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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, आर.के.पुरम, नई दिल्ली - 110066  
Sewa Bhawan, R. K. Puram, New Delhi-110066



[ISO: 9001:2008]

No. 1/9/38th /PSP&PA-I-2016 /

Dated: 8<sup>th</sup> June, 2016

-As per list enclosed-

**Subject: Minutes of 38<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region held on 30<sup>th</sup> May, 2016, at NRPC, Katwaria Sarai, New Delhi.**

महोदय/ महोदया  
Sir/ Madam,

The Minutes of 38<sup>th</sup> Meeting of the Standing Committee on Power System Planning of Northern Region have been uploaded on the CEA website '[http://www.cea.nic.in/sppa\\_nr.html](http://www.cea.nic.in/sppa_nr.html)' for information and necessary action please.

आपका विश्वसी/ Yours faithfully,

चन्द्र प्रकाश  
(चन्द्र प्रकाश/ Chandra Prakash) 8/6/2016.  
निदेशक/ Director

1. Member, Secretary, NRPC, 18-A Shajeed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi - 110016 (Fax-011-26865206)	2. Director (W &P) UPPTCL, Shakti Bhawan Extn,3rd floor, 14, Ashok Marg, Lucknow - 226 001 (Fax:0522-2287822)	3. Director (Projects) PTCUL, Urja Bhawan Campus, Kanawali Road Dehradun-248001. Uttarakhand Fax-0135-276431
4. Director (Technical), Punjab State Transmission Corporation Ltd. (PSTCL) Head Office The Mall Patiala -147001 Fax-0175-2304017	5. Member (Power) BBMB, Sectot-19 B Madhya Marg, Chandigarh-1 60019 (Fax-01 72-2549857)	6. Director (Operation) Delhi Transco Ltd. (DTL) Shakti Sadan, Kotla Marg, New Delhi-110002 (Fax-01123234640)
7. Director (Technical) RRVNL, Vidut Bhawan, Jaipur-302005. Fax:-0141-2740794	8. Director (Technical) HVPNL Shakti Bhawan, Sector-6 Panchkula-134109 Fax-0172-256060640	9. Director (Technical) HPSEB Ltd. Vidut Bhawan, Shimla -171004 Fax-0177-2813554
10. Managing Director, HPPTCL, Barowalias, Khalini Shimla-171002 Fax-0177-2623415	11. Chief Engineer (Operation) Ministry of Power, UT Secretariat, Sector-9 D Chandigarh -161009 Fax-0172-2637880	12. Development Commissioner (Power), Power Department, Grid Substation Complex, Janipur, Jammu, Fax: 191-2534284
13. Chief Engineer (Transmission) NPCIL, 9-S-30, Vikram Sarabhai Bhawan, Anushakti Nagar, Mumbai-400094 Fax-022-25993570	14. Director (T&RE) NHPC Office Complex, Sector-33, NHPC, Faridabad-121003 (Fax-0129-2256055)	15 Director (Projects) NTPC, NTPC Bhawan, Core 7, Scope Complex-6, Institutional Area, Lodhi Road. New Delhi (Fax-011-24361018)
16 Director (Technical) THDC Ltd. Pragatipuram, Bypass Road, Rishikesh-249201 Fax: 0135-2431519)	17 Director (Projects) POWERGRID Saudamini Plot no. 2, Sector - 29. Gurgaon-122 001 (Fax-0124-2571809)	18. CEO, POSOCO B-9, Qutab Institutional Area, Katwaria Sarai New Delhi – 110010 (Fax:2682747)
19. COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)		

**Minutes of 38<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region  
held on 30<sup>th</sup> May, 2016, at NRPC, Katwaria Sarai, New Delhi.**

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

Member (Power System), CEA welcomed the participants of the 38<sup>th</sup> Meeting of the Standing Committee on Power System Planning of Northern Region. He stated that this is a very important meeting for comprehensive planning of the Power System in northern region with overall perspective throughout the country. Meetings of all other regions are also scheduled to be conducted in the next month and the agreed transmission systems in all the regions would be taken in the Empowered Committee on Transmission for their time bound implementation.

Chief Engineer (PSP&PA-I), CEA while welcoming the participants stated that the agenda of the meeting is very lengthy thus the members are requested to be specific in deliberation and arrive at decision. 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 in holistic manner and arrive at a consensus decision on each issue so the transmission network creation and their utilisation is optimised.

**1.0 Confirmation of the Minutes of the 37<sup>th</sup> meeting of the Standing Committee on Power System Planning of Northern region held on 20<sup>th</sup> January, 2016.**

1.1 Director (PSP&PA-I), CEA stated that the minutes of 37<sup>th</sup> meeting of the Standing Committee on Power System Planning of Northern Region were issued vide CEA letter No. 1/9/37th SCM/2015-PSP&PA-I/162-181 dated 11th Feb, 2016.

1.2 He further stated that Powergrid vide their letter C/CTU/N/PLG dated 14.2.2016 had given the observations regarding the connectivity of Bilhaur TPS (NTPC) wherein Bilhaur –Kanpur 400kV D/C line has been mentioned instead of Bilhaur – Kanpur 400kV D/C Quad line.

**Hence, point no 1.2.2.3 of the minutes is modified as follows:**

**Connectivity of Bilhaur TPS (NTPC):**

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

1.3 AGM, CTU stated that 1x125 MVAr Bus reactor at 400kV Bhadla (PS) which was agreed as part of Transmission system for Ultra Mega Solar Parks in Bhadla, Distt. Rajasthan was

inadvertently missed out from the transmission scheme's scope mentioned at Para 25.7 of the minutes of 37<sup>th</sup> SCM.

1.3.1 The following is added in Para 25.7 as item (vii) under the scope of the scheme Transmission system for Ultra Mega Solar Parks in Bhadla, Distt. Rajasthan:

**(vii) 1x125 MVA Bus reactor at Bhadla Pooling Station (400kV)**

1.3.2 Director (PSP&PA-I), CEA stated that M/s Adani Solar Park is constructing solar park at Bhadla with installed capacity of 500 MW. Out of this capacity, it is directly connecting with RRVPNL for 250 MW and for remaining 250 MW, LTA has been granted by CTU at Bhadla (Pg) w.e.f. March, 2017. As per the information received from Powergrid, the 400 kV voltage level at 765/400/200 kV Bhadla (Pg) is expected by December, 2017 and 765 kV voltage level at Bhadla (Pg) is expected by March, 2018, which would further feed power to Bikaner (765kV) and Moga (765kV). Accordingly, **till the time 765 kV network at Bhadla is not commissioned, the total power of 500 MW from Adani Solar Park shall be evacuated from Bhadla (RRVPN) directly.**

1.4 CE., UPPTCL stated that in the operational feedback under ICT constraints, single ICT has been mentioned at Gorakhpur Substation. However, there are two ICTs existing at this substation which needs to be mentioned. It was clarified that there are two ICTs of capacities of 315 MVA and 240 MVA.

1.5 As no other suggestion for the modification to the minutes of meeting has been received, the Minutes of the 37<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region with the above modifications suggested by Powergrid and UPPTCL are, therefore, confirmed.

## **2.0 New WR- NR 765 kV Inter-regional corridor**

2.1 Director (PSP&PA-I), CEA stated that in the 37<sup>th</sup> meeting of Standing Committee on Power System Planning of Northern Region, it was decided that a sub-committee comprising of CEA, UPPTCL and CTU shall be formed to discuss the scheme and evolve strengthening scheme for WR-NR transmission corridor. Thus studies were carried out by Powergrid in consultation with UPPTCL and CEA. UPPTCL proposed that in view of certain upcoming generation in Allahabad and adjoining area, it would be better to connect WR to 765 kV Varanasi (PG) substation instead of 765/400 kV Allahabad (New) s/stn. In this way, construction of a new 765/400kV substation at

Allahabad along with 400kV connectivity can be avoided. Further, the study was revised to 2019-2020 time frame anticipating that the process of award and completion of the project would take around four years. Considering the above inputs, Vindhyachal Pooling Station - Varanasi 765kV D/C line was agreed by the sub-committee to be implemented as 765 kV NR-WR Strengthening corridor. The corridor would provide strong connectivity of NR and WR and would facilitate flow of power under various contingencies of line outage, economic despatch of power market operation etc. The estimated cost of the system would be Rs. 1000 Crore.

2.2 Study results are enclosed at **Exhibit-1** to **Exhibit-4**.

- **Exhibit – 1:** Basecase
- **Exhibit – 2:** Basecase N-1, (1 ckt of 765kV Agra – Gwalior D/C line)
- **Exhibit – 3:** With Proposed System
- **Exhibit – 4:** With Proposed System N-1 (1 ckt of 765kV Agra – Gwalior D/C line)

2.3 GM, POSOCO opined that the load in western UP is more and Fatehpur could also be a location for WR- NR integration.

2.4 CE, UPPTCL stated that during the studies this option was also explored but connection at Varanasi is the better solution as this avoided creation of one new substation and would provide the power to eastern UP which is presently in deficit condition due to non- materialisation of generation in Eastern region. With this corridor, some of the overloaded lines in UP are also getting relieved.

2.5 AGM, CTU stated that in order to facilitate charging of the line and maintaining voltage within stipulated limits under various network operating conditions, a 330 MVAR line reactor in both circuits of Vindhyachal Pooling Station- Varanasi 765kV D/C line is proposed at Varanasi end as a part of Inter-Regional system strengthening scheme for NR.

2.6 After deliberations, the following system was agreed for **WR- NR 765kV Inter-regional corridor**:

1. 765 kV Vindhyanchal Pooling Station – Varanasi D/Cline
2. 330 MVAR line reactor in both lines at Varanasi end

### **3.0 Evacuation of New Generation Project in 13<sup>th</sup> Plan (2017-2022):**

3.1 Director (PSP&PA-I), CEA stated that the proposal of UPPTCL on the transmission system for evacuation of power from 1x660 MW Panki Extension TPS, 1x660 MW Harduaganj Extn., 2x660 MW Obra “C” TPS and 2x660 MW Jawaharpur (Etah) TPS along with some 765 kV and 400kV Substations was discussed in the 37<sup>th</sup> SCSPNR, wherein it was agreed that a joint study would be carried out with UPPTCL, CEA and CTU and the study results would be taken up for discussions in the next SCSPNR.

3.2 He further stated that CEA carried out the studies for the transmission elements under the proposal and the proposed transmission network is generally in order. No overloading is observed on the existing as well as proposed transmission elements.

3.3 AGM, CTU stated that in the DPR submitted by UPPTCL, the generation projects namely Kotlibhel –IB, Singrauli –III, Gidarbha STPP have been considered but as per the present status these projects have been dropped.

3.4 Deputy Director (PSP&PA-I), CEA stated that while carrying out the studies by CEA these projects have not been considered. **The study file (.sav) has been uploaded on CEA website.**

3.5 AGM, CTU stated that bus reactors are not present at the proposed 765kV and 400kV substations. This needs to be incorporated. He further stated that the Modipuram is well connected with Bagpat, thus the proposed 400 kV D/C Modipuram- Bagpat line would not be required and this would also add to the short circuit levels. He also enquired about the impact on the short circuit level with addition of the proposed generations and transmission system.

