



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

-As per list enclosed-

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

Sub: 3rd Meeting of Northern Region Standing Committee on Transmission – Meeting Notice.

Sir/ Madam,

In continuation to our letter dated 10.05.2019, it is to intimate that the 3rd Meeting of Northern Region Standing Committee on Transmission would be held on 24th May, 2019 (Friday) at 10:30 hrs at NRPC Katwaria Sarai, New Delhi instead of 4th June 2019, as intimated earlier.

The Agenda 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 preponement is regretted.

Kindly make it convenient to attend the meeting.

Yours faithfully,


(Goutam Roy) 19/5/19

Chief Engineer (PSPA-I)

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, Vidhyut Bhawan, Near ISBT -Crossing, Saharanpur Road, Majra, Dehradun-248002. Uttarakhand Fax-0135-2645744
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. 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. Fax:-0141-2740794 ce.ppm@rvpn.co.in	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.	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 (Fax:2682747)	15.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)

Agenda note for 3rd Meeting of Northern Region Standing Committee on Transmission

1.0 Confirmation of the Minutes of the 2nd meeting of Northern Region Standing Committee on Transmission held on 13.11.2018.

- 1.1 The 2nd meeting of Northern Region Standing Committee on Transmission (NRSCT) was held on 13.11.2018 and the minutes of the meeting were issued vide CEA letter no. CEA-PS-11-21(19)/3/2018-PSPA-I Division /I/3021/2018/1262-1277 dated 30.11.2018. Subsequently, HVPNL PTCUL and PSTCL has forwarded their observations on the minutes of meeting.
- 1.2 HVPNL vide their letter no. Ch – 18/HSS-152/Vol. – 21 dated 20.12.2018 made observation regarding Point no. - 2 i.e. Evolution of transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones and Transmission Schemes for Solar Energy Zones (REZS) in Rajasthan and requested to incorporate their concern in the minutes of 2nd meeting of NRSCT.

Accordingly, following is added under Para no. 2.9 of minutes of 2nd meeting of NRSCT:

“HVPNL proposed that the cost of the transmission infrastructure created for evacuation of RE power may be taken as zero while calculating the PoC charges and Government of India may be requested to provide complete financial assistance for the said transmission infrastructure. HVPNL added that PoC mechanism is just a method of allocation of transmission charges of Inter State Transmission System (ISTS). This method is used to distribute the total yearly Transmission Charges/Monthly Transmission Charges YTC/MTC of the ISTS system amongst all the DICs. With creation of any new Interstate transmission asset the recoverable transmission cost from all the Designated ISTS Customers (DICs) shall increase, irrespective of model/mechanism/method employed for allocation amongst DICs.”

- 1.3 PTCUL vide their letter 774/CE(C7R)/PTCUL/CEA dated 11.12.2018 has furnished some observation on para 4.2 of the minutes. Following mentioned under Par 4.2 of minutes of meeting:

4.2 ----- However, PTCUL observed that if power from SHP's of UJVNL is to be evacuated through 220 kV S/s Baramwari (ISTS network) then UJVNL will have to bear applicable PoC (ISTS) Charges.

The above line of the minutes is replaced with the following:

4.2 ----- *However, it is observed that if power from SHP's of UJVNL is to be evacuated through 220 kV S/s Baramwari (ISTS network) then UJVNL will have to bear applicable PoC (ISTS) Charges.*

- 1.4 No other observations have been received from any of the constituents. Therefore, the minutes of the 2nd meeting of NRSCT along with the above modifications may please be confirmed.

2.0 Proposal for establishment of 765/400 kV Pooling Station at Kishtwar, J&K.

2.1 Chenab Valley Power Projects Ltd. (CVPPPL), (JV of NHPC, JKSPDC and PTC) vide their letter CVPP/P/2018/749 dated 30.01.2019 has informed that CVPPPL is implementing three major HEPs viz Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEP in J&K. works on various components of of Pakal Dul HEP are in progress. Works of Kiru and Kwar HEP are in advanced stage of tendering. The power from these projects was planned to be pooled to Kishtwar S/s, therefore CVPPPL is planning for construction of dedicated transmission line from pothead yards of above HE Projects to Kishtwar Pooling Station. However, the land for 765/400 kV Pooling Station at Kishtwar is yet to be identified.

2.2 The matter was also deliberated in 2nd meeting of NRSCT held on 13.11.2018, wherein CTU informed that CVPPPL has applied for connectivity for Pakaldul HEP only and following was agreed in regard of the connectivity of Pakal Dul HEP (1000 MW):

1. Transmission system was agreed for providing connectivity to Pakal Dul HEP (1000 MW):

- i) 400 kV D/c (Triple HTLS Conductor) line from Pakal Dul HEP–Kishtwar Switching station along with associated bays at both ends – under scope of generation developer
- ii) Establishment of 400 kV switching station at Kishtwar (GIS) by LILO one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung) –under ISTS
- iii) GIS switchyard equipment, XLPE cables and other associated equipment may be designed for current carrying capacity of 4000 Amps - under scope of generation developer
- iv) 420 kV, 125 MVAR Bus Reactor at Pakal Dul HEP - under scope of generation developer
- v) 420 kV, 125 MVAR Bus Reactor at Kishtwar Switching Station - under ISTS
- vi) One and a half breaker switching scheme for 400kV Generation switchyard - under scope of generation developer

2. Generation developer to sign the Transmission agreement and submit the Bank Guarantee to CTU as per the CERC connectivity Regulation.

