



भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन-I प्रभाग

Power System Planning & Appraisal-I Division

To

-As per list enclosed-

विषय: उत्तरी क्षेत्र की ट्रांसमिशन पर स्थायी समिति की चतुर्थ बैठक के विषय में

Subject: 4th meeting of Northern Region Standing Committee on Transmission (NRSCT) – Rescheduling of meeting and agenda note

Sir/ Madam,

In continuation to our letter dated 12.07.2019, it is to intimate that the 4th meeting of Northern Region Standing Committee on Transmission would be held on **25th July, 2019 (Thursday)** at **11:00 hrs at NRPC Katwaria Sarai, New Delhi** instead of 19th July 2019, as intimated earlier.

The agenda note for the meeting has already been uploaded on CEA website: www.cea.nic.in (path to access: Home Page - Wing - Power System - PSPA-I - Standing Committee on Power System Planning - Northern Region).

Inconvenience caused due to the rescheduling of the meeting is regretted.

Kindly make it convenient to attend the meeting.

Yours faithfully,

(Goutam Roy) 17/7/19
Chief Engineer

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1.	Member Secretary, NRPC, 18-A ShajeedJeet 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, Vidhyut Bhawan, Near ISBT -Crossing, Saharanpur Road, Majra, Dehradun-248002. Uttarakhand
4.	Director (Technical), Punjab State Transmission Corporation Ltd. (PSTCL) Head Office The Mall Patiala - 147001	5.	Member (Power) BBMB, Sector-19 B Madhya Marg, Chandigarh-1 60019 (Fax-01 72-2549857)	6.	Director (Operation) Delhi Transco Ltd. Shakti Sadan, Kotla Marg, New Delhi-110002 (Fax-01123234640)
7.	Director (PP&D) RVPN, 3 rd Floor, Room no 330, Vidhyut Bhawan, Janpath, Jaipur-302005.	8.	Director (Technical) HVPNL Shakti Bhawan, Sector-6 Panchkula-134109	9.	Director (Technical) HPSEB Ltd. VidutBhawan, 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.	Director (Projects) POWERGRID Saudamini Plot no. 2, Sector - 29. Gurgaon-122 001 (Fax-0124-2571809)	14	CEO, POSOCO B-9, Qutab Institutional Area, Katwaria Sarai New Delhi – 110010	15	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)

1.	Er Rajesh Gupta, Chief Engineer/ Transmission Systems, BBMB, BBMB SLDC Complex, 66kV Substation , Industrial area Phase -I, Chandigarh-02	2.	Chief Engineer (PP&D), RVPN, 3rdFloor, Room No. 330, Vidyut Bhawan Janpath, Jaipur, Contact No. 0141- 2740794 (O) ce.ppm@rvpn.co.in	3.	Director (planning & Contract), Himfed Bhawan, Panjiri Shimla-171005 directorpc@hpptcl.in
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Nominated members for NRSCT:

Agenda note for 4th Meeting of Northern Region Standing Committee on Transmission

1.0 Confirmation of the Minutes of the 3rd meeting of Northern Region Standing Committee on Transmission held on 24.05.2019.

- 1.1 The 3rd meeting of Northern Region Standing Committee on Transmission (NRSCT) was held on 24.05.2019 and the minutes of the meeting were issued vide CEA letter no. File No.CEA-PS-11-21(19)/1/2019-PSPA-I Division-Part (1) dated 17.7.2019.
- 1.2 The minutes of 3rd meeting of NRSCT may please be confirmed.

2.0 Transmission scheme for controlling high loading and high short circuit level at Moga substation

- 2.1 The transmission scheme for evacuation of 8.9 GW of RE power from Solar Energy Zones (SEZs) in Rajasthan was agreed technically in the 2nd NRSCT meeting held on 13.11.2018. Subsequently, Punjab had objected to the augmentation of 1x1500 MVA, 765/400 kV ICT (3rd) at Moga substation as it would further increase the fault level at Moga, which is already at higher side and with ISTS injection in west of Punjab (at Moga), their associated 220 kV network is strained. Therefore, PSTCL had requested to review the proposal of additional 1x1500 MVA (3rd) transformer at Moga substation.

The observations made by PSTCL are as follows:

- a) As per their studies, in the paddy season, the loading 2x1500 MVA, 765/400kV transformers is only 17% and will further decrease with installation of additional transformer. Installation of third 1x1500 MVA, 765/400kV ICT at PGCIL Moga S/S may not be beneficial on account of power evacuation point of view as the MW flows through the ICTs at Moga remain unaffected because of its direct connectivity with Talwandi-Sabo TPS of 3x660 MW.
 - b) In the light load conditions, Punjab's load reduces to about 3000-3500 MW especially in winters, problem of high bus voltages at 220/ 400/ 765kV buses arises.
 - c) Fault level at PGCIL Moga has already exceeded design limit. Under these circumstances, it may not be beneficial for the system to have more 1x1500 MVA, 765/400 kV ICT & 765 /400 kV lines to be terminated at Moga.
 - d) CTU studies shows about 4000 MW of RE power injection from Bikaner to Moga through 765 kV D/C line and drawl of about 3000 MW through 3 nos. of 765/400 kV ICTs at Moga. Injection of such quantum of power at Moga (in western side of Punjab) is going to overload the associated 400 kV and 220 kV systems of Punjab.
 - e) To control the short circuit level at Moga 220 kV and 400 kV level, bus splitting at 765 kV or 400 kV level may be considered and outlets may be planned from Moga so that their 220 kV system do not get overloaded.
- 2.2 The issue was deliberated in the 3rd meeting of NRSCT wherein it was agreed that studies would be carried by CEA and CTU in association with PSTCL, to evolve additional transmission schemes (inter-state as well as intra-state) in order to address the technical concerns raised by PSTCL. The same would be deliberated in a joint meeting of CEA, CTU and PSTCL to be held on 3rd/4th June 2019. The transmission scheme finalized in that meeting would also be included as agenda for the 45th NRPC meeting scheduled on 6th and 7th June 2019.

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2.3 Subsequently, a meeting was held on 3rd & 4th June 2019 (minutes enclosed as Annexure-II) at PSTCL office, Patiala and Chandigarh, among CEA, CTU and PSTCL wherein, following was agreed:

- i) In order to resolve the issues of high short circuit levels of Moga(PG) 400kV bus, bus split arrangement will be required. The following splitting option resolves the issues of high short circuit level and high loading levels on 765/400kV transformers at Moga:

400kV Bus Section-1

- 400kV Kishenpur D/c feeders
- 400kV Hisar D/c feeders
- 2 nos. 765/400kV transformers
- 1 No. 80 MVAR or 125 MVAR Reactor based on feasibility

400kV Bus Section-2

- 400kV Jalandhar D/c feeders
- 400kV Bhiwani feeder
- 400kV Fatehabad feeder
- 400kV Nakodar feeder
- 400kV Talwandi Sabo/Malkana Feeder
- 4 nos. 400/220kV transformers
- 1 No. 80 MVAR or 125 MVAR Reactor based on feasibility

- ii) The above splitting arrangement would require relocation of the bays for bus section-1 for which existing buildings shall have to be relocated for space creation. Further, other options for interconnection of feeders of bus section-1 to 400kV main Bus (bus section-2) through GIS bus duct needs to be explored.