3.6 CE, UPPTCL stated that this is only a contingency arrangement and in normal conditions this line would be a floating line.

3.7 AGM, POSOCO raised the concern about the downstream network for the proposed substations. CE, UPPTCL stated that the comprehensive planning has been done upto 33kV level till 13<sup>th</sup> Plan, which had also been submitted to CEA in the DPR for transmission system requirement for Uttar Pradesh Power System (to be funded by World Bank). A copy of the planned downstream network is attached at **Annexure-II**.

3.8 The issue of short circuit levels is a matter of concern and has been many times debated in the past. Accordingly, a detailed study on the short circuit would be presented in the next SCM and

would be a part of outcome of committee constituted to look into the high short circuit levels in Singrauli, Anpara generation complexes as well as other nodes in the northern region.

3.9 After detailed deliberations, the following transmission network proposed by UPPTCL was agreed:

### 3.9.1 Evacuation System for the following Generation Projects:

(A) **1x660 MW Panki Extension TPS Power (2020-21):** The evacuation system is as under:

- (i) Generation Transformer 21/400 kV
- (ii) Panki TPS – Panki 400 kV D/C line – 3km
- (iii) Bus Reactor at Panki TPS -125 MVAr

(B) **1x660 MW Harduaganj TPS (2019-20):** The evacuation system is as under:

- (i) G.T 21/400 kV at Harduaganj Extn.
- (ii) LILO of one ckt of Aligarh-Sikandrabad 400 kV D/C line (Isolux line) at Harduaganj TPS- 25 km.
- (iii) 400/220 kV, 2x315 MVA ICT at Harduaganj Extn.
- (iv) 220 kV Spare Bays – 2 nos
- (v) 80 MVAr bus Reactor at Harduaganj TPS.

*It was observed that instead of 400/220 kV, 2x315 MVA ICT at Harduaganj Extn., capacity of 2x500 MVA may be considered.*

(C) **2x660 MW Obra “C” TPS (2019-20):** The evacuation system is as under:

- (i) G.T. 21/765 kV at Obra “C”
- (ii) 2x1500 MVA 765/400 kV ICT at Obra “C”
- (iii) LILO of Anpara “D” – Unnao 765 kV S/C line at Obra “C” – 40 km.
- (iv) Obra “C” – Jaunpur 400 kV D/C line – 200 km.
- (v) LILO of one ckt of Obra C – Jaunpur 400 kV D/C line at Obra (Existing) – 15 km.
- (vi) Bus Reactor 330 MVAr, 765 kV at Obra “C”

(D) **2x660 MW Jawaharpur (Etah) TPS (2021-22):** The evacuation system is as under:

- (i) Evacuation at 765 kV with G.T. 21/765 kV
- (ii) LILO of Mainpuri – Greater Noida 765 kV S/C line at Jawaharpur TPS - 30 km
- (iii) 765/400 kV, 2x1500 MVA ICT at Jawaharpur TPS
- (iv) 400/220 kV, 2x500 ICT at Jawaharpur TPS
- (v) Creation of Firozabad 400/220/132 kV 2x500, 2x160 MVA substation

- (vi) Jawaharpur TPS – Firozabad 400 kV D/C line – 80 km
- (vii) Firozabad – Agra South 400 kV D/C– 40 km
- (viii) Etah – Jawaharpur TPS 220 kV D/C – 20 km
- (ix) Jawaharpur TPS – Sirsaganj 220 kV D/C – 40 km
- (x) 330 MVAR, 765 kV Bus Reactor at Jawaharpur TPS

*It was observed that with LILO of Mainpuri – Greater Noida 765 kV S/C line at Jawaharpur TPS, the power flows from Mainpuri to Jawaharpur TPS switchyard and then to Greater Noida 765 kV.*

### **3.9.2 New 765/400 kV substations:**

#### **(A) 765/400/220 kV substations at Modipuram (Meerut):**

- (i) Construction of 765/400 kV, 2x1500 MVA; 2x500 MVA, 400/220 kV Modipuram (Meerut) S/S
- (ii) Hapur – G. Noida 765kV S/C line at Modipuram (Meerut) – 20 km
- (iii) Modipuram (765kV) – Simbholi 400 kV D/C line – 40 km
- (iv) Modipuram (765kV) – Shamli (400 kV) D/C– 60 km
- (v) Modipuram – Baghpat 400 kV D/C line – 60 km

#### **(B) 765/400/220 kV S/s Moradabad:**

- (i) Construction of 765/400 kV, 2x1500 MVA; 2x500 MVA, 400/220 kV substation at Moradabad.
- (ii) LILO of approved Ghatampur TPS – Hapur 765kV S/C line at Moradabad.
- (iii) Moradabad (765 kV) – Sambhal 400 kV D/C line – 50 km.
- (iv) Moradabad (765 kV) – Moradabad 400 kV D/C line – 25km
- (v) Creation of 400/220 kV, 2x500 MVA S/s Sambhal.

### **3.9.3 New 400/220 kV substations:**

#### **(A) 400/220/132 kV, 2x500MVA(400/220kV), 2x160 MVA(220/132kV) Firozabad:**

- (i) Firozabad – Jawaharpur TPS 400 kV D/C line – 40 km
- (ii) Firozabad (400 kV) – Agra South 400 kV D/C line – 50 km
- (iii) Firozabad (400 kV) – Tundla 220 kV D/C line
- (iv) Firozabad (400kV) – Firozabad 220 kV D/C line



**(B) 400/220 kV 2x315 MVA Badaun:**

- (i) Construction of 2x315 MVA, 400/220 kV substation at Badaun
- (ii) Roza TPS – Badaun 400 kV D/C line - 90 km
- (iii) Badaun – Sambhal 400 kV D/C line – 50 km

*It was observed that instead of 400/220 kV, 2x315 MVA ICT at Badaun, capacity of 2x500 MVA may be considered.*

**(C) 400/220 kV S/s Jaunpur:**

- (i) Construction of 2x500 MVA, 400/220 kV substation at Jaunpur.
- (ii) Obra”C” – Jaunpur 400 kV D/C line – 200 km.
- (iii) Varanasi (765 kV) PGCIL – Jaunpur 400 kV D/C line – 60 km.
- (iv) Construction of 400 kV Bays at Varanasi (765 kV) PGCIL S/s – 2Nos

**(D) 400/220/132 kV Rasra (Mau):**

- (i) Construction of 2x500 MVA, 400/220 kV; 2X160 MVA, 220/132 kV substation at Rasra (Mau)
- (ii) LILO of one ckt of Balia – Mau 400 kV D/C line at Rasra – 15 km
- (iii) Balia (PGCIL) – Rasra 400 kV S/C line – 35 km

*It was observed that for Rasra S/s LILO of one circuit of 400kV Balia – Mau 400 kV D/C line at Rasra would meet the present demand. The provision of Balia (PGCIL) – Rasra 400 kV D/C line in place of Balia (PGCIL) – Rasra 400 kV S/C line may be kept for future.*

**(E) 400/220/132 kV Simbholi:**

- (i) Construction of 2x500 MVA, 400/220 kV; 2X160 MVA, 220/132 kV substation at Simbholi
- (ii) Modipuram (765 kV) – Simbholi 400 kV D/C line – 40 km
- (iii) Simbholi – Moradnagar –II 400 kV D/C line – 50 km

**(F) 400/220/132 kV Sambhal:**

- (i) Construction of 2x500 MVA, 400/220 kV; 2X160 MVA, 220/132 kV substation at Sambhal
- (ii) Badaun – Sambhal 400 kV D/C line – 90 km
- (iii) Moradabad – Sambhal 400 kV D/C line – 50 km

**Note: Suitable Bus reactors may be installed at all the substations proposed by UPPTCL.**

#### **4.0 Overloading on Singrauli - Anpara 400kV S/C line**

4.1 Director (PSP&PA-I), CEA stated that 400 kV Singrauli - Anpara S/C line often gets overloaded due to high generation in Rihand- Singrauli complex and also the short circuit level at Singrauli and Anpara is very high. In the 37<sup>th</sup> SCSPNR, it was decided that the studies would be carried out by putting series reactor of suitable size so as to reduce the short circuit levels. Short circuit studies had been carried out with a 12ohm series reactor on the Singrauli- Anpara 400kV S/C line and it was observed that the fault level at Singrauli and Anpara reduces to 35 kA and 39 kA from 41 kA and 44 kA, respectively.

4.2 Chief Engineer, UPPTCL stated that due to new generation addition at Anapara,D and Bara the loading of the line has been reduced but, the short circuit level at Singrauli and Anpara remains high which is a cause of concern. He further stated that the option of bus splitting could be explored to bring down the fault level in the area.

4.3 AGM, POSOCO stated that the present reduction in the loading of the line is only due to non-availability of 765kV network associated with these generations and once these transmission elements get commissioned, the Singrauli- Anpara 400kV S/C line would again be overloaded.

4.4 COO, CTU stated that NTPC and UPPTCL should seriously look into the matter of increased fault level. A series reactor of 14 ohm on the Singrauli - Anpara 400 kV S/C line could bring down the fault level.

4.5 Director (PSP&PA-I), CEA stated that there is only marginal reduction in the short circuit level after putting in series reactor, and hence the proposal of series reactor of 12  $\Omega$  (ohm) may be dropped.

4.6 After detailed deliberations, it was decided that a committee would be formed involving CEA, CTU, NTPC and UPPTCL to address issue of fault level/high loading and carry out detailed short circuit analysis and suggest remedial measures. This committee would carry out the short circuit analysis at all the nodes in the northern region.

## **5.0 Evacuation System for Tapovan Vishnugarh HEP & Pipalkoti HEP and finalisation of land for the proposed substation at Pipalkoti under UITP**

5.1 Director (PSP&PA-I), CEA stated that during the 37<sup>th</sup> Standing committee meeting of Power System Planning of NR, it was decided that a meeting would be convened under the chairmanship of Member (PS), CEA with representatives from CTU, PTCUL, NTPC and THDC for finalising the evacuation system for Tapovan Vishnugarh HEP and Pipalkoti HEP as well as for the finalisation of land for the proposed Pipalkoti 400/220 kV substation under UITP to be implemented by PTCUL.

5.2 Accordingly, meetings were held in CEA on 18/2/16 and 10/03/2016 under the Chairmanship of Member (Power System), CEA. During the meetings, NTPC informed that Tapovan Vishnugarh is likely to come up by September 2018, and Pipalkoti HEP by December, 2019. It was decided that Pipalkoti substation should first be constructed as a switching station for evacuating Vishnugad HEP (NTPC) and Pipalkoti HEP (THDC) with the provision of installing 400/220kV ICTs in future for evacuating other HEPs in Alaknanda basin as and when they are cleared by Hon'ble Supreme Court.

5.3 Director (PSP&PA-I), CEA further stated that for evacuation of power from Tapovan Vishnugad HEP, PTCUL shall construct 400 kV D/C line with twin conductor from Tapovan Vishnugad HEP to the proposed site of Pipalkoti substation and 400 kV quad line from the proposed site of Pipalkoti substation to Srinagar. Accordingly, there would be a direct connectivity between twin moose and quad moose lines at the proposed Pipalkoti substation and hence switching station would not be required till September, 2018 when Tapovan Vishnugad HEP is scheduled to be commissioned.

