

Agenda note for 33rd Standing Committee Meeting on Power System Planning in Northern Region.

1. Confirmation of the minutes of 32nd Standing Committee on Power System Planning in Northern Region held on 31/08/2013

- 1.1 The minutes of the 32nd meeting of Standing Committee on Power System Planning in Northern Region held on 31.08.2013 at Gurgaon, were circulated vide CEA letter No. 1/9/SP&PA-2013 / dated 27.09.2013.
- 1.2 In para 15.5 of minutes of the meeting, it has been recorded that it "*HPPCL informed that Sainj project is expected by Dec'14. PKTCL is constructing 400 kV 2xS/c lines from Parbati-II HEP to Koldam HEP. Portion of these lines between Parbati-III HEP and Parbati Pooling Station has been completed for evacuation of Parbati-III HEP. It was proposed that PKTCL may be requested to extend these 400 kV lines up to Sainj HEP switchyard by December, 2014 matching with the scheduled commissioning of Sainj HEP for evacuation of power from Sainj HEP.*"
- 1.3 CTU has requested that above para may be recorded as "As informed by HPPCL Sainj project is expected by Dec'14. PKTCL is constructing 400 kV 2xS/c lines from Parbati-II HEP to Koldam HEP. Portion of these lines between Parbati-III HEP and Parbati Pooling Station has been completed for evacuation of Parbati-III HEP. It was further informed that Parbati-II and Sainj HEPs are located in very close proximity. For evacuation of power from Sainj, it was agreed that both the 400 kV circuits from Koldam HEP may be constructed upto Parbati-II HEP. As Parbati-II switchyard would not be available by December 2014, these circuits (i.e. one coming from Parbati Pooling station and other from Parbati-III generation) may be joined together. For evacuation of power from Sainj LILO of 400 kV direct circuit from Parbati-II HEP to Parbati Pooling station (Banala) may be implemented by HPPCL/HPPTCL. This arrangement would provide reliable evacuation of power even under N-1 contingency. It was proposed that PKTCL may be requested to extend these 400 kV lines up to Parbati-II and join both the circuits at dead-end tower of Parbati-II switchyard by December, 2014

matching with the scheduled commissioning of Sainj HEP for evacuation of power from Sainj HEP. “

The above modification proposed by CTU appears to be in order. Members may agree for the same.

- 1.3 No other observations have been received from the constituents. Accordingly, the minutes of the meeting may please be confirmed.

2. Evacuation of Koldam HEP(800MW)

- 2.1 CTU informed that as per the data received from NTPC, Koldam Hydro generation switchyard has been designed with one and half breaker switching scheme with main bus rating of 3000 Amps whereas the standard 400 kV bay rating of 2000 Amps have been provided for Koldam - Ludhiana triple conductor and Koldam- Nalagarh 400kV quad lines.
- 2.2 The transmission lines connected with Koldam HEP are Quad conductor lines, which are implemented considering the R-o-W constraints in the region and to facilitate evacuation of power from future projects. Considering that the lines connected are triple / quad conductor lines, the equipment rating for bay should have been provided with 3000 Amps switchgear. However, the switchyard at Koldam HEP has already been constructed with bay equipment's having 2000 Amps rating.
- 2.3 As the generation is to be commissioned shortly and the switchyard is already commissioned, it is proposed that the line bay rating of 2000 A of Koldam may be considered at present as the same has already been installed. However, in case, up-gradation of bay rating is required in future on account of capacity addition in the complex, the same may be taken up by NTPC.

Members may deliberate and decide.

3. Bairasuil - Sarna 220 kV Double Circuit line

- 3.1 Presently, there is only one 220kV D/c Bairasuil- Pong Transmission Line (line length: 96.82kMs) for evacuating the generation from 180MW of Bairasuil HEP. This line is already 31 years old (DOCO - 18/05/1980) and it passes through very difficult mountainous terrain. There have been instances of failure of 220 kV Bairasiul- Pong transmission line due to sinking of tower

foundations of this line in past. In view of above, during the 30th Standing Committee of Power System Planning of Northern Region held on 19/12/11, an additional 220 kV D/c evacuation line from Bairasuil HEP to Sarna 220kV Substation of PSTCL was agreed as a system strengthening scheme (ISTS) to be implemented through Tariff based Competitive Bidding route.