2.3 CTU/CVPPPL may furnish the status of signing of transmission agreement and submission of BG. Members may deliberate.

3.0 Approval of charging of 220kV and 400kV Intra-State Transmission Systems of RVPNL

3.1 RVPNL vide their letter no RVPN/SE(P&P)/XEN-2(P7P)/AE-2/F/D1479 dated 10.1.2019 and RVPN/SE(P&P)/XEN-2(P7P)/AE-2/F/D1440 dated 18.1.2019 had requested for conveying in-principle approval of CEA for the following two nos. proposal of RVPNL:

- i) Establishment of 220/132/33 kV (1x160 MVA+1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Morak 220kV S/c line at Ranpur (Kota) (3km).
- ii) 400 kV Double Circuit Interconnection Line between bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor.

RRVPNL also informed that the above transmission elements works had already been completed and they were ready for commissioning.

3.2 To discuss the above proposals, a meeting was held on 04.02.2019 (minutes enclosed at **Annexure-I**), wherein, following was agreed:

(a) Establishment of 220/132/33 kV (1x160 MVA+1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS – Morak 220kV S/c line at Ranpur (Kota) (3km).

- i. Establishment of 220/132/33 kV (1x160 MVA + 1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Modak 220kV S/c line at Ranpur (3km) was agreed in principle. The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.
- ii. Accordingly, on MP side Bhanpur 220 kV substation is the inter-regional point and on Rajasthan side, Ranpur and Morak would become the inter-regional points. Bhanpur and Modak are existing inter-regional points, whereas Ranpur substation would be new inter-regional point. Therefore, necessary metering arrangement would be done at Ranpur 220 kV substation by RRVPNL/POSOCO/NRLDC/CTU.
- iii. MPPTCL to implement the 2nd main bus (220 kV) at the existing Bhanpura 220/132/ 33 kV substation.

(b) 400 kV Double Circuit Interconnection Line between bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor.

- i. 400 kV Double Circuit Interconnection Line between Bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and Bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor was agreed in principle.
- ii. Interconnection Line between CSCTPP and CTPP has been made to cater to the contingency conditions and would remain open in normal condition.
- iii. The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.

3.3 Members may please concur the in-principle approval for the following elements of RRVPNL:

- i. Establishment of 220/132/33 kV (1x160 MVA+1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Morak 220kV S/c line at Ranpur (Kota) (3km).
- ii. 400 kV Double Circuit Interconnection Line between bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor.

4.0 Commissioning of newly constructed/under construction intra-State transmission lines of Punjab State Transmission Corporation Limited (PSTCL):

4.1 PSTCL vide their letter no 690/P-I dated 22.11.18 & 723/P-I dated 11.12.2018 requested CEA to grant in-principle approval for the following under construction transmission lines of Punjab State Transmission Corporation Limited (PSTCL):

- a) Ludhiana (PG) (400kV) - Doraha, 220 kV S/C line - 27.819km conductor 0.4sq" (Zebra)
- b) Moga (PG) (400 kV) - Mehal Kalan 220 kV D/C line - 52.9km conductor 0.4sq" (Zebra)
- c) Goindwal Sahib - Bottianwala, 220 kV D/C line - 64.735km conductor 0.4sq" (Zebra)
- d) Ludhiana (PG) (400 kV) – Sahnewal 220 kV (2nd Circuit) line - 6.5 km conductor 0.5sq" (Moose)
- e) LILO of 2nd circuit of Jalandhar (PG) (400 kV) (Kartarpur)- Kotla Jangan 220 kV line at Kartarpur – 220 kV D/C (PSTCL).

4.2 To deliberate on the above, a meeting was held in CEA on 19.12.2018 (copy of minutes of meeting is enclosed at **Annexure-II**) with representatives from PSTCL, CTU and POSOCO wherein, ‘in principle’ approval for charging of following 220 kV lines was agreed subject to ratification from the constituents of NRSCT:

- a) Ludhiana (PG) (400kV) - Doraha, 220 kV S/C line
- b) Moga (PG) (400 kV) - Mehal Kalan 220 kV D/C line
- c) Goindwal Sahib - Bottianwala, 220 kV D/C line
- d) Ludhiana (PG) (400 kV) – Sahnewal 220 kV (2nd Circuit) line formed by by passing at Lalton Kalan as mentioned above.
- e) LILO of 2nd circuit of Jalandhar (PG) (400 kV) (Kartarpur)- Kotla Jangan 220 kV line at Kartarpur – 220 kV D/C

4.3 Members may please concur the in-principle approval for the above elements of PSTCL.

5.0 PSTCL proposal regarding (i)Upgradation of 132kV Alawalpur S/s at 220kV along with LILO of one circuit of 220 kV BBMB Jalandhar- 220 kV Pong D/c line at Alawalpur 220 kV substation and (ii) Upgradation of 132kV Badhnikalan S/s at 220kV along with LILO of 220 kV Himmatpura- PGCIL Moga line at 220 kV Badhnikalan.

5.1 PSTCL vide their letters dated 8.1.2019 & 16.1.2019 forwarded following two proposals to CEA seeking in-principle approval as these transmission elements works had been completed and they were ready for commissioning:

- i) Upgradation of 132kV Alawalpur S/s at 220kV along with LILO of one circuit of 220 kV BBMB Jalandhar- 220 kV Pong D/c line at Alawalpur 220 kV substation and
- ii) (ii) Upgradation of 132kV Badhnikalan S/s at 220kV along with LILO of 220 kV Himmatpura- PGCIL Moga line at 220 kV Badhnikalan.

5.2 To deliberate on the above issue, a meeting was held in CEA on 4.2.2019 (**minutes of meeting enclosed at Annexure-III**), wherein following was agreed:

- i) Upgradation of existing 132 kV Alawarpur S/s (132/66 KV: 1x25 MVA, 132/11 kV: (12.5+20) MVA) to 220kV (220/66 kV: 1x100 MVA, 66/11 kV: 2x20 MVA) along with LILO of one circuit of Jalandhar (BBMB) - Pong 220 kV D/c line at 220 kV

Alawalpur substation was agreed in principle. The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.