5.4 As Pipalkoti HEP would be commissioned in December, 2019, the same shall be evacuated by constructing a 400kV switching station at Pipalkoti. Subsequently, 400/220 kV ICTs would be required at Pipalkoti switching station as per the timelines for commissioning of the HEPs in Alaknanda valley.

5.5 Accordingly, the scope for evacuation of power from Vishnugad HEP (NTPC) and Pipalkoti HEP (THDC) may be considered as under:

### **Tapovan Vishnnugad HEP:**

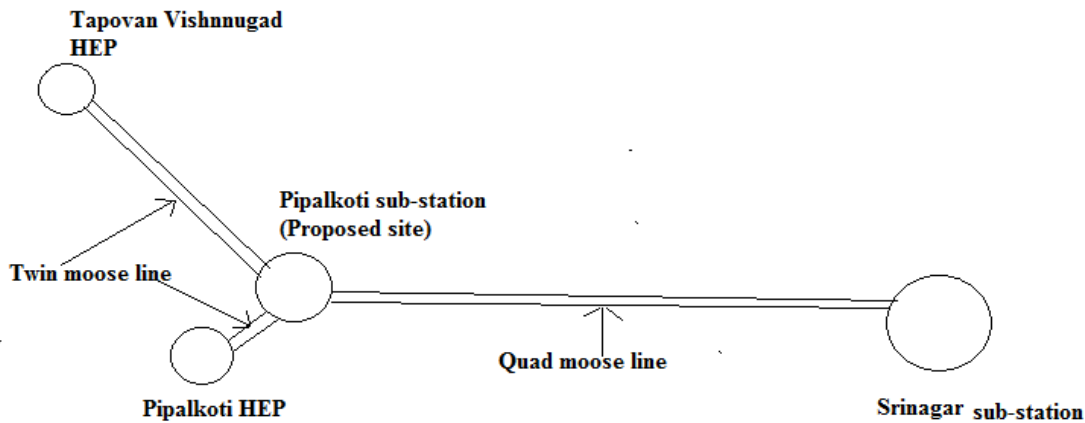
- (i) 400 kV D/C (Twin Moose) Tapovan Vishnugad HEP –Pipalkoti S/stn (Proposed site) line

(ii) 400 kV D/C (Quad Moose) Pipalkoti S/stn (Proposed site) - Srinagar line

**Pipalkoti HEP:**

- (i) Establishment of 400 kV Pipalkoti switching station (Proposed site) in timeframe of Pipalkoti HEP
- (ii) 400kV D/C (Twin Moose) Pipalkoti HEP– Pipalkoti switching station (Proposed site) line
- (iii) 400kV D/C (Twin Moose) Realignment of Tapovan Vishnugad HEP–Pipalkoti S/stn (Proposed site) line at Pipalkoti switching station
- (iv) Realignment of 400kV D/C (Quad) Pipalkoti Substation – Srinagar line to Pipalkoti switching station.

**The above evacuation scheme for Tapovan Vishnugarh HEP & Pipalkoti HEP is as under:**



5.6 DGM, NTPC stated that the revised commissioning schedule of Tapovan Vishnugarh HEP is March, 2019 instead of September, 2018 intimated during the meetings held in CEA. DGM, POSOCO stated that for 400kV GIS substation, the one and half breaker bus bar arrangement should be implemented.

**After deliberations, the above evacuation system was agreed by the members with the above timeframe.**

**6.0 Construction of four 400/220kV Substations in Delhi:**

6.1 Director (PSP&PA-I), CEA stated that four 400/220kV substations have been envisaged to be constructed by Powergrid in Delhi as ISTS works at Rajghat, Tuglakabad, Dwarka and Karampura to be completed by 2016-17 in the 34<sup>th</sup> SCSPNR held on 8<sup>th</sup> August, 2014. He requested Powergrid to update the status of these sub-stations.

6.2 AGM, CTU stated that the handing of the land for Tuglakabad and Dawarka S/Ss was yet to be completed. The placement of the award was ready but they have not been able to issue the LoA due to non-possession of the land. Govt. of NCT, Delhi informed that Powergrid may take possession of the land for both substations at any time as all the matters have been sorted out.

**Rajghat:** As decided earlier, the location for Rajghat S/S was shifted to IP Extn. premises, which involves some RoW issues for re-routing of two 220kV lines and some other issues. Govt. of NCT, Delhi, Delhi Transco Ltd. and Powergrid would discuss and resolve the issues with regard to allotment of land at IP Extn.

**Karpura:** Powergrid informed that due to non-feasibility of the line corridor, site for Karpura substation could not be finalized and it was agreed to explore the possibility of this substation through use of some alternative method or use of latest technology.

6.3 Members were of the view that the land issue may be settled between DTL and Powergrid at the earliest. Regarding the construction of sub-station at Karpura, CEA would call a meeting with the stakeholders.

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

7.1 Director (PSP&PA-I), CEA stated that in the 37<sup>th</sup> SCSPNR held on 20/01/2016, the evacuation system for Nuclear power generator (2X700MW) of M/s NPCIL for Gorakhpur Haryana Anu Vidyut Pariyojna (GHAVP) located at Fatehabad, Haryana was agreed. During the same meeting it was also decided that a suitable scheme for power evacuation should be planned taking implementation of the capacity of 4x700 MW in a phased manner as the final capacity of the plant would be 4x700 MW. Thus, CTU would carry out studies considering the plant capacity as 4x700 MW. Further, the short circuit levels shall be indicated for the proposed LILO of Moga-Hisar 400 kV D/C line as well as other nodes in Haryana.

7.2 Chief Engineer, NPCIL stated that the commissioning schedule for unit 1 and 2 has been delayed and the anticipated COD is August, 2023 and that of 3rd and 4th unit is not known.

7.3 COO, CTU opined that as the time frame for the 2x700 MW generation is beyond 13th plan, the connectivity and LTA applications may be closed and NPCIL may re-apply subsequently. The

load flow and short circuit studies would be carried out when the revised application is submitted by NPCIL.

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

8.1 Director (PSP&PA-I), CEA stated that in the 37<sup>th</sup> SCM meeting, it was decided that LILO of 220kV S/C Gladini – Hiranagar at Samba may be carried out instead of LILO of Sarna – Hiranagar 220 kV S/C line. **Powergrid stated that this would be commissioned by June, 2016.**

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

9.1 The following transmission schemes are under implementation through TBCB route in the Northern Region:

Sl. No.	Name of Scheme	BPC	Status
1	System Strengthening Scheme in Northern Region (NRSS-XXXVI)” along with LILO of Sikar-Neemrana 400kV D/C line at Babai (RRVPNL)	RECTPCL	Letter of Intent has been placed to the successful bidder M/s Essel Infrastructure Limited on 29/03/2016
2	Creation of new 400kV GIS Substations in Gurgaon and Palwal area as a part of ISTS	PFCCL	Letter of Intent has been placed to the successful bidder M/s Sterlite Grid on 29/02/2016

**Members noted the same.**

**10.0 Operational Feedback on Transmission Constraint: April 2016**

10.1 The operational feedback by NLDC on Transmission constraints in Northern Region for the quarter January to March, 2016 is given below:

Sl. No.	Corridor	Season/ Antecedent Conditions	Deliberations in 38 <sup>th</sup> SCM
<b>I. Transmission line constraints</b>			
1.	400 kV Dadri - Muradnagar	February; High MW loading	Due to commissioning of Kashipur –Roorkee 400kV D/C line and Muradnagar-II substation, the loading has reduced considerably. 765kV Greater Noida has already been commissioned,765kV

<b>Sl. No.</b>	<b>Corridor</b>	<b>Season/ Antecedent Conditions</b>	<b>Deliberations in 38<sup>th</sup> SCM</b>
			Hapur (planned by UPPTCL) is expected shortly. Their connectivity with the existing network will further relieve this constraint.
2.	400kV Dadri-Greater Noida	All time High MW loading	UPPTCL commissioned 765/400 kV substation at Greater Noida in February, 2016 which would relieve the loading. The LILO of Agra – Meerut 765 kV S/C line at Greater Noida would be commissioned in July, 2016.
3.	400kV Singrauli-Anpara		Severe Right of Way constraints and availability of bays at Singrauli and Anpara. SPS would be installed by June, 2016. The committee would look into the issue (para 4.0 of this minutes)
4.	400 kV Anpara- Mau and Anpara – Obra		Anpara D – Unnao line would be commissioned by Aug, 2016 which would relieve Anpara – Obra line. Anpara- Mau line remains an issue due to injection by Balia – Bhiwadi HVDC.
5.	Mohinder-garh Bhiwani 400kV D/C		To be commissioned by June, 2018
6.	Phagi - Bassi 400kV D/C	All time High MW loading.	After the commissioning of 765kV Phagi – Bhiwani 2nd ckt, loading on 400 kV Phagi-Bhiwani would be reduced. Phagi – Bhiwani would be commissioned by Sept., 2016.
7.	400kV Chhabra - Hindaun line	All time High MW loading.	A joint meeting to be called by CEA with CTU, RRVPNL and Rajasthan Genco.
8.	Underlying 220kV network of Bhiwadi		220 kV Bhiwadi (Pg) - Bhiwadi (Raj) D/C line to be commissioned by July, 2016

Sl. No.	Corridor	Season/ Antecedent Conditions	Deliberations in 38 <sup>th</sup> SCM
9.	Underlying network of following substation is not available	220kV network not available 1. Bhiwani (Har) 2. Jind (Haryana) 3. Sohawal (UP) 4. New Wanpoh (J&K) 5. Samba (J&K) 6. Shahjahanpur 7. Bagpat (PG) 8. Kurukshetra (PG) 9. Sikandrabad (UP)	<b>Haryana:</b> Bhiwani and Jind (lines to be commissioned in 1 year), Kurukshetra (March, 2018), Sonapat (partly being utilised due to less load) <b>UP:</b> Sohawal (Oct. 2016), Shahjahanpur (July, 2016), Sikandrabad (July, 2016), remaining connectivity of Bagpat (Pg) by UPPTCL <b>Delhi:</b> Mundka (additional drawal required) <b>Punjab:</b> Makhu (partly commissioned) <b>Samba:</b> to be commissioned by June, 2016. <b>New Wanpoh (J&amp;K):</b> information awaited from JKPDD.

## II. ICT Constraints

Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Suggestions /comments
1.	400/220kV 2x315 MVA Mainpuri	Winter	Two ICTs of 315 MVA each loaded in the range of ~240 MW and not N-1 compliant.	New ICT would to be commissioned by March, 2018. Powergrid to expedite.
2.	400/220kV, 4 x 315 MVA Wagoora	Security issues of 220KV Network at Wagoora, only 4 ckts are there	Four ICTs of 315MVA each loaded in 200-225MW. 4 Ckts of 220kV level; 220kV Wagoora Pampore D/C, 220kV Wagoora-Zainkote D/C. All four lines are critically loaded.	information awaited from JKPDD.
3.	765/400 kV ICTs of Unnao (2 X 1500 MVA)	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 June, 2016.



Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Suggestions /comments
4.	765/400kV Phagi 2 x 1500 MVA	All time	Phagi has two ICTs of 1500 MVA each and 765kV Phagi-Bhiwani S/C. Power flow over the ICTs is more than 900 MW, which is not N-1 compliant.	The third ICT by June, 2018.
5.	400/220 kV Azamgarh 2 x 315 MVA	All time	Azamgarh had two ICTs of 315MVA and 240MVA and 400kV Azamgarh-Sarnath, 400kV Azamgarh-Sultanpur, 400kV Azamgarh- Gorakhpur (UP) & 400kV Azamgarh-Mau. Power flow over the ICTs is more than 350 MW, which is not N-1 compliant. At present 240MVA ICT has been replaced with 315MVA ICT.	No 3 <sup>rd</sup> ICT is required as 240 MVA & 315 MVA ICTs would be replaced by 2 no. 500 MVA ICTs in phased manner by Dec, 2016.
5	Single ICTs at following 400kV Nodes:		1. Chhabra (Raj) – 1 x 315 MVA 2. Kalisindh (Raj) – 1 x 315 MVA 3. Rajwest (Raj) – 1 x 315 MVA 4. Dehar (BBMB) – 1 x 250 MVA 5. Bhiwani (BBMB) – 1 x 500 MVA 6. Agra(PG) – 1 x 315 MVA 7. Aligarh (UP) – 1 x 500 MVA	<b>1-3:</b> joint meeting to be called by CEA; <b>4-5:</b> BBMB to furnish information <b>6:</b> by July, 2017 <b>7:</b> by Oct., 2016

### III. Nodes Experiencing Low Voltage

S. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Deliberations in the meeting
1.	Wagoora In J&K,	Winter	400 kV Wagoora is continuously experiencing low voltage.	JKPDD to to furnish information
2.	Bhilwara	winter	In Rajasthan, 400kV Bhilwara is continuously experiencing	RRVPNL to install suitable capacitor banks.

			low voltage. In September voltage profile has slightly improved after tap changing.	
3.	Alwar	Winter/ January	In Rajasthan, 400kV Alwar is continuously experiencing low voltage. In March voltage profile has slightly improved	

#### IV. Nodes Experiencing High Voltage throughout the year:

Sl. No.	Nodes	Sl. No.	Nodes
1.	765kV Jhatikara	2.	765kV Meerut
3.	Agra (PG)	4.	Ballabhgarh
5.	Amritsar	6.	Bhiwadi
7.	Bhiwani	8.	Parbati Pool
9.	Gurgaon	10.	Jalandhar
11.	Kaithal	12.	Mandola
13.	Mahendragarh	14.	Nallagarh
15.	Patiala	16.	Rampur
17.	Sonepat	18.	Dehar (BBMB)
19.	Koldam (NTPC)	20.	Parbati-III (NHPC)
21.	Koteshwar	22.	Deepalpur
23.	Naptha Jhakri	24.	Dhanonda
25.	Bawana	26.	Dhuri
27.	Makhu	28.	Jodhpur
29.	Parichha	30.	Suratgarh

Members noted the same.

#### 11.0 OPGW on main transmission line being LILOed:

11.1 AGM, CTU stated that in the 36<sup>th</sup> Standing Committee Meeting of Power System Planning of NR, it was agreed to include one 24 Fibre (OPGW) in all new transmission lines including transmission lines to be implemented under TBCB route and communication equipment (SDH–STM-16) to be provided at all upcoming substations. Further, establishment of data and voice connectivity for new substation with RLDC is mandatory for charging the transmission system as per CERC guidelines.

11.2 He further stated that while giving inputs to BPC, about communication requirement for TBCB projects the following problem are being faced:

- (a) **OPGW:** In case of LILO of existing line, the TBCB scope covers construction of LILO portion of transmission line along with construction of new substation. While planning the communication connectivity of this new substation, sometimes it has been observed that in some cases OPGW has not been laid on the main line owned by POWERGRID/other utilities. In these cases, proposed OPGW in LILO portion will not provide communication connectivity to new substation unless OPGW is installed in main line being LILOed. Thus, it is proposed that the provision of OPGW in the main line may be taken up by the respective owner of the transmission system to provide communication connectivity to these new substations.
- (b) **Communication equipment:** For projects that are being implemented under TBCB route, the communication equipment (SDH and PDH, PMU, SASIRTU, Approach cable & FODP) for new substation are included in the RfP document. But the communication equipment of other end of transmission line which is under ownership of POWERGRID/other utility is not covered. In these cases, end to end communication will not be established unless the communication equipment for other end is commissioned. It is proposed that the provision of communication equipment at the other end may be taken up by the respective owners.

11.3 Director (PSP&PA-I), CEA stated that a Joint Meeting of all the five Regional Standing Committees on Power System Planning was held on March 5, 2012 on the issue of “**Unified Real Time Dynamic State Measurement**”. As per the minutes of the meeting, the following was decided:

***“It was agreed that the scheme would be implemented in the following manner:***

- (i) *The URTDSM scheme will cover placement of PMU at sub-stations and both ends of transmission lines at 400kV and above level including generating stations at 220 kV level under State and Central Sector coming up by 2014-15 time frame.*
- (ii) *The proposed URTDSM scheme will be implemented in two stages.*
- (iii) *In the Stage-I, PMUs will be placed at those locations where fiber optic communication link is either available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in state, remote consoles at RPCs, CEA, CTU and other locations. Nodal PDC shall be provided for collection of data from 40 PMUs in a cluster.*
- (iv) ***In stage-II, PMUs would be installed at balance locations along with communications links.***
- (v) *For effective utilization of synchrophasor technology national and international level training programs will be arranged for engineers from State utilities, RPCs, CEA, CTU and POSOCO under the URTDSM scheme.*

- (vi) *After deliberations, members of regional Standing Committees on Power System Planning agreed that “Unified Real Time Dynamic State Measurement (URTDSM)” scheme to be taken up for implementation. It was also agreed that scheme is to be implemented by POWERGRID as system strengthening and cost shall be added in the National transmission pool account and to be shared by all the Designated ISTS Customers(DICs) as per the POC mechanism under the CERC regulation.”*

11.4 Regarding the status of implementation of URSTDM scheme, Powergrid stated that Stage-I is under implementation and a petition was filed for approval of Stage-II of URSTDM, for which the Hon’ble Commission has sought the results of stage I before approving Stage-II.

11.5 AGM, NTPC stated that in addition to relay of generation data, the communication channel is now also being used for protection. Earlier two sets of analogue PLCC were being used. In recent projects being implemented through TBCB route namely, Gadarwara, North Karanpura and Khargone one digital PLCC (DPC) and another analogue PLCC has been specified. Present scope of supply under TBCB includes Analogue PLCC and DPC for both end. However, Fibre Optic Terminal Equipment (FOTE) for generating end has been excluded from scope of supply. As per the proposal, communication equipment (SDH and PDH, PMU, SASIRTU, Approach cable & FODP) for generating end is to be provided by the generators. Like PLCC, make of PDH at both end should be identical. Requirement of SDH or PDH or both and their make as well at other end is not known beforehand due to difference in timeline between award of LOA. As the cost of FOTE is very small compared to cost of transmission lines and for ease of integration as well, terminal equipment, approach cable and FODP for both ends of may be retained in the scope of TSP in line with existing practice.

**11.6 It was decided that the issue would be approved on case to case basis by the standing committee.**

**12.0 Refurbishment/ overhauling of the existing 1500 MW HVDC Rihand- Dadri Bipole and Capacity enhancement of Rihand- Dadri HVDC from 1500MW to 2500MW along with R&M of existing HVDC Rihand- Dadri Bipole**

12.1 Director (PSP&PA-I), CEA stated that the matter was discussed in 37<sup>th</sup> SCM held on 20<sup>th</sup> January, 2016. After detailed deliberation the proposal of up-gradation of existing Rihand-Dadri HVDC bipole by 1000 MW was agreed in principally, however before finalizing, the following was 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

12.2 Director (PSP&PA-I), CEA stated that Powergrid vide letter dated 13/5/2016 has submitted that the RLA experts are not available for such type of HVDC installations. However, ABB as an OEM has done the audit & assessment about the health of HVDC equipment at Rihand and Dadri and has submitted its report indicating the equipment which needs replacement / revamping. The report for the same was forwarded to CEA on 12/02/2016. CE (PSP&PA-I), CEA stated that the report mentions various inspections findings viz., air leakage possibilities were found to be high, especially at transformer bushing area. Maintaining positive pressure with high air leakage can be difficult. Positive pressure inside the hall could not be measured (no indicator). Humidity indicator was not operational. No system interlocks or alarm system found for positive pressure limit or humidity limit. Various actions were proposed such as replacing capacitor by new dry type capacitor, replacing thyristor control unit (TCL) with new design, provision of new optical fibres. These observations of the original equipment manufacturer (OEM) must be taken into account in the O&M of HVDC stations.

12.3 AGM, Powergrid stated that the RLA experts are not available for such type of HVDC installations. However, ABB as an OEM has done the audit & assessment about the health of HVDC equipment at Rihand and Dadri and has submitted its report indicating the equipment which needs replacement/ revamping. He further stated that CERC has allowed technology up-gradation costing around Rs. 500 Crore with existing  $\pm 500$  kV Rihand – Dadri 1500 MW HVDC Bi-Pole vide their tariff order dated 28.01.2016 under O&M add cap. During technology up-gradation of these HVDC terminals at Rihand and Dadri, provision would be kept in control & protection system to take care of parallel converter operation requirement for upgrading of Rihand – Dadri HVDC by 1000MW. This would provide additional capacity for transfer of 1000MW from pit head generating station to NCR with no extra land/transmission corridor.

12.4 Director (PSP&PA-I), CEA stated that in the 37<sup>th</sup> meeting of the SCPSNR, Powergrid proposed to club the works of Renovation and Modernization of existing Rihand-Dadri HVDC terminals with the capacity enhancement works of the  $\pm 500$ kV Rihand-Dadri HVDC link for the following advantages:

- (i) Sharing of the space of the existing Filters and Switchyard equipment 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.

12.5 Director (PSP&PA-I), CEA stated that **in view of para 12.3, it is found that these two proposals are interrelated.** Accordingly, the capacity up-gradation cannot be treated as standalone project. Moreover,

12.6 GM, POSOCO stated that the upgradation was suggested by them to bring in additional power in the NCR region from the pit head generations and hence may be approved.

12.7 CE, UPPTCL stated that already a number of new of 765kV and 400kV lines are emanating from Rihand, Anpara and Singrauli generation complexes and also there is high short circuit level at Dadri, keeping these scenarios, the capacity upgradation of 1000 MW would not be required. He further stated that already number of HVDC are terminating in northern region and all the injections by them have to be seen in totality and hence the upgradation proposal may be reviewed.

12.8 SE, HVPNL stated that Powergrid may inform the constituents on the life extension of the existing HVDC after carrying out the O&M add cap. He also stated that the upgradation proposal may be reviewed.

12.9 After detailed deliberations, it was decided to approve the renovation and modernization of existing Rihand-Dadri HVDC under O&M addcap of the HVDC stations. Powergrid would submit the details of O&M being carried out to CEA. It was also decided to form a committee consisting of CEA, CTU and UPPTCL to carry out joint studies to review the upgradation proposal of 1000 MW.