- 3.2 The 220 kV double circuit transmission line project is presently under bid processing stage through RECTPCL. RECTPCL after carrying out the survey of the line, informed the length of line as 80 km out of which, 60 km line shall traverse through forest involving about 208 hectares of forest area. It was also informed that about 60 km of the line stretch shall be through hilly terrain. It was apprehended that on account of forest area and hilly terrain, the cost of line may be much higher than earlier envisaged cost of Rs. 80 Crs. Based on the information received from Bid Process Coordinator (RECTPCL), the cost of Bairasuil – Sarna 220 kV D/c line has been reassessed and it is mentioned that the estimated completed cost of this line would be about Rs. 250 Crs. i.e. Rs. 3 Crs./km which is very high compared to the normative per km cost of 220 kV D/c line.
- 3.3 Considering the above, it is proposed to review the implementation of this line in the Standing Committee of Power System Planning for Northern Region.

Members may deliberate and decide.

4. Status of UITP scheme of Uttarakhand

- 4.1 During the 31st Standing Committee Meeting of NR, it was agreed that PTCUL would make all efforts to complete the Pipalkoti-Srinagar-Kashipur 400 kV D/c (Quad) line matching with the commissioning of Tapovan Vishnugad HEP to facilitate the evacuation of power from Tapovan Vishnugad HEP. PTCUL may inform the progress of this line.
- 4.2 PTCUL may also inform the status of connectivity applications received by them from the other hydro generators.

5. LILO of 2nd circuit of 400 kV Talwandi Sabo– Nakodar D/c line at Moga S/s (PG)

5.1 Talwandi Saboo is a 1980MW (3x660MW) state generation being developed in Punjab. For evacuation of power from the projects Punjab is already constructing following evacuation system:

- Talwandi Sabo - Muktsar 400 kV D/C line
- Muktsar - Patti - Nakodar 400 kV D/C
- Patti - Amritsar (PGCIL) 400 kV D/C line
- Talwandi Sabo - Nakodar 400 kV D/C (one ckt to be LILoed at Moga 400kV PGCIL s/s)
- Talwandi Sabo - Dhuri 400 kV D/C
- Dhuri - Rajpura 400 kV D/C
- Rajpura - Rajpura TPS 400kV D/C
- Rajpura TPS - Nakodar 400kV D/C
- Establishment of 400/220 kV S/S by PSEB at Muktsar, Patt and
- Nakodar with 2x315 MVA 400/220kV trf at each
- Establishment of 400/220 kV S/S by PSEB at Rajpura and Dhuri with 2x500 MVA 400/220kV trf at each

5.2 The above mentioned transmission system was discussed and agreed during the 26th Standing Committee on power system planning of Northern Region held on 13/10/2008.

5.3 PSTCL vide their letter dated 17/9/21013 has requested for Loop-in-Loop-out of second circuit of Talwandi Sabo - Nakodar 400 kV D/C at Moga S/s (PG). PSTCL has indicated that under light load condition overloading of Talwandi-Moga-Nakodar is being observed and proposed LILo of second circuit of Talwandi Sabo - Nakodar 400 kV D/C at Moga would mitigate this overloading. They have also mentioned that the proposed LILo would provide better connectivity of Moga (ISTS) with the 400kV intra-state transmission system being developed by PSTCL and facilitate Punjab to draw power from

ISTS during high load period when the generation of Talwandi Saboo Plant is low.

- 5.4 Considering the above, the proposal of PSTCL is found to be in order and may be agreed to.
- 5.5 However, POWERGRID has informed that space for only one number of 400kV bay is available at Moga S/s (PG). Considering the above and the anticipated future load growth in Moga area, it is proposed that POWERGRID may acquire additional land for expansion of Moga S/s under any ongoing or new scheme.