It was agreed in principle that the Bus Bar splitting at Moga would be done by suitable reengineering and it would become part of Bikaner- Moga 765 kV D/C line as a supplementary ISTS strengthening scheme. This Scheme shall remain associated with the transmission scheme of Bikaner-Moga 765 kV D/C line and would require to be completed in same time of the line. However, since Bikaner-Moga line is in advance stage of implementation, suitable operational measures in consultation with POSOCO shall need to be taken in forthcoming meeting.

- iii) With the above proposed Moga bus split arrangement, 3rd 1x1500 MVA, 765/400kV transformer at Moga is not required as a part of the present scheme of Transmission system of Rajasthan Solar Energy Zones (8.9 GW).

2.5 Members may like to deliberate.

3.0 Transmission System for evacuation of Power from potential solar energy zones – Phase -II in Northern Region.

- 3.1 Govt. of India had set a target for establishing 175 GW renewable capacity by 2022, which includes 100 GW Solar, 60 GW Wind generation capacity. MNRE vide its order dated 08.06.2018 had constituted a Sub-Committee to identify ISTS connectivity for renewable energy projects from potential solar energy zones (SEZs) and potential wind energy zones (WEZs) of about 50 GW and 16.5 GW respectively. SEZs and WEZs envisaged in 7 RE

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rich states (Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Rajasthan, Maharashtra and Madhya Pradesh) were identified by SECI in association with MNRE in consultation with RE power developers.

To ease implementation of transmission infrastructure, it was proposed to bifurcate these requirements in two phases. A total of 20 GW solar & 9 GW wind projects has been planned in Phase-I (up to Dec'2020) and 30 GW solar & 7.5 GW wind has been planned for Phase-II (Dec' 2021). For Northern Region the same translates into a requirement of 10 GW solar in Phase-I (up to Dec'2020) and 10 GW solar in Phase-II (Dec'2021) totalling to 20 GW. The details of SEZs in Northern Region are given below:

State/District	Solar Energy Zones		
	Ph-1 (GW)	Ph-2 (GW)	Total
	2020	2021	
Rajasthan			
Jaisalmer (S: Ramgarh, Fatehgarh)	5	3	8
Jodhpur (S: Phalodi)	2	1	3
Bikaner (S: Kolayat/Pugal)	3	1	4
Barmer (S: Barmer)	0	5	5
Subtotal	10	10	20

MNRE has subsequently revised Solar Potential complexes details in Rajasthan for development by 2020/2021 in two phases, which is as under:

District	Taluk/Tehsil	Ph-1(GW) 2020	Ph-2(GW) 2021	Total
Jaisalmer	Kuchhri	-	4.00	4.00
	Fatehgarh	3.50	2.20	5.70
Jodhpur	Phalodi/Bhadla	3.55	1.75	5.30
Bikaner	Koyalat /Pugal	1.85	3.15	5.00
Total		8.90	11.1	20

3.2 Out of total 20 GW REZ [Solar] in Rajasthan, transmission system for 8.9 GW in Bhadla (3.55 GW), Fatehgarh (3.5 GW), Bikaner (1.85 GW) complexes under Phase-I, was agreed in the 2nd meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 13.11.2018.

3.3 The details of connectivity/LTA granted are as follows:

Sl no.	Location	St-II connectivity granted/ (MW)	LTA granted (MW)
1	Bhadla	3380	3380
2	Bhadla-II	900 (agreed for grant)+ 980 (Received)	980 (Received)
3	Fatehgarh	2200	2200
4	Fatehgarh-II	1790 (agreed for grant)	900 (agreed for grant) + 390 (Received)

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5	Bikaner	850 + 1200 (agreed for grant)	850
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- 3.4 Subsequently, transmission system was evolved for integration of balance 11.1 GW solar potential in Rajasthan [Phase –II :11.1GW] (Out of total 20 GW REZ [Solar]) from Ramgarh/Kuchheri (4 GW), Bikaner (3.15 GW), Bhadla (1.75GW) & Fatehgarh (2.2 GW) and same was deliberated in the 3rd meeting of NRSCT held on 24.5.2019. In the meeting RVPNL highlighted that the intra-state EHV transmission in Western Rajasthan is sufficient to evacuate about 10 GW RE projects (7.4 GW already commissioned and 1.3 GW under implementation). In addition to this, 2 GW, 2.1 GW and 2.211 GW of RE capacity addition is expected in the year 2020-21, 2021-22 and 2022-23 respectively. For evacuation of this additional 6.3 GW RE capacity, 765/400 kV Jodhpur GSS (Hingola) along with its interconnections with Phagi 765/400 kV GSS has been planned. Considering the above, it was accounted that transmission system for only 8.1 GW of RE potential is required to be planned under ISTS as compared to 11.1 GW system that has been proposed earlier and it was decided that that a joint study meeting would be convened in the to further deliberate on the scheme.
- 3.5 Subsequently, a study file was circulated to all the Northern region constituents to send their comments on the transmission system proposed as well as the on load flow file based on which the transmission system for evacuation of power from 8.1 GW RE (solar) projects has been proposed.
- 3.6 A joint study meeting was convened on 17.6.2019 & 18.6.2019 at Powergrid, Gurgaon, wherein, the representatives from CTU, POSOCO, Haryana, Punjab ,Himachal Pradesh , Rajasthan and Delhi were present. No representative from UPPTCL, PTCUL and JKPDD attended the meeting. All the State representative furnished their load generation balance as well as existing and planned RE generations in their respective states.
- 3.7 Further, as per MoP OM dated 14.6.2018 had notified the long term RPO trajectory, solar and non-solar, uniformly for all the States, wherein, RPO (%) (of total consumption Excluding Hydro) 10.5% for Solar and 10.5% for non- solar has been mentioned for 2021-22. However, RPO (%) as per the State Electricity Regulatory commission for 2021-22 furnished by respective State are as follows:

S. No	State	RPO (%) of Total Consumption Excluding Hydro (as per SERC) for 2021-22	
		Solar	Non-Solar
1	Punjab	6.5	8
2	Haryana	8	3
3	Rajasthan	8.5	9.8

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4	Uttar Pradesh	4	6
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The comments furnished by the constituents were discussed and accordingly the load flow study was revised.