### **13.0 220 kV bays at 400kV Bahadurgarh (PG) substation:**

13.1 Director (PSP&PA-I), CEA stated that HVPNL vide letter dated 26/06/09 had earlier requested for 2 no of 220 kV bays at 400kV Bahadurgarh (PG) sub-station, to provide connectivity and feed to proposed new substation of HVPNL at Sikanderpur on Jhajhar – Badli road through a 220 kV D/C line. Subsequently, HVPNL vide letter dated 27/01/2016, informed that creation of proposed 220kV substation at Sikanderpur stands cancelled. Instead of this, HVPNL has now proposed for LILO of one circuit of 220kV D/C line from 220kV Bahadurgarh to 400/220kV substation Daulatabad at 400kV Bahadurgarh (PG).

13.2 Accordingly, HVPNL has requested to reallocate the 220 kV bays for providing connectivity and feed to Sikanderpur substation, to accommodate LILO of one circuit of 220kV D/C line from 220kV Bahadurgarh to 400/220 kV Daulatabad substation at 400kV Bahadurgarh (PG). PGCIL has confirmed the availability of 2 nos. of 220kV bays is available at 400kV Bahadurgarh (PG) substation.

**Members noted the same.**

### **14.0 400 kV bays at 400kV substation Bhinmal and Sikar:**

14.1 Director (PSP&PA-I), CEA stated that in the 30th Standing committee meeting of NR, RRVPNL requested Powergrid to provide two nos. on 400 kV bays each at 400 kV Bhinmal and 400 kV Sikar substation for termination of 400 kV D/C lines being constructed by RRVPN for evacuation of power from renewable energy projects expected to come up in Rajasthan. During the meeting, Powergrid requested RRVPNL to inform time frame in which these bays would be required. RRVPNL agreed to intimate in due course of time.

14.2 Subsequently, RRVPNL vide letter dated 13/04/2016 intimated that 400 kV D/C Bikaner - Sikar (Twin Moose) transmission line through Public Private Partnership (PPP) mode would be commissioned by January, 2018. Accordingly, RRVPNL has requested Powergrid for two nos. of 400 kV line bays along with 50 MVAR line reactors on each circuit by January, 2018. However, the time frame in which bays at 400kV Bhinmal S/s will be required is yet to be informed by RRVPNL.

14.3 AGM, CTU stated that implementation of bays would take about 24-30 months. In case RRVPNL desires these bays earlier, they may implement the same on their own. RRVPNL requested Powergrid to implement the bays.

14.4 CE, UPPTCL stated that a time period of 24-30 months for the construction of bays at existing sub-stations is too long and Powergrid may like to look into the same. Member (Power System), CEA stated that Powergrid may expedite the work of commissioning of the bays.

**Powergrid agreed for the same.**

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

15.1 ED, Powergrid stated that in the 36<sup>th</sup> Meeting of Standing Committee on Power System Planning in Northern Region held on 13.07.15, the interstate transmission scheme for evacuation of 3000MW of solar power in Jaisalmer (Parewar and Fatehgarh: 2000MW) and Jodhpur (Bhadla:1000MW) was in-principally agreed. And it was also agreed that implementation of above system shall be taken up only after receipt of LTA of at least 25% of their installed capacity from respective Solar park developers. Subsequently, M/s Saurya Urja (500MW), M/s Adani (250MW) & M/s Essel Saurya (750MW) applied for LTA for injection at Bhadla for which transmission scheme was agreed in 37<sup>th</sup> NR SCM with establishment of 765/400/220kV Bhadla substation along with 765kV Bhadla (PG)- Bikaner and 400kV Bhadla (PG)-Bhadla (RVPN) interconnection which is in the process of implementation.

15.2 He further stated that M/s Adani Renewable Energy Park Rajasthan (AREPL) Ltd has applied for connectivity (1000 MW) and Long Term Access (250 MW) in ISTS with commissioning schedule of Jun'17 for its Ultra Mega Solar Power Park at Fatehgarh, distt. Jaisalmer, Rajasthan with target region as NR. Subsequently, M/s Adani Renewable Energy Park Rajasthan (AREPL) Ltd applied for additional LTA for 750 MW (application is under processing as of now) for its above Fatehgarh UMSPP. As per the combined LTA application, 1000 MW Power from Fatehgarh UMSPP is envisaged to be transferred to beneficiaries of Northern region by June, 2017. Thus, to evacuate power from the Fatehgarh UMSPP (1000 MW), it is proposed that the earlier agreed 3x500 MVA, 400/220kV Pooling Station at Fatehgarh (with a provision to upgrade at 765kV level) along with 765 kV Fatehgarh Pool - Bhadla (PG) D/C line (initially to be operated at 400kV) may be implemented.

15.3 Director (PSP&PA-I), CEA stated that as there is only one solar park developer is getting connected to Fatehgarh Pooling Station. In the present case also M/s Adani may be advised to construct its own dedicated transmission line upto Bhadla pooling station. Further, there is a need to optimize the location of solar parks so that the idle time for transmission is minimized as the



solar would generate during few hours only. Moreover, there is already instances of perennial high voltages at various nodes in the grid. Creating extra high voltage lines exclusively for solar generation with CUF of 20% may exacerbate already severe high voltage problem in the grid. Moreover, members may also like to deliberate on the treatment of the radial lines from the solar parks to the pooling sub-station during the night time when there is no solar generation. He also stated that in a meeting taken by CE(PSP&PA-I), CEA on 20.05.2016, M/s Adani informed that they are yet to get the possession of the land for the park. He further stated that M/s Adani has been planned to step up their generation at 400kV level at Fatehgarh solar park. Therefore, 220 kV level along with earlier proposed 400/220 kV transformation capacity would not be required.

15.4 All the States except Rajasthan were of the view that exclusive transmission system for solar generation should not be created, as it would play havoc with the grid.

15.5 During the discussions, it was brought that around 3000 MW of solar generation would be coming up in the Fatehgarh district of Rajasthan and would be evacuated through Fatehgarh pooling sub-station. Accordingly, it was decided that the following transmission system may be taken up for implementation under ISTS through TBCB route.

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

**Note:** Park Developer to construct 400 kV line from M/s AREPL solar park along with 1x125 MVAR bus reactor at generation switchyard.

15.6 ED (SG), Powergrid stated that the solar park developer would provide adequate land for 765/400 kV Pooling sub-station adjacent to the proposed solar park.

15.7 It was decided that while implementing the transmission system, adequate care should be taken such that the transmission system does not remain idle.

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

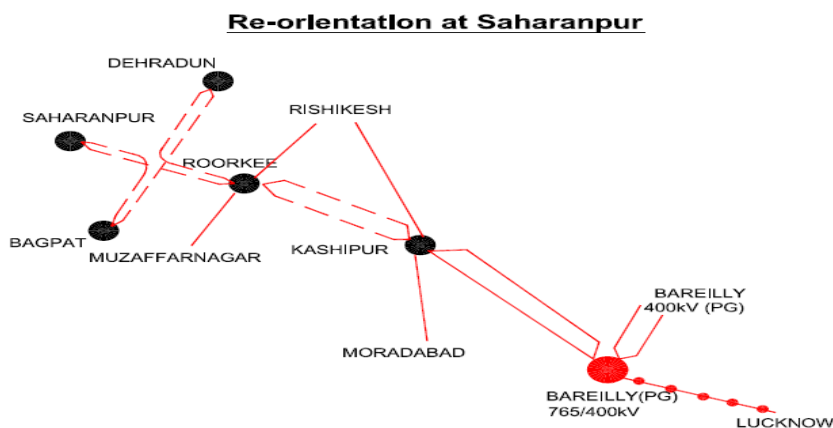
16.1 Director (PSP&PA-I), CEA stated that the connectivity application from M/s SJVN Ltd. for 66 MW (Plus 10% inbuilt overload capability to meet grid requirement) was discussed during the 7<sup>th</sup> & 8<sup>th</sup> Meeting of Northern Region Constituents for Connectivity/Long Term applications held on 14/07/2015 and 20/01/2016 respectively. The LTA application is yet to be received. Powergrid had proposed to grant Connectivity to M/s SJVNL for Dhaulasidh HEP through Dhaulasidh HEP – Hamirpur (PG) 220 kV D/C line. He further added that as the installed capacity of 66 MW is small quantum, evacuating the same at 220 kV would be *a non-optimal transmission plan*.

16.2 After deliberations, it was decided that a meeting would be called by CEA with CTU, SJVNL and HPPTCL/HPSEBL.

## 17.0 Interim arrangement to provide alternate feed to 400kV 2x315MVA Saharanpur.

17.1 Director (PSP&PA-I), CEA stated that in the 36<sup>th</sup> Standing committee Meeting on Power System Planning of NR, reorientation of the originally agreed schemes (NRSS-XVIII, NRSS – XIX & NRTSS) was discussed and approved, due to severe R-o-W constraints faced during construction works. Accordingly, after reorientation of the original schemes, the interconnection is as follows:

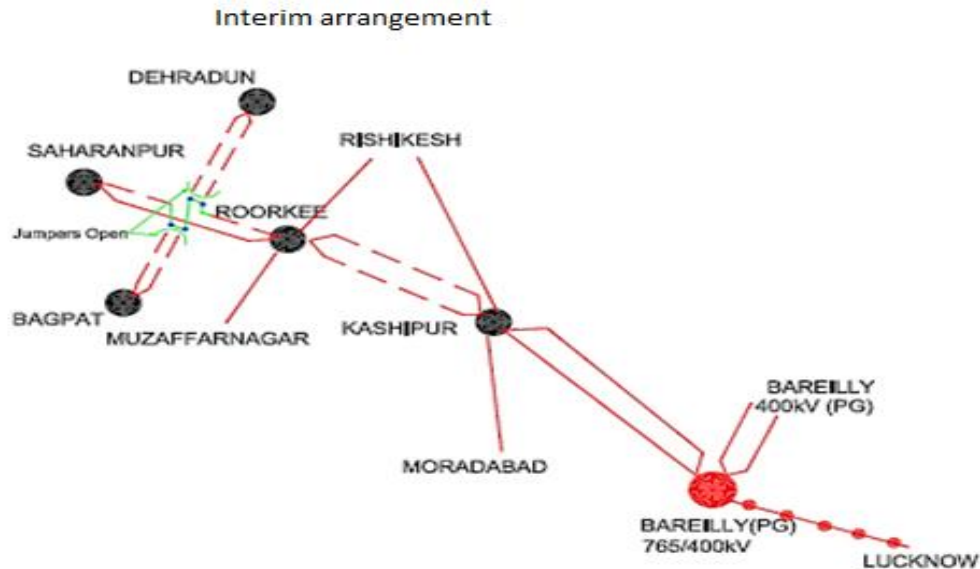
- (i) 400kV Bagpat – Dehradun S/C line,
- (ii) 400kV Bagpat – Saharanpur S/C line,
- (iii) 400kV Roorkee – Dehradun S/C line,
- (iv) 400kV Roorkee – Saharanpur S/C line.