Members may discuss and decide.

6. Agra-Sikar 400kV D/c line.

- 6.1 Agra-Sikar 400kV D/c was proposed under System strengthening in Northern region for Sasan & Mundra UMPP and is nearing completion. At the time of planning, the line length was estimated to be about 310km and accordingly, 50MVAR line reactors were planned at both ends of this line. However, it has been found that the actual line length as per the final route is about 385km. Considering the increased line length and existing voltage profiles, POWERGRID has proposed that the 50MVAR line reactors of this line at Agra end may be replaced by 80MVAR line reactors. This would facilitate the line charging from Sikar end also. The 50MVAR line reactors getting spared at Agra S/s may be diverted for gainful utilization under any ongoing or future scheme.

Members may discuss and decide.

- 6.2 POWERGRID has also informed that the Agra – Sikar 400 kV D/c line is almost ready whereas, the bays at Agra for Agra – Sikar line shall come later. Accordingly, POWERGRID is terminating the line at Gwalior bays of Agra – Gwalior line, which were vacated after charging of Agra- Gwalior line at 765 kV level. Later on after the completion of Sikar bays at Agra S/s for Agra – Sikar line, the Agra – Sikar line shall be diverted to these bays.

Members may note.

7. Series Bus reactor

7.1 During the 32nd Standing committee meeting the issue of increase in short circuit level in NCR areas due to growth in the network and generation provision of series reactors to control fault current was discussed and it was mentioned that to limit the short circuit level, splitting of the 400 kV ring was proposed during 2008-09. However, in light of the grid failure in July'12 and to meet the (N-1-1) security level as per Revised Transmission Planning criteria of CEA, the earlier approved bus-splitting arrangement of Delhi ring needed to be reviewed and it was proposed to control the short circuit level at 400 kV substations in/around Delhi by using series reactors at the following locations:

- Dadri-Mandaula 400kV Ckt-I & II – 2nos
- Dadri-Maharanibagh 400kV Ckt – 1nos
- Dadri-Greater Noida 400kV Ckt – 1nos
- Ballabgarh-Bamnoli 400kV Ckt-I & II – 2nos
- Ballabgarh-Nawada 400kV Ckt-I – 1nos
- Bawana-Mandaula 400kV Ckt-I & II – 2nos
- Bawana-Mundka 400kV Ckt-I & II – 2nos
- Jhattikhara-Mundka 400kV Ckt-I & II – 2nos
- Series bus reactors of at 400 kV Mandaula & Ballabgarh substations
- Connection of 765kV Greater Noida S/s to 400/220 kV Greater Noida S/s connected to ISTS then proper sectionalizing arrangement may be provided in such a manner that 400 kV Dadri-Greater Noida-Nawada-Ballabgarh line is kept isolated from main bus of 765/400 kV Greater Noida substation of UPPTCL under normal operation and only connected as a contingency measure when requirement arises.

7.2 The above proposal was discussed in 32nd SCM of NR and it was decided that initially only two series bus reactors and two series line reactors on any one D/c line may be taken up in first phase and subsequently with the

acquired operational experience, the other proposed series reactors could be considered for implementation. The provision of series reactors at following locations was approved:

Series bus reactors

- i. 400 kV Mandaula substation
- ii. 400kV Ballabgarh substation

Series Line reactors:

- iii. Dadri-Mandaula 400kV Ckt-I & II – 2 Nos.

7.3 The above decision was taken up in subsequent NRPC meeting where UPPTCL stated that the increase in fault level was due to increase in ISTS network and restrictions for the interconnection of 765/400 kV Greater Noida S/s (UPPTCL) and 400/220 kV G.Noida S/s (UPPTCL) may not be appropriate for their system.

