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विद्युत मंत्रालय / Ministry of Power
केन्द्रीय विद्युत प्राधिकरण / Central Electricity Authority
विद्युत प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग - I
Power System Planning & Project Appraisal Division-I
सेवा भवन आरण कण पुरम नई दिल्ली-110066
Sewa Bhawan, R. K. Puram, New Delhi-110066



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No. 1/9/37th SCM/2015-PSP&PA-I / 162-181

Dated: 11th February, 2016

सेवा मे/

- सूची अनुसार / As per list enclosed-

Subject: Minutes of 37th Standing Committee Meeting on Power System Planning of Northern Region held on 20th January 2016, at NRPC, Katwaria Sarai, New Delhi.

महोदय/ महोदया
Sir/ Madam,

The 37th Standing Committee Meeting on Power System Planning of Northern Region held under the Chairmanship of Member (PS), CEA on 20th January 2016, at NRPC, Katwaria Sarai, New Delhi.

The Minutes of the meeting have been uploaded on the CEA website 'http://cea.nic.in/reports/committee/scm/nr/minutes_meeting/37th.pdf' for information and necessary action please.

आपका विश्वासी Yours faithfully,

Chandra
(चन्द्र प्रकाश/ Chandra Prakash) 21/2016
निदेशक/ Director

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|-----|---|-----|--|-----|--|
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Minutes of the 37th Standing Committee Meeting (SCM) on Power System Planning of Northern Region held on 20th January, 2016 (Wednesday) at NRPC, New Delhi

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

Member (Power System), CEA welcomed the participants of the 37th Meeting of the Standing Committee on Power System Planning of Northern Region. He stated that the role of this forum is to deliberate the issues related to transmission planning in a holistic manner and to arrive at decisions in collective wisdom benefitting all.

Chief Engineer (PSP&PA-I), CEA while welcoming the participants stated that the 37th Meeting of the Standing Committee on Power System Planning of Northern Region is being held after more than six months of 36th meeting held on 13th July, 2015. He requested Director (PSP&PA-I), CEA to take up agenda items.

Director (PSP&PA-I), CEA requested the participants to discuss all the issues thread bare and arrive at a consensus decision on each issue.

1.0 Confirmation of the Minutes of the 36th meeting of the Standing Committee on Power System Planning of Northern region held on 13th July, 2015.

1.1 Director (PSP&PA-I), CEA stated that the minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region were issued vide CEA letter No. 1/9/2015/SP&PA/4-22 dated 20th August 2015. Subsequently, observations/ comments have been received from PGCIL, HVPNL and RRVPNL. Accordingly, a corrigendum to the Minutes of the 36th meeting was issued vide CEA letter of even no. dated 30th October 2015. The same are attached at **Annexure – II**.

1.2 Subsequently, UPPTCL vide their letter dated 9th December, 2015 has given certain observations on the minutes of the 36th meeting of the Standing Committee on Power System Planning of Northern Region (SCPSPNR), which are as under:

1.2.1 Para 4.6: WR- NR 765 kV Strengthening Transmission Corridor:

Director (PSP&PA-I), CEA stated that UPPTCL vide their letter dated 9th December, 2015 has proposed modifications in Para 4.6 of the minutes of 36th SCPSPNR meeting. As such, Para 4.6 may be read as under:

4.6 CE, UPPTCL stated that they do not 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 along WR-NR. He pointed out that due to operational problems such as over voltage during peak period and loop flows, there is under-utilization of existing ISTS assets and efforts may be made for proper utilization of the existing assets rather than making huge investments creating new transmission infrastructure. So, UPPTCL stated that the proposed Vindhyachal – Allahabad (New) 765 kV network are subject to review of utilization of existing and already approved network. In fact it was suggested by UPPTCL for connecting Vindhyachal to Eastern Region through 765 kV, 400 kV PGCIL substations say at Balia, Sasaram, etc. to provide source from eastern side.

1.2.2 Evacuation network of Ghatampur (Kanpur) 3x660 MW TPS:

1.2.2.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter No. 877/C.E.(Trans. Plan.)/CEA/TWC Quarries/13th Plan dated 9th December, 2015 has proposed that the following may be corrected in evacuation system of Ghatampur (Kanpur) 3x660 MW TPS:

- (a) Agra ó Ghatampur 765 kV S/C line length is 240 km with 189 MVAR line reactors on each side instead of 320 km S/C line with 189 MVAR line reactors proposed earlier.
- (b) 330 MVAR, 765 kV and 125 MVAR, 400 kV Bus Reactors at Ghatampur TPS to be included.

1.2.2.2 Accordingly, the **modified Evacuation system of Ghatampur (Kanpur) 3x660 MW TPS** is as under:

- (a) 21/765 kV Generator Transformers, 2x1500MVA, 765/400kV & 3x200MVA, 400/132kV ICTs at Ghatampur TPS along with 6-8 nos. of 132 kV bays for outlets.
- (b) Ghatampur TPS óAgra (UP) 765kV S/C Line- 240 km (with Line reactors of 189 MVAR at both ends)
- (c) Agra (UP) -Greater Noida (UP) 765kV S/C Line - 200 km (with Line reactor of 240 MVAR at Agra end)
- (d) Ghatampur TPS - Hapur 765 kV S/C Line - 400 km with line reactors of 330MVAR at both ends.
- (e) Ghatampur TPS ó Kanpur (PG) 400 kV D/C line- 60 km
- (f) 330 MVAR, 765 kV and 125 MVAR, 400 kV Bus Reactors at Ghatampur TPS switchyard.

1.2.2.3 AGM, CTU stated that while discussing the transmission system for Ghatampur TPS, transmission system for connectivity to Bilhaur TPS (2X660MW) of NTPC was also agreed

and the same needs to be mentioned in the SCPSPNR minutes for grant of connectivity to Bilhaur TPS. The connectivity of Bilhaur TPS (NTPC) was agreed to be granted through Bilhaur - Kanpur 400 kV D/C line.

Connectivity of Bilhaur TPS (NTPC):

- Bilhaur - Kanpur 400 kV D/C line

Members agreed to the same.

1.2.3 Modifications in the evacuation system for Lalitpur 3x660 MW TPS:

1.2.3.1 UPPTCL vide their letter dated 9th December, 2015 had stated that long term solution for radial connection of Lalitpur TPS was approved earlier as per CTU proposal in the 32nd meeting of SCPSPNR with LILO of Jabalpur ó Orai 765 kV S/C line at Lalitpur TPS in 2018-19 horizon. UPPTCL also mentioned that a new proposal for creating 400 kV level and connecting Parichha - Orai 400 kV line by LILO at Lalitpur TPS was approved in 36th SCM. Horizon year 2018-19 was not mentioned in minutes for 400 kV system and therefore may kindly be noted.

1.2.3.2 AGM, CTU stated that issue of Lalitpur evacuation was discussed in the last Standing Committee Meeting also and while discussing the transmission system for Lalitpur, members were 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 FACT devices on the Lalitpur-Agra 765kV, 2 X S/C lines and studies for the same had been shared with the constituents. CTU was of the view that the stability would remain a concern with LILO of one circuit of Paricha - Orai 400 kV D/C line. The representative of NRLDC stated that the oscillations in the system would propagate to the integrated grid and the issue needs to be addressed. 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.

1.2.3.3 AGM, CTU further stated that CTU is still in disagreement with the LILO proposal as under contingency the system would not be stable. A joint study for the evacuation system may be carried out for alternate options like anchoring of the Lalitpur generation through Orai at 765kV, if UP so desires. The options may avoid creation of 765/400 kV level at Lalitpur. UPPTCL agreed to the proposal of joint study with CTU.

1.2.4 Item, if any

1.2.4.1 Chief Engineer, UPPTCL stated that the deliberations regarding short circuit levels at various nodes in the northern regions were not recorded in the minutes of 36th SCM. He requested that the same may be incorporated. Further, CEA/ CTU may carry out a detailed study to identify nodes having high short circuit levels and suggest measures to limit the same. He further stated that the construction of sub-station at Pipalkoti remained unresolved. The same may be looked into.

1.2.4.2 Director (PSP&PA-I), CEA stated that the implementation of UITP scheme by PTCUL is being taken up as an agenda item at **Sl. no. 11.0** of this agenda. For the short circuit level, agenda for discussions would be taken up in the next meeting of SCPSPNR.

1.3 As no other suggestion for the modification to the minutes of meeting has been received, the Minutes of the 36th Standing Committee Meeting on Power System Planning of Northern Region along with the corrigendum and the above modifications suggested by UPPTCL are, therefore, confirmed.

2.0 LILO of 220 kV Sarna –Hiranagar –Gladini S/C line at Samba (PG)

2.1 Director (PSP&PA-I), CEA stated LILO of 220 kV Hiranagar ó Sarna S/C line at Samba (PG) was agreed during the 32nd and 33rd meeting of the Standing Committee of Power system Planning of Northern Region and the line is under advanced stage of implementation by Powergrid with commissioning scheduled in March, 2016. JKPDD vide their letter dated 19th October, 2015 submitted that they had requested Powergrid to carry out LILO of 220kV S/C Gladini - Hiranagar section at Samba (Jatwal) S/S instead of LILO of 220kV S/C Sarna- Hiranagar section of 220 kV S/C Sarna- Hiranagar ó Gladini ISTS line, as LILO of 220 kV S/C Gladini - Hiranagar section at Samba (Jatwal) S/S has more benefit and the congestion would also be removed.

2.2 COO, CTU stated that if LILO of 220 kV S/C Gladini - Hiranagar section at Samba (Jatwal) S/S instead of LILO of 220kV S/C Sarna- Hiranagar section of 220kV S/C Sarna- Hiranagar ó Gladini ISTS line is carried out, about 4-5 foundations would be abandoned and the same need to be capitalised in the project cost. CE, PDD, J & K stated that with LILO of Sarna Hiranagar at

Samba, J&K has no benefit and the congestion would also not be removed. Accordingly, the LILO of Sarna -Hiranagar at Samba may be changed to LILO of Gladini - Hiranagar at Samba.

2.3 After deliberations, it was agreed that LILO of 220kV S/C Gladini ó Hiranagar at Samba may be carried out instead of LILO of Sarna ó Hiranagar 220 kV S/C line.

3.0 Loading at Raebareli 220/132 kV S/Station

3.1 Director (PSP&PA-I), CEA stated that due to overloading of the Raebareli 220/132 kV S/Station, UPPTCL has 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 an additional ICT. As proposed by UP, the transformers need to be replaced at the earliest as the loading would further increase in the ensuing summer months.

3.2 CE, UPPTCL informed that initially it was considered that UPPTCL may not be able to draw more load from 132kV side, so a new substation was planned and nearly 100-150 MW load was planned to be shifted to the proposed new substation. However, due to delayed availability of the land for new Bachhrawan (Raebareli) substation (already approved as an intra-State sub-station), the construction may take 2 ó 3 years. Accordingly, considering n-1 contingency conditions for reliably feeding the loads, UPPTCL stated that transformation capacity at Raebareli substation needs to be augmented urgently and if required, UPPTCL has 160MVA ICTs that can be used on loan to serve the peak summer load of 2016 at Raebareli.

3.3 AGM, PGCIL stated that as per the CERC directions, the replaced ICTs need to be de-capitalized and hence replacement of ICTs is not a good option, especially when life of ICTs is still remaining. Further, the process of replacement would take around one year.

3.4 Member Secretary, NRPC observed that de-capitalization of the replaced transformers is a major issue and it is proposed that CTU should prepare the guidelines for de-capitalization of the transformers along with the review of the equipment ratings. Director (PSP&PA-I), CEA stated that an inventory of ICTs replaced before the useful life may be created by PGCIL and put forth before the committee in the next meeting.

3.5 CE, UPPTCL stated that one out of the two replaced transformers may be installed at Sitaraganj S/s which is getting overloaded and the other may be used as the regional spare unit.

3.6 Powergrid stated that in case UPPTCL desires to replace one ICT at Raebareli, the same can be carried out by UPPTCL at their own cost. Powergrid further stated that they would revert back after discussing the issue with their engineering department.

3.7 After deliberations, it was agreed in ó principle to replace the 2x100 MVA transformers with 2 x 200 MVA transformers. UPPTCL and PGCIL may discuss bilaterally to finalise the action plan for the same.