- 3.8 As per the load flow studies, following alternatives are proposed for evacuation of power from 8.1 GW potential RE generation in Northern Region (**Ramgarh/Kuchheri (1.9 GW), Bikaner (2.95 GW), Bhadla (1.05GW) & Fatehgarh (2.2GW)**):

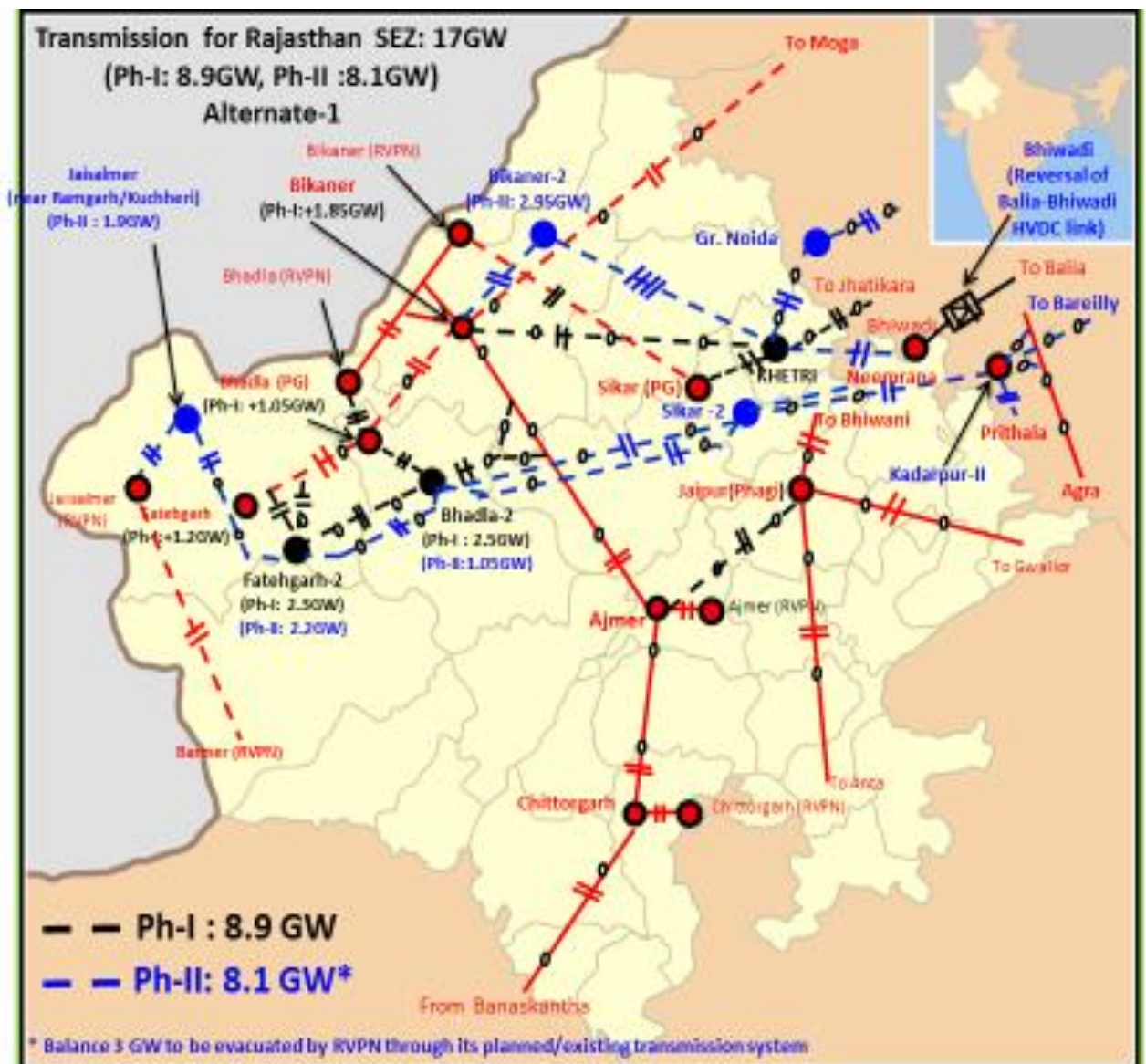
Alternative-1

- 1) Establishment of 400/220kV, 4x500 MVA pooling station at suitable location near Ramgarh/Kuchheri in Distt Jaisalmer (Ramgarh-II PS)
- 2) Establishment of 400/220kV, 6x500MVA pooling station at suitable location near Bikaner (Bikaner-II PS)
- 3) Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Sikar (Sikar-II Substation)
- 4) Establishment of 765/400kV, 2x1500MVA substation at suitable location near Kadarapur (Kadarapur-II substation)
- 5) Augmentation with 765/400kV, 2x1500MVA transformer (5th & 6th) at Fatehgarh-II PS
- 6) Augmentation with 400/220kV, 4x500MVA transformer at Fatehgarh-II PS
- 7) Augmentation with 765/400kV, 1x1500MVA transformer (4th) at Bhadla-II PS
- 8) Augmentation with 400/220kV, 3x500MVA transformer at Bhadla-II PS
- 9) Ramgarh-II PS –Fatehgarh-II PS 400 kV D/c Line (Twin HTLS)
- 10) Ramgarh-II PS – Jaisalmer-II (RVPN) 400 kV D/c Line (Twin HTLS)
- 11) Fatehgarh-II PS – Bhadla-II PS 765kV D/c line (2nd)
- 12) Bhadla-II PS – Sikar-II 765kV 2xD/c line
- 13) Sikar-II – Kadarapur-II 765kV D/c line
- 14) Sikar-II – Neemrana 400kV D/c line (Twin HTLS)
- 15) LILO of 765kV Jhatikara – Agra S/c line at Kadarapur-II
- 16) Kadarapur-II – Bareilly 765kV D/c line
- 17) Kadarapur-II – Prithala 400kV D/c line (Twin HTLS)
- 18) Bikaner-II PS – Khetri 400kV 2xD/c line (Twin HTLS line on M/c tower)
- 19) Khetri - Bhiwadi 400kV D/c line (Twin HTLS)
- 20) Bikaner-II PS – Bikaner (PG) 400kV D/c line (Twin AL59)
- 21) Khetri - Gr. Noida (UPPCL) 765kV D/c line
- 22) Power reversal on ± 500 kV, 2500MW Balia – Bhiwadi HVDC line upto 2000MW from Bhiwadi to Balia for solar maximized time
- 23) 220kV line bays for interconnection of solar projects at Bikaner-II PS (10 nos.), Ramgarh-II PS (7 nos), Fatehgarh-II PS (7 nos) & Bhadla-II PS (4 nos)
- 24) 1x125 MVA (420kV), 2x240 MVA (765kV) Bus Reactor each at Sikar-II & , Kadarapur-II Substation
- 25) 2x125 MVA (420kV) Bus Reactor each at Bikaner-II & Ramgarh-II PS
- 26) 1x240 MVA Switchable line reactor for each circuit at each end of Fatehgarh-II – Bhadla-II 765kV D/c line
- 27) 1x240 MVA Switchable line reactor for each circuit at Bhadla-II end of Bhadla-II – Sikar-II 765kV D/c line
- 28) 1x330 MVA Switchable line reactor for each circuit at Sikar-II end of Bhadla-II – Sikar-II 765kV D/c line