7.4 Accordingly NRPC decided that since UPPTCL was not present in the Standing Committee meeting, the matter should be discussed by POWERGRID with UPPTCL. However considering the criticality of the issue it is considered appropriate to discuss the issue again in the presence of all the Members.

7.5 Here it may be mentioned that existing 400kV Greater Noida is connected to the Delhi Ring. Inter-connection of existing 400 kV Greater Noida S/s with proposed 765kV Greater Noida substation directly/indirectly shall increase the short circuit level appreciably as:

- Any fault contribution from 765kV for a fault at 400kV level shall get almost doubled due to transformer step down.
- As the 765/400 kV transformation capacity is large, reduction in fault contribution due to transformer impedance will not be significant.

7.6 Further, it is mentioned that above restriction for inter connection of 765 and 400 kV Greater Noida S/stns was proposed as a last resort after considering the effect of addition of series bus reactors and series line reactors. The

relevant studies were also circulated to Members with the agenda of 32nd Standing Committee Meeting.

- 7.7 It may be noted that the present proposal is only for two nos. series line reactors and two nos. series bus reactors and it is proposed that POWERGRID may be allowed to proceed with the same.

Members may discuss and decide.

8. Greater Noida Substation

- 8.1 During the 31st Standing committee meeting, NPCL's application for connectivity for drawl of 500MW power for distribution in Greater Noida area in Uttar Pradesh was discussed. During the meeting it was informed that M/s NPCL had executed a Long Term PPA with M/s Essar Power (Jharkhand) Ltd for procurement of 240 MW power from April 2014 for 25 years and CTU had already granted Long Term Access of 400 MW (for Target Beneficiaries) in Northern Region to M/s Essar Power (Jharkhand) Ltd and they have requested to approve / provide LTA of 240 MW to NPCL being the actual beneficiary, out of total approved 400MW LTA in NR.

- 8.2 Presently 400/220 kV, 3x315MVA transformers are installed at Greater Noida and the transformers are loaded heavily and to meet the future power demand another substation is required in the area. Considering the requirement of UP and of Noida Power Company following system was agreed as system strengthening scheme

NRSS-XXXIII:

- Ballabgarh – Greater Noida (New) 400 kV D/c (5 km from Ballabgarh S/s on multi-circuit towers)
 - Establishment of 2x500 MVA, 400/220 kV GIS substation at Greater Noida (New) with a short circuit current rating of 50 kA.
- 8.3 Subsequently, the PPA between Noida Power Company Ltd and Essar Power has gone in to dispute and it is understood the Noida Power has terminated their PPA with Essar Power (generating company).

- 8.4 In view of the above, the bidding process for above mentioned NRSS-XXXIII scheme has been suspended as utilisation of the substation is not ensured.

Members may note.

9. Karcham Wangtoo Reactors

- 9.1 For evacuation of power from Karcham Wangtoo HEP, Karcham Wangtoo – Abdullapur 400kV D/c quad line with 80MVAR line reactors at Karcham Wangtoo was established.
- 9.2 In the 31st standing committee meeting of NR it was agreed to Loop-in Loop-out both circuits of Karcham Wangtoo – Abdullapur 400 kV D/c line at Kala Amb (HP) and provide 40% Series Compensation on 400 kV Karcham Wangtoo – Kala Amb D/c line under NRSS-XXXI. The scheme is being implemented under Tariff Based Competitive Bidding.
- 9.3 The expected length of Karcham Wangtoo-Kala Amb line after Loop-in Loop-out is about 120km. Considering the reduction in length of the line and proposed series compensation on this line, it is proposed that the 80 MVAR line reactors at Karcham Wangtoo may be converted into bus reactor. Both the line reactors would be connected to one 400 kV bay. The works may be carried out as system strengthening scheme by the Transmission licensee, M/s Jaypee-Powergrid.

Members may discuss and decide.