17.2 The 400/220kV, 2X315 MVA Saharanpur Substation was commissioned on 7<sup>th</sup> May, 2016 and is presently fed through 400 kV Roorkee – Saharanpur S/C line. 400/220 kV Saharanpur substation is also connected by LILO of Saharanpur (UP) - Nanauta 220kV S/C line. Presently,

power flow through 400kV Roorkee – Saharanpur S/C line is about 250– 300MW. Considering reliability of power supply to Saharanpur substation, it is proposed to charge the 2<sup>nd</sup> circuit of 400kV Roorkee- Saharanpur line (made ready after contingency arrangement at re-orientation point).

**Schematic diagram of the contingency arrangement is as shown below:**



**Members concurred the same.**

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

18.1 Director (PSP&PA-I), CEA stated that 400/220 kV, 2x315 MVA Saharanpur substation and 400/220kV, 2X500MVA Bagpat substation have been commissioned. However, only 2 Nos. of line bays have been utilised at Saharanpur Substation. Powergrid requested to inform the status and commissioning schedule of 220kV lines planned for utilisation of the remaining 4 nos. of 220kV line bays at Saharanpur and 8 nos. of 220 kV line bays at Baghpat.

18.2 Chief Engineer, UPPTCL stated that for utilization of bays at Baghpat (Pg), the following downstream connectivities have already been approved previously in SCM:

- (i) Baghpat (Pg) – Baghpat (220) 220 kV S/C line
- (ii) Baghpat (Pg)- Baraut (220) 220 kV S/C line

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

- (i) Stringing of 220 kV II<sup>nd</sup> ckt of Baghpat (Pg) to Baghpat (UP) 220 kV line
- (ii) Stringing of 220 kV II<sup>nd</sup> ckt from Baghpat (Pg) to Baraut (UP) 220 kV line
- (iii) Baghpat (Pg) – Modipuram (II) 220 kV D/C line
- (iv) LILO of Moradnagar II (UP) – Shamli 220 kV S/C line at Baghpat (Pg)

Thus, remaining 8 nos 220 kV would be utilised.

18.4 CE, UPPTCL also stated that 220 kV Baghpat (UP) substation has already been commissioned and has taken considerable load of 220/132kV Baraut (UP) substation. Moradnagar (400) - Shamli 220 kV S/C line has already been shifted to Moradnagar II 400/220kV substation. Further, it has already been informed that Moradnagar II- Shamli 220 kV S/C would be LILOed at 220kV Baghpat (UP). It is, however, held up due to ROW issues and may take some time.

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

- (i) LILO of Saharanpur -Nanauta 220 kV SC line at Saharanpur PG (400) s/s: already informed in previous SCM
- (ii) LILO of Khara - Shamli 220 kV S/C line at Saharanpur (Pg)
- (iii) Saharanpur (Pg) - Saherswa (220) 220 kV D/C line
- (iv) LILO of one ckt of Khodri-Saharanpur 220 kV D/C line at Saherswa (220) (220/132/33 kV 2x160, MVA Saherswa S/s is under construction)

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

**Members noted the same.**

## **19.0 Intra- State Transmission corridor in Rajasthan for evacuation of RE generation - Proposal from RRVPNL**

19.1 Executive Engineer, RRVPNL stated that by 2021-22, total renewable generation capacity of 15231 MW would be installed in the State of Rajasthan. As the installed capacity of aforesaid Solar/ Wind Power Projects is high and load consumption is low in the Western part of Rajasthan, hence for evacuation of this RE capacity, the existing Solar/Wind capacity is being evacuated with constraint through two 400 kV S/S at Akal and Barmer, ten 220 kV S/S and scattered 132 kV S/S. Presently, three 400 kV S/S at Bhadla, Ramgarh and Jaisalmer-2 and seven 220 kV S/S at Kanasar, Pratapgarh, Chhatrail, Pokaran, Kolayat, PS-1/Bajju and Undoo are under construction. Therefore, it is envisaged that 8000 MW of solar and Wind would be evacuated through the existing and under

construction transmission system by 2017-18. Also, some new intra State transmission system has been planned for evacuation of additional 7000 MW wind/ solar generation by 2021-22.

19.2 As per the guidelines on Solar Park Policy formulated by MNRE, ***at least 20 % of installed capacity of Solar Parks*** shall be bought by the State government through its discoms. The relevant extracts are reproduced for ready reference:

***The State Government in which the solar park is developed must agree to buy at least 20% of the power produced in the park through its Discom. The States which agree to buy higher percentage of power will be given preference. In such cases, where the State refuses to buy at least 50% power, the park should preferably be connected with CTU system. If STU system has to be used to evacuate power to other states, the STU/State Government concerned will agree to waive off the wheeling charges or reduce the wheeling charges to affordable level.***

19.3 She further stated that in the 32<sup>nd</sup> Standing Committee meeting held on 31.8.2013 and 36<sup>th</sup> Standing Committee meeting held on 13.7.2015, 765 kV D/C Bhuj-Banaskantha-Chittorgarh - Ajmer –Bikaner-Moga line with 2x1500 MVA, 765/400 kV sub-stations each at Chittorgarh, Ajmer and Bikaner have been approved under “Green Energy Corridor”. This comprehensive corridor was approved due to the requirement of transmission strengthening beyond Bhuj pooling station for integration of envisaged renewable capacity in Gujarat and Rajasthan.

19.4 For interconnection of this green energy corridor with the intra-State system of Rajasthan, RRVPNL has proposed 765 kV D/C line from RVPN’s 765/400 kV Korna SS to PGCIL’s 765/400 kV Ajmer S/Stn with 2x240 MVAR, 765 kV line type switchable shunt reactors at Korna and Ajmer S/Stns.

19.5 In the 37<sup>th</sup> Standing Committee Meeting, Powergrid informed that three (3) long term applications for 1500 MW Solar Power transfer requirement through Bhadla pooling station, through Bhadla (PG) – Bikaner(PG) 765kV D/C line and Bhadla (PG)- Bhadla (RVPN) 400kV D/C (Quad) line. LILO of one circuit of 400 kV D/C Bhadla (RRVPNL)-Bikaner line at PGCIL’s 765 kV Bikaner (Pg) was also agreed. Due to LILO of single circuit unbalanced loadings are observed in the circuits. Hence, RRVPNL has proposed to LILO second circuit of 400 kV D/C Bhadla (RRVPNL)-Bikaner line at PGCIL’s 765 kV Bikaner (Pg).

19.6 After deliberations, the following new intra State interconnections to the ISTS was agreed to be implemented by RRVPNL:

- (i) 765 kV D/C line Korna (RRVPNL) S/S to Ajmer (Pg) 765/400 kV S/S with 2x240 MVAR, 765 kV line type switchable shunt reactors at Korna and Ajmer S/Stns.
- (ii) LILO of second circuit of 400 kV D/C Bhadla (RVPN) – Bikaner (RVPN) line at PGCIL’s 765/400 kV Bikaner GSS

Note:

- Powergrid to provide 2 no of 765 kV line bays at 765/400 kV Ajmer S/Stn along with 2x240 MVAR, 765 kV line type switchable shunt reactors
- Powergrid to provide 2 no of 400 kV line bays at 765/400 kV Bikaner S/Stn

## 20.0 Power Evacuation System of Suratgarh Super Critical TPS (2x660 MW)

20.1 Director (PSP&PA-I), CEA stated that the evacuation system for Suratgarh TPS was discussed in the 27<sup>th</sup> SCM of NR held on 30<sup>th</sup> May, 2009. The transmission system of Suratgarh SCTPS had been re-examined due to change of capacity of the generating units from 3x660 MW to 2x660 MW and the following evacuation system had been planned by RRVPNL:

Transmission System	Line Length /Transformation Capacity	Commissioned /Target
2x315 MVA, 400/220 kV GSS at Babai (Jhunjhunu)	2 x315 MVA	2017-18
400 kV D/C (Quad Moose) Suratgarh TPS – Babai line with 2*80 MVAR Line Reactors at both ends of line	240 km	2017-18
LILO of 220 kV S/C Khetri-Heerapura line at Babai	3 km	Commissioned
LILO of 220 kV S/C Khetri-Reengus line at Babai	1 km	Commissioned
400 kV D/C (Twin Moose) Suratgarh TPS – Bikaner line	170 km	May, 2018
400 kV D/C (Twin Moose) Bikaner – Merta line with 1*50 MVAR Line Reactors at both ends of line	172 km	Commissioned
1x80 MVAR, 400 kV Bus Reactors at Babai	-	-
1x125 MVAR, 400 kV bus reactor at STPS	-	-

Members noted the same.

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

21.1 AGM, Powergrid stated that CERC vide its recent orders has advised the following in the context of mismatch in the commissioning of the sub-stations and downstream STU networks:

"In case of cost plus, the mismatch between Generation/Downstream network/Upstream network, Transmission licensee will not burden the consumers and the charges would be compensated through the IA between the parties".

21.2 CERC has directed that such assets shall not be included in the computation of PoC charges and in cases of declaration of commercial operation of such assets, transmission charges shall be recovered from the concerned generator/ STU/ Discoms.

21.3 Further, a new Regulation 6.3A on 'Commercial operation of Central generating stations and inter-State Generating Stations' has been framed under the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016. Sub-Regulation 4 (iii) on 'Date of commercial operation in relation to an inter-State Transmission System', provides as under:

*Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavour to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement. Where either of the transmission systems or both are implemented through tariff based competitive bidding, the progress of implementation of the transmission systems in a matching time schedule shall be monitored by the Central Electricity Authority.*

21.4 Keeping the Regulation and various orders of CERC in mind, Powergrid may please provide update on the *endeavours to match the commissioning of the following sub-stations with the downstream transmission system of respective STUs.*

Sl. No.	Name of Substation	Capacity (MVA)	Expected Schedule
1	400/220kV Kurukshetra Substation (GIS)	2x500	commissioned
2	400/220kV Bagpat Substation (GIS)	2x500	commissioned
3	400/220 kV Saharanpur Substation	2x315	commissioned
4	400/220kV Substation at Patran(GIS)	2x500	End of May'16
5	400/220kV Dehradun Substation	2x315	July'16
6	400/220kV Parbati Pooling Station	2x315	Oct.'16
7	220/66kV GIS S/s at Sector 47, Chandigarh	2x160	24 months from IA

8	400/220kV S/s at Kala Amb	7x105	Oct.'18 (Likely to be preponed)
9	400/220kV S/s at Amargarh	7x105	Oct.'18
10	400/220kV Kadarapur S/s in Gurgaon area (GIS)	2x500	38 months
11	400/220kV Sohna Road S/s in Gurgaon area (GIS)	2x500	38 months
12	400/220kV Prithala S/s in Palwal area (GIS)	2x500	38 months
13	400/220kV Baram (Jauljivi) S/s	2x315	40 months

21.5 STUs are advised to ensure utilization of the 220kV line bays at the above mentioned new/under implementation ISTS substations planned under various transmission schemes. STUs may furnish the implementation schedule for the outgoing 220 kV lines from above substations to CEA and Powergrid. STUs are also advised to enter into Implementation Agreement for the commissioning of transmission elements with Powergrid.

**22.0 Re-conductoring of 220kV Badarpur – Ballabgarh D/C line and 220 kV Narela - Rohtak Road D/C Line and establishment of 220kV GIS Bays at Rohtak Road S/Stn. of BBMB**

22.1 Director (PSP&PA-I), CEA stated that the Re-conductoring of 220kV Badarpur – Ballabgarh D/C line and 220 kV Narela - Rohtak Road D/C Line and establishment of 220kV GIS Bays at Rohtak Road S/Stn. of BBMB were discussed in the 37<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region held on 20<sup>th</sup> January 2016, wherein 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.