- ii) PSTCL to coordinate with RLDC and CTU for installation of energy meter at Alawalpur 220/66/11 kV substation.
- iii) Upgradation of existing 132/66/11 kV Badhnikalan substation (132/66 kV: 1x25 + 1x 20 MVA, 66/11 kV: 2x20 MVA) to 220/66/11 kV (220/66 KV: 1x100 MVA, 66/11 kV: 2x 20 MVA) along with LILO of Moga (PGCIL)- Himmatpura 220 kV line at 220 kV Badhnikalan substation was agreed in principle.
- iv) PSTCL to intimate all Intra - State transmission schemes which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 400 kV Intra – State schemes which are already under implementation and has not been intimated earlier in Standing Committee on Power System Planning, as agenda in the next NRSCT meeting.
- v) PSTCL to include new/planned Intra - State transmission schemes which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 220kV & above Intra – State schemes as an agenda for the next meeting of NRSCT.
- vi) The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.

5.3 Members may please concur the in-principle approval for the above transmission elements of PSTCL.

6.0 2 nos. of 220kV bays at Mainpuri(PG) 400/220kV substation for providing connectivity to Railway Traction GSS:

6.1 The issue of providing space for 2 nos. of bays for establishment of 220kV connectivity of Railway's 220/132kV GSS at Bhogan with Mainpuri(PG) 400/220kV substation was discussed in 40th meeting of SCPSNR held on 22.6.2018. In the meeting, Powergrid confirmed the availability of space for two nos. 220 kV bays at Mainpuri 400/220 kV substation. However, UPPTCL informed that in Mainpuri area, to cater to the load of about 250-300 MW, they are also planning a new 220 kV substation, for which they require 2 no. of 220 kV bays at Mainpuri 400/220 kV substation. Therefore, it was decided that CEA, POWERGRID, UPPTCL and Railways would carry out a site visit to check the availability of space for four numbers of 220kV bays (two nos. for Railways and two nos. for UPPTCL) at Mainpuri (PG).

6.2 Accordingly, a site visit was carried out at Mainpuri 400/220 kV substation by representatives of CEA, Powergrid, UPPTCL and Railways on 8.2.2019 and the observations made are as follows:

1. Distance from existing bays to the boundary wall is 80m which is sufficient to accommodate 4 nos. of 220kV bays and main entrance road.
2. Main gate and existing road will be required to be shifted near the boundary for construction of the bays.
3. There are trees which will be required to be cut for construction of the bays
4. UPPTCL and Railways will have to decide the outgoing 220kV power line route as buildings in front of the substation are already constructed.
5. Layout shall be approved by Powergrid Engg Department/Competent Authority.

6.3 In view of above, space for four number of bays may be made available by Powergrid at Mainpuri(PG) 400/220kV S/s for construction of 2 no of 220kV bays by Railways for providing connectivity to 220/132kV GSS at Bhogan and 2 no of 220kV bays by UPPTCL.

6.4 Members may like to deliberate.

7.0 Addition 1x500 MVA 400/220kV Transformer at Balachak:

7.1 During the 1st meeting of NRSCT held on 11.9.2018, the issue of augmentation of transformer capacity at Balachak by additional 1x500MVA,400/220kV transformer was deliberated and CTU suggested that instead of augmentation of transformer capacity at 400/220kV Balachak S/s, PSTCL may shift the load to Makhu 400/220kV S/s after completion of its augmentation works at Makhu and PSTCL agreed for the same.

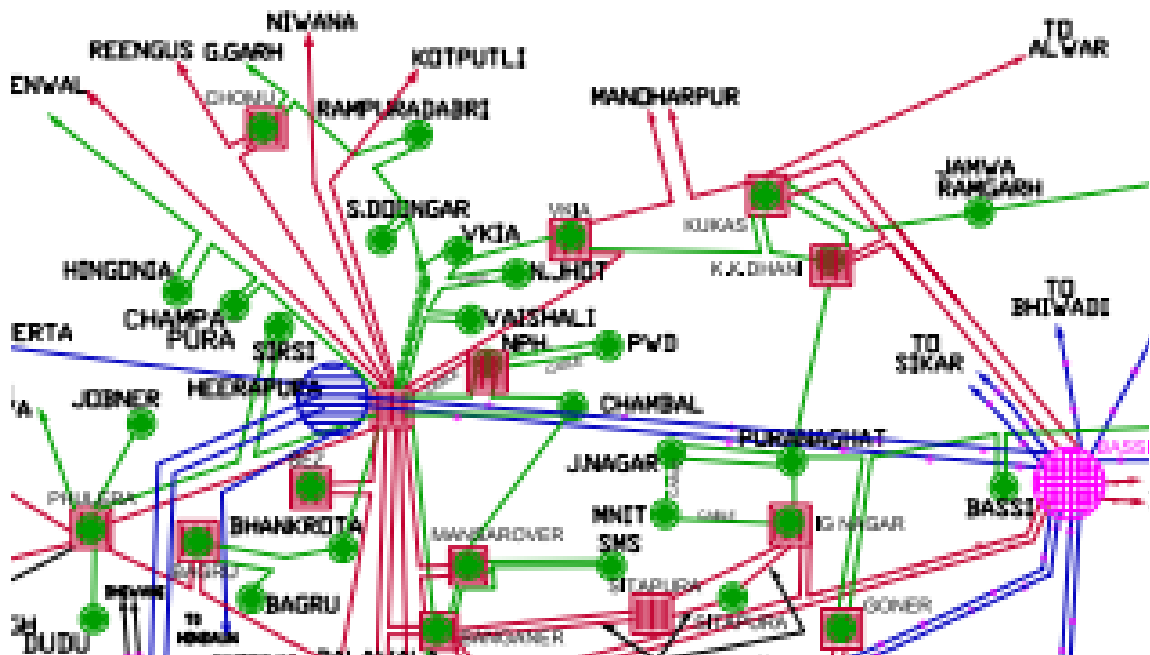
7.2 Subsequently, PSTCL vide their letter no 652/P-I/144 dated 14.11.18 has informed that they have carried out the studies with shifting load of Balachak at Makhu as well as additional 220kV links at 400kV Makhu S/s. However, no major change in the loadings of the transformers have been observed at Balachak. Therefore, PSTCL has proposed additional 1x500MVA, 400/220kV ICT at 400kV Balachak S/s of POWERGRID under ISTS to meet n-1 contingency.