10. Kishen Ganga HEP(330MW)

- 10.1 Following transmission system for Evacuation of power from Kishenganga HEP (330MW) of NHPC in J&K was discussed and agreed during the 18th standing committee meeting held on 6/6/2005:
- Kishenganga – Alistang - New Wanpoh 220 kV D/C line
 - Kishenganga - Amargarh 220kV D/C line.
- 10.2 The generation is scheduled for commissioning by 2016-17. NHPC may update the status. The approved system is being taken up by POWERGRID. In the above transmission scheme it may be observed that space for 4 nos. of 220 kV bays at Alistang (PDD) and space for 2 nos. of 220 kV bays at

Amargarh substations of PDD, J&K shall be required. PDD, J&K shall have to carry the above works on deposit basis. Further it is gathered that a parallel Alistang-Amargarh 220kV line is being taken up by PDD, J&K. **PDD may inform the status of the line and confirm the implementation of 6 nos. 220 kV bays as mentioned above.**

11. Gorakhpur & Sultanpur Bus reactors

11.1 As directed by NRPC it was desired that CTU would carry out studies for identifying reactive compensation required in intra-state network at 220kV level. Accordingly, the studies were discussed in the 32nd Standing committee meeting and following 400kV Bus reactors were agreed to:

S.No.	SUBSTATION	MVAr
1	HINDAUN	125
2	PANCHKULA-PG	125
3	SULTANPUR	125
4	GORAKHPUR(UP)	2X125
5	SONEPAT-PG	125
6	MANESAR	125
7	KAITHAL	125
8	KANPUR(PG)	125
9	JAIPUR(S)	125
10	BASSI	125
11	MERTA	125

11.2 It was also agreed in the meeting that the reactors shall be provided by the owner of the respective substation. The proposal was put up in 29th NRPC for approval. During the meeting UPPTCL stated that reactors for UP at Sultanpur and Gorakhpur had been approved without consulting them. High voltage was being caused by addition of a number of lines which remain lightly loaded. Further, it was mentioned that installation of reactors would have cost implications as well as liability of their maintenance. After

discussions, NRPC agreed with the installation of the reactors at POWERGRID & RVPNL substations. In respect of reactors at UPPTCL substations, it was decided that the issue would be discussed with UPPTCL.

- 11.3 It may be mentioned that presently UPPTCL owns and operates 410km of 765kV line and about 4000ckm of 400kV lines. The total MVAR generation by these lines would be about 3200MVAR. As against this the total reactive compensation provided by UPPTCL in its system is only 2400MVAR (1470MVAR line reactor + 920MVAR bus reactor). The total compensation is only about 75%. Even out of this 2400 MVAR one 50MVAR reactor at Muradnaagr is provided by POWERGRID and 300MVAR reactors are not in working condition.
- 11.4 It may be seen that the compensation level in UPPTCL system is very low. Here it may be mentioned that in ISTS the level of reactive compensation presently provided is about 89% at 400 kV level only and more than 110% including 765 kV system. Though the voltage control is a local phenomenon, however total level of compensation can be worked out in a broader perspective.
- 11.5 In view of above, it is proposed that UPPTCL should take up the reactive compensation at Gorakhpur and Sultanpur S/s as mentioned above to control the voltage in these areas as prolonged high voltage would affect the equipment installed at these substations.

Members may discuss and agree.

12. 220kV, Intra state system of Haryana

12.1 HVPNL vide its letter dated 19/11/2013 and 20/11/2013 has intimated that following 220kV transmission system is being proposed for implementation under Intra-state transmission system:

- 220kV S/s at Sec-46 Faridabad with Capacity 2x160MVA , 220/66kV +1x100MVA 220/33kV Transformers

- LILO of both circuits existing 220kV D/c Palla-Palli line at proposed 220kV S/s at Sec-46 Faridabad
- 220kV S/s at Sec-58 Faridabad with Capacity 2x160MVA , 220/66kV Transformers
- LILO of both circuits existing 220kV D/c Faridabad-Samaypur (POWERGRID) line at proposed 220kV S/s at Sec-58 Faridabad
- 220kV S/s at Neemwala with Capacity 2x100MVA , 220/132kV Transformers
- Kaithal(POWERGRID) – Neemwala 200kV D/c (0.5 moose conductor) – 36kms
- 132kV network beyond Neemwala to various load centres.