22.2 As BBMB was not present in the meeting, it was decided that CEA would convene a meeting with all the stakeholders.

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

23.1 Director (PSP&PA-I), CEA stated that the 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 was discussed in the 37<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region held on 20<sup>th</sup> January 2016, wherein it was decided that a separate meeting shall be convened by CEA with CTU, AD Hydro and HPPTCL to resolve the issue.



23.2 Accordingly, Member (Power System), CEA took a meeting on 1.3.2016, in which the following was decided:

- (i) LILO of one circuit of Pirni– Nalagarh 220 kV D/C line at Phojal was agreed as an interim arrangement only so that the small hydro generations is not bottled up.
- (ii) HPPTCL would file an affidavit before CERC to follow the formula as applicable to the AD Hydro and Malana – II HEPs for scheduling, loss allocation etc. among them i.e. AD Hydro, Malana-II and 40 MW being injected at Phojal by HPPTCL.
- (iii) HPPTCL shall be responsible for managing the schedules of the small HEPs at the proposed Phojal substation of HPPTCL and would give the consolidated schedule etc. to NRLDC.

23.3 AGM, NRLDC stated that there is local load also at Phojal S/S and hence HPPTCL would give the consolidated schedule etc. to NRLDC for all small HEPs and local load at the proposed Phojal substation.

**The same was agreed to by the members.**

#### **24.0 Reliability issue at Sorang HEP**

24.1 Director (PSP&PA-I), CEA stated that in the 37<sup>th</sup> Standing Committee Meeting on Power System Planning of Northern Region POSOCO had raised the issue that the rating of switchgear equipment at Sorang HEP were 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) and the switchgear ratings at Karcham Wangtoo switchyard and Abdullapur substation are of 3000 Ampere (3 kA).

24.2 AGM, POSOCO stated that LILO arrangement carried out by Sorang HEP has been bypassed and the issue of switchgear rating has been referred to PSETD division of CEA for examination.

**Members noted the same.**

#### **25.0 Connectivity (6x660 MW) and LTA (4x660MW) Application of Barethi STPS of NTPC**

25.1 AGM, Powergrid stated that M/s NTPC had applied for connectivity (6x660 MW) and LTA (4x660MW) to Powergrid for their new generation project at Barethi. The subject application was discussed in the 22<sup>nd</sup> LTA and Connectivity meeting of WR constituents held on 30-11-2015

wherein it was decided that in view of uncertainty due to pending environment clearance and observation/ suggestion of MPPTCL, the transmission system for connectivity and LTA for Barethi STPS shall be finalised in the next meeting. Proposed Barethi generation project is located in MP, close to the boundary of Uttar Pradesh. Considering the location of the project and availability of transmission network in the vicinity, system studies were carried out by Powergrid for connectivity and LTA for Barethi STPS and following system is proposed

**Transmission System for Connectivity:**

- LILO of one ckt of Satna-Gwalior 765kV 2x S/C line at Barethi STPS\*

\*One ckt of Satna-Gwalior 765 kV 2x S/C line is already getting LILOed at Orai S/s. The proposal is to LILO other 765 kV S/C line at Barethi STPS.

**Reactive Compensation**

- 240 MVAR Switchable Line Reactors at Barethi STPS end of Gwalior – Barethi STPS 765kV S/C line (approx. length: 225 km)  
*(formed after LILO of one ckt of Satna-Gwalior 765KV 2x S/C line at Barethi STPS)*

**Transmission System Strengthening for LTA:**

- Barethi STPS - Orai 765kV D/C line (Approx Length: 180 km)
- Orai – Bareilly 765kV D/C line (Approx Length: 300 km)

**Reactive Compensation**

- 240 MVAR Switchable Line Reactors in each circuit at both ends of Orai – Bareilly 765kV D/C line (Approx Length: 300 Kms.)

Further, provision of following is proposed at Barethi STPS switchyard under the scope of NTPC Ltd.:

- 765kV line bays: 2 nos.
- 765kV bus reactor: 2x240 MVAR
- 765kV switchable line reactor: 2x240 MVAR in Barethi STPS - Orai 765 kV D/C Provision of space for additional 4 nos. 765 kV line bays along with switchable line reactors may be kept as future provision

25.2 The matter was deliberated at length and it was decided that the connectivity and evacuation of Barethi STPS would be evolved keeping in view the load generation scenario of northern region by a committee consisting of CEA, CTU, NTPC and UPPTCL.

## 26.0 Underground GIS at UT Chandigarh

26.1 Director (PSP&PA-I), CEA stated that the establishment of 220/66kV, 2x160MVA GIS at UT Chandigarh was agreed in the 34<sup>th</sup> Standing Committee meeting of Power System Planning of Northern Region held on 8/8/2014 and implementation activities have been taken up by Powergrid subsequent to the allocation from Ministry of Power under compressed time schedule.

26.2 AGM, Powergrid stated that during the Power for All (PFA) document meeting of Chandigarh held on 11/02/2016 at MoP, it was desired that the possibility for establishing an underground GIS substation at Chandigarh may be explored. Powergrid has also received a letter from SE, Electy. OP circle, UT of Chandigarh for necessary action.

26.3 Director (PSP&PA-I), CEA stated that in the meeting taken by Member (Power System), CEA on 19.04.2016, it was decided **to explore the possibilities of constructing GIS S/Stn. as (i) partly underground with transformers over the ground, (ii) fully underground S/Stn. and (iii) fully over the ground with nice aesthetics.** The sub-station is being constructed for the benefit of UT of Chandigarh. There was no representation from Electricity Department, UT of Chandigarh. As decided in the meeting, CEA and Powergrid jointly carried site visit of the proposed GIS substation on 20/04/2016. Primarily there are two options for underground GIS i.e. (a) ICTs (Oil filled) on Ground & GIS underground and (b) Completely underground GIS including Gas Insulated Transformers (GIT).

26.4 AGM, Powergrid stated that Preliminary estimates indicate that for option (a) the cost is about 30% higher (mainly on account of civil works) and for option (b), the cost is about 75% higher as compared to conventional over ground GIS. Considering that the cost of GIT (Gas Insulated Transformer) is approximately three times of conventional oil type transformer and only few GITs manufacturer worldwide, it was proposed during site visit to further explore the option with ICTs on ground. The cost of civil work for underground substation would be higher, however there would be substantial saving in land surface area of approximately 4 acre (costing in the range of Rs 80-90 Crore) in case of underground substation and also it would give a better aesthetic look. Further this would be the first of this kind in the country at this voltage level. Considering these aspects it is proposed that underground with GIS transformers over the ground option for establishment of 220/66 kV substation to be considered.

26.5 Director (PSP&PA-I), CEA stated that the land requirement for a 220/66 kV sub-station with four incoming feeder and 10 outgoing feeders is approximately 1.1 acre and cost is Rs.100

Crore only. No doubt that this would be first of its kind sub-station in the country, but this is more of a bilateral arrangement between UT of Chandigarh and Powergrid and the other beneficiaries should not bear the additional cost on account of GIS being underground. Saving of 4 acre of land for a 220 kV sub-station is a highly exaggerated.

26.6 The constituents present in the meeting were also of the view that the differential amount of additional fund for constructing underground sub-station should be provided by UT of Chandigarh, as the sub-station is meant for them. COO, Powergrid stated that the differential funding may be decided.

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

#### **27.0 Connectivity to Moradnagar II 400/220KV 2X240 MVA S/S:**

27.1 Director (PSP&PA-I), CEA stated that UPPTCL vide letter dated 23<sup>rd</sup> May, 2016 stated that the shifting of Dadri-Moradnagar 400 kV line to Moradnagar II was approved in 37<sup>th</sup> SCM at para 12.5, subject to following:

- (i) Commissioning of 220/132 kV Baghpat (UP) S/Stn
- (ii) LILO of Moradnagar II - Shamli 220 kV S/C line at 220 kV Baghpat (UP) s/s
- (iii) Baghpat (PG)- 220 kV Baghpat (UP) S/C line
- (iv) Baghpat (PG) -Baraut 220 kV S/C line
- (v) LILO of Moradnagar-Moradabad 400kV S/C line at 765/400 kV Hapur s/s

27.2 Chief Engineer, UPPTCL stated that in 37<sup>th</sup> SCM that connectivity of 765 kV Hapur (UP) could give additional strength to Moradnagar (400kV) after shifting Dadri-Moradnagar 400 kV S/C line. But it should not have been mentioned as a mandatory condition for shifting to Moradnagar II. Further, Hapur 765 kV substation is expected in July, 2016.

27.3 He further stated that 220 kV Baghpat (UP) s/s is already commissioned and is now feeding heavily loaded area of Baghpat directly from 400 kV Baghpat (Pg) s/s. Earlier it was being fed from 220 kV Baraut s/s. Thus, the line loadings of Moradnagar II - Baraut 220kV feeding 220 kV Baraut s/s are considerably reduced. Baghpat (Pg) - Baraut 220 kV S/C line and LILO of MoradnagarII - Shamli 220 kV S/C line at 220 kV Baghpat (UP) already approved are having RoW

constraints and may cause delays. Moradnagar 400/220 kV s/s still is having high loadings and additional loads need be shifted to Moradnagar II soon. It is, therefore, requested that shifting for Dadri-Moradnagar 400kV S/C line to Moradnagar II (400) be permitted alongwith revised system as follows:

- (i) Shifting of Agra UP-Moradnagar 400 kV S/C line to Moradnagar II (completed and charged)
- (ii) Shifting of Moradnagar-Baraut 220 kV S/C line to Moradnagar II (Completed and charged),
- (iii) Shifting of Moradnagar-Shamli 220 kV S/C line to Moradnagar II (Completed and charged)
- (iv) Commissioning of 220/132 kV Baghpat (UP) s/s (completed and charged)
- (v) 400kV Baghpat (Pg) – 220 kV Baghpat (UP) S/C line - 6km (completed and charged)
- (vi) Stringing of II<sup>nd</sup> 220 kV circuit from 400 kV Baghpat (PG) to 220kV Baghpat (UP) -10 km (proposed and completion in max one month)
- (vii) LILO of Moradnagar II-Shamli 220 kV S/C line at 400 kV Baghpat (PG)-1.5 km (proposed for approval)-completion expected in a month

27.4 AGM, NRLDC reiterated that their stand remains the same and Muradnagar II should be allowed to connect only when the elements have been commissioned as agreed in the 37<sup>th</sup> SCSPNR.

27.5 Director (PSP&PA-I), CEA stated that keeping in view the requirement of UP, the connectivity may be approved as per the revised proposal of UP. The flows on the lines, pre- and post Dadri - Moradnagar 400 kV line to Moradnagar II are shown in **Exhibit –V** and **Exhibit –VI**, respectively. Moreover, it may be seen from the exhibits that Dadri Thermal complex would remain connected with four other places, namely, Malerkotla, G. Noida, Panipat and Mandola post shifting to Moradnagar II.

27.6 The discussion could not conclude. It is desired to have a detailed study by CEA, CT, NRLDC and UPPTCL to reach to final conclusion as UP revised the proposal.