4.0 Construction of 400/220/132kV Hardoi Road Substation (UPPTCL)

4.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter 537/CE(Trans Plan)/TWC Quarries/ISTS dated 20/8/2015 informed that 2x500 MVA(400/220kV), 2x200 MVA (220/132kV) Hardoi Road AIS Substation was earlier planned by UPPTCL by LILO of one circuit of existing 400 kV Lucknow ó Unnao D/C line. However, due to non availability of the land at selected place, it is proposed to implement substation as GIS instead of AIS. UPPTCL had also proposed to LILO both circuits of 400 kV Lucknow ó Unnao D/C line at Hardoi Road Substation. Director, CEA further requested UPPTCL to inform the expected load in next 10 year time frame so that suitable system may be planned.

4.2 Studies were carried out by PGCIL on the proposal of UPPTCL to LILO both circuits of Lucknow ó Unnao 400kV D/C line at Hardoi Road Substation. High loading of the lines were observed under n-1 condition. Hence, it was proposed to LILO Lucknow (PG) óKanpur 400kV D/C line at Hardoi Substation instead of Lucknow ó Unnao 400kV D/C line.

4.3 CE, UPPTCL stated that Hardoi Road intra State sub-station was earlier approved in Standing Committee meeting by LILO of Unnao-Sarojini Nagar 400 kV S/C of UPPTCL. Lucknow being a capital city, land could not be available at earlier selected place. Due to less ó availability of land, the proposed substation would be now GIS with alternate connectivity. Accordingly, permission was sought from PGCIL to LILO both circuits of Unnao - Lucknow (PG) 400 kV DC at Hardoi Road (GIS) as land for substation is very near to the lines (LILO length of 15 km). Other probable 400 kV lines of PGCIL or UPPTCL for LILO at this substation are far off from the already identified land. Load flow study indicates normal flows and reduced losses.

4.4 Powergrid stated that in the operational feedback by POSOCO, Lucknow - Unnao and Unnao-Panki 400kV lines are constrained. Keeping the overloading in view, Lucknow-Kanpur 400kV D/C line had been planned as a parallel corridor. The LILO length would increase by 30km (120 ckt km). However, under n-1 conditions, 760 MW power flow is not preferable during planning stage itself. It would be prudent to LILO a longer and almost parallel Lucknow- Kanpur 400kV D/C line which is under construction for better utilisation of assets. Hardoi Road s/stn would get two sources of power from ISTS for better reliability.

4.5 CE, UPPTCL stated that the line lengths being small, they can be loaded upto their thermal limits. If the loading is to be restricted, a general criterion may be adopted for future reference for all the sub-stations. However, this would result in creation of a huge investment in the transmission infrastructure.

4.6 Powergrid proposed that considering future load growth, provision of space may be kept for LILO of both circuits of Lucknow ó Kanpur 400kV D/C lines at Hardoi Road. Powergrid also suggested that provision of 125 MVAR bus reactor at Hardoi Road substation may be kept. UPPTCL agreed for the same.

4.7 After deliberations, the following was agreed for Hardoi Road 400/220/132kV(UP) substation:

- LILO of both circuits of Lucknow (PG)-Unnao 400kV D/C lines at Hardoi Road (UP)
- Provision of LILO of both circuits of Lucknow(PG) óKanpur 400kV D/C line at Hardoi Road (UP) substation in future
- Provision of 125MVA bus reactor at Hardoi Road

5.0 Construction of 400/220/132kV Landhora Substation by PTCUL

5.1 Director (PSP&PA-I), CEA stated that PTCUL vide their letter no. 1420/Dir (P)/PTCUL/CEA dated 11/8/2015 proposed a 400/220/132kV Landhora Substation to cater to the exponential growth of industrial and load demand in Roorkee area. The proposed capacity of the Substation is 2x240 MVA (400/220kV) and 2x100 MVA (220/132kV) and will be connected through LILO of one circuit of 400kV D/C Kashipur ó Puhana line. The proposed interconnections are as follows:

- (i) LILO of one circuit of Kashipur ó Puhana 400kV D/C line at Landhora substation. (1.3km)
- (ii) LILO of Ramnagar(Roorkee) ó Nara 220kV line at Landhora substation (19.67km)
- (iii) LILO of Manglore ó Nehtaur 132kV line at Landhora substation(6km)
- (iv) LILO of Laksar ó Nehtaur 132kV line at Landhora substation (21.5km)
- (v) Construction of 132kV S/C Landhora ó Chilla line via Sultanpur. In future 2x40 MVA, 132kV Sultanpur Substation is also proposed which will cater to the load demand in the area.

5.2 Director (PSP&PA-I), CEA further stated that studies have been carried out for the above proposal. It was observed that the transformers at 220/132kV, 2x100 MVA Landhora substation were getting overloaded and the Landhora- Manglore 132 kV S/C line and Landhora óLaksar 132kV S/C line were critically loaded. **In view of above, the studies were carried out considering the following modification:**

- (i) 400/220kV, 2x500 MVA Landhora Substation with LILO of one circuit of 400kV D/C Kashipur ó Puhana line in stages
- (ii) LILO of 220 kV Ramnagar (Roorkee) ó Nara line at Landhora substation (19.67 km)
- (iii) 220/66kV or 220/33kV, 2x50MVA new substation to feed the loads in Laksar and Manglore Area along with 220kV connectivity with Landhora S/s.
- (iv) To construct Sultanpur substation as 220/66 kV or 220/33kV, 2x 50 MVA instead of 2x40, 132 MVA in order to cater the growing load demand of Sultanpur Area along with 220kV connectivity with Landhora S/s.

He stated that the system was found adequate with incorporation of above modifications

5.3 AGM, CTU stated that LILO of the single circuit may cause unbalanced loading thus the provision for LILO of the second circuit should be kept at Landhora (PTCUL) sub-station. Also, considering that the Kashipur- Roorkee 400kV D/C line is with Quad conductors, it was proposed that the switchgear rating (3150 Amps) of Landhora substation and LILO line should match the capacity of quad line. It was also proposed that 125MVAr bus reactor may be installed at Landhora (PTCUL) substation.

5.4 After deliberations, members agreed for the above modified network (at para 5.2) for Landhora substation with the suitable bus reactors and matching ampacity with quad conductors of the transmission line for the switchgear.

6.0 Re-conductoring of 220kV Badarpur – Ballabgarh D/C line

6.1 Director (PSP&PA-I), CEA stated that DTL vide their letter dated 30th October, 2015 informed that Badarpur ó Ballabgarh 220kV D/C line experiences high loading in the order of 160 MW/ckt. Under n-1 condition, the other circuit becomes critically loaded. Hence, DTL proposed to upgrade the line by replacing with HTLS conductors.

6.2 Director (HVPNL) stated that the transmission system of Haryana is also integrated with BBMB and DTL systems. If re - conductoring of Badarpur ó Ballabgarh 220kV D/C line is carried out, more power would flow towards Delhi causing further overloading in the transmission system passing through Haryana, which is already critically loaded. Further, he stated that this line is only for reliability purpose and not for feeding power to Delhi system.

6.3 The representatives of BBMB stated that the matter needs deliberations by the BBMB member States.

6.4 Asstt. GM, POSOCO stated that the shutdown for the re - conductoring works would be very difficult to obtain. He also pointed out that the switchgears at the substations were very old thus these ratings need to be looked into before taking up the re - conductoring works. He also informed that Samaypur ó Ballabgarh 220 kV interconnections also remain critically loaded. The same also needs to be addressed.

6.5 COO, CTU stated that the proposal of DTL cannot be seen in isolation. This may also require augmentation of bays/switchgear capacity at Badarpur as well as Ballabgarh. The representatives of DTL stated that the replacement of conductors is only to meet contingency of one circuit outage not for increasing power flow in routine.

6.6 After deliberations, it was agreed that the issue would be discussed among member States of BBMB and thereafter the same can be taken up in next SCPSNR.

7.0 Construction of four 400/220kV Substations in Delhi:

7.1 Director (PSP&PA-I), CEA stated that four numbers of 400/220kV substations have been envisaged to be constructed by PGCIL in Delhi as ISTS works at Rajghat, Tuglakabad, Dwarka and Karampura to be completed by 2016-17. He requested Powergrid and DTL to update the status of these substations.

7.2 The status and issues, informed by POWERGRID and DTL are as under:

- (i) **Dwarka:** It was informed that DDA has finalised policy for land transfer as one time rent of Rs. 100 Crore and annual lease charges have been diluted from 20% to 2.5% which can also be paid one time (approx. Rs. 100 Crore)
- (ii) **Tughlakabad:** The allocation of land has been finalised in the DDA Board meeting held on 18-19 Jan. 2016. The same would take about 1 month time for transfer.
- (iii) **Rajghat:** The earlier suggested site falls under Yamuna riverbed. Accordingly, the team comprising of PGCIL, DTL and CEA identified alternate land at the existing IP Power substation which is about 1.2 km from the proposed substation site at Rajghat. The identified land would be finalised in 2-3 weeks time.
- (iv) **Karampura:** In the 36th meeting of SCPSNR, it was agreed that a team of CEA, CTU and DTL would visit site for ascertaining the feasibility of the RoW for overhead transmission line and identification of land for the s/stn. The same has not yet been resolved. A meeting was held on 08.10.2015 in CEA in which, Member (Power System), CEA suggested that alternate substation site to feed central Delhi or the option of using the combination of overhead and underground AC line may be explored. The possibility for getting permission from Flood Control Authority for erecting the towers of the 400 kV transmission line along the drain may also be explored by a team comprising of CEA, CTU and DTL. Subsequently, in the meeting taken by Secretary (Power), MoP on 30th November, 2015, it was decided to look for alternate site so that corridor for laying of the transmission line does not pose any constraints. Alternate land was available in the outskirts of Delhi however the substation had been planned for feeding load of central Delhi. DTL suggested that if overhead transmission corridor is not possible, option of 400 kV cable may be explored. POSOCO was of the view that considering that four failures have occurred in last two years in Badarpur -Bamnauli line, maintenance of cable joints failure and reliability becomes an issue with cables. After deliberations it was decided that a meeting in CEA may be convened along with CTU and DTL officers to explore feasible alternate options.

Members noted to the same.

8.0 Transmission system for Ultra Mega Solar Power Park in Jalaun, UP (270MW)

8.1 Director (PSP&PA-I), CEA stated that in the 36th meeting of SCSPNR, transmission system for Solar Power Parks in Jalaun, UP with installed capacity of 370 MW was in - principle agreed for establishment of 400/132kV, 3x200 MVA S/stn at Jalaun with a 400kV D/C line between Jalaun Pooling Station and Kanpur (New). In the meeting, it was also decided that implementation of above transmission scheme shall be taken up only after receipt of LTA application from Solar park developer for at least 25% of the installed capacity.

8.2 Executive Director (Smart Grid), PGCIL informed that subsequently the Solar Power park developer, M/s Lucknow Solar Power Development Corp. Ltd. (LSPDCL) submitted the application for Connectivity and LTA for ISTS for revised capacity of 270 MW for Jalaun Solar Power Park with NR as target beneficiary. Keeping in view the reduction in solar generation capacity, scheme was reviewed and joint studies were carried out by UPPTCL, PGCIL and LSPDCL at UPPTCL office in Lucknow. Based on studies, following alternative was proposed by the UPPTCL and Powergrid as ISTS scheme for Jalaun Solar Park (270 MW):

- (i) Establishment of 400/132kV, 3x200 MVA Pooling station at Jalaun along with 1x125MVA bus reactor
- (ii) LILO of one circuit of 400kV Orai (UP) - Mainpuri (UP) 400kV D/C line- about 20km
- (iii) 4 nos. 132kV line bays at 400/132kV Jalaun Pooling Station

8.3 ED, PGCIL informed that M/s LSPDCL vide their letter dated 19.01.2016 has further revised the solar park capacity to 260 MW and therefore sought revision in LTA/connectivity capacity. M/s LSPDCL also earlier informed that UPCL has requested to allocate entire 600 MW capacity from UP Solar Power parks to UP under VGF scheme.

8.4 Director (PSP&PA-I), CEA stated that as per the information provided by M/s LSPDCL, solar park in Jalaun comprises development of solar parks at 7 different locations in Jalaun district at Dakore (40 MW), Makrechha (25 MW), Tikar óI (20 MW), Tikar óII (10 MW), Banghauri (20 MW), Gurah (75 MW) and Parasan (75 MW). The power generated from these locations is to be pooled through 132 kV lines at its 132kV Dakore Switching station. Thereafter, it will be connected to 132/400kV Jalaun Pooling station as proposed above. However, considering quantum of solar capacity 10-75 MW at various locations to be pooled and evacuated through 132kV system is not considered an optimal proposition with UP being the sole beneficiary for the

generated power and the fact that solar generation is available (capacity utilisation factor) for only 20% of the time in a year.