12.2 Presently evacuation from Faridabad CCGT (430 MW) is at 220 kV. There are 2 nos. of 220 kV D/C lines, one D/C line towards 220 kV Samaypur S/S of BBMB and other line towards 220 kV Palla S/S of HVPNL. The entire power of Faridabad is allocated to Haryana and the tariff of these lines is solely borne by POWERGRID. In the 31st SCM following was proposed by HVPNL and same was agreed to.

- LILO of one circuit of 220 kV A5-A4 D/c line at Faridabad generating station
- LILO of one circuit of 220 kV Faridabad Generation station-A3 (Palla) D/c line at BPTP S/s
- LILO of other circuit of 220 kV A5-A4 D/c line at BPTP substation.

12.3 The present proposal of LILO of both circuits existing 220kV D/c Faridabad-Samaypur (POWERGRID) line at proposed 220kV S/s at Sec-58 Faridabad would reduce injection of power into Samaypur and relieve loading on Samaypur-Ballabgarh 220kV lines.

Members may discuss and agree.

13. Construction of 220kV system by PDD for drawing power from ISTS Substation in J&K

13.1. To meet the growing power demand and provide additional touch points for drawl of power by Jammu and Kashmir a 400/220kV substation were approved at Samba and New Wanpoh. These substations have been commissioned and can facilitate drawl of power by J&K. However PDD, J&K is yet to commission any 220kV outlets from both these substations. During the 32nd Standing committee

meeting, PDD, J&K requested that the LILO of the Sarna-Hiranagar 220kV line at 400/220kV Samba (PG) substation may be implemented as an ISTS scheme.

13.2. During the meeting Member (PS) directed PDD, J&K to submit the program with firm schedule of completion of their 220kV lines/substations for drawing power from 400/220kV Samba and New Wanpoh S/s of POWERGRID. He desired a commitment from Govt. of J&K in this regard. PDD may indicate their program to draw power from these stations.

14. Two nos. of 400 kV bays at Bhiwani 765/400/220 kV substation of POWERGRID (Agenda for Standing Committee Meeting)

14.1 As expansion of STU network, establishment of Dhanonda (HVPNL) – Bhiwani (POWERGRID) 400 kV D/c line of HVPNL was agreed in the 31st Standing Committee Meeting of Northern Region held on 02/01/2013. For execution of 2 nos. of 400 kV bays at Bhiwani (POWERGRID) substation an agreement was signed between POWERGRID and HVPNL to carry out the work by POWERGRID on behalf of HVPNL. Award for execution of these 400 kV bays was placed on L&T. The work on these bays is almost complete and M/s L&T is repeatedly requesting for the payments. For these works payment is to be made by HVPNL.

14.2 Subsequently, after the conversion of Transmission System of Adani Power Limited as ISTS system, the Dhanonda (HVPNL) – Bhiwani (POWERGRID) 400 kV D/c by HVPNL was discussed again during the 32nd Standing Committee Meeting of Northern Region held on 31/08/2013. After discussions it was agreed to take up the Mohindergarh – Bhiwani 400 kV D/c line with Twin HTLS as ISTS strengthening instead of Dhanonda (HVPNL) – Bhiwani (POWERGRID) 400 kV D/c line by HVPNL. Considering the above development, HVPNL vide their letter dated 24/10/2013 has conveyed that the works of Bhiwani (POWERGRID) substation needs to be cancelled.

14.3 Keeping above in view it is now proposed that the 2 nos. of 400 kV bays at Bhiwani S/s (PG) which were being implemented by POWERGRID on behalf of HVPNL may be included as part of ISTS system for terminating Mohindergarh – Bhiwani (POWERGRID) 400 kV D/c line.

Members may agree to the above proposal.