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- 29) 1x240 MVAR Switchable line reactor for each circuit at each end of Sikar-II – Kadarpur-II 765kV D/c line
- 30) 1x240 MVAR Switchable line reactor for each circuit at each end of Kadarpur-II – Bareilly 765kV D/c line
- 31) 1x80 MVAR Switchable line reactor for each circuit at each end of Bikaner-II – Khetri 400kV 2xD/c line
- 32) 1x240 MVAR Switchable line reactor for each circuit at Gr. Noida end of Khetri – Gr. Noida (UPPCL) 765kV D/c line

Estimated Cost : Rs 12,000 Cr



Alternative-2

1. EHVAC Portion

- 1) Establishment of 400/220kV, 4x500 MVA pooling station at suitable location near Ramgarh/Kuchheri in Distt Jaisalmer (Ramgarh-II PS)

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- 2) Establishment of 400/220kV, 6x500MVA pooling station at suitable location near Bikaner (Bikaner-II PS)
- 3) Augmentation with 765/400kV, 2x1500MVA transformer (5th & 6th) at Fatehgarh-II PS
- 4) Augmentation with 400/220kV, 4x500MVA transformer at Fatehgarh-II PS
- 5) Augmentation with 400/220kV, 3x500MVA transformer at Bhadla-II PS
- 6) Ramgarh-II PS –Fatehgarh-II PS 400 kV D/c Line (Twin HTLS)
- 7) Ramgarh-II PS – Jaisalmer-II (RVPN) 400 kV D/c Line (Twin HTLS)
- 8) Fatehgarh-II PS – Bhadla-II PS 765kV D/c line (2nd)
- 9) Bikaner-II PS – Khetri 400kV 2xD/c line (Twin HTLS line on M/c tower)
- 10) Khetri - Bhiwadi 400kV D/c line (Twin HTLS)
- 11) Bikaner-II PS – Bikaner (PG) 400kV D/c line (Twin AL59)
- 12) Khetri - Gr. Noida (UPPCL) 765kV D/c line
- 13) Power reversal on ± 500 kV, 2500MW Balia – Bhiwadi HVDC line upto 2000MW from Bhiwadi to Balia for solar maximized time
- 14) 220kV line bays for interconnection of solar projects at Bikaner-II PS (10 nos.), Ramgarh-II PS (7 nos), Fatehgarh-II PS (7 nos) & Bhadla-II PS (4 nos)
- 15) 2x125 MVA (420kV) Bus Reactor each at Bikaner-II & Ramgarh-II PS
- 16) 1x240 MVA Switchable line reactor for each circuit at each end of Fatehgarh-II – Bhadla-II 765kV D/c line
- 17) 1x80 MVA Switchable line reactor for each circuit at each end of Bikaner-II – Khetri 400kV 2xD/c line
- 18) 1x240 MVA Switchable line reactor for each circuit at Gr. Noida end of Khetri – Gr. Noida (UPPCL) 765kV D/c line

2. HVDC Portion

- 19) VSC based HVDC system between Bhadla-II PS and suitable location (near Aliganj) between Bareilly and Mainpuri
 - ± 400 kV, 5000 MW HVDC terminal at Pooling point near Bhadla-II PS
 - ± 400 kV, 5000 MW HVDC terminal at Pooling point in suitable location (near Aliganj) between Bareilly and Mainpuri
 - ± 400 kV HVDC line (Quad) between Bhadla-II PS and suitable location (near Aliganj) between Bareilly and Mainpuri

Opt 2.1 (AC portion beyond Aliganj)

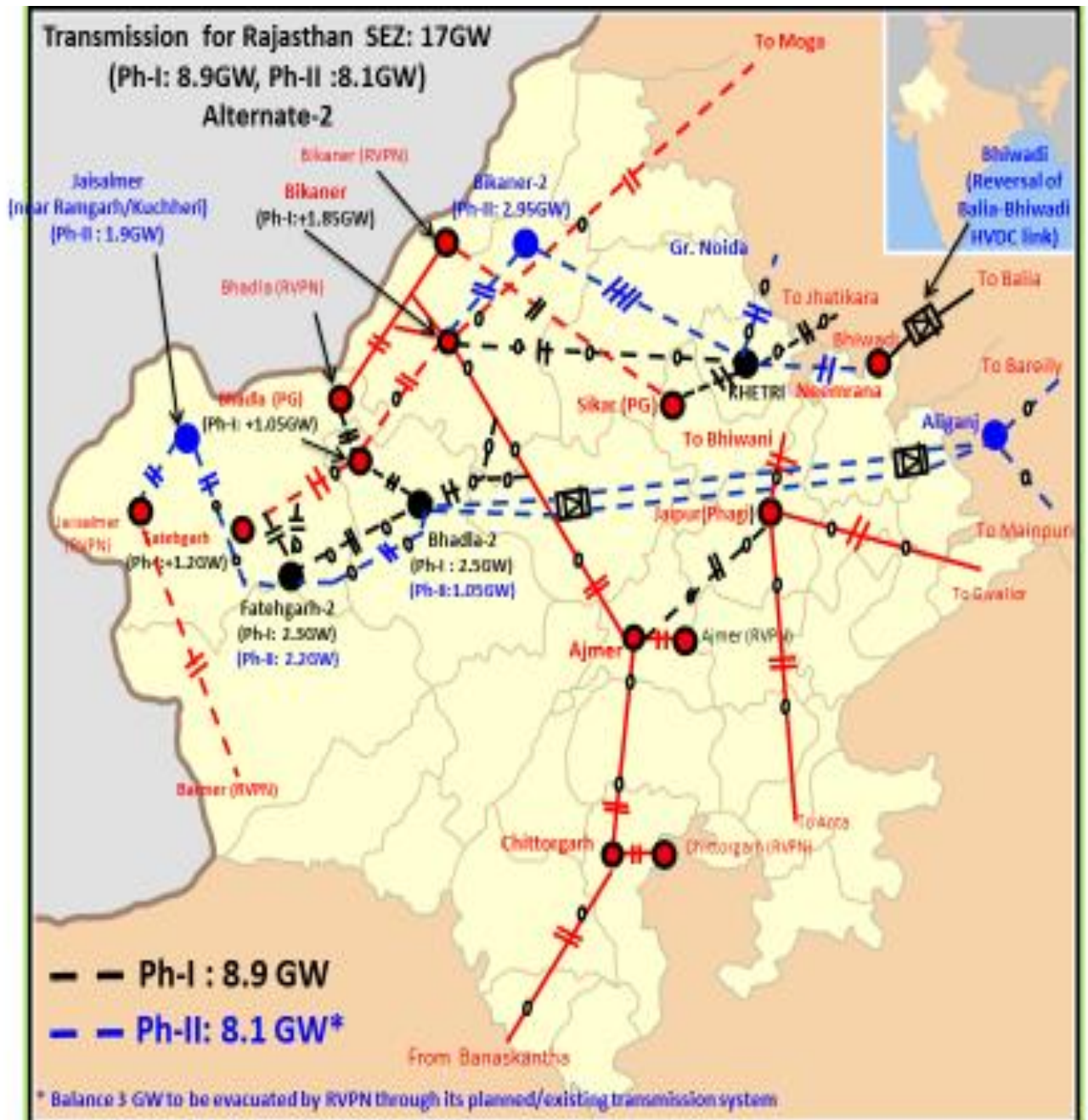
- 20) 5x1500MVA transformer at suitable location (near Aliganj) between Bareilly and Mainpuri
- 21) Aliganj- Bareilly (PG) 765kV D/c line
- 22) Aliganj- Mainpuri (UPPCL) 765kV D/c line
- 23) 1x125 MVA (420kV), 2x240 MVA (765kV) Bus Reactor at Aliganj Substation