7.3 PSTCL may present their studies. Members may deliberate.

8.0 RVPNL proposal regarding Up-rating and refurbishment of existing 132kV lines using HTLS conductor with associated works in Jaipur EHV Network:

8.1 RVPNL vide their letter RVPN/SE(P&P)/XEN-2(P&P)/AE-2/F/D1750 dated 19.3.2019 has proposed to strengthen the 132 kV network at 132 kV GSS Chambal, Vaishali Nagar, Jhotwara and VKIA by uprating and refurbishment using HTLS conductor of following 132 kV S/C lines:

- 132 kV Heerapura-VKIA with LILO at Vaishali Nagar (Route length: 19.276 km).
- 132 kV VKIA-220 kV VKIA (Route length: 2.859 km).
- 132 kV Mansarover-Chambal (Route length: 3.775 km)



While seeking the grant from PSDF, Power System Operation and Corporation Limited (PSDF-Secretariat) has raised the observation vide letter no. 455 dated 05.02.2019 that clearance of Standing Committee on Power System Planning (SCPSP) for up-rating of transmission line is required to release grant for the said lines.

- 8.2 RVPNL has informed that the peak line loadings observed during 2017-18 on some of the 132kV lines in Jaipur City are as follows:

S.No.	Name of line	Loading in MW
1.	132 kV Heerapura-VKIA S/c line	61.47
2.	132 kV Vaishali - Heerapura S/c line	86
3.	132 kV VKIA-Vaishali Nagar S/c line	43.5
4.	132 kV VKIA(132 kV GSS)- VKIA(220 kV GSS) S/C line	85
5.	132 kV Chambal-Heerapura <i>SIC</i> line	77
6.	132 kV Chambal-Mansarover <i>SIC</i> line	85

- 8.3 RVPNL also informed that from the peak loading observed, following points are noted:
- Total transformer capacity at 132kV GSS Chambal is 165 MVA and load is about 125 MVA. Feeding 132kV lines are overloaded
 - Total transformer capacity at 132kV GSS VKIA is 175 MVA and load is about 150 MVA. Feeding 132kV lines are overloaded
 - Total transformer capacity at 132kV GSS Vaishali Nagar is 100 MVA and load is about 75 MVA. Feeding 132kV lines are overloaded
 - 132kV GIS at Jhotwara (new) with 100 MVA capacity and with LILO of VKIA-Vaishali Nagar 132kV S/c at Jhotwara has been commissioned

In order to utilize the existing transformer capacity at above 132kV GSS, RVPNL has proposed to uprate the capacity of existing transmission lines.

- 8.4 The advantages highlighted by RVPNL for stringing the aforesaid lines with HTLS conductors are as follows:

- HTLS conductors would give us the advantage of using the existing towers.
- The ampacity of HTLS conductor is 800 A (183 MVA). Since, there will be an added advantage of higher ampacity of using HTLS conductor, therefore, the envisaged load growth would also be met.
- Looking into the past problems in laying new transmission lines by utilizing the existing RoW, it is feasible that the existing towers be used by use of existing towers with HTLS conductor.

- 8.5 Load flow studies have been carried out by RVPNL for condition corresponding to 2021-22 for total system load of 14430 MW. The study results are enclosed as **Annexure-IV**. From load flow study with proposed transmission system, it is observed that load of 132 kV GSS VKIA, New Jhotwara, Vaishali Nagar and Chambal can be fed without any over loading on the line. Therefore, by enhancing the transmission capacity of above existing

lines with HTLS conductor, there would not only be optimum utilization of existing available transformer capacities at GSS viz. Vaishali, Jhotwara, VKIA and Chambal but also take care of the future load growth in the area.

8.6 Members may like to deliberate.

9.0 Agenda from DTL: Up-gradation and Strengthening of Delhi transmission system Phase-I

9.1 DTL vide its letter no F.DTL/202/Opr(Plg)/GM(Plg)/2019-20/F-20/02 dated 5.4.2019 has informed that under the up-gradation and strengthening of Delhi transmission system Phase-I, DTL had submitted the DPR to NLDC (Designated as Nodal Agency in accordance with Regulation 5 of CERC (PSDF) Regulations., 2014) for seeking the grant from PSDF for six 220kV D/C lines for re-conductoring with HTLS conductor of the total of 79.53 km with estimated cost of Rs. 116.51 crore. The details of these transmission lines are as under:-

S.No.	Name of Transmission Line	Existing conductor	Route Length (KM)	Year of Commissioning	Reasons for replacement
1.	220kV Bawana-Rohini, ckt-I & II	Single ACSR Zebra	10.05	2005	Important links of DTL transmission network and HTLS Reconductoring, necessary to avoid transmission power congestion for n-1 reliability
2.	220 kV Bawana-Shalimar Bagh, ckt-I & II	Single ACSR Zebra	10.752	1990	
3.	220 kV Mandola-Gopal Pur, ckt-I & II	Single ACSR Zebra	22.62	1975	
4.	220 kV Mandola-Wazirabad, ckt-I, II, III & IV.	Single ACSR Zebra	29.06	1986	
5.	220 kV BTPS-Sarita Vihar ckt-I & II	Single ACSR Zebra	2.8	1977	
6.	220 kV Maharani Bagh-Lodhi Road, ckt-I & II	Single ACSR Zebra	4.25	1995	
Total Line length (KM)			79.53		

9.2 PSDF-proposal of DTL was examined by the 48th meeting of TSEG held on 22.02.2019 and some observations were sought by the TSEG as per their letter vide no. NLDC-PSDF/48th TSEG/DTL-263/2018-19/1583 dt. 05.03.2019 wherein a recommendation of North Region Standing Committee on Transmission (NRSCT) on the proposal of DTL is also required.