## **28.0 Construction of 2x500 MVA, 400/220 kV, 2x160 MVA 220/132 kV Raebareli S/s:**

28.1 Director (PSP&PA-I), CEA stated that UPPTCL vide letter dated 23<sup>rd</sup> May, 2016 stated that in 37<sup>th</sup> SCM at point 19, two nos 220 kV bays required by UPPTCL at 220 kV Raebareli (PG) S/stn was not agreed by Powergrid due to space constraint. UPPTCL is presently constructing two nos 220/132/33 kV substations at Amethi and Sangipur (Partapgarh). It was desired in 37<sup>th</sup> SCM that

UPPTCL may alternately propose 400/220/132 kV S/s in Raebareli area. Accordingly, it is proposed as follows:

- (i) Construction of 2x500MVA, 400/220kV; 2x160 MVA, 220/132 kV S/s at Raebareli
- (ii) LILO of one ckt of Unchahar – 400 kV Fatehpur (PG) D/C line (U/C twin moose) at Raebareli (400) – 40 km (Above 400 kV PGCIL Line is nearing completion)
- (iii) Raebareli (400) – Amethi 220 kV D/C line – 50 km
- (iv) Amethi, Sangipur 220 kV S/S to be connected to 3 No 132 kV S/s each

28.2 CEA has carried out the studies with the above proposition. The study results are displayed at **Exhibit – VII**.

28.3 No constraint is observed with above proposed system. Also there is no effect on short circuit level as Unchahar and Fatehpur with the implementation of above network. Hence, **the proposal of UPPTCL was agreed.**

### **29.0 Utilizing 1km II<sup>nd</sup> ckt river stretch of Allahabad (PG) - Jhusi 220 kV D/C line for river crossing for Allahabad (PG) – Phulpur 220 kV S/C line:**

29.1 Director (PSP&PA-I), CEA stated that UPPTCL vide letter dated 23<sup>rd</sup> May, 2016 indicated that in the earlier SCM, is aware that Allahabad (PG)– Phulpur (220) 220 kV S/C (60 km) UPPTCL new line is under construction to reduce overloading of existing Allahabad (PG) – Jhusi – Phulpur 220 kV S/C existing line. New line involves 1km of Ganga river crossing which is time consuming and may cause additional cost. It may be noted that existing Allahabad (PG) –Jhusi 220 kV S/C line is being maintained by PGCIL and it is having 1 km Ganga river crossing line portion already built on D/C towers with II<sup>nd</sup> ckt also strung. UPPTCL requests Powergrid to allow UPPTCL to use this unused II<sup>nd</sup> ckt on river crossing for its Allahabad PG – Phulpur 220 kV S/C new line. Powergrid and members may agree to the following request of UPPTCL:

- Construction of Allahabad (PG) –Phulpur 220kV S/C (UP) line by utilizing II<sup>nd</sup> ckt (already strung but spare) of existing Allahabad – Jhusi 220 kV S/C line stretch over Ganga river crossing

**Members agreed for the same.**

### **30.0 Strengthening of WR- NR corridor and Lalitpur TPS radial issue:**

30.1 Director (PSP&PA-I), CEA stated that UPPTCL vide letter dated 23<sup>rd</sup> May, 2016 indicated that at para 1.2.3 of the minutes of 37th SCM, Powergrid had assured further study for an additional

network which could be less costly and possible in limited time frame to remove the radial status of Lalitpur Thermal plant. In a discussion with Powergrid and CEA at New Delhi, it was felt that WR- NR strengthening and Lalitpur TPS radial issue can be resolved in a manner to save cost time and additional corridor as follows:

- 765kV Bina (PG) – Lalitpur TPS (765) 765 kV D/C line – 70 km
- 765kV Agra (UP)– 765kV Aligarh (PG) 765 kV S/C line – 50 km

30.2 Chief Engineer, UPPTCL stated that the above would address both the issues of radial connectivity of Lalitpur TPS and strengthening of WR – NR corridors. In addition, in case of no generation at Lalitpur TPS, Lalitpur TPS - Agra 765 2XS/C UP lines would never remain idle. It could be an effective proposal for corridor optimization too.

30.3 After detailed deliberations, it was decided that committee consisting of CEA, CTU and UPPTCL would examine the same and revert back in the next SCM.

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

31.1 Director (PSP&PA-I), CEA stated that UPPTCL vide letter dated 23<sup>rd</sup> May, 2016 indicated 400/220 kV Agra (PG) substation is having only 1x315 MVA ICT and is thus not N-1 compliant.

31.2 Chief Engineer, UPPTCL stated that recently this ICT tripped on WTI and led to further downstream multiple trippings and hence requested for installation of another ICT of 500 MVA.

**Members agreed to the same.**

### **32.0 Early charging of Jalandhar – Sambha 400 kV D/C line under NRSS-XXIX Transmission Ltd by Sterlite Grid Ltd**

32.1 Director (PSP&PA-I), CEA stated that NRSS-XXIX Transmission Ltd by Sterlite Grid Ltd vide letter dated 11<sup>th</sup> February, 2016 intimated CEA for early charging of Jalandhar – Samba 400 kV D/C line as the line was almost ready and also requested CTU to allow temporary interconnection with the existing transmission lines i.e. at Moga - Jalandhar and Samba-Kishenpur transmission lines, in absence of readiness of terminal bays at Jalandhar and Samba. Subsequently, Commissioner/ Secretary to Govt. of Jammu and Kashmir wrote letter dated 19<sup>th</sup> February, 2016 to Ministry of Power, Govt. of India regarding commissioning of this line as this would improve the quality and transmission capability of J&K State. It may be mentioned that Ministry of Power vide Order No. 15/1/2013-Trans dated 15<sup>th</sup> July, 2015 issued policy for incentivizing early

commissioning of transmission projects. Hence, meetings were convened in CEA for early charging of Jalandhar – Samba 400 kV D/C line.

32.2 It was decided that the charging of the line would be carried out through reorientation arrangement which involves opening of one circuit of Jalandhar- Moga 400 kV line at Jalandhar end and connecting it with one circuit of Samba- Jalandhar line, thus forming Moga- Samba 400 kV S/C line and opening of one circuit of Samba- Kishenpur 400 kV D/C line at Samba end and connecting it with one circuit of Samba- Jalandhar line, thus forming Kishenpur- Jalandhar 400 kV S/C line. It was also agreed that this would be an interim arrangement till the time the bay extension works at Samba and Jalandhar S/Sn's gets completed. All the cost of this re-orientation shall have to be borne by M/s Sterlite Grid Ltd and they agreed for the same.

32.3 AGM, CTU stated that with the proposed arrangement, there is a reduction in transmission losses and hence may be agreed by the members.

32.4 Director (PSP&PA-I), CEA stated that certain observations were made by Powergrid regarding PLCC and communication. After detailed deliberations the following was decided:

- Regarding shifting of the PLCC panels, M/s Sterlite Grid Ltd. would shift the communication panels in consultation with the OEM for achieving the protection/communication for the modified transmission scheme. They would also take care about the signal strength for communication as the earlier line length of Samba- Kishenpur 400 kV D/C line was only 35 km, which would now become 215 km for Moga- Samba 400 kV S/C and 170 km for Jalandhar- Kishenpur 400 kV S/C line.
- Regarding operation of 400 kV Jalandhar- Kishenpur line on one PLCC channel, it was stated that as per CEA Standards for Construction of Transmission Lines, each 765kV or 400kV or 220 kV Line shall be provided with two protection channels in addition to one speech plus data channels for each direction. However, this being purely an interim arrangement, it was decided that the lines could be operated with one protection channel till September/ October, 2016 only, as it is anticipated that power in the range of 15-30 MW would flow.



- Power Grid NR-II office would provide the PLCC interconnection drawings, Control and Relay panel schematic drawings for Main-I and Main-II protection for Kishenpur-Samba line.
- On the issue of un-availability of line due to fault on the section of line owned by M/s Sterlite Grid Ltd., which would have financial implication for Powergrid, M/s Sterlite Grid agreed to compensate for the same.
- PLCC to be functional only on Phase-Ground coupling for both the modified lines namely, Moga- Samba 400 kV S/C and Jalandhar- Kishenpur 400 kV S/C line, as Wave traps are presently available only on Y-Ph for Samba- Kishenpur transmission line.
- Both the modified lines are to be made operational with Complete Main-I and Main-II protection and inter-tripping (PLCC) in service.
- All the necessary modifications/ changes being made to facilitate the early charging of Jalandhar – Samba 400 kV D/C line under NRSS-XXIX Transmission Ltd by Sterlite Grid Ltd and restoration back to original transmission system at Samba sub-station (PG) shall be borne by M/S Sterlite.

**Members agreed for the same.**

## Annexure - I

### **List of the Participants of the 38<sup>th</sup> meeting of the Standing Committee on Power System Planning of Northern Region held on 30<sup>th</sup> May, 2016 at NRPC, Katwaria Sarai, New Delhi**

<b>S. No.</b>	<b>Name Shri/Smt./Ku.</b>	<b>Designation</b>
<b>CEA</b>		
1.	S. D. Dubey	Member (PS) – in chair
2.	K.K. Arya	Chief Engineer
3.	Chandra Prakash	Director
4.	Manjari Chaturvedi	Deputy Director
5.	Priyam Srivastava	Asst. Director
<b>NRPC</b>		
6.	P.S. Mhaske	Member Secretary
<b>MOP</b>		
7.	Ghanshyam Prasad	Director(Trans)
<b>CTU-Planning</b>		
8.	Seema Gupta	COO
9.	Mukesh Khanna	AGM
10.	Rashmi Pant Joshi	Dy. Manager
11.	V. Tyagarajan	DGM
<b>Powergrid</b>		
12.	Subir Sen	ED (SG&EE)
13.	A. Sensarma	DGM
14.	B. B. Mukharjee	DGM
15.	Kashish Bhambhani	Chief Manager
16.	Vishal Singh	Chief Manager
17.	R. P.S.Rana	Chief Manager
18.	Mohan Kishor N	Manager
19.	Sandeep	Sr. Engineer
20.	Sandeep Gupta	Engineer
21.	Divyendu	Engineer
22.	Amit K Singh	Engineer
23.	Shyam Sunder Goyal	Engineer
<b>NTPC</b>		
24.	Subhash Thakur	Addl. GM (PE-E)
25.	V.K.Jain	DGM
<b>NLDC, POSOCO</b>		
26.	S. R. Narsimhan	AGM
<b>NRLDC, POSOCO</b>		
27.	P. K.Agarwal	GM
28.	D.K.Jain	Add.GM
29.	Rajiv Porwal	AGM
30.	Suruchi Jain	Dy Manager

**HVPNL**

31. Rakesh Jolly

Chief Engineer

32. M.M. Matta

Supt. Engineer

**NPCIL**

33. K. P.Singh

Chief Engineer

**UPPTCL**

34. Suman Guchh

Chief Engineer

**HPPTCL**

35. Deepak Verma

Sr. Manager

**RRVNL**

36. Sona Shishodia

Ex. Engineer

37. M.P.Sharma

AEN

38. Kamal Jain

ACE

**PTCUL**

39. Lalit Kumar

SE

40. Ashok Kumar

EE