Estimated Cost : Rs 15,800 Cr

Opt 2.2 (AC portion beyond Aliganj)

- 20) Aliganj- Bareilly (PG) 400kV D/c line (Twin HTLS)
- 21) Aliganj- Mainpuri (UPPCL) 400kV D/c line (Twin HTLS)
- 22) Aliganj- Hapur (UPPCL) 400kV D/c line (Twin HTLS)
- 23) 2x125 MVA (420kV) Bus Reactor at Aliganj Substation

Estimated Cost : Rs 15,100 Cr



The load flow study results are enclosed as Annexure-I .

Members may like to deliberate.

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4.0 HPPTCL's proposal for transmission elements to be included in GEC-II.

4.1 H.P. Power Transmission Corporation Limited (HPPTCL) vide its letter HPPTCL/Planning/GEC-II/2017-18-19820-21 dated 15.03.2018 has submitted the DPR for for following intra-state transmission elements for evacuation of power from small hydroelectric plants in Himachal Pradesh to be included under GEC-II:

S. No.	Name of Transmission Project	Estimated Cost (in Crore)
1	Construction of 220/66 kV, 80/100 MVA substation at Mindhal in Chenab basin in Distt. Lahaul & Spiti.	91.5
2	Construction of 400 kV D/c transmission line (initially charged at 220 kV) from 220/66 kV, 80/100 MVA substation at Mindhal to 400/220 kV GIS pooling station at Mazra in Distt. Chamba.	531.81
3	Construction of 132/33 kV, 31.5 MVA GIS substation upstream of Malana-II HEP in Distt. Kullu along with LILO of one circuit of 132 kV Barsaini – Charor D/c transmission line.	75.28
4	Construction of 132 kV D/c transmission line from Chanju-I HEP to 220/132 kV substation at Mazra in Distt. Chamba.	36.98
5	Construction of 400/220 kV, 2x315 MVA GIS Pooling Station at Mazra along with LILO of 400 kV Chamera – I to Chamera – II S/c line in Distt. Chamba.	301.92
	Total	1037.49

4.2 CEA vide its letter no. CEA-PS-11-21(17)/2/2018-PSPA-I Division dated 30.11.2018 has accorded concurrence to the proposal submitted by HPPTCL.

4.3 Members may like to note.

5.0 Intra-State transmission works of HPPTCL posed for funding from Multilateral Development Banks:

5.1 HPPTCL vide its letter no HPPTCL/CEA/Vol-IV/2019-2533 dated 11.06.2019 has submitted the proposal related to following intra –state transmission works posed for funding from Multilateral Development Bank:

S.No.	Transmission Element	Estimated Cost (in Crores)	Remarks
1	LILO of 132kV Giri-Kulhal transmission line at 132/33kV Paonta(Gondpur) sub-station	16.15	Required to provide reliable supply to Paonta area.
2	132/33kV, 2x20 MVA new sub-station in Rajgarh area at Charna by LILO of 132 kV Giri-Gaura S/c transmission line	65.78	Required to improve voltage profile and provide reliable supply to Rajgarh area.
3	Up gradation of existing 33/11kV sub-station Bahri (Dharampur) to	36.97	Required to provide reliable supply to

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	132/33kV, 2x16/20 MVA by LILO of 132kV Bassi-Hamirpur transmission line		Dharampur area.
4	<ul style="list-style-type: none"> • 220/132kV, 2x100 MVA sub-station at Ochaghat (Solan) alongwith LILO of 132kV Solan-Gaura line at Ochaghat. • Construction of 132 kV S/c transmission line from proposed 220/132 kV Ochaghat Substation to 132/33 kV Solan substation (using 4 km portion of dismantled 132 kV S/c Solan- Giri transmission line) 	113.94	Required to enhance reliability of power supply to Solan and Giri area.
5	<ul style="list-style-type: none"> • Dismantling of 60 km portion of existing Giri-Solan 132 kV S/c line on S/c towers (64 km). • Construction of 220 kV D/c transmission line from 220/132kV Ochaghat Substation to 400/220kV Arandwala (Kala Amb) substation (PGCIL)[34 km on D/c towers and 14 km on M/c towers]* • 220 kV D/c Line from 220/132 kV Giri substation to 400/220kV Arandwala (Kala Amb) substation (PGCIL)[30 km on D/c towers and 14 km on M/c towers]*. <p>* Using RoW of dismantled portion of Giri-Solan 132 kV S/c line</p>	214.64	Required to enhance reliability of power supply to Solan and Giri area.
6	132/33kV, 2X31.5 MVA sub-station in Dharamshala area & 132kV D/c transmission line from proposed substation to 220/132 kV Patti (Dehan) substation	88.82	Required to meet the increased load demand in Dharmashala area which has been identified as a smart city.
	Total	536.30	

5.2 The proposal submitted by HPPTCL has been examined by CEA and found to be technically in order except the transmission element mentioned at S. No. 1 i.e. LILO of Giri-Kulhal 132 kV transmission line at 132/33kV Paonta(Gondpur) sub-station, which is an inter-state transmission line between Uttarakhand and Himachal Pradesh, therefore, needs the approval of NRSCT as Giri-Kulhal 132 kV line is an ISTS line.

5.3 Members may like to deliberate.

6.0 Construction of 2 nos. of 400 kV bays under ISTS at 765/400 kV PGCIL substation, Varanasi:

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- 6.1 In the 38th meeting of Standing Committee on Power System Planning for Northern Region, Jaunpur-Varanasi (PGCIL) 400 kV D/c line and 400 kV bays at Varanasi (PGCIL) were approved.
- 6.2 UPPTCL vide its letter no. 57/Dir(Comm & plg)/UPPTCL/2019/TWC Queries dated 26.06.2019 has informed that 400 kV Jaunpur substation(UPPTCL) is under construction and shall be completed by January 2021 and construction of Jaunpur-Varanasi (PGCIL) 400 kV D/c line will be completed by November 2020. In view of above, UPPTCL has requested to construct 02 nos 400 kV bays at Varanasi (PGCIL) under ISTS scheme within the matching time frame.
- 6.3 Members may like to deliberate.