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9.3 Further, considering the past, present and future trends of peak loading on above mentioned transmission lines, load flow studies has also been carried out. The study results are enclosed at **Annexure-V**. As per the studies furnished by DTL, the flows on these lines corresponding to peak load observed in 2018(7016 MW) & anticipated load of 8500 MW are as follows:

S. No	Name of Transmission Line	Flows on each circuit corresponding to 7016 MW load	Flows on each circuit corresponding to 8500 MW load
1.	220kV Bawana-Rohini, ckt-I & II	159	184
2.	220 kV Bawana-Shalimar Bagh, ckt-I & II	102	187
3.	220 kV Mandola-Gopal Pur, ckt-I & II	173	204
4.	220 kV Mandola-Wazirabad, ckt-I, II, III & IV.	206	157
5.	220 kV BTPS-Sarita Vihar ckt-I & II	190	180
6.	220 kV Maharani Bagh- Lodhi Road, ckt-I & II	83	183

9.4 Members may deliberate.

10.0 Issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.

10.1 M/s GMR Energy Ltd. is constructing Bajoli Holi HEP (3x60MW) on Ravi River in Himachal Pradesh. Long Term Access was granted to M/s GMR Bajoli Holi Hydropower Pvt. Ltd. in March 2014 for 155 MW from August 2018 for 25 years through the following transmission system being implemented by HPPTCL:

- i) Bajoli Holi-Lahal Pooling Station of Himachal 220 kV D/C line with Twin Moose conductor
- ii) Lahal Pooling Station-Chamera Pooling Station (PG) 400 kV D/c line

10.2 Due to delay envisaged in implementation of above transmission system, GMR had proposed following temporary arrangement for evacuation of power from their project till the originally planned system is completed:

- a) Connect Plant bus to Lahal pooling station through transmission line Bajoli Holi-Lahal P.S 220 kV D/c by expediting construction of the line.
- b) Lahal P.S–Budhil HEP 220 kV D/c line (nearing completion)
- c) Budhil HEP–Chamera-III 220 kV S/c line (existing)
- d) Chamera-III–Chamera Pooling station 220 kV D/C (existing ISTS transmission system).

The matter was discussed in 39th & 40th meeting of SCPSNR. However, in the 40th meeting, it was decided that a separate meeting would be convened to discuss the interim

arrangement with all stake holders viz. CEA, CTU, POSOCO, HPPTCL, M/s GMR and M/s GREENKO (Budhil HEP).

- 10.3 A meeting was held in CEA on 22.1.2019 (**minutes enclosed at Annexure –VI**), wherein, following was agreed:
- i. There is a requirement of interim arrangement during the period from September 2019 to March 2021 as first unit of M/s GMR BHPPL is expected to be commissioned by September 2019, whereas it's planned evacuation system under implementation by HPPTCL is expected to be commissioned by March 2021.
 - ii. HPPTCL agreed to expedite the completion of Bajoli Holi – Lahal P.S. 220 kV D/C line (completion schedule June 2020) required for implementation of interim arrangement forevacuation of power from Bajoli Holi of M/s GMR BHPPL. HPPTCL also agreed to expedite the completion of Lahal P.S. – Chamera P.S. 400 kV D/C line before or by March2021.
 - iii. Special Protection System (SPS) to be implemented by M/s GMR BHPPL during interim arrangement period to back down/trip their generation to avoid overloading of 400/220 kV, 2 x 315 MVA ICTs at Chamera Pooling Station in the event of outage of one 315 MVA ICT.
 - iv. A joint survey by M/s GMR BHPPL and M/s GREENKO could be undertaken to ascertain hotspots, maximum operating temperature, bus bar rating, circuit breaker rating and other technical parameters for Budhil HEP - Chamera 220 kV S/C line and switchgear rating of Chamera III 220 kV switchyard. The joint survey to quantify the permissible power flow over Budhil HEP - Chamera 220 kV S/C line during interim arrangement.
 - v. M/s GMR (Bajoli Holi HEP developer) needs to arrive at mutual agreement with M/s GREENKO (Budhil HEP developer) for sharing of Budhil HEP - Chamera 220 kV S/C line and consent for the same need to be taken from Central Electricity Regulatory Commission (CERC).
- 10.4 HPPTCL may present the status of the evacuation system. Members may like to deliberate.

11.0 Agenda by HPPTCL: Additional intra-state transmission works proposed by HPPTCL to be included under “Himachal Pradesh Clean Energy Transmission Investment Program”

- 11.1 HPPTCL vide their letter no HPPTCL/Misc-Vol_X/2018-12004 dated 01.01.2019 has submitted the proposal of additional intra-state transmission works to be included under “Himachal Pradesh Clean Energy Transmission Investment Program” which is being implemented under Multi-Tranche Financing Facility (MFF) of ADB.