8.5 CE, UPPTCL stated that the proposed solar park location was near Orai and 220/132kV network around that location is already critically loaded. He also stated that many small capacities solar plants with total capacity of 235 MW are already planned in the nearby area by the developer for which connectivity has already been given. With injection of power from Jalaun Solar Power Park, the network loading on nearby area will further increase. He suggested that small generation capacities can be evacuated directly at nearby 132/33 kV load centers for optimal utilisation.

8.6 CE, UPPTCL further suggested that in place of stepping up the solar power from pooling station to 400kV grid and then dispersing it to somewhere else, Solar power parks should be located near to load centres like Chitrakoot, Siratu, Bundelkhand etc., so that it can be consumed locally and relieve the grid. Further, as Jalaun Solar Power park also comprises multiple locations, its locations should be decided in such a way that power may be consumed directly at nearby load centres at 33kV or 132kV level by LILO of the existing lines or by creation of few smaller length lines.

8.7 Members were generally of the view that transmission schemes should be created after detailed cost benefit analysis keeping in view the utilisation of the network.

8.8 After deliberations, it was decided that transmission scheme for evacuation of power from different locations of Jalaun Solar Power park would be evolved and developed by UPPTCL as an Intra State transmission scheme, as Uttar Pradesh is the sole beneficiary. Accordingly, the implementation of above identified as inter State transmission system for Jalaun Solar Power Park is not required.

9.0 220kV interconnection from Samba and New Wanpoh 2x315 MVA, 400/220kV substations of POWERGRID in Jammu & Kashmir

9.1 Director (PSP&PA-I), CEA stated that 2x315 MVA, 400/220kV substations at Samba and New Wanpoh were commissioned by PGCIL in 2013 under ISTS. However, for drawal of power from these substations, the downstream 220 kV lines have not been constructed by PDD, J&K. He requested PDD, J&K to update the status of the underlying network.

9.2 Chief Engineer, JK PDD stated that LILO of both circuits of Bishnah- Hiranagar 220kV D/C has been planned and is presently at tendering stage. The length of LILO is about 2 km and is expected to be commissioned by August, 2016. Regarding downstream network of New Wanpoh, J&K informed that there are fund constraints. He also stated that CEA has concurred the technical part of the proposal for development of intra State transmission network through Govt. of India funding and requested CEA to vet the financial part at the earliest. In the DPR, the downstream network from Samba and New wanpoh Substations have been considered. He, however, stated that as and when the fund gets allocated by Government of India, the works would be taken up for implementation.

10.0 Creation of 400/220 kV, 2x315 MVA S/S at Akhnoor and Kishtwar as ISTS

10.1 Director (PSP&PA-I), CEA stated that in the 36th SCPSNR, it was decided that PDD, J&K should furnish the firm power evacuation plan from Samba and New Wanpoh sub-stations and should also incorporate the 220 kV downstream transmission system under State plan and after that the new proposals of Akhnoor and Kishtwar substations would be considered in the next standing committee.

10.2 Chief Engineer, Jammu, PDD, J&K stated that the committee members may like to give concurrence for establishing 400/132 kV substation at Kishtwar as currently Kishtwar is connected through 132 kV line resulting in more transmission losses. He also stated that 220 kV D/C Akhnoor ó Barn has been proposed in the DPR.

10.3 Director (PSP&PA-I), CEA stated that J&K had proposed 400 kV substations at Akhnoor and Kishtwar and DPR is presently under examination. Powergrid stated that 400/220kV Amargarh substation is also under implementation through TBCB route in J&K and is expected by October, 2018. It was proposed that downstream 220kV network for Amargarh substation also needs to be planned in matching timeframe.

10.4 After deliberations, it was agreed that proposal of new substation at Akhnoor may be considered only after the 220 kV downstream from Samba, New Wanpoh and Amargarh are taken up for implementation by PDD, J&K. Kishtwar 400/132 kV substation may be agreed subject to feasibility based on load flow studies by CEA and CTU. JKPDD was advised to implement their

downstream network expeditiously so as to optimally utilize the already created transmission elements.

11.0 Modification of UITP scheme by PTCUL

11.1 Director (PSP&PA-I), CEA stated that 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 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 sub-station at the proposed site already in their name but not in possession. Accordingly, PTCUL requested THDC to provide a piece of land acquired by THDC for their generation project. In the 36th SCSPNR, it was decided that a committee comprising of THDC, PTCUL, NTPC, CTU and CEA would identify site for proposed the substation. Director, CEA further stated that the team during 13-14 December, 2015 visited the proposed sites at Pipalkoti switchyard and other locations viz., Pakhi and near muck disposal site of Pipalkoti HEP and also across the other side of the river. The committee ruled out the site at Pakhi and Pipalkoti switchyard and desired that PTCUL to explore the other sites shown during the visit.

11.2 AGM, CTU stated that a team of officials from PTCUL visited PGCIL office to interact with civil department about the feasibility of the proposal about muck disposal site of Pipalkoti HEP. Director, CEA stated that PTCUL had employed a consultant to work out the suitability of the land for construction of substation.

11.3 AGM, NTPC expressed concern about the readiness of the transmission system in the time matching with the evacuation of Tapovan HEP. AGM, CTU further stated that the transmission system for Tapovan Vishnugadh and Pipalkoti HEPs need to be finalised on priority as these project are expected in 2018-19 time frame and delay in finalisation may result into bottling up of power.

11.4 It was decided that PTCUL may take up the implementation of 400 kV D/C line with twin conductor from Tapovan Vishnugah to proposed site of Pipalkoti substation (near muck disposal site of Pipalkoti HEP) and Quad line from there to Srinagar. Further, the power from Pipalkoti HEP may be injected at Pipalkoti switching station. It was further stated that in the time frame of

these two projects, only 400 kV switching station would be required at Pipalkoti and transformers are to be provided later with other generation projects like Alaknanda, etc. Pipalkoti switching station may be commissioned matching with the commissioning of the Tapovan Vishnugah and Pipalkoti HEPs.

11.5 After deliberations it was decided that a meeting would be convened under chairmanship of Member (PS), CEA with representatives from PTCUL, THDC, NTPC and CTU for further discussion on this issue.

12.0 Connectivity of UPPTCL Moradnagar-II (new) 400/220 kV, 2X240 MVA Substation

12.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter dated 29/9/2015 has informed that due to overloading of the existing 3x315 MVA, 400/220kV Moradnagar UPPTCL substation, 400/220 kV, 2x240 MVA Moradnagar óII (new) substation was planned. CEA vide their letter dated 26/10/2015 has given in- principle approval for shifting of the following circuits to Moradnagar-II Substation (new):

400 kV:

- Dadri TPS ó Moradnagar 400kV S/C line (ISTS)
- Agra ó Moradnagar 400kV S/C line (UPPTCL)

220 kV:

- Moradnagar ó Baraut 220kV S/C line (UPPTCL)
- Moradnagar ó Loni 220kV S/C line (UPPTCL)
- Moradnagar ó Shamli 220kV S/C line (UPPTCL)

12.2 He further stated that UPPTCL had shifted the Agra ó Moradnagar 400 kV S/C line and Moradnagar ó Baraut 220 kV S/C line (UPPTCL)) shifted to Moradnagar-II and the arrangement has been running satisfactorily. But POSOCO vide their letter has raised some issues of Stable connectivity between UP west and rest of UP and reliability after shifting of above circuits to Moradnagar óII (new) and he proposed that instead of shifting the Dadri TPS ó Moradnagar 400kV S/C line to Moradnagar-II, the circuit may be LILOOed at Moradnagar-II.

12.3 COO, CTU stated that existing Dadri ó Moradnagar 400 kV line is an important line from reliability point of view and proposed that instead of diversion of line UPPTCL may consider the LILO of Dadri ó Moradnagar line at Moradnagar (New).

12.4 Regarding the concern of POSOCO, CE (UPPTCL) stated that 220 kV downstream system to Moradnagar -II S/s namely Baghpat, Baraut shall soon get connected to Baghpat (400) PGCIL S/s nearing completion. Similarly existing 400 kV Moradnagar S/s shall also get connected soon to Hapur (765 kV) S/s of M/s Cobra after LILO of Moradnagar óMoradabad 400 kV S/C ISTS line at Hapur(765kV). All these have already been approved/ concurred by SCM and will further strengthen both Moradnagar and Moradnagar-II substations.

12.5 Director (PSP&PA-I), CEA stated system studies were carried out considering the following additional transmission elements:

- (i) 2x500 MVA, 400/220kV Bagpat (PG) S/s with LILO of Meerut(PG)- Kaithal 400 kV S/C line at Bagpat(PG)
- (ii) 220/132kV, 2x100MVA Baghpat (UP) S/s with LILO of Moradnagar-II óShamli 220kV S/C line at Baghpat (UP)
- (iii) Bagpat(PG)- Baghpat(UP) 220kV D/C line (18km)
- (iv) Baghpat (PG)- Baraut 220kV D/C line
- (v) 765/400/220 kV Hapur S/s with LILO of Moradnagar óMoradabad 400 kV (PG) S/C ISTS line at Hapur(765kV)

12.6 The matter was deliberated and it was decided that UPPTCL may shift the following circuits to Moradnagar-II after the commissioning of the above mentioned (at para12.5) transmission elements:

- (i) Dadri TPS óMoradnagar 400kV S/C line(ISTS) at Moradnagar-II
- (ii) Moradnagar ó Loni 220kV S/C line(UPPTCL) at Moradnagar-II
- (iii) Moradnagar ó Shamli 220kV S/C line(UPPTCL) at Moradnagar-II

13.0 Reliability issue at Sorang HEP

13.1 Director (PSP&PA-I), CEA stated that Sorang HEP has submitted data to NRLDC, wherein it has been observed that switchgear equipment like isolators, circuit breakers at Sorang HEP are of 2000 Ampere (2kA) rating while Sorang HEP has been connected to the grid with the LILO of 400 kV Karcham Wangtoo - Abdullapur line (Quad Moose). It is also pertinent to mention that the switchgear ratings at Karcham Wangtoo switchyard and Abdullapur substation are of 3000 Ampere (3 kA).

13.2 POSOCO stated that Karcham Wangtoo HEP - Sorang HEP is one of the important lines for the evacuation of generation from Karcham Wangtoo ó Baspa - Nathpa Jhakri - Rampur complex. There have been constraints in the evacuation of power from this complex and System Protection Scheme (SPS) has also been implemented in view of high loading of lines.

13.3 He further stated that SCPSNR has already approved series compensation of Karcham Wangtoo - Abdullapur 400 kV D/C (Quad) line alongwith LILO of both circuits at Kala Amb. This issue has also been discussed in 116th OCC meeting held at NRPC and members expressed their concern. In view of above, NRLDC impressed upon taking the necessary action and accordingly advised to the concerned for rectification of above issue.

13.4 COO, CTU stated that as per the Master Plan of Evacuation system for Projects in Satluj Basin, power from other HEPs would also be evacuated through these lines in future resulting in the increase in loading of these lines. Therefore, under n-1 security conditions, 2 kA rating of switchgears at Sorang HEP would be the first limiting factor for the power flow.

13.5 AGM, CTU stated that during the signing of the connection agreement, the developer was informed that the capacity of the switchgear must be equivalent to Quad line capacity and switchgear rating at Abdullapur. He further stated that the issue was also discussed in the 36th NRPC meeting, wherein it was decided that CTU should take up the matter with the developer. Accordingly a letter has been written to the developer for necessary clarifications; however no response has been received yet.

13.6 Director (PSP&PA-I), CEA stated that the matter is of great concern and the committee members would like to take a view so as to avoid re- occurrence of these issues in future.

13.7 The matter was deliberated and it was decided that the developer have to upgrade the switchyard equipment matching with quad line capacity. In the present scenario, the LILO arrangement carried out by Sorang HEP shall be by passed. Further it was decided that a separate meeting may be convened involving CEA, CTU, POSOCO and the developer of Sorang HEP to work out the action plan for up gradation of the switchyard to higher rating.

14.0 Safe and secure grid operation during forthcoming winter months

14.1 Director (PSP&PA-I), CEA stated that NRLDC vide their letter dated 12-11-2015 to Principal Secretary, J&K with a copy to CEA has informed that presently, Kashmir valley power system is connected through rest of the grid through transmission lines, viz, 400 kV Kishenpur-New Wanpoh - Wagoora 2xS/C line, 220 kV Kishenpur-Ramban-Mirbazar - Pampore S/C line and 220 kV Kishenpur-Mirbazar óPampore S/C line. During winter season and high import requirement, any contingency of lines specially 400 kV ones would create severe bottleneck for power supply to the valley area. He requested PDD, J & K to update (i) Status of commissioning of SPS scheme for valley (As approved by CEA) (ii) Status of deployment of capacitor banks, under frequency schemes etc. (iii) Status of GTs at Pampore at the time of contingency (iv) Readiness for black start capability at all such generating stations.

14.2 As no representative from PDD, Kashmir region was present in the meeting, it was decided that a letter would be written from Member (PS), CEA to Principal Secretary, PDD J&K to expeditiously carry out the above works.

15.0 Construction of 100 MVA, 33/220 kV sub-station at Phojal by LILO of one circuit of 220 kV Prini-Nalagam D/C line of M/S ADHPL

15.1 Director (PSP&PA-I), CEA stated that HPPTCL vide their letter No. HPPTCL/Naggar/2015-5066 dated 21-11-2015 informed that in the Naggar (Beas) valley in Distt. Kullu of Himachal Pradesh, about 90 MW of Small HEPs have been identified. In the same valley, M/S ADHPL have constructed 180 km long 220 kV D/C line (ASCR ZEBRA conductor) up to 400/220 kV Nalagarh sub-station (PG) for evacuation of 192 MW power of Allain Dhuangan HEP. Due to severe right of way constraints in the valley, it was planned to evacuate power of other projects through this 220 kV line by LILO at suitable locations. So, HPPTCL has requested for approval of the 33/220 kV, 100 MVA sub station at Phojal by LILO of one circuit of 220 kV Prini-Nalagarh D/C line which is nearing completion. HPPTCL further stated that petition for determination of tariff is to be filed before CERC for which approval of CEA for construction of the sub station is required.

15.2 AGM, CTU stated that they have received an email from AD Hydro expressing their reservations as it is their dedicated line and requested to consider their views before concurring the construction of LILO arrangement. It was also informed that presently Malana-II and ADHEP are

evacuating through this line and there are evacuation constraints under n-1 contingency. In fact considering the constraints under contingency, a separate evacuation for Malana-II had been planned, which is already under implementation.

15.3 Considering the above issues it was decided that a separate meeting shall be convened by CEA with CTU, AD Hydro and HPPTCL to resolve the issue.

16.0 Augmentation of transformation capacity at 400kV Maharani Bagh Substation (PG)

16.1 Director (PSP&PA-I), CEA stated that DTL vide their letter no F.DT/Dir(O)15-16/F12-/42 dated 22/26-05-2015 had proposed to augment the transformation capacity of 400kV Maharani Bagh Substation from the present 1630 MVA to 2000 MVA by replacing existing 2 Nos. 400/220kV, 315MVA ICTs to 2 nos. 400/220kV, 500 MVA ICTs.

16.2 AGM, PGCIL stated that as per the CERC directions, the replaced ICTs need to be de-capitalized and hence replacement of ICTs is not a good option, especially when life of ICTs is still remaining. Further, the process of replacement would take around one year.

16.3 Member Secretary, NRPC stated that the issue has to be seen in totality as the same has tariff implications and utilization of the assets for the remaining period of useful life. The representative of DTL stated that due to decommissioning of 210 MW units at Badarpur TPS, to meet ensuing summer load, the augmentation of ICTs were urgently required.

16.4 COO, CTU stated that the replacement of ICTs would take time around one year, as the same involves the activities like investment approval and placement of award. Timeline for augmenting the ICT by summer 2016 would not be met.

16.5 ED, POSOCO stated that before closing down any unit of BTPS, the reliability of the whole power system has to be seen. Members were of the view that already four substations of total capacity of 8000 MW have been approved for Delhi with the commissioning schedule of March, 2017 and loads at Maharani Bagh substation may be diverted to these new substations.

16.6 After deliberation, it was observed that the time to be taken for augmentation for ICTs would match with commissioning of the proposed new substations, hence the committee members were of the view to drop this augmentation proposal and impressed upon for the timely completion

of approved substations for NCT of Delhi. The committee also decided that all the pros and cons of environmental vis-à-vis the reliable operation of power system must be seen before shutting down of BTPS and desired that immediate shut down is not advisable.

17.0 Re-conductoring of 220 kV Narela - Rohtak Road D/C Line and establishment of 220kV GIS Bays at Rohtak Road S/Stn. of BBMB.

17.1 Director (PSP&PA-I), CEA stated that DTL vide their letter F.DTL/Dir (O)/ 2015-16 dated 10.12.2015 has proposed that the conductors of 220kV Narela-Rohtak Road D/C line (commissioned during 1961-62) needs to be replaced with HTLS conductors. Therefore, it is required to decide the methodology for accounting the cost involved for re-conductoring of 220kV Narela - Rohtak Road D/C line along with establishment of 9 bays 220kV GIS (6 Feeder + 2 spare + 1 B/C) at Rohtak Road. The representatives of BBMB stated that the matter needs deliberations by the BBMB member States.

17.2 After deliberations, it was decided that the matter would be discussed among the member States of BBMB and the decision taken would be intimated in the next SCM.

18.0 Provision of 220kV line bays at 400/220kV Meerut (PG) and Allahabad (PG) substation:

18.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter 728/CE(Trans Plan)/TWC Quarries dated 9.10.2015 stated that in 36th SCM, CTU had given the time frame of 24-30 months for the construction of 220kV bays at 400/220kV Meerut (PG) and Allahabad (PG) substations, which may delay the strengthening of the downstream systems. Hence, UPPTCL requested PGCIL to either reduce the time frame for construction to 8-10 months or else permit STU to implement construction of bays at PGCIL substation as per standard procedures and practices.

18.2 Powergrid stated that the implementation of bays would take about 24-30 months and in case UPPTCL desires these bays on urgent basis, they may take-up the implementation on their own. UPPTCL agreed to take up the implementation of the bays on their own. Powergrid informed that based on the confirmation from UPPTCL, they have already deleted the scope of these bays from the scheme.

Members noted the same.

19.0 220kV line bays at 400/220kV ISTS substations in U.P.

19.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter no. 877/C.E. (Trans. Plan.)/ CEA/TWC Quarries/13th Plan dated 9th December, 2015 informed that 2 no. 220 kV bays are required each at (i) **Fatehpur (765kV) PGCIL S/s for Fatehpur (765kV) ó Sarh (Kanpur) 220 kV D/C line** and (ii) **220 kV Raebareilly (existing) PGCIL S/s for Sultanpur (400) ó Sangipur ó Raebareilly (PG) - Amawan 220 kV D/C line.**

19.2 AGM, CTU has stated that space is available at Fatehpur (765 kV), PGCIL substation but the space is not available for bays at existing Raebareilly (PG). However, the commissioning of bays would take around 24 ó 30 months from now. If UPPTCL need these bays early, they may take the implementation on their own. CE, UPPTCL stated that their down stream system would take around 24 ó 30 months hence that the time schedule is agreeable to them.

19.3 CE, UPPTCL stated that UPPTCL had a proposal to construct a new 400/220 kV substation at/near Raebareilly by LILO of Unchahar ó Fatehpur subject to confirmation from the load flow studies. They would bring the proposal in the next SCM.

Members noted the same.

20.0 Evacuation of New Generation Project in 13th Plan (2017-22)

20.1 Director (PSP&PA-I), CEA stated that UPPTCL vide their letter no. 877/C.E. (Trans. Plan.)/ CEA/TWC Quarries/13th Plan dated 09.12.2015 has proposed the transmission system for evacuation of power from **1x660 MW Panki Extension TPS (expected by 2019), 1x660 MW Harduaganj Extn. (expected by 2019), 2x660 MW Obra “C” TPS (expected by 2019) and 2x660 MW Jawaharpur (Etah) TPS along with some 765kV and 400kv Substations.**

20.2 CE, UPPTCL stated that these generation projects are likely to be commissioned by 2019-22. Hence, along with the evacuation system of these projects they have also proposed the strengthening of the transmission system in UP

20.3 The matter was deliberated and it was decided that a joint study would be carried out with UPPTCL, CEA and CTU and would be taken up for discussions in the next SCSPNR.

21.0 WR - NR 765 kV Strengthening Transmission Corridor

21.1 Director (PSP&PA-I), CEA stated that WR - NR 765 kV Strengthening Transmission Corridor was discussed in the 39th meeting of the Standing Committee on Power System Planning of WR held on 30-11-2015. In that meeting CTU had informed that based on LTA applications and Central Sector allocations, total power transfer requirement towards NR comes out to about 26000MW. If certain uncertain/abandoned/closed applications are not considered, power transfer requirement reduces to about 23500 MW. In addition to the import requirement of NR assessed above, additional requirement of about 2500 MW power transfer to NR is envisaged from following generation projects in WR (& SR):

| Sl. No. | Generation Projects | Additional Allocation to NR (MW) |
|---------|--|----------------------------------|
| 1 | MB Power (MP) Ltd. | 200 (169MW Firm) |
| 2 | MB Power (MP) Ltd. | 144 |
| 3 | DB Power Chhattisgarh Ltd. | 75(Firm) |
| 4 | Rewa Ultra Mega Solar Ltd. | 300 |
| 5 | SEI Sunshine Power Pvt. Ltd. | 180 |
| 6 | Suzlon Power Infrastructure Ltd. (3 applications, location of project in SR) | 120 |
| 7 | Maruti Clean Coal & Power Ltd * | 205 (Firm) |
| 8 | TRN Energy Ltd * | 240 (Firm) |
| 9 | KSK Mahanadi Power Company Ltd | 1000 (Firm) |
| | Grand Total | 2464 MW |

** TRN Energy and Maruti Clean Coal & Power Ltd. had submitted LTA applications against firm PPAs signed with beneficiaries in NR; however same were closed on account of incomplete applications.*

21.2 Powergrid further stated that the above mentioned quantum of WR ó NR power transfer desired by TRN and DBPCL and MCCPL has been included in studies considering that they have firm PPA as they may apply afresh. In addition to above applications, LTA application of Barethi STPS indicates about 871MW power allocation to Northern Region. Hence, the total power transfer requirement to NR after considering above applications is likely to be about 26500-27000 MW.

21.3 Director (PSP&PA-I), CEA stated that the above was discussed during the 36th SCSPNR wherein UP raised the issue of lightly loaded ER-NR links. It was deliberated that since generation projects in WR (particularly in Chhattisgarh) and in Odisha, which have strong connectivity with WR (via Chhattisgarh), have materialized in time, hence WR ó NR corridor gets stressed.

21.4 Director (PSP&PA-I), CEA further stated that during the 22nd meeting of WR constituents regarding Connectivity/Open Access held on 30.11.2015 following new inter-regional transmission corridor was agreed as the strengthening between WR and NR is necessary to process the pending LTA applications:

- Establishment of New 2x1500MVA, 765/400kV Substation at Allahabad
- Vindhyachal Pool ó Allahabad (New) 765kV D/C line
- Allahabad (New) ó Lucknow 765kV D/C line
- LILO of Sasaram ó Fatehpur 765kV S/C line at Allahabad (New)
- LILO of Meja ó Allahabad 400kV D/C line at Allahabad (New)*

**On the above, the representative of CTU stated that while carrying out the above studies it was observed that Allahabad – Allahabad 400 kV D/C line becomes critically loaded. Accordingly in this case LILO of Allahabad – Kanpur 400 kV D/C line at Allahabad (New) has been considered and with this problem of critical loading of Allahabad – Allahabad (New) gets alleviated.*

21.5 CE, UPPTCL stated that prima face it was observed that the studies did not include few of the generations coming within the state of Uttar Pradesh. He further stated that Allahabad already has a strong in-feeds and the proposed new 760/400 kV substation at Allahabad cannot push the power downwards and accordingly the corridor would remain unutilized. He also stated that the quantum of LTA sought by the distribution companies of NR needs be indicated.

21.6 Member (PS), CEA stated that the scheme had already been approved in SCMPSPWR. He suggested that a sub-committee comprising of CEA, UPPTCL and CTU shall be formed to discuss and finalise transmission strengthening scheme between WR and NR.

21.7 The members were generally of the view that the revised studies for proposing a new corridor between Northern and Western region should have been submitted to them atleast 7 days before the meeting so that constructive discussions could have taken place. It was also decided that UPPTCL would submit their concern while finalising the scheme.

22.0 Status of the Projects in Northern region under implementation through TBCB route:

22.1 Director (PSP&PA-I),CEA stated that following transmission schemes are under implementation through TBCB route in the Northern Region:

| S. No. | Name of Scheme | BPC | Status |
|---------------|---|----------------|--|
| 1 | System Strengthening Scheme in Northern Region (NRSS-XXXVI)ö along with LILO of Sikar-Neemrana 400kV D/C line at Babai (RRVPNL) | RECTPCL | Bidders short listed on 12.11.2015 RfP issued on 12.11.2015 Submission date for RfP: 8th Feb, 2016 |
| 2 | Creation of new 400kV GIS Substations in Gurgaon and Palwal area as a part of ISTS | PFCCL | RfQ finalized. RfP issued on 29 Dec 2015, Last date: March 1, 2016 |

Members noted the same.

23.0 Reconductoring of Existing Lines in Northern Region:

23.1 Director (PSP&PA-I), CEA stated that a number of transmission lines had been identified for re-conductoring in a meeting taken in MoP. The lines identified for reconductoring in Northern Region are as under:

- (i) 400kV Singrauli-Anpara S/C
- (ii) 400kV Dadri-Murandnagar S/C
- (iii) 400kV Meerut-Muzaffarnagar S/C
- (iv) 400kV Muzaffarnagar-Roorkee S/C
- (v) 400kV Anpara-Obra S/C
- (vi) 400kV Mohindergarh-Bhiwani D/C
- (vii) 400kV Unnao-Panki S/C
- (viii) 400kV Bassi-Heerapura D/C

23.2 POSOCO stated that that most of these lines except 400kV Singrauli-Anpara S/C and 400kV Anpara-Obra S/C were overloaded in the past but after commissioning of other parallel circuits, these lines are presently operating at normal load hence do not require reconductoring. Also, for reconductoring the shut down of the lines as well as of the generating units would be required.

23.3 CE, UPPTCL stated that due to high generation in the Singrauli ó Anpara complexes the short circuit levels were already high and also this being a critical line connecting the 2 generation complexes taking shut down would be very difficult.

23.4 As short circuit level is already high, it was decided that the studies would be carried out by putting series reactor of suitable size so as to reduce the short circuit level.

23.5 Director, HVPNL stated that the cost of re-conductoring with HTLS conductors is 1.5 times the cost of constructing a new transmission line. Hence, the proposal for re-conductoring of the transmission lines in Northern Region may be dropped.

Members agreed for the same.

24.0 ± 500kV Rihand-Dadri HVDC works input for capacity enhancement.

24.1 Director (PSP&PA-I),CEA stated that the proposal of capacity enhancement of Rihand-Dadri HVDC from 1500MW to 2500MW was discussed during the 36th Standing Committee and was in-principally agreed by the Constituents. However, HVPNL stated that life of HVDC terminals is about 25 years and enquired about the future plans of utilisation of existing HVDC terminals at Dadri and Rihand ends. POWERGRID stated that R&M proposed for existing Rihand-Dadri HVDC terminals has been planned and up-gradation can be taken up along with that. During the meeting it was decided that a comprehensive proposal would be prepared for consideration in the next standing committee meeting.

24.2 AGM, CTU stated that Rihand-Dadri HVDC link is an important transmission link for evacuation of bulk power from pit head generating units in Rihand and its vicinity. This HVDC link transfers bulk power from the RihandóSingrauli-Vindhyachal generation complex to National Capital Region (NCR) which is load centre comprising of number of industrial and densely populated areas. This facilitates the System Operator to enable economic despatch function by utilizing the HVDC system to its full capacity for most of the times. Quick load control feature including the run back control in the event of outage of the Rihand generators in the Rihand-Dadri HVDC system in the past has been effectively utilized for enhancing the stability of the underlying AC network during extreme grid loading conditions.

24.3 He also stated that 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

Bi-pole can be enhanced by 1000MW by utilizing the existing additional loading capability margin available on the HVDC bipolar transmission line. The thermal capacity of $\pm 500\text{kV}$ 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, additional 2X500MW parallel converters at Rihand and Dadri HVDC station have been proposed. 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.

24.4 He further stated that the existing bi-pole system is completing 25 years and a number of equipment refurbishment/overhauling works are essentially required to be undertaken for the smooth operation of the said HVDC system in view of the changes in the Power electronics over a period of time. The designs of thyristors, snubber circuit capacitors, light-guides and thyristor control units have migrated to next generation levels and hence the existing equipments require structured replacements to ensure continued safe operations of this link during the future.

24.5 Accordingly, the major equipment which require replacement in full or part include Valve Hall equipments including Thyristors & Valve Cooling, Control, Protection & Communication Systems, DC Filters, AC Filters, AC/DC switchyard equipments, Valve Hall Ventilation System.

24.6 These works are proposed to be clubbed with the capacity enhancement works of the $\pm 500\text{kV}$ Rihand-Dadri HVDC Link for the following advantages:

- (i) Sharing of the space of the existing Filters and Switchyard equipments in view of space constraints with the available aid of GIS/ hybrid technology design solutions.
- (ii) Enhancing the AC Filter capacity for 2500 MVA for parallel operation of the two bi-poles.
- (iii) Integrated control & protection for parallel operation of the existing and new bi-poles leading to flexible Operation with Master Control with parallel Converters.
- (iv) Reactive power control for both the bi-poles.
- (v) Replacement of existing Control & Protection Systems for IEC 61850 compliance.
- (vi) Shifting of 2 number of 400kV bays from NTPC Dadri Switchyard to HVDC Switchyard to avoid 400kV Bus capacity up-gradation works of NTPC plant and interconnection between NTPC & POWERGRID 400kV bus-bars.

(vii) The Up-gradation work and the Augmentation work for 1000 MW are planned in staggered manner in such a sequence that the reduction of existing Bi-pole capacity due to Pole shutdown is avoided.

24.7 AGM, POSOCO stated that augmentation of HVDC bi-pole is very important from Grid operation point of view. It was also stated that this would relieve the critical loading of Singrauli ó Anpara 400 kV line.

24.8 Director (PSP&PA-I),CEA enquired about the Residual Life Assessment (RLA) studies for Rihand-Dadri HVDC Bipole, Expected life of existing Rihand-Dadri HVDC bipole after R&M and expected combined life of 2500MW HVDC bi-pole. POWERGRID assured to submit the same.

24.9 After detailed deliberation the proposal of up-gradation of existing Rihand-Dadri HVDC bipole by 1000 MW was agreed in principally, however before finalising the proposal following is to be submitted to CEA

- (i) RLA report for the Rihand-Dadri HVDC Bipole
- (ii) Expected life of existing Rihand-Dadri HVDC bipole after R&M
- (iii) Expected combined life of 2500MW HVDC bipole
- (iv) Estimated cost of R & M works and augmentation works

24.10 It was decided that the above information would be placed before the Committee Members before taking up the execution works.

25.0 Transmission system for Ultra Mega Solar Parks in Bhadla, Distt. Rajasthan

25.1 Director (PSP&PA-I),CEA stated that in the 36th Meeting of Standing Committee on Power System Planning in Northern Region held on 13/7/2015, inter-state transmission scheme for evacuation of 3000MW of solar power in Jodhpur (Bhadla :1000MW) and Jaisalmer (Parewar and Fatehgarh : 2000MW) was in-principally agreed. In the meeting, it was also agreed that implementation of above system shall be taken up by POWERGRID only after receipt of LTA for at least 25% of their installed capacity from respective Solar park developers.

25.2 ED(SG), PGCIL stated that subsequently following three Solar Power park Developers (SPPDs) have applied for Connectivity /LTA at Bhadla (Jodhpur) in Rajasthan

- (a) **M/s Surya Urja Company of Rajasthan Ltd:** 500 MW out of Bhadla Phase-III Solar park with commissioning schedule of January, 2017; Target region-NR

- (b) **M/s Adani Renewable Energy Park Rajasthan Ltd:** 250MW out of Bhadla Ph-IV Solar park with commissioning schedule of March, 2017; Target region-NR
- (c) **M/s Essel Saurya Urja Company of Rajasthan Ltd:** From Phalodi-Pokaran Solar Park (750 MW) with commissioning schedule of July, 2017; Target region as NR-400 MW and WR-350 MW.

25.3 PGCIL stated that based on the joint visit for site selection for 765/400/220kV Bhadla Pooling station by RRECL, RVPN, POWERGRID, Solar Power park developers etc., Govt land (about 130 acres) in Tehsil Bap, Jodhpur district was identified. The above site for Bhadla Pooling Station is at about 20 km from M/s Saurya Urja and Adani Solar Power Park whereas M/s Essel Park is about 60 km.

25.4 It was informed that M/s Adani (250 MW) and M/s Saurya Urja Co. (500 MW) proposed connectivity at 220kV voltage level, whereas M/s Essel (750 MW) proposed at 400kV, 220kV and 400kV D/C interconnecting transmission line from Solar Park Pooling station upto 220/400/765kV Bhadla Pooling station shall be developed by the respective applicants/SPPD as part of its internal transmission infrastructure. The scope of 4 nos. 220kV line bays and 2 nos. 400kV line bays at 220/400/765kV Bhadla Pooling station for termination of SPPD's interconnecting transmission lines (2 nos. 220kV each for M/s Saurya Urja and Adani Renewable and 2 nos. 400kV for M/s Essel) would be developed by SPPDs. Further 1 x 125 MVAR bus reactor would be constructed by Essel at their end.

25.5 M/s Essel (750 MW) had some reservations regarding the laying of 60 km long D/C line from Solar Park Pooling station upto 220/400/765kV Bhadla Pooling station as it would impact on the project cost and the project may become unviable.

25.6 Further, to address reactive power management aspects including during low / no solar generation periods, 1x240MVAR bus reactor at 765kV Bhadla S/s is proposed. For 765kV Bhadla-Bikaner D/C line also, 1x240 MVAR Switchable line reactor at each end of each circuit is proposed.

25.7 Considering above three (3) LTA applications for 1500 MW Solar Power transfer requirement through Bhadla pooling station, following transmission scheme was agreed to be taken up for implementation as ISTS by POWERGRID:

- (i) Bhadla (PG) ó Bikaner(PG) 765kV D/C line
- (ii) Bhadla (PG)- Bhadla (RVPN) 400kV D/C (Quad) line

- (iii) Establishment of Pooling Station at Bhadla (PG) (765/400kV : 3x1500MVA 400/220kV : 3x500MVA,)
- (iv) 2 nos. 400kV & 4 nos. 220kV line bays at Bhadla (PG) for interconnection of solar park interconnection
- (v) 1x240 MVA_r switchable line reactor at each end (each ckt) of 765kV Bhadla(PG)-Bikaner(PG) D/C line
- (vi) 1x240 MVA_r (765kV) Bus reactor at Bhadla Pooling Station

26.0 Connectivity & LTA to GHAVP Nuclear power plant (2X700MW) of M/s NPCIL in Haryana.

26.1 Director (PSP&PA-I),CEA stated that the evacuation system for upcoming Nuclear power generator (2X700MW) of M/s NPCIL for Gorakhpur Haryana Anu Vidyut Pariyojna (GHAVP) located at Fatehabad, Haryana was discussed during the 36th SCSPSNR held on 13/07/2015. Connectivity and Long Term Access was sought for 1400 MW from the GHAVP nuclear power plant of NPCIL. Connectivity was sought w.e.f. September, 2020 with target Beneficiaries as Northern Region and following transmission system was proposed:

Connectivity:

- Fatehabad - NPCIL generation 400kV D/C line

Long Term Access:

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

26.2 CE, HVPNL stated that NPCIL had acquired land for 4x700 MW, whereas LTA and Connectivity application was made for only 2x700 MW and thus the proposed scheme may need changes considering the final capacity of 4x700 MW. He further stated that CTU shall carry out studies considering the plant capacity as 4x700 MW Also, the short circuit levels should be indicated for the proposed LILO of Moga- Hisar 400 kV D/C line as well as other nodes in Haryana.

26.3 Director (PSP&PA-I), CEA stated that a suitable scheme for power evacuation should be planned taking implementation of the capacity of 4x700 MW in a phased manner.

26.4 Powergrid informed that NPCIL had desired that considering that the present financial sanction is for 2x700 MW, for which Connectivity and LTA applications have been made, it prefers to retain the same applications, rather than making new applications (4x700MW) for which no financial sanction is available. Therefore, it was proposed by NPCIL that power evacuation scheme for GHAVP may be considered based on the earlier application (2x700MW).

26.5 POWERGRID stated that accordingly, two units were considered in 2020 time frame & studies were carried out. GHAVP Nuclear plant (2X700MW) of M/s NPCIL is in proximity of Fatehabad 400/220 kV substation of POWERGRID. Hence, it was proposed that connectivity can be granted at Fatehabad. Presently, Fatehabad 400/220 kV S/s is connected with LILO of one circuit of Moga-Hissar 400 kV D/C line. LILO of Moga-Bhiwadi 400 kV D/C line at Hissar is under implementation and therefore another 400kV D/c line would be available between Moga & Hissar.

26.6 After discussions, it was agreed that the connectivity and LTA with the above mentioned Transmission System may be granted to M/s NPCIL. In addition, it was proposed that a 125 MVAR bus reactor may also be provided at generation switchyard and switchgear equipment may be designed with 50 kA fault level. NPCIL may complete the necessary formalities in this regard at the earliest.

27.0 Connectivity & Long Term Access to M/s Noida Power Company Ltd. For drawl of 500 MW as a bulk consumer in Greater Noida area, Uttar Pradesh.

27.1 Director (PSP&PA-I),CEA stated that the issue of grant of Connectivity and LTA to Noida Power Company Ltd. (NPCL) was discussed in various Standing Committee/LTA and connectivity meetings, however, the same could not be resolved. During 34th SCM held on 08/08/2014, it was suggested that NPCL may approach CERC. Accordingly, NPCL had approached CERC. CERC vide their order dated 16/09/2015 has directed to process the applications. Based on the direction, UPPTCL gave the NOC for availing LTA. It has been stated in the NOC that M/s NPCL would be connected to UPPTCL substations and UP system is capable of supply of 500 MW to NPCL.

27.2 He further stated that keeping above in view, it was proposed to grant LTA for drawal of 500MW power at G. Noida 765/400kV S/s of UPPTCL through intra State system of UPPTCL w.e.f. 1/10/2017 to 30/9/2042. The grant of LTA shall be subject to fulfilment of the conditions as

given in the letter and NOC given by UPPTCL. The grant of LTA shall be abide by all provisions of the Electricity Act, 2003, CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State transmission and related matters) Regulations, 2009, Approved Detailed procedure of CTU, CEA (Technical Standards for connectivity to the Grid) and Indian Electricity Grid Code as amended from time to time.

27.3 Accordingly, it was proposed that the already granted connectivity at 400/220 kV G. Noida (new) proposed under ISTS, shall be cancelled as M/s NPCL would be connected to UPPTCL substations. It was also proposed that the transmission scheme NRSS-XXXIII comprising of establishment of 400/220 kV Greater Noida ISTS substation along with Ballabharh ó Greater Noida 400 kV D/C line may be dropped.

27.4 Further, M/s NPCL requested that as some part of the U.P transmission system associated with grant of connectivity as bulk consumer to them is getting commissioned shortly, therefore, part LTA for 270 MW may be granted. It was deliberated that, as per CERC regulations, LTA shall be granted for total quantum i.e. 500MW from the time period as applied in the LTA application i.e. October 07. Representative of M/s NPCL agreed to the same.

It was decided that the planned NRSS – XXXIII for implementation through TBCB route may be dropped and the BPC, PFCCL may be advised to close the SPV.

28.0 50MVAR Switchable Line reactor at Bassi after LILO of Bhiwadi-Bassi 400kV line at Kotputli

28.1 POWERGRID informed that the LILO of Bhiwadi-Bassi 400kV line at Kotputli was approved under NRSS 6XV. The line length for the 400kV Kotputli ó Bassi section was envisaged as 160 km in Detailed Project Report. Accordingly, the 50 MVAR existing line reactor at Bassi end in 400kV Kotputli ó Bassi section was to be made switchable. However, the actual Line length of Kotputli ó Bassi section is 106 km. Considering the length of line, the Reactor was not made switchable.

Members noted the same.

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

29.1 Powergrid informed that the following new substations were planned under various transmission schemes & are under implementation:

| S. No. | Name of Substation | Capacity (MVA) | Expected Schedule |
|--------|--|----------------|-------------------|
| 1 | 400/220kV Kurukshetra S/Stn. (GIS) | 2x500 | Commissioned |
| 2 | 400/220kV Parbati Pooling Station | 2x315 | Jun'16 |
| 3 | 400/220kV Dehradun Sub station | 2x315 | Mar'16 |
| 4 | 400/220kV Bagpat Gas Insulated Stn. | 2x500 | Mar'16 |
| 5 | 400/220 kV Saharanpur Sub station | 2x315 | Mar'16 |
| 6 | 400/220kV Rajghat Sub station (GIS) | 4x500 | May'17 |
| 7 | 400/220kV Papankalan -I Sub station (GIS) | 4x500 | May'17 |
| 8 | 400/220kV Tughlakabad Sub station (GIS) | 4x500 | May'17 |
| 9 | 220/66kV GIS S/s at Sector 47, Chandigarh | 2x160 | 24 months from IA |
| 10 | 400/220kV S/s at Kala Amb | 7x105 | Oct.'18 |
| 11 | 400/220kV S/s at Amargarh | 7x105 | Oct.'18 |
| 12 | 400/220kV S/s at Patran | 2x500 | May'16 |
| 13 | 400/220kV Kadarapur S/s in Gurgaon area (GIS) | 2x500 | 38 months |
| 14 | 400/220kV Sohna Road S/s in Gurgaon area (GIS) | 2x500 | 38 months |
| 15 | 400/220kV Prithala S/s in Palwal area (GIS) | 2x500 | 38 months |
| 16 | 400/220kV Baram(Jauljivi) S/s | 2x315 | 40 months |

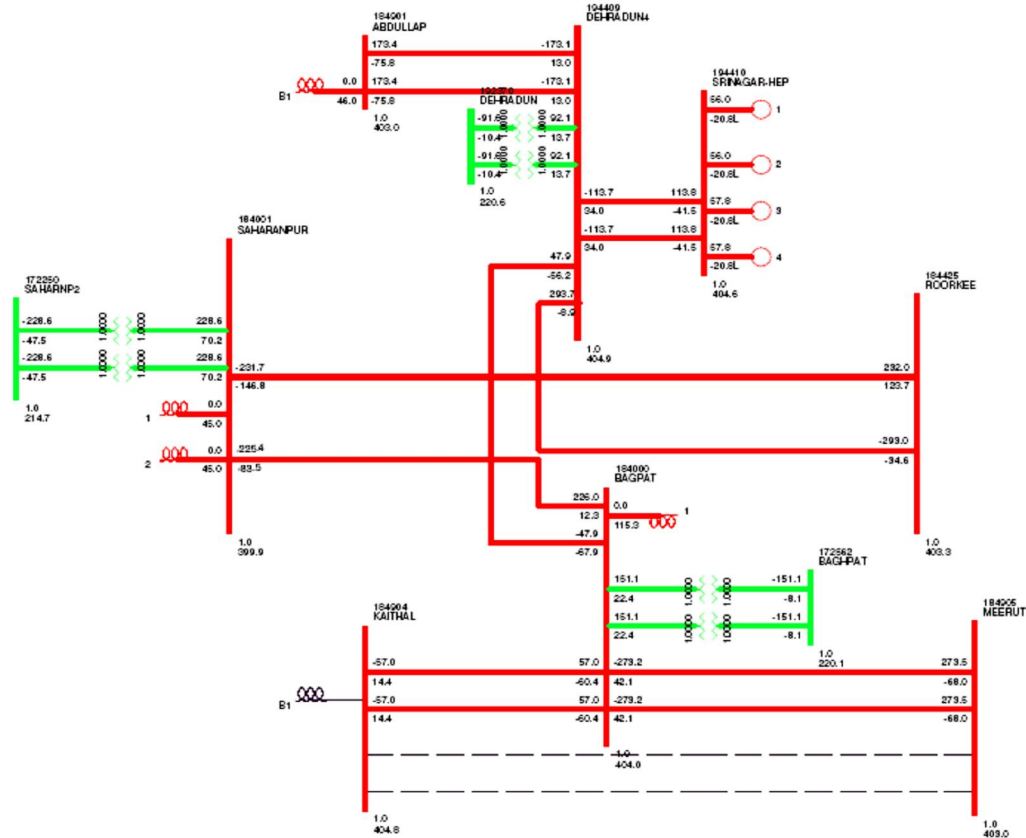
30.2 For above 400/220kV substations, implementation of downstream 220kV elements needs to be commissioned at the earliest for utilization of the system. It was desired that the 220kV system also gets commissioned in the matching time frame. Appropriate STUs may note the above and inform the committee about the planned 220 kV system from these substations and their status to CEA and CTU.

Members noted the same.

30.0 Dehradun- Bagpat line without 50MVAr Line reactor

30.1 Powergrid stated that Dehradun-Bagpat 400kV D/C line under NRSS XVIII was initially proposed with two nos of 50MVAr line reactors at Dehradun end, as it was a radial line from Bagpat. Subsequently, under NRSS Scheme, 400kV Dehradun ó Bagpat line was planned to be LILoed at Saharanpur. The line length of Dehradun ó Bagpat line was reduced and the line reactors earlier proposed at Dehradun end were approved to be shifted to Saharanpur substation as bus reactors at Saharanpur. Accordingly, during implementation both 50MVAr reactors were directly delivered to Saharanpur.

30.2 In the 36th SCPSNR, due to RoW constraints, LILo of 400kV Dehradun - Bagpat at Saharanpur was dropped and the network configuration was revised to provide reliability to Saharanpur as shown in figure below:



30.3 Further, the requirement of 50 MVAR line reactor in 400kV Bagpat ó Dehradun S/c line at Dehradun end has been reviewed considering that the network configuration has changed with dropping of the above LILo and also considering Dehradun -Abdullapur 400kV D/c lines.

30.4 AGM, CTU stated that in addition to facilitate line charging, the 50MVAr line reactors had been proposed to control system voltage profile of the area. Since, the two 50MVAr reactors would still be available in close proximity at Saharanpur; the 50MVAr reactors would continue to control the voltages in the area under light load conditions. He further stated that studies indicate that with revised configuration, the expected maximum total voltage rise is within 10kV in charging the 400kV Dehradun óBagpat S/C line without line reactor from either end. Further, under steady state, voltages are almost same in the area with or without 50MVAr line reactor in Dehradun -Bagpat line.

30.5 Director (PSP&PA-I),CEA requested CTU to submit the study results.

30.6 In view of the above, it was agreed that the 50MVAr reactors may be retained as bus reactors at Saharanpur and 400kV Dehradun óBagpat S/c line be operated without 50MVAr line reactor at Dehradun end and CTU to submit the study results to the committee.

31.0 Connectivity to Singoli Bhatwari HEP (99 MW) of M/s L&T Uttarakhand Hydropower Ltd. in Uttarakhand.

31.1 AGM, CTU stated that L&T Uttarakhand Hydropower Ltd. had applied for Connectivity for 99 MW to Singoli Bhatwari HEP located in Uttarakhand w.e.f November, 2017. The commissioning schedule of the first unit is December, 2017. The application was agreed in the 7th LTA/connectivity meeting held on 14/7/2015. As per the application, the nearest substation present in the vicinity is Baramwari 220/33kV GIS substation under UITP (deemed ISTS).

31.2 Singoli Bhatwari generation has been identified to be evacuated through UITP system. The proposal of connectivity is as below:

- LILO of one circuit of Srinagar-Baramwari 220 kV D/C line at Singoli Bhatwari Generation switchyard.

31.3 However, Baramwari 220/33kV substation to be implemented by PTCUL may get delayed as other hydro generations in the vicinity of Baramwari substation are delayed. Accordingly, interim connectivity to Singoli Bhatwar HEP may be provided as below:

- Singoli Bhatwari HEP - Srinagar 400/220/33 kV 220 kV D/C line
 - LILO to be implemented by the applicant i.e. M/s L&T Uttarakhand Hydropower Ltd.
 - Remaining portion of the 220kV line to be implemented by PTCUL.

31.4 This would allow interim connectivity arrangement for Singoli Bhatwari generation. After commissioning of Baramwari substation, the final arrangement as mentioned at **Para 31.2** to be taken up.

31.5 It was also informed that PTCUL shall sign Implementation Agreement with the generation developer. Further, grant of connectivity does not fulfil the condition of adequacy of transmission system for transfer of power to target beneficiaries. The grant of connectivity shall not entitle to interchange power with the grid unless it obtains any type of access to the ISTS from CTU.

31.6 Transmission beyond immediate evacuation system is to be evolved once the applicant applies for the LTA.

Members agreed to the same.

32.0 Operational Feedback on Transmission Constraint: October 2015

32.1 The operational feedback by NLDC on Transmission constraints in Northern Region for the quarter July 2015 to September 2015 was discussed by the members and summary of the deliberations on Transmission line constraints and ICT constraints are as given below:

| S. No | Corridor | Season/ Antecedent Conditions | Description of the constraints | Deliberations in the meeting |
|---|---------------------------|--------------------------------------|---|---|
| I. Transmission line Constraints | | | | |
| 1 | 400kV Dadri-Muradnagar | Monsoon | Loading of Dadri-Muradnagar was in range of 500MW for 30% of time | Due to commissioning of Kashipur & Roorkee 400kV D/C line and Muradnagar-II substation, the loading has reduced considerably. Additional substations such as Hapur and Greater Noida 765 kV (planned by UPPTCL) are expected shortly and their connectivity with the existing network will further relieve this constraint. |
| 2 | 400kV Dadri-Greater Noida | All time | High MW loading | UPPTCL is commissioning a new 765/400 kV substation at Greater Noida which would relieve the loading. The scheduled commission is February, 2016 |

| | | | | |
|-----|---|--|--|---|
| 3 | 400kV Meerut-Muzaffarnagar | Non availability of Vishnuprayag HEP (400MW) | During high load in Uttarakhand & UP and low hydro (at Vishnuprayag) in Uttarakhand | Commissioning of 400kV Bareilly - Kashipur-Roorkee D/C line has given relief to the loading of Meerut- Muzaffarnagar. Roorkee-Saharanpur is expected to be commissioned during January, 2016. |
| 4 | 400kV Singrauli-Anpara | All time | Due to low generation at Anpara and high generation at Rihand-Singrauli Complex, 400kV Singrauli-Anpara often gets overloaded. | Severe Right of Way constraints and non - availability of bays at Singrauli and Anpara. It was proposed to study installation of the series reactor in the line so as to reduce the high loading and limit high short circuit level |
| 5-7 | 400kV Anpara-Obra, Anpara-Mau & Anpara-Sarnath-I&II | | Connected to generating station (Anpara-B & C) | UPPTCL stated that the overloading is due the non commissioning of the generations in the Eastern Region. These issues would be examined while in the studies by the sub group for proposed new NR- WR corridor |
| 8 | 400kV Rosa-Bareilly | | | Shahjahanpur S/s commissioned. Rosa ó Shahjahanpur D/C line is expected to be completed in Feb016 |
| 9 | Mohindergarh Bhiwani 400kV D/C | | Already one more 400kV Mohindergarh-Bhiwani D/C lines have been approved. | De-notified from implementation through TBCB route and given to PG under compressed time schedule by MoP on 17.09.15 Schedule - 24 months from award - DPR under preparation |
| 10 | Underlying 220kV network of Bhiwadi | | 400/220kV Bhiwadi has three ICTs(3×315 = 945 MVA). Though 220kV network connectivity at Bhiwadi is: 1. 220kV Bhiwadi-Bhiwadi Raj D/C 2. 220kV Bhiwadi-Khuskhera D/C 3. 220kV Bhiwadi-Rewari (Bus split) & 220kV Bhiwadi-Mau. Both circuit connected to Haryana and import of power from Haryana is restricted through bus | RRVPNL stated that the load at Bhiwadi would soon be diverted to Neemrana & Alwar which are going to be commissioned shortly. |

| | | | | |
|----|--|--|--|---|
| | | | split. 220kV Bhiwadi-Bhiwadi Raj D/C always loaded ~200MW each. Any N-1 contingency at 220kV network would cause further tripping at 220kVBhiwadi. | |
| 11 | Non availability of downstream network of the listed substations and under utilization of ICTs | | 220kV network not available; 1. Bhiwani & Jind (Haryana) 2. Sohawal & Shahjahanpur (UP) 3. New Wanpoh & Samba (J &K) Underutilization of ICTs; 4. Mundka, Sonapat, Deepalpur & Kabulpur (Haryana), 5. Neemrana & Jaipur South (Rajasthan) & 6. Makhu (Punjab) | Bhiwani and Jind (Haryana): lines to be commissioned in June 17 Sohawal (UP): to be commissioned in May 16 Shahjahanpur (UP): to be commissioned in Feb 16 Samba (J &K): to be commissioned March 16 Mundka (Delhi): additional drawal required Sonapat (Haryana): partly being utilised due to less load Makhu (Punjab): partly commissioned |

II. ICT Constraints

| S. No | ICT | Season/ Antecedent Conditions | Description of the constraints | Deliberations in the meeting |
|-------|------------|-------------------------------|---|--|
| 1 | Agra UP | All time | Agra UP has three ICTs of 315 MVA each. One ICT has been replaced with 500 MVA. Total transformation capacity is now 1130 MVA. Power flow over the three ICTs is more than 800 MW (for three ICTs in parallel, max loading should be 70% of rated capacity) which is not N-1 compliant. | Math 400 kV is scheduled to be commissioned in May, 2016 which would relieve the high loading. |
| 2 | Bhiwadi | All time | Three ICTs of 315 MVA each, loading is in range of ~650 MW and underlying network of Bhiwadi is also constrained due to skewed loading at Bhiwadi, Rajasthan. | RRV PNL stated that the load at Bhiwadi would soon be diverted to Neemrana & Alwar which are going to be commissioned shortly. |
| 3 | Muradnagar | All time | All the three ICTs are fully loaded and not n-1 compliant. Loading on ICTs is more than | After commissioning of Murad nagar-II, the loading has been reduced. |

| S. No | ICT | Season/ Antecedent Conditions | Description of the constraints | Deliberations in the meeting |
|-------|--|---|--|--|
| | | | 700MW for 20-30% of the time. | |
| 4 | 765/400kV ICTs of Unnao (2X1000 MVA) | Security issues of 765kV Anpara-Unnao on n-1 contingency of Unnao ICT | Evacuation of Anpara C thermal power station through 765kV Anpara-Unnao. Unnao ICTs are loaded more than ~1100MW and not N-1 compliant. | The third ICT is expected to be commissioned in May, 2017. |
| 5 | Mainpuri | Summer | Two ICTs of 315 MVA each loaded in the range of ~500 MW and not N-1 compliant. | New ICT would be commissioned in September, 2017 |
| 6 | 400/220kV Dhuri ICTs (2 X 500 MVA) | Monsoon | Dhuri has two ICTs of 500 MVA each, Rajpura TPS of 2× 700 MW is directly connected to Dhuri and Dhuri is connected to Talwandi Saboo. Major part of Rajpura TPS generation is evacuating through Dhuri ICTs only and Dhuri ICTs loading are in the range of ~500 MW each most of the time during paddy season, thus Dhuri ICT are not N-1 compliant. | 3 rd ICT would be commissioned by September, 2016 |
| 7 | Kaithal | Summer | Two ICTs of 315 MVA each loaded in the range of 400-500 MW, loading depend upon the 220kV connectivity with 400/220kV Abdullapur, 220kV Jorian and generation at 220kV DC RTP. | 3 rd ICT would be commissioned by July, 2017 |
| 8 | Greater Noida | All time | Three ICTs of 315 MVA each & fourth ICT of 315 MVA has been replaced by 500 MVA ICT, loaded upto ~900-1000 MW in this quarter. | New Substation at G. Noida (UPPTCL) is expected to be commissioned by February, 2016 |
| 9 | Moradabad UP | | Moradabad has two 400/220 kV ICTs of 315 MVA each. The loading is in the range of 300-400 MW, which is not n-1 | No more constraint now after commissioning of Muradnagar-II |

| S. No | ICT | Season/ Antecedent Conditions | Description of the constraints | Deliberations in the meeting |
|-------|---------------------------------------|-------------------------------|---|---|
| | | | compliant. | |
| 10 | Gurgaon | | Gurgaon has two 400/220 kV ICTs of 315 MVA each. The loading is in the range of 400-450 MW most of the time, which is not N-1 compliant. | New substations has been planned in Gurgaon Area to cater to the future load. Two substations are under implementation through TBCB route hence no further augmentation is required |
| 11 | Azamgarh | | Azamgarh has two 400/220 ICTs of 240MVA each in ring bus system. The loading is in the range of 350-450MW, which is not N-1 compliant. | 3 rd ICT is expected to be commissioned by May, 2016 |
| 12 | Obra TPS | | Obra TPS has two ICTs; one ICT was repaired recently after ~2 year outage but that ICT still has problem and not operating continuously. | No more constraint now |
| 13 | Single ICTs at following 400kV Nodes: | | <ol style="list-style-type: none"> 1. Bikaner (Rajasthan) 2. Chhabra (Rajasthan) ó 220 kV Modak óBadod inter regional lines is required to be opened many a times. 3. Kalisindh (Rajasthan) 4. Rajwest (Rajasthan) 5. Dehar (BBMB) 6. Bhiwani (BBMB) 7. Gorakhpur (UPPTCL) | No problem at Bikaner GENCO to install new banks which would take 2 ó 3 years. Feasibility studies being done for Chabra Kali Sindh Rajwest commissioning of new ICTs at these places would take 2 ó 3 years from now. ICT at Deharadun (BBMB) would be commissioned by December, 2016. |

III. Nodes Experiencing Low Voltage

| S. No | Nodes | Season/ Antecedent Conditions | Description of the constraints | Deliberations in the meeting |
|-------|-------|-------------------------------|--------------------------------|------------------------------|
| | | | | |

| | | | | |
|---|----------|--------|---|---|
| 1 | Bhilwara | Summer | In Rajasthan, 400kV Bhilwara is continuously experiencing low voltage. In September voltage profile has slightly improved after tap changing. | The voltage at Bhilwara during summer months remain in the range of 360 ó 370 kV, even after changing the tap positions. RRVPNL to install suitable capacitor banks. |
|---|----------|--------|---|---|

IV. Nodes Experiencing High Voltage:

| S. No | Nodes | Season/ Antecedent Conditions | Description of the constraints |
|-------|---------------------|-------------------------------|--|
| 1 | Dehar(BBMB) | All time | High Voltage |
| 2 | Deepalpur | July | High Voltage |
| 3 | Kabulpur | July | High Voltage |
| 4 | Kirori | July | High Voltage |
| 5 | CLP Jhajjar(MGTPS) | July | High Voltage |
| 6 | Nuhiyawali | All time | High Voltage |
| 7 | RGTPS(Khedar) | April | High Voltage |
| 8 | Abdullapur | July | High Voltage |
| 10 | Agra(PG) | All time | High Voltage |
| 11 | Amritsar | July | High Voltage(Load reduces in September) |
| 12 | Ballabgarh | July | High Voltage |
| 13 | Bhiwadi | July | High Voltage |
| 14 | Parbati Pool | July | High Voltage |
| 15 | Fatehabad | July | High Voltage |
| 16 | Jalandhar | July & August | High Voltage |
| 17 | Karcham Wangtoo HEP | July | High Voltage |
| 18 | Mandola | July | High Voltage |
| 19 | Mahendragarh | July | High Voltage |
| 20 | Nallagarh | July | High Voltage |
| 21 | Neemrana | July | High Voltage |
| 22 | Naptha Jhakri | July | High Voltage |
| 23 | Patiala | July | High Voltage |
| 24 | Panchkula | April | High Voltage |
| 25 | Shree Cement | All time | High Voltage |
| 26 | Sonepat | July | High Voltage |
| 27 | Dhuri | July | High Voltage |
| 28 | Makhu | All time | High Voltage |
| 29 | Muktsar | July | High Voltage |
| 30 | Nakodar | April | High Voltage |
| 31 | Jodhpur | All time | High Voltage |
| 32 | Rampur | April | High Voltage |
| 33 | Talwandi Sabo | April | High Voltage |
| 34 | Akal | All time | High Voltage |

It was decided that detail studies would be carried out for the nodes experiencing high voltages.

33.0 Connectivity to Railways with CTU network

33.1 Director (PSP&PA-I),CEA stated that based on the request of Railways, the agenda for connectivity to Railway with CTU network was discussed in the 36th Standing Committee meeting of NR. During the meeting, constituents were of the view that Railways would be using 220kV corridor for small quantum of power 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.

33.2 Subsequently, a meeting of CEA, CTU and Railways was convened by CEA wherein Railways had desired that connectivity at Agra(PG), Mainpuri(PG), Kanpur(PG), Fatehpur(PG) and Saharanpur (PG) 400/220kV drawal points in NR may be provided. Railway intend to draw more than 100 MW from each of this ISTS interconnection point. During the meeting in CEA it was also deliberated that Railway can construct transmission lines under the Railways Act, and all the costs for construction shall have to be borne by Railways.

33.3 Director, HVPNL stated that Railways would draw 5-10 MW from each interconnection which would result in under-utilisation of the transmission assets. Further Railways draws only two phase supply which may also create unbalance in the system.

33.4 The representative of Railways stated that they intend to draw more than 100 MW from each interconnection point. It was also informed that Railway would draw 3 phase supply and Railways distributes the traction load in such a manner so as the issue of unbalanced loading is addressed. Further, they intend to connect to the ISTS system in order to have reliable power supply for traction purpose.

33.5 HVPNL further stated that optimal utilisation of transmission ROW is important and should be looked into. Considering the fact that obtaining RoW is very onerous issue, Railways should explore connectivity with STU system first if STU substation is located in the vicinity, so as to avoid the construction of long lines by Railways.

33.6 After detailed deliberations, the proposal of Railways was agreed in principle. It was decided that the Railways would seek connectivity from STU substations in the vicinity, wherever possible. STUs would grant connectivity to Railways in time bound manner.

33.7 CTU stated they also need to look into the availability of space at their substations and shall inform the same to Railways.

33.8 STUs stated that Railways take considerable time in granting permission for laying the overhead transmission lines and underground cables across the track. **It was decided that Railways would grant such clearance in time bound manner and States would reciprocate with granting time bound connectivity to their system.**

34.0 Temporary connectivity through LILO to various IPPs.

34.1 AGM, CTU stated that a number of generation projects in different regions were granted Connectivity/ Long Term Access (LTA) with strengthening of transmission system. In few cases generation projects were to be commissioned ahead of the anticipated commissioning of the direct transmission system. In such cases, generation projects were given temporary connectivity through loop-in & loop-out (LILO) of nearby transmission lines so as to enable them connect with the grid and commission their generation projects. The temporary connectivity through LILO was to be withdrawn after commissioning of the main transmission system. Main transmission system of some of such generation projects have been commissioned and their temporary connectivity through LILO has been disconnected; however, some are still connected through LILO arrangement.

34.2 He further stated that hearing the tariff petition for one such case viz. transmission system associated Phase-1 IPPs in Odisha (Petition No.112/TT/13), where two generation projects are still connected through temporary LILO arrangement, the Honøble CERC had passed the order dated 07.10.2015 wherein the following direction has been given in para 65 of the order:

"The associated transmission lines were to be constructed by the generation developer matching with the transmission system to be developed by the petitioner and the LILOs constructed by generation developers which were temporary arrangement were to be replaced by the associated transmission system. It is noticed that some of the generation developers have not commissioned the dedicated lines and are continuing to evacuate power through the temporary LILO arrangements. We direct the petitioner to discuss the

issue in the Standing Committee Meeting on Transmission and finalize the timeline for replacement of the LILOs of generation developer by dedicated transmission lines within a period of six months from the date of connection of LILO of the petitioner."

34.3 In view of above CTU further informed that there are number of generation projects in Eastern and Western regions connected through temporary LILO arrangements which are supplying power to Northern Region under LTA / MTOA. In line with the directions from CERC, matter needs to be discussed in Standing Committee meetings and timeline for opening of LILOs of generation developer by dedicated transmission lines is to be finalised.

Members noted the above.

Meeting ended with the thanks to the Chair.

Annexure - I**List of the Participants of the 37th meeting of the Standing Committee on Power System Planning of Northern Region held at 11:00 Hrs. on 20th January, 2016 at NRPC, Katwaria Sarai, New Delhi**

| S. No. | Name Shri/Smt. | Designation | Mobile No. | Email |
|----------------------|---------------------|------------------------|------------|--|
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Annexure-II

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

The Minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region were issued vide our letter No. 1/9/2015/SP&PA/4-22 dated 20th August 2015. Following corrigendum is issued based on the observations/Comments received from PGCIL, RRVPNL and HVPNL.

Corrigendum # 1

POWERGRID vide their letter No C/CTU/N/PLG dated 8-9-2015 had mentioned that the Annexure to the minutes for scope of NRSS XXXVII. Based on the POWERGRID's observations, **Annexure II** in the minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region is thus revised and is as under:

Annexure-II

Phase I: By PTCUL under Uttarakhand Intra-State system

- (i) Creation of 220/33kV Jauljivi(PTCUL) substation by LILO of one circuit of 220kV Dhauliganga-Pithoragarh (PG) line at 220kV Jauljivi (PTCUL) substation

Phase II: Part by POWERGRID under ISTS as "NRSS XXXVII"

- (i) Creation of 400/220kV, 7X105MVA GIS Substation in Jauljivi area under ISTS by LILO of both ckts. of 400kV Dhauliganga -Bareilly (presently charged at 220kV) at 400/220kV Jauljivi (PG) [Incoming line from Dhauliganga shall be charged at 220kV & outgoing to Bareilly shall be charged at 400kV]

The 400/220 kV Jauljivi substation to have the following provision:

400 kV side

- a. 7*105 MVA Single Phase ICTs along with ICT bays
- b. 2 nos. of line bays

- c. 2X63MVAr switchable line reactors in Bareilly-Jauljivi 400kV D/C at Jauljivi end for providing voltage control under various operating conditions. These 63MVAr line reactors shall be taken up as single phase units, if required.
- d. Space provision for 2 future bays

220 kV side

- a. 2 nos. of ICT bays
 - b. 8 nos. of line bays(Pithoragarh-2, Almora-2, Jauljivi-2 & Dhauliganga-2)
 - c. One no. of 220kV sectionaliser
 - d. Shifting of 25 MVAr line reactor already available in 220kV Dhauliganga óBareilly line at Dhauliganga end, to 400/220kV Jauljivi S/s as a bus reactor at 220kV
 - e. Disconnection of 220 kV LILO of Dhauliganga - Bareilly at Pithoragarh and connection of Pithoragarh line to Jauljivi 400/220 kV S/s at 220kV.
- (ii) Diversion of Dhauliganga-Bareilly 400kV D/C line (operated at 220kV) at Bareilly end from Bareilly(UP) to Bareilly(PG) alongwith 2 nos. of 400 kV bays at Bareilly

Phase II: Part by PTCUL under Uttarakhand intraState system

- (i) 220kV GIS substation at Almora & associated 220kV AlmoraóJauljivi (PG) D/C line
- (ii) Existing LILO line of Dhauliganga- Pithoragarh (PG) at 220/33kV Jauljivi (PTCUL) Substation would be disconnected & 220/33kV Jauljivi (PTCUL) would be connected to Jauljivi (ISTS) 400/220kV substation through 220kV D/C line.

Corrigendum # 2

POWERGRID vide their letter No C/CTU/N/PLG dated 8-9-2015 proposed that the complete scope of the scheme óCreation of 400/220kV substations in NCT of Delhi during 12th Plan periodö may be included as an Annexure to the minutes. PGCIL has also mentioned that LILO of one circuit of Bawana óMandola 400kV D/C line at Rajghat on M/c tower with Twin/HTLS conductor was inadvertently recorded in the minutes of the 34th Standing Committee Meeting whereas the actual scheme involves LILO of both the circuits of Bawana óMandola 400kV D/C line at Rajghat. PGCIL has also pointed out that the number of 220 kV bays at Rajghat and Tughlakabad would be 24 instead of 23 and 20 instead of 23 at Dwarka-I , as recorded in the minutes of the 34th Standing Committee Meeting. Accordingly, the complete scope of the scheme óCreation of 400/220kV substations in NCT of Delhi during 12th Plan periodö is as under and is appended as Annexure III to the minutes.

Annexure III

“Creation of 400/220kV Substations in NCT of Delhi during 12th Plan Period (Part-A)”

- (i) LILO of both circuits of Bawana óMandola 400kV D/C line at Rajghat on M/c tower with Twin/HTLS conductor
- (ii) LILO of one circuit of Bamnauli - Jattikalan 400kV D/C line at Dwarka-I with Twin/HTLS conductor
- (iii) Establishment of 4x500MVA, 400/220 kV GIS Substation at Rajghat
400 kV

- a. Line bays : 4 nos. (with provision for future expansion)
- b. 500 MVA, 400/220 kV ICTs : 4 nos.
- c. 125 MVAR Bus Reactor : 1 no.
- d. Transformer bay : 4 nos.
- e. Reactor Bay : 1 no.

220 kV

- a. Line bays : 12 Nos.
- b. Transformer bay : 8 Nos. (4 nos. for 400/220kV ICTs & 4 nos. for 220/33kV ICTs)
- c. Bus coupler bays : 2 Nos.
- d. Bus Sectionalizer bays : 2 Nos.

- (iv) Establishment of 4x500MVA, 400/220 kV GIS Substation at Dwarka-I
400 kV

- a. Line bays : 2 Nos. (with provision for future expansion)
- b. 500 MVA, 400/220 kV ICTs: 4 Nos.
- c. 125 MVAR Bus Reactor : 1 No.
- d. Transformer bay : 4 No.
- e. Reactor Bay : 1 No.

220 kV

- a. Line bays : 12 Nos.
- b. Transformer bay : 4 Nos.
- c. Bus coupler bays : 2 Nos.
- d. Bus Sectionalizer bay : 2 Nos.

“Creation of 400/220kV Substations in NCT of Delhi during 12th Plan Period (Part-B1)”

- (i) LILO of both circuits of Bamnauli ó Samaypur 400kV D/C line at Tughlakabad with Twin HTLS conductor
- (ii) Establishment of 4x500MVA, 400/220 kV GIS Substation at Tughlakabad
400 kV

- a. Line bays : 4 nos. (with provision for future expansion)
- b. 500 MVA, 400/220 kV ICTs : 4 nos.
- c. 125 MVAR Bus Reactor : 1 no.
- d. Transformer bay : 4 nos.
- e. Reactor Bay : 1 no.

220 kV

- e. Line bays : 12 Nos.

- f. Transformer bay : 8 Nos. (4 nos. for 400/220kV ICTs & 4 nos. for 220/33kV ICTs)
- g. Bus coupler bays : 2 Nos.
- h. Bus Sectionalizer bays : 2 Nos.

Corrigendum # 3

RRVPNL vide their letter no. RVPN/SE(P&P)/PSS/D 1446 dated 14.09.2015 has intimated a modification regarding **“Development of ISTS system for evacuation of power from new Solar parks and Solar power projects in Rajasthan”** discussed at **S.no 17** in the Minutes of Meeting.

Accordingly, at **S.no. 17.3**, 765 kV D/C Pugal-Bhadla (PG-765 kV GSS) line (initially charged at 400 kV) has to be replaced by 765 kV D/C Pugal-Bikaner (PG-765 kV GSS) (initially charged at 400 kV) in the minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region.

Further, **as per PGCIL’s observation vide their mail dated 09.10.2015**, In para **17.10 (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”, should be modified and read as “The ISTS scheme mentioned at **S.No 17.3** for evacuation of 13,700 MW in the identified complex is in-principally agreed by the committee”.

Corrigendum # 4

HVPNL vide their letter no. Ch/32/HSS-152 dated 09.09.2015 has made observation that As per item **No 1.1.2** in the minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region, **“Implementation of 220/66kV substation in Chandigarh along with Chandigarh–Panchkula (PG) 220kV D/C line”**, the following may be included at the end of the paragraph in the said item of the minutes.

“**Provision for space for two numbers 220kV bays at 400 kV substation Naggal (Panchkula) to be provided for Haryana**”

Corrigendum # 5

As per PGCIL’s observation vide their mail dated 09.10.2015, At **S.no 16** in the minutes of 36th meeting of the Standing Committee on Power System Planning of Northern Region, in the scheme **Modification of Suratgarh Substation Location in Green Energy Corridor**, the following may be added as **Sl.no 16.5**

16.5 Due to change of S/s location, line lengths of various sections have changed. Therefore, revised reactive compensation is proposed as under:

- **Line Reactors**

| S. No. | Transmission Line | From end (each ckt) MVar | To end (each ckt) MVar |
|---------------|---|--------------------------------------|--------------------------------------|
| (i) | Ajmer(New) ó Bikaner(New) 765 kV D/C line -272km | 1x240 (switchable) (each ckt.) | 1x330 (switchable) (each ckt.) |
| (ii) | Bikaner(New) ó Moga(PG) 765 kV D/C line-350km | 1x330 (switchable) (each ckt.) | 1x330 (switchable) (each ckt.) |

- **Bus Reactors**

| S. No. | Bus | Reactor (MVAR) |
|---------------|---------------------|--|
| (i) | Bikaner(New) | 1X330 (765kV bus) 1x125 (400kV bus) |

The Standing Committee agreed with the above proposal.