7.0 Up-gradation and Strengthening of Delhi transmission system Phase-I

- 7.1 In the 3rd meeting of NRSCT the DTL has proposed for of following 220kV transmission lines from zebra conductor to HTLS:
 - i. Bawana-Rohini 220 KV line - D/C line
 - ii. Bawana-Shalimarbagh 220 KV line – D/C line
 - iii. Mandaula-Gopalpur 220 KV line – D/C line
 - iv. Mandaula to Wazirabad - 2 X D/C line
 - v. BTPS to Sarita Vihar - D/C line
 - vi. Maharani Bagh to Lodhi Road – D/C line
- 7.2 After discussions in 3rd NRSCT, the proposal of re-conductoring of the following 2 nos. of 220kV lines of DTL with HTLS conductor was agreed:
 - a. 220 kV BTPS-Sarita Vihar ckt-I & II
 - b. 220 kV Maharani Bagh - Lodhi Road, ckt-I & II
- 7.3 Regarding remaining 4 nos. of transmission lines, it was opined that in view of implementation of 400/220 kV Gopalpur substation and Shalimar S/s as intra—state works, the loading on these lines will reduce. Therefore, it was agreed that CEA and DTL may be deliberate the proposal of reconductoring of following 220kV transmission lines of DTL:
 - a. Bawana-Rohini 220 kV D/C line
 - b. Bawana-Shalimarbagh 220 kV D/C line
 - c. Mandaula-Gopalpur 220 kV D/C line
 - d. Mandaula to Wazirabad 2 x D/C line
- 7.4 Subsequently, a meeting was held in CEA on 29.5.2019, wherein, DTL informed that that works for Gopalpur 400 KV sub-station are presently under tendering process, and the substation is likely to be commissioned by 2021-22. DTL also stated that there is no proposal for establishment of 400 kV Shalimarbagh S/S. Therefore, immediate solution to meet with the summer peak demand is re-conducting of these lines, as the same could be completed within few months and would provide the necessary relief to the system near Gopalpur and Wazirabad areas. DTL added that the reconductoring of

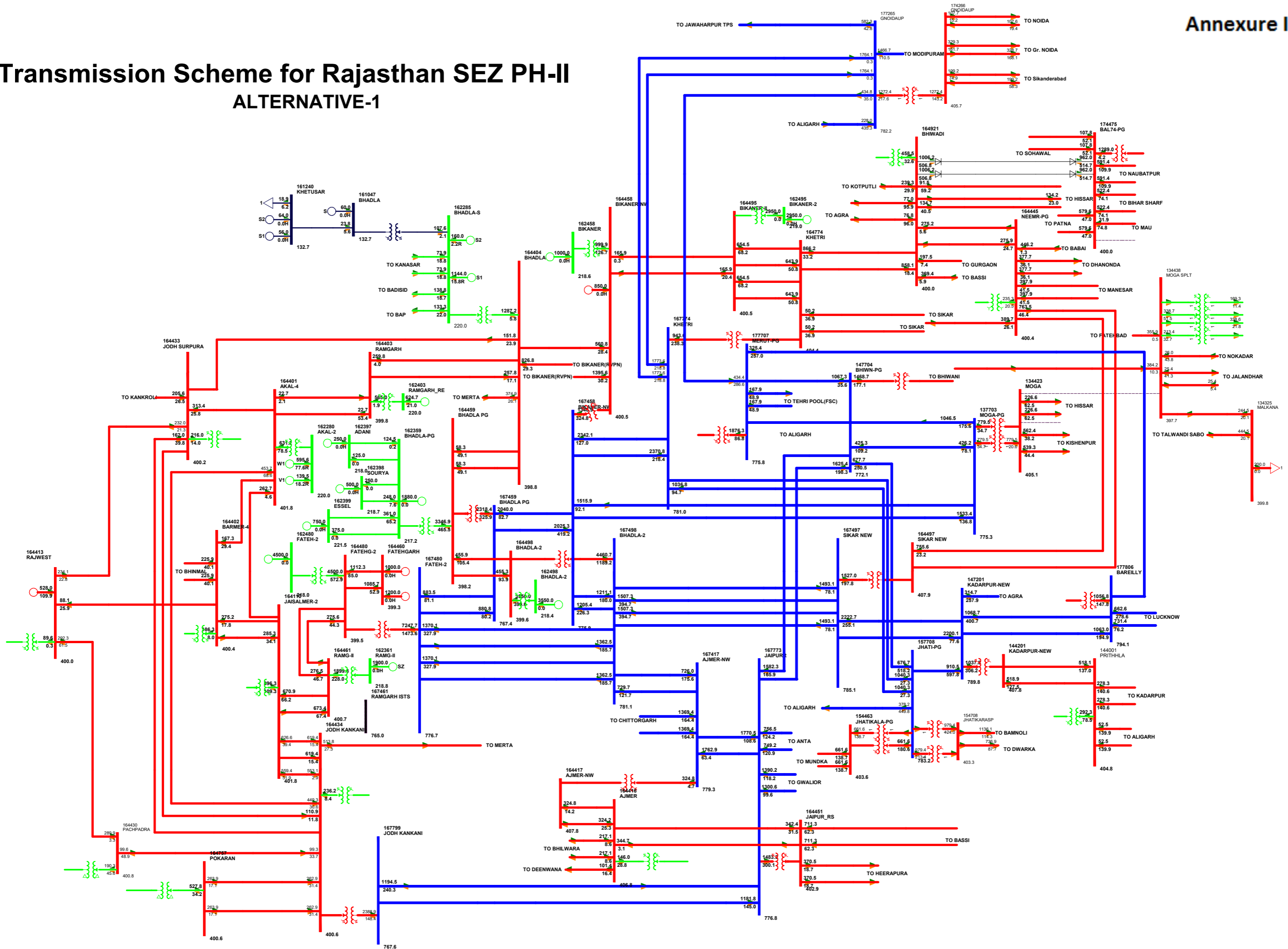
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the lines from Rohini and Shalimarbagh to Bawana would provide necessary relief to Shalimarbagh area. Considering the above facts, the proposal for re-conducting of transmission lines (mentioned at Para 6.3 above) with HTLS conductor as proposed by DTL was agreed in principle subject to ratification in the next meeting of NRSCT.

7.5 Members may like to deliberate.

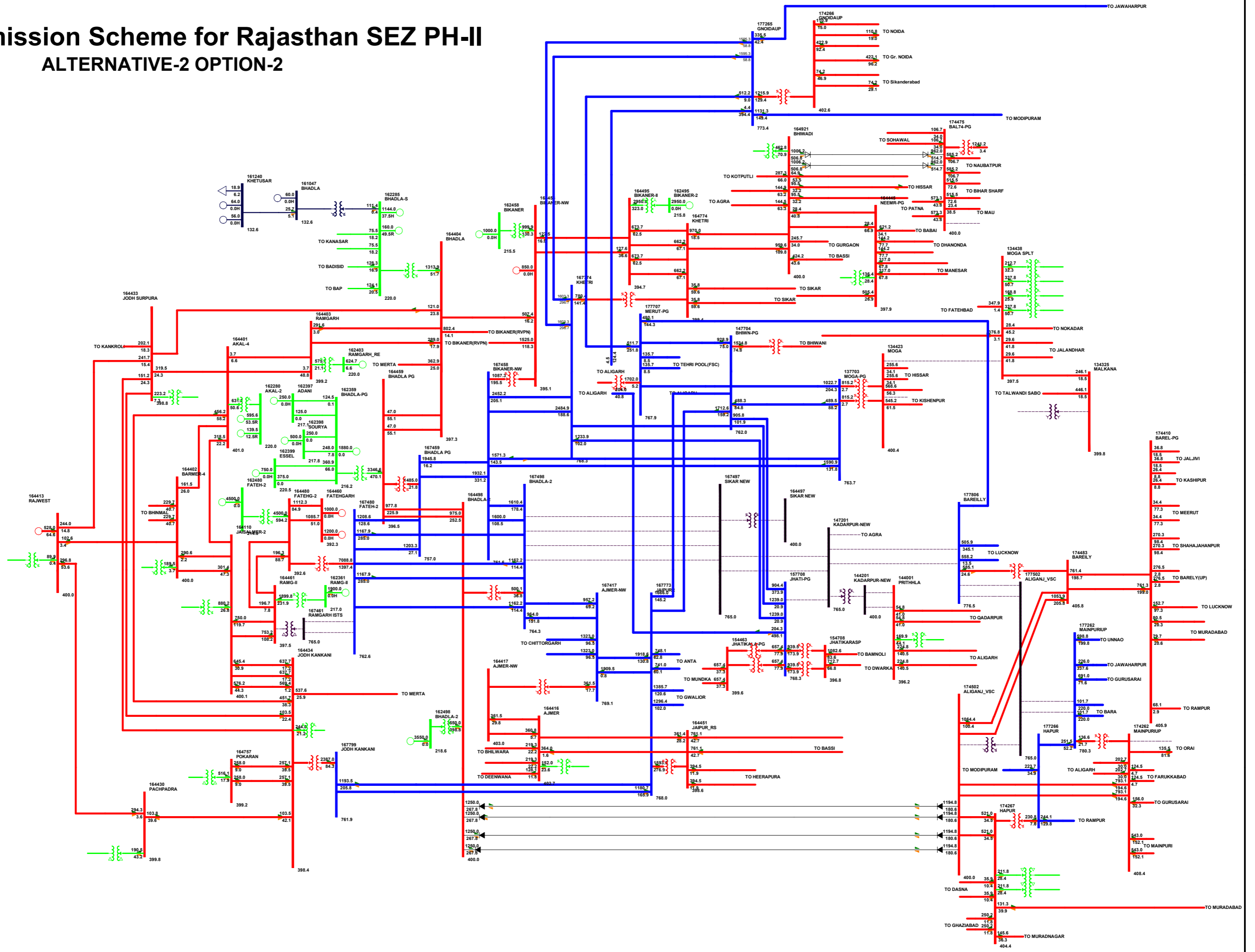
Any other issue with the permission of chair.

Transmission Scheme for Rajasthan SEZ PH-II ALTERNATIVE-1



Transmission Scheme for Rajasthan SEZ PH-II

ALTERNATIVE-2 OPTION-2



Minutes of Meeting held on 03.06.19/04.06.19 among CEA, POWERGRID & PSTCL at Patiala regarding Short circuit level at Moga S/s & Injection of power through Bikaner - Moga 765kV D/c line.

List of participants is enclosed at Annexure-I

In-line with decision taken in 3rd NRSCT meeting held on 24.05.19(MOM awaited) regarding Transmission system for Rajasthan Solar Energy Zone (8.9 GW), a meeting was held on 03.06.19 & 04.06.19 at PSTCL office, Patiala & Chandigarh to further deliberate on high short circuit level at Moga S/s (400kV & 220kV level) and overloading of 220kV level network in Western Punjab due to increased injection of power at 765/400 kV Moga S/s through Bikaner - Moga 765kV D/c line.

Chief Engineer (TS), PSTCL welcomed the participants and requested them to deliberate on the study scenario cases carried out by them regarding injection of power at 765/400kV Moga S/s in Punjab. It was deliberated that in order to resolve issues regarding high short circuit levels of Moga(PG) 400kV bus, a bus split arrangement is required. Based on the feasibility, various alternatives were discussed and the following option was found to be technically suitable:

400kV Bus Section-1

- 400kV Kishenpur D/c feeders
- 400kV Hisar D/c feeders
- 2 nos. 765/400kV transformers
- 1 No. 80 MVAR or 125 MVAR Reactor based on feasibility

400kV Bus Section-2

- 400kV Jalandhar D/c feeders
- 400kV Bhiwani feeder
- 400kV Fatehabad feeder
- 400kV Nakodar feeder
- 400kV Talwandi Sabo/Malkana Feeder
- 4 nos. 400/220kV transformers
- 1 No. 80 MVAR or 125 MVAR Reactor based on feasibility

With the above bus split arrangement, fault level of Bus section-1 & 2 is observed to be reduced to within the limits of 40 kA.

With the bus splitting proposed issue of high short circuit level at Moga is resolved and also the loading problem in Punjab flow is resolved.

With above arrangement there are no ISTS touch points to Punjab through Moga 765/400kV ICT (Bus section-1). However on Bus section-2, one circuit each of

Hisar/Bhiwani and Fatehabad is connected which takes care of some ISTS flows at Moga Bus. The flows have been checked at all ISTS stations and Punjab stations and the same remains N-1 compliant at all levels after adding the proposed system of Punjab which is as under at 2022 peak of 14800 MW.

Additional ICT at Balachak = 500 MVA

Additional ICT each at Makhu, Muktsar and Rajpura = 500 MVA each

Upgradation of ICT at Nakodar from 315 MVA to 500 MVA = 185 MVA

New 400 kV substation at Dhanansu by LILO of Jalandhar – Kurukshetra line – 2 X 315 = 630 MVA

New 400 kV substation at Ropar by LILO of KolDam – Ludhiana line – 2 X 500 MVA = 1000 MVA

PSTCL further stated that additional ICT of 500 MVA each at Dhanansu and Ropar in line with closure of GGSTP Ropar shall be planned to keep them N-1 compliant on closure of GGSTP Ropar. Further, any additional ICT if necessary shall be planned as per the real-time flows.

POWERGRID informed that with given space constraints at 765/400kV Moga substation, they would need to relocate the bays for bus section-1 for which existing buildings shall have to be relocated for space creation. Further, other options for interconnection of feeders of bus section-1 to 400kV main Bus (bus section-2) through GIS bus duct shall also be explored. Based on the suitability & feasibility of above option, above proposed bus split arrangement at 400kV Moga S/s shall be carried out separately as part of system strengthening.

It was in principal agreed that the above splitting of busbar will be done by reengineering as part of ISTS system at Moga and this scheme of splitting the busbar at Moga shall become part of the Bikaner-Moga line scheme as supplementary strengthening scheme and shall remain associated with the transmission scheme of Bikaner–Moga line. Technically both the above schemes are required to be completed in similar time frame. Powergrid informed that Bikaner–Moga line is in advance stage of implementation and considering the same it was agreed in principal that in case of completion of Bikaner-Moga line, before completion of bus splitting the way forward shall be as discussed below:

The implementation of Bikaner-Moga 765 kV D/C line considering the power flow from RE generation in Rajasthan who have been granted LTA (3.38 GW approx.) was deliberated and it was observed that with bus splitting there are no issues of any quantum of flow in this line. However, without bus splitting the quantum of injection into 400 kV system through 765/400 kV ICTs needs to be studied in detail. The preliminary studies reveals that in case of this loading exceeding 2000 MW (threshold) the Punjab system gets overloaded and the operational measures will



have to be taken. Punjab deliberated that before finalizing this issue, the operational measures to be taken needs to be agreed upon as Punjab shall not be liable to any load shedding due to the same. Powergrid deliberated that to finalize the operational measures, they need to consult their seniors and POSOCO and the issue shall be further deliberated during meeting scheduled on 13/14th June already fixed at CEA Delhi.

It was observed that some additional 400kV outlets from Moga 400kV bus section-1 or shifting of some circuits from Moga 400kV bus section-2 to Moga bus section-1 needs to be done. Shifting of some elements like Moga - Nakodar 400kV S/c line from bus section-2 to bus section-1 was studied and found not feasible as it results into overloading of Moga-Nakodar line, loading of ICTs at Moga and also at Nakodar. Further, LILO of Talwandi Sabo- Nakodar 400kV S/c line at Moga was studied but the field reports as gathered by PSTCL revealed that there is no possibility of connecting this LILO due to ROW issues.

It was also observed that with above bus split arrangement, loading levels on 765/400kV transformers at Moga reduces. Accordingly, need of 3rd 1x1500 MVA, 765/400kV transformer was reviewed. It emerged in the studies that with proposed Moga bus split arrangement, 3rd 1x1500 MVA, 765/400kV transformer at Moga may not be required as a part of the present scheme of Transmission system of Rajasthan Solar Energy Zones (8.9 GW).

CEA indicated that keeping in view charging of Kishenpur - Moga 400kV D/c line at 765kV level, future space for at least 2 nos. of 765kV diameters at Moga s/s may be explored by POWERGRID. Further, with charging of Kishenpur - Moga at 765kV level the 400kV bays vacated could be used for taking additional 400kV outlet from Moga bus section-1 and in that time frame implementation of Moga 3rd ICT could be taken up if required. However PSTCL stated that before planning any such link, the Punjab shall be supplied with all the study material with flows and acceptance of Punjab shall be a prerequisite, which was agreed in principal.

Further, as referred in the 3rd NIR SGT meeting, matter regarding agenda from PSTCL for creation of new 400/220kV substation at Ropar & Dhanansu was also discussed. As per the studies, following transmission system was agreed for implementation by PSTCL:

400/220kV Ropar S/s in the premises of existing 220kV Guru Gobind Singh Thermal Power(GGSSTP)

1. Establishment of 2x500 MVA, 400/220kV S/s at Ropar
2. LILO of both circuits of 400kV Koldam-Ludhiana(PG) 400kV D/c line at Ropar
3. 220kV interconnection (2xD/C-twin moose) of Ropar and existing 220kV Ropar bus
4. 1x125 MVAR, 420kV Bus Reactor at Ropar



400/220kV S/s at Dhansanu

1. Establishment of 2x315 MVA, 400/220kVAIS S/s at Dhansanu
2. LILO of one circuit of Jalandhar-Kurukshetra 400kV (direct) line at Dhansanu
3. 1x125 MVAR, 420kV Bus Reactor at Dhanansu.

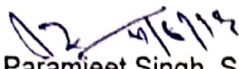
The entire study and the viewpoint as emerged above was presented to the management of PSTCL and PSPCL on 04.06.19 at PSPCL guest house, Sector-10, Chandigarh and the above viewpoint was agreed upon in principal. The management was of considered opinion that the entire scheme of green corridor and the scheme of transmission system for solar system in Rajasthan should have no financial burden on Punjab as the same is being implemented as per Govt. of India guidelines.

CEA stated that the scheme has been technically agreed in the NRSCT except for provision of 3rd ICT at Moga. Punjab has raised some technical issues. The issues have been deliberated and technical solution has been found in terms of bus splitting. The commercial aspects of the scheme need to be raised at appropriate forum.

Powergrid representative agreed to the above technical deliberations in principal subject to final approval of their management.

PSTCL

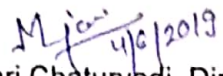

Sh. Sanjeev Gupta, CE/TS


Sh. Paramjeet Singh, SE/Planning



Sh. Kamal Krishan, ASE/Planning

CEA

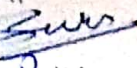

Sh. Awdhesh Kr. Yadav, Director (PSP&A-I)

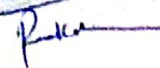

Ms. Manjari Chaturvedi, Director (PSP&A-I)


CTU/POWERGRID

Sh. Rajesh Verma, Sr. DGM(CTU-Plg) 

Sh. Kashish Bhambhani, DGM(Smart Grid) 

Sh. Sandeep Kumawat, Chief Manager(Smart Grid) 

Sh. V M S Prakash Yerubandi, Manager(CTU-Plg) 

Sh. K Deepak, Dy. Mgr(Engg.-S/s) 
-----X-----

List of participants

PSTCL

- Sh. Sanjeev Gupta, Chief Engineer (TS)
Sh. Paramjeet Singh, Supdt. Engineer(Planning)
Sh. Kamal Krishan, ASE/Planning

CEA

- Sh. Awdhesh Kr. Yadav, Director(PSP&A-I)
Ms. Manjari Chaturvedi, Director(PSP&A-I)

CTU/POWERGRID

- Sh. Rajesh Verma, Sr. DGM(CTU-Plg)
Sh. Kashish Bhambhani, DGM(Smart Grid) *Yadav*
Sh. Sandeep Kumawat, Chief Manager(Smart Grid)
Sh. V M S Prakash Yerubandi, Manager(CTU-Plg)
Sh. K Deepak, Dy. Mgr(Engg.-S/s) *g*

Additional Participants on 4.6.19:

1. CMD PSTCL
2. CMD, PSPCL
3. Director/Distribution, PSPCL
4. Director/Technical, PSTCL
5. CE/PPR, PSPCL
6. CE/P&M, PSTCL
7. CE/SLDC, PSTCL
8. Dy. CE/PR, PSPCL
9. Dy. CE/SLDC (Op), PSTCL