Following transmission elements amounting to Rs. 141.14 Crore have been proposed by HPPTCL to be covered under “Himachal Pradesh Clean Energy Transmission Investment Program”:

- 11.2 **Providing 220/66 kV, 80/100 MVA transformer in the yard of 400/220 kV Gumma substation in Dist. Shimla.**

HPPTCL is constructing 400/220 kV, 2X315 MVA GIS sub-station at Pragatinagar (Gumma) in Distt. Shimla for evacuation of upcoming hydroelectric projects in Pabbar Valley. Construction of proposed 220/66 kV, 80/100 MVA substation in the yard of 400/220 kV Gumma substation shall provide an alternate source of power to Shimla District. HPSEBL shall implement LILO of existing Huli-Sainj 66 kV S/c line at

proposed 220/66 kV Gumma sub-station and shall draw about 60 MW from the proposed substation. This would also result in improved voltage profile and reliability in Kotkhai/Sainj area. This transmission element has an estimated cost of Rs. 45.53 Crore.

11.3 LILO of 2nd circuit of 220 kV Kunihar-Panchkula transmission line at 220 kV substation Baddi.

This transmission scheme has already been deliberated and approved in the 40th Standing Committee meeting on Power System Planning in Northern region held on 22nd June, 2018. The estimated cost of this LILO as submitted by HPPTCL is Rs. 5.95 Crore.

11.4 Creation of a joint Control and Operations Center for the transmission assets of HPPTCL/HPSEBL.

The Joint Control and Operations Center shall monitor and control all the transmission assets at a central, more accessible location. This shall reduce system disruptions and fault time in addition to reduced manpower requirement. Its Scope includes Control Centre set up, interconnection with SLDC, FOTE equipment. The project has an estimated cost of Rs. 31.62 Crore.

11.5 Augmentation of existing 220/132 kV Kangoo sub-station by 2X100 MVA and stringing of 2nd circuit of 220 kV S/c line on D/c towers from Dehar Power House of BBMB to Kangoo substation.

11.5.1 HPPTCL has intimated that presently 220/132 kV Kangoo sub-station of HPSEBL is connected to Dehar Power House of BBMB through Dehar-Kangoo 220 kV S/c Transmission Line (on D/C Towers) and Dehar-Kangoo 132 kV S/C Transmission Line. Presently, there is a restriction on drawl of power from Dehar Power House and thus HPSEBL restricts the drawl to 140 MW only (around 60 MW on 220 kV and 60 MW on 132 kV). Due to the restriction on drawl of power, HPSEBL is not able to integrate 132 kV buses at 220/132 kV Kangoo sub-station. Therefore, the system is being operated in radial mode.

11.5.2 Further, HPPTCL has informed that joint meetings were convened with officials from BBMB, HPSEBL and HPPTCL to address the issue. During the discussions it was revealed that during the winter months when the demand of HP state is high on account of heating loads the demand of other neighbouring states such as Punjab, Haryana etc. is low. Thus, it was concluded that the integrated operation at Kangoo sub-station of HPSEBL may be allowed as sufficient power margins are available. Further, it was highlighted that integration at 220/132 kV Kangoo sub-station of HPSEBL shall also increase the security of grid as continuous load is available at Kangoo sub-station even during the night hours, thereby addressing the issues of voltage rise because of Ferranti effect. Accordingly, after deliberations it was decided that study shall be conducted by POSOCO for integrated operation of Kangoo sub-station. The results of the requisite Load Flow study as conducted by POSOCO has been submitted by HPPTCL and the same are enclosed as **Annexure-VII**.

11.5.3 In the load flow studies POSOCO has highlighted the issue of N-1 contingency in case of failure of 220 kV Kangoo-Dehar transmission line. Presently, there is S/C 220 kV transmission line (on Double Circuit towers) from Dehar to Kangoo. Also, POSOCO

has desired to augment 220/132 kV Kangoo sub-station of HPSBEL to ensure reliable power while ensuring the contingency.

11.5.4 In view of above, it is evident that stringing of 2nd circuit of Dehar - Kangoo transmission line and Augmentation of existing 220/132 kV Kangoo sub-station by 2X100 MVA is necessitated so as to ensure N-1 contingency in the system. The estimated cost of the above mentioned transmission element as submitted by HPPTCL is Rs. 58.04 Crore.

11.5.5 Members may like to deliberate.

11.5.6

12.0 UPPTCL' agenda regarding strengthening of intra-State network for additional loads and reliability:

12.1 UPPTCL vide their letter no 3748-SE(TP&PSS)/SCM dated 24.1.2019 has proposed the following intra-state works:

12.1.1 Creation of 220/33 kV (3x60 MVA) GIS S/S Kidwainagar (Kanpur):

- a) Creation of 220/33 kV (3x60 MVA) GIS S/s Kidwainagar (Kanpur)
- b) LILO of 220 kV PGCIL line Bhauti Kanpur (400) PGCIL-Panki (220) on Monopole at 220 kV S/S Kidwainagar (Kanpur) – 06 km

12.1.2 Creation of 220/132/33 kV (2x160+2x40 MVA) and 220/33 kV (2x60 MVA) S/S Deoband (Saharanpur)

- a) Creation of 220/132/33 kV (2x160+2x40 MVA) and 220/33 kV (2x60 MVA) S/S Deoband (Saharanpur)
- b) 220 kV DC line Saharanpur (400) PGCIL-Deoband (Saharanpur) on Single Moose-30 km
- c) 220 kV Two Feeder bays at Saharanpur(400) PGCIL
- d) 220 kV DC line Shamli (400) GIS-Deoband (Saharanpur) on Single Moose – 55 km

12.1.3 Creation of 220/132/33 kV(2x160+2x40) MVA S/S Tundla (Firozabad)

- a) Creation of 220/132/33 kV(2x160+2x40) MVA S/S Tundla (Firozabad)
- b) LILO of 220 kV SC line AgraPG(765)-Firozabad(400)(Proposed) 220kV S/S at Tundla(Firozabad)-01 km

12.1.4 Creation of 220/132/33 kV (2x160+2x40) MVA S/S Kirawali(Agra)

- a) Creation of 220/132/33 kV (2x160+2x40) MVA S/S Kirawali(Agra)
- b) LILO of AgraPG(765)-Sikandra(220) 220kV PGCIL Section of 220kV SC line Sikandra(220)-Bharatpur(Rajasthan) at 220kV S/S Kirawali(Agra)-13 km

12.1.5 LILO of one ckt 400kV Quad DC line of Aaur(400) (WUPPTCL)-Indirapuram (WUPPTCL) at 400Kv S/S Noida Sec-123 on Monopole-10 km

12.1.6 Evacuation of 2x660 MW Obra “C” TPS & Startup power.

Agenda Note - 3rd meeting of NRSCT

In 38th SCM dated 30.05.2016 Obra “C” evacuation was approved. For providing startup power to Obra “C” some minor modification have been proposed:

S.No.	Approved in 38 th SCM Dt 30.05.2016	Proposed As
01	GT 21/765Kv at Obra “C”	No Change
02	2x1500 MVA 765/400Kv ICT at Obra “C”	No Change
03	LILO of Anpara “D”-Unnao 765Kv SC line at Obra “C” -40km	LILO of Anpara “D”-Unnao 765Kv S/C line at Obra “C”-15km & Shifting of 330 MVAR line reactor from Anpara “D” to Obra “C” TPS
04	Obra “C”-Jaunpur 400Kv DC line-200km	LILO of One ckt of 400Kv D/C line Obra “B”-Obra “C” at Jaunpur(400)-190km
05	--	400Kv D/C line Obra “B”-Obra “C”-1.5km (For Startup Power)
06	Bus Reactor 330 MVAR, 765Kv at Obra “C”	No Change

12.2 UPPTCL may present the studies and members may like to deliberate.

13.0 Augmentation of 400 kV substation at Nawada:

13.1 Nawada 400 kV S/s was approved in 23rd meeting of Standing Committee on Power System Planning of Northern Region and the sub-station was commissioned with transformation capacity of 2 x 315 MVA. HVPNL vide their letter dated 09.04.2019 has informed that they have completed the work of augmentation of the transformation capacity at Nawada 400/220 kV S/s by adding third transformer of capacity 315 MVA, to increase the load growth and improved reliability. However, for giving charging permission for the 3rd transformer, NRLDC has sought the approval of the NRSCT.

13.2 To discuss the above issue, a meeting was held in CEA with representatives from CTU, HVPNL, POSOCO on 11.4.2019 (**minutes of meeting are enclosed at Annexure-VIII**), wherein, the augmentation of transformation capacity at Nawada 400/220 kV S/s by adding third transformer of capacity 315 MVA was agreed in principle subject to ratification in the forthcoming meeting of NRSCT. HVPNL was also requested to intimate all Intra – State transmission schemes which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 400 kV Intra-State schemes which are already under implementation/planned and has not been intimated earlier in NRSCT.

13.3 Members may please concur the in-principle approval for the above transmission element of HVPNL.

14.0 Transfer of Connectivity of Manala-II HEP

14.1 CTU vide its email dated 12.03.2019 had forwarded Everest Power Private Limited (EPPL) letter dated 18.02.2019 (regarding transfer of connectivity of Manala-II HEP. In the letter, it was stated that evacuation of power from Malana-II HEP to Nalagarh through the ADHPL transmission line is an interim arrangement and Malana-II would shift to the 220kV Chhaur- Banala transmission line constructed by HPPTCL once it is completed. HPPTCL have informed that the line is nearing completion and would get commissioned in March, 2019 and have asked EPPL to apply for LTOA. Accordingly, EPPL requested

CTU for connectivity through Chhaur – Banala transmission line of HPPTCL & requested to address issues related regarding POC charges, LTA/BPTA, transmission charges from Chhaur to Banala etc. In view of above, CTU has requested to convene a meeting with stakeholders including CEA, CTU, POSOCO, HPPTCL, HPSLDC, PSPCL, AD Hydro and EPPL so as to enable smooth transition.

14.2 To deliberate on the above issue, a meeting was held on 26.03.2019 in CEA (copy enclosed at **Annexure- IX**), wherein, following was agreed:

- a) Shifting of the connectivity of Malana-II HEP from the interim arrangement i.e. LILO of one circuit of AD HEP – Nalagarh 220 kV D/c line (of M/s AD Hydro) at 220/132kV Chhaur substation to the final arrangement i.e. Chhaur–Banala 220 kV D/c line
- b) M/s EPPL to apply for connectivity to STU and NoC granted by STU to be submitted to CTU for revised LTA intimation to M/s EPPL.
- c) M/s AD Hydro, EPPL and HPPTCL to coordinate among themselves to minimize the shut down time for smooth switch over from interim arrangement to final arrangement.
- d) M/s AD Hydro, EPPL and HPPTCL to coordinate among themselves and with POSOCO to plan shut down timing to minimize generation loss during the shutdown.

14.3 Subsequently, PSPCL vide their letter no 849/ISB-395 dated 29.4.2019 has forwarded certain observations on Para no 5 of minutes of the meeting held on 26.03.2019 in CEA.

Following is mentioned under Par-5 of the minutes:

“PSPCL stated that with shifting of connectivity, PSPCL has to bear STU charges also. It was clarified that at present PSPCL is bearing the charges for transmission of power from Malana II to Nalagarh through M/s AD Hydro line i.e. AD HEP – Nalagarh 220 kV D/c line. So instead of these charges, they have to bear charges of Chhaur – Banala 220 kV D/c line.”

PSPCL has requested to replace the above Para with the following:

PSPCL stated that with the shifting of connectivity, STU charges shall also become applicable in addition to CTU charges and PSPCL stated that as recorded in the MoM of 31st meeting of Standing Committee on Power System Planning of Northern Region M/s EPPL would have to pay STU charges and M/s EPPL has also agreed to sort out all commercial issues with HPPTCL. PSPCL further stated that PSPCL should not be burdened with transmission charges over and above the charges as provided in PSA.

14.4 Members may like to deliberate.

15.0 Utilization of 2 nos. 220 kV Feeder Bays at 400 kV GSS Sikar (PGCIL) by RVPN:

15.1 RVPN vide their letter RVPN/SECP&P)/XEN-2CP&P)/ AE-2/ F. /D-119 dated 2.5.2019 has forwarded the proposal for utilization of 2 nos. 220 kV feeder Bays at 400 kV GSS Sikar (PGCIL) by LILO of 220 kV Sikar (220 kV GSS)-Dhod S/C line at Sikar (PGCIL).

15.2 In the 34th meeting of SCPSPNR held on 8th August 2014, augmentation of 1x500MVA, 400/220 kV transformer at Sikar(PG) was agreed. Construction of 2 nos. 220 kV feeder bays was also agreed subject to confirmation of its requirement by RVPN.

Subsequently, vide letter dated 23.09.2014, RVPN had confirmed the requirement of 2 nos. 220 kV Feeder Bays at 400 kV GSS Sikar (PGCIL). RVPN had also confirmed that the RVPN would lay 220 kV DIC line from 400 kV GSS Sikar to nearby 220 kV GSS after receiving technical feasibility from the field. However, due to severe problem of RoW, RVPN was unable to frame a suitable proposal for utilization of 2 nos. 220 kV line bays. In the 2nd meeting of NRSCT, RVPN requested to allocate the 220 kV Bays for wind/solar developers or utilize for any other purpose as RVPN was unable to utilize the bays. M/s PGCIL vide letter dated 04.01.2019 had intimated that "allocation of these bays to RE developers can be considered in future depending on stage-II connectivity applications received at Sikar. Now, RVPN has proposed to utilize 2 nos. 220 kV feeder bays at 400 kV GSS Sikar (PGCIL) by LILO of 220 kV Sikar (220 kV GSS)-Dhod S/C line at Sikar (PGCIL) by using the 2 km XLPE underground cable to avoid RoW problem. This proposal will provide an additional circuit between the 400 kV GSS Sikar (PGCIL) and 220 kV GSS Sikar (RVPN)

15.3 Load flow studies have been carried out by RVPN for condition corresponding to 2021-2022 for total Rajasthan system load of 14430 MW. Results of load flow study are enclosed at **Annexure- X**. From the studies, it is observed that the loading on 220 kV Sikar (PGCIL)-Sikar (RVPN)D/c line reduces to 265 MW from 427 MW, after carrying out by LILO of 220 kV Sikar (220 kV GSS)-Dhod S/C line at Sikar (PGCIL) This will also help to meet out the increased future load demand in the region.

Members may like to deliberate.

16.0 Stringing of 2nd Circuit on 220 kV Khodri- Majri S/C line on D/C towers-reg.

16.1 HPPTCL vide their letter no. HPPTCL/CEA-Vol_IV/2019-700 dated 18.04.2019 has requested for approval of 2nd circuit on 220 kV Khodri Majri S/C line on D/C towers. The stringing of 2nd circuit on 220 kV Khodri –Majri S/C line on D/C towers of HPPTCL which was deliberated in 7th meeting of NRPC held on 20th December, 2007 and PTCUL /UJVNL had informed that all issues regarding termination of 2nd circuit of 220 kV Khodri –Majri line at Khodri had been resolved. HPPTCL has intimated that HPPTCL is ready for to stringing of 2nd circuit on 220 kV Khodri-Majri D/C line and requested for CEA approval.

16.2 The load flow studies are enclosed at **Annexure-XI**. Members may like to deliberate.

17.0 LILO of Baghat PG(400)-Muradnagar-II (400)220 kV, SC UPPTCL line at Madola Vihar 220 /33kV, 3x60 MVA UPPTCL substation.

17.1 UPPTCL vide their letter no 380/Dir.(Comm. & Plg.)/UPPTCL /CEA/2019 dated 12.04.2019 informed that the following 220 kV downstream U.P network to Baghat 400/220 kV, PGCIL substation was agreed in 40th meeting of SCPSPNR held on 22.06.2018: -

- **LILO of Muradnagar-II (400)- Baghat PG (400)220 kV, SC UPPTCL existing line at 220 kV, Baghat substation U.P.**

(Baghpat PG (400)-Baghpat U.P 220 kV, SC line already exist and after above LILO, Baghpat PG (400)-Baghpat UP will be 220 kV, DC line).

The above LILO at Baghpat (220) substation work is under construction but delayed and temporarily held up due to some R.O.W. constraints. After above LILO, Baghpat (220)-Muradnagar –II (400)220 KV, SC section is further to be LILOed at 220/33 KV, 3X60 MVA UPPTCL Mandola Vihar (Ghaziabad) substation approved by UPPTCL as intra state network and which will soon be additionally connected with 400/220 kV, Aaur (Ghaziabad) U.P.substaion 220kV, Mandola vihar substation and related LILO work is complete and is ready of energization. UPPTCL however is not getting energization code from NRLDC to connect Mandola Vihar substation by LILO of Baghpat (400)-Muradnagar-II (400)220 kV, existing SC line in the absence of NSCT approval. Therefore, UPPTCL has requested that in the light of delayed LILO of Baghpat PG (400)-Muradnagar-II (400)220 kV, S/C line at, Baghpat (U.P) substation due to R.O.W issues, the LILO as sequenced below may be approved to facilitate Mandola Vihