and Jauljivi and 220/66kV GIS S/s at Sector 47, Chandigarh.

25.2. POWERGRID requested for implementation of adequate 220kV downstream transmission system by the States in matching time frame for utilization of the above ISTS substations.

25.3. STUs noted the above and agreed to inform the planned 220kV transmission system from these substations and their status to CEA and CTU in the next SCM.

25.4. PSTCL informed that for Patran no work has been initiated on site and 8 no. of bays are required which needs to be confirmed with the developer.

25.5. Director (SP&PA), CEA stated that the project developer is required to construct 8 no. of 220 kV bay. A meeting with the transmission developer was proposed to review the progress of the substation.

Members of the committee agreed for the same.

26. Provision of 400/220 kV ICTs at Parbati Pooling Station

26.1. POWERGRID stated that 2 nos. of 400/220kV, 315MVA ICTs (7x105 MVA single phase units) at Parbati Pooling Station alongwith 2 nos. of 220 kV line bays are expected to be commissioned by Jun.'16. HPPTCL was requested to intimate the 220kV connectivity at Parbati Pooling Station and its status. HPPTCL stated that 220kV Chaur line has been awarded and would be commissioned by Oct.'16. HPPTCL was requested to expedite the same so as the 220kV bays does not remain unutilized.

27. Overloading of Transformation Capacity:

27.1. Raebareli 220/132 kV substation:

27.1.1. POWERGRID stated that all three 100 MVA transformers at Raebareli remain critically loaded in the range of 90 MW each. Considering the present loading of Raebareli ICTs, in 34th Standing Committee meeting of NR held on 3/11/2014, it was proposed to replace two nos. of 100 MVA, 220/132 kV ICTs with two nos. of 200 MVA ICTs as space is not available for providing additional ICT. However, UPPTCL had committed to divert the loads from Raebareli S/S. UPPTCL was requested to update the status.

27.1.2. After deliberations, UPPTCL stated that in case POWERGRID desires, they may change the ICTs. POWERGRID stated that replacement of ICTs would involve investment and in case UPPTCL can divert the loading on ICTs, it would be a better option.

Members noted the same.

27.2. Varanasi 765/400 kV substation:

27.2.1. It was discussed that the existing 400/220kV ICTs at Sarnath (UP) substation are critically loaded. A 765/400kV Varanasi substation is being established under transmission

scheme of IPPs of Jharkhand and West Bengal. In 34th Standing Committee Meeting of NR held on 3/11/14, POWERGRID had proposed to provide 2 nos. of 500MVA, 400/220kV ICTs at Varanasi 765/400kV S/S. However, UPPTCL had committed to divert the loads from Varanasi S/S. UPPTCL was requested to update the status.

27.2.2. UPPTCL intimated that Aurai S/S is going to be commissioned shortly. Also, Jaunpur substation has been planned to cater to the load in Varanasi and Azamgarh area and it is proposed to be connected to Varanasi 765/400kV Substation during 13th Plan period. Accordingly, UPPTCL stated that ICT augmentation is not required at Varanasi. UPPTCL was requested to inform the detailed status to CEA and CTU.

Members noted the same.

28. Staggering of commissioning of new 400kV Substations in Gurgaon area.

28.1. POWERGRID stated that in the 35th Standing Committee meeting on Power System Planning in Northern Region held on 3/11/2014, one no of 400/220kV substation at Prithala S/S in Palwal area and two nos. of 400/220kV substations at Sohna Road and Kadarapur in Gurgaon area have been approved. The associated 400kV transmission lines were envisaged as Quad lines. However, considering the small length of the lines, POWERGRID proposed that the lines may be constructed with HTLS conductor and a 125 MVar Bus Reactor be included each at Kadarapur, Sohna Road & Prithala S/S. Members agreed to the same.

28.2. Further, it was informed that in the 34th Empowered committee meeting held on 13/4/15, it was enquired whether the construction of the two substations proposed in Gurgaon area at Sohna Road and Kadarapur areas could be staggered. HVPNL stated that Prithala substation does not serve Gurgaon. The 400/220kV, 2X500MVA substations in Gurgaon at Sohna Road and Kadarapur would serve two different areas and both are essential. Accordingly, it was agreed that both Kadarapur and Sohna Road substations are to be implemented together and are not to be staggered. Accordingly, all three sub-stations shall be taken up simultaneously.

Members agreed for the same.

29. NRSS XXXI- B –Extn. of 400kV Malerkotla -Indoor GIS bays

29.1. POWERGRID stated that Kurukshetra – Malerkotla - Amritsar 400kV D/C line is being implemented under TBCB under NRSS-XXXI-B. The associated 400kV bays are to be implemented by POWERGRID. While taking up the implementation of the 400kV bays at Malerkotla, it was observed that adequate space is not available for accommodation of 4 nos. of AIS bays at Malerkotla switchyard. Accordingly, in the 34th Meeting of Standing Committee on Power System Planning of Northern Region, the 4 nos. of 400kV GIS bays at Malerkotla were mentioned as outdoor GIS bays. However, POWERGRID informed that considering the pollution and dustfree requirements of the GIS bays, presently the 4 nos. of bays at Malerkotla are being implemented as indoor GIS bays.

Members agreed for the same.

30. Standardisation of OPGW in lieu of One Earth wire in all Transmission lines.

30.1. POWERGRID stated that the Power System requirement for Communication is increasing multifold due to special protection schemes:

- (i) Increasing data reporting to Load Dispatch Centre.
- (ii) Phasor measurements based data collection and reporting.
- (iii) Remote monitoring/operation of sub-station/elements.
- (iv) Differential protection on Lines

30.2. The practice of putting fibre in select lines lead to situation where station connectivity is held up due to either identified line delay, LILO of under construction line etc. OPGW installation on existing lines is taking long time/ delayed due to shut down, ROW issues as well as capacity constraints of executing agencies.

30.3. Accordingly, POWERGRID proposed to include one 24 Fibre (OPGW) in all new transmission lines including transmission lines to be implemented under TBCB route which will ensure availability of wideband communication from all substations to cater bandwidth for various power system applications for which communication equipment (SDH–STM-16) shall be provided at all upcoming substations.

Members agreed to the above proposal.

31. Transmission system for GHAVP Nuclear Power Plant (2X700MW) of M/s NPCIL in Haryana.

31.1. CTU informed that an application was received in November, 2014 for connectivity and Long Term Access for 1400 MW from upcoming Nuclear power generator (2X700MW) of M/s NPCIL for Gorakhpur Haryana Anu Vidyut Pariyojna (GHAVP) located at Fatehabad, Haryana. Connectivity has been sought w.e.f. Sep, 2020. Target Beneficiaries as mentioned in the application is Northern Region.

31.2. Director, HVPNL informed that the total plant capacity of NPCIL plant is 4x700 MW (2800 MW) out of which they have already signed PPA for 1400 MW. The balance power tie-up is to be confirmed by NPCIL. HVPNL during the meeting held on 13/07/2014 had informed that for transfer of 2800 MW of power the proposed scheme may require change.

31.3. However, the Connectivity and LTA application was being processed by CTU as per the capacity mentioned in the application received. Therefore, the committee advised that NPCIL may resolve the matter with HVPNL and confirm the capacity for which the evacuation system has to be planned by CTU at the earliest so that same can be discussed in the next Standing Committee and Connectivity/LTA meeting. It was agreed that NPCIL and HVPNL would discuss the issue and send their response within a month.

32. Connectivity to Railway with ISTS network

32.1. POWERGRID stated that Indian Railways has sought connectivity at different stations throughout the country. Railways vide letter dated 11/6/2015, have informed that in the report of “Energy Plan for Indian Railways” by CEA, it has been recommended that ‘for connecting its existing or future TSS with the ISTS, Railways is a deemed Transmission Licensee and is not required to formally apply to CTU. However, they would have to communicate their connectivity requirement to CEA and CTU for consideration in the integrated planning for ISTS. In view of above, Indian Railways has requested for connectivity to draw power from the following ISTS points in Northern Region at 220kV level viz. 400/220kV Agra (PG), Mainpuri (PG), Kanpur (PG), Fatehpur (PG) and Saharanpur (PG).

32.2. Members were of the view that Railways would seek 220kV corridor for small quantum of power at about every 500 metres which cannot be agreed looking at the R-o-W considerations.

Further, the supply would be two phase and unbalanced loading would affect the grid. Accordingly, the same was not agreed to by the constituents. **It was decided that a separate meeting may be convened by CEA with Railways and CTU for detailed analysis of the proposal and the matter may be deliberated in the next Standing Committee meeting.**

Members of the committee agreed to the same.

33. Any Issue with the permission of chair.

33.1. It was proposed that keeping in view the need for conducting the Standing Committee Meeting at every 3-4 months interval (as per the timeline prescribed by MoP) and difficulty in seeking the venue for the Standing Committee Meeting on Power System Planning in Northern Region, the meetings shall be hosted by Northern Region Constituents on a rotational basis. This was agreed to by all to hold the meeting in rotation in alphabetical order as under:

1. BBMB	9. NPCIL
2. Department of Power-UT of Chandigarh	10. PGCIL
3. Delhi Transco Limited	11. PSTCL
4. HPPTCL	12. RRVPNL
5. HVPNL	13. THDC Ltd.
6. PDD, J&K	14. PTCUL
7. NHPC Ltd.	15. UPPTCL
8. NTPC Ltd	

Meeting ended with a vote of thanks to the Chair

Annexure - I**List of the Participants for the 36th meeting of the Standing Committee on Power System Planning of Northern Region held at 11:00 Hrs. on 13th July 2015 at NRPC, Katwaria Sarai, New Delhi**

S.No.	Name Shri/Smt.	Designation	Mobile No.	Email
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Phase I

- (i) Creation of 220/33 kV S/s Jauljivi by PTCUL by LILO of one circuit of 220kV Dhauliganga-Pithoragarh (PGCIL) line at 220kV S/s Jauljivi (PTCUL).

Phase II.

- (ii) Creation of 400/220kV, 2X315MVA GIS Substation in Jauljibi area under ISTS by LILO of both ckt. of 400 kV Dhauliganga-Bareilly (PGCIL) line charged at 220 kV at Jauljibi (ISTS). The 400 kV Jauljibi S/S should have the following provisions:

400 kV side

- (a) 4 nos. of 400 kV line bays
- (b) 2 nos. of 400 kV ICT bays
- (c) Space provision for 2 future bays

220 kV side

- (a) 6 nos. of 220 kV line bays
- (iii) 220 kV Jauljibi (PTCUL) under Phase I would be connected to Jauljibi (ISTS) 400/220kV substation through 220 kV D/C line. (line and the S/S under PTCUL scope)
- (iv) The existing link of Dhauliganga-Pithoragarh (PGCIL) line at 220KV Jauljibi S/s would be disconnected.
- (v) 220 kV GIS substation at Almora and its associated 220 kV D/C Almora - Jauljibi 400/220kV GIS Substation.
- (vi) Disconnection of 220 kV LILO of Dhauliganga - Bareilly at Pithoragarh and connection of Pithoragarh to Baram (Jauljivi) 400/220 kV S/s.
- (vii) Due to transportation limitations in the hilly terrain in Uttarakhand, in place of 2X315MVA, 400/220kV 3 phase ICTs, 7X105MVA single phase ICTs may be considered at 400/220 kV Baram(Jauljivi) substation.
- (viii) 2 X 63MVAr switchable line reactors in Bareilly - Baram (Jauljivi) 400kV D/C at Baram (Jauljivi) 400/220kV end is proposed for providing voltage control at Jauljivi end under various operating conditions. These 63MVAr line reactors shall be taken up as single phase units, if required.
- (ix) 2 Nos. of 400kV bays at Bareilly(PG) to be included in the scope for Bareilly-Baram(Jauljivi) 400kV D/C line
- (x) One no. of 220kV sectionaliser alongwith an associated bay at 400/220kV Baram Substation is proposed for reliability in accordance to the Transmission Planning Criteria of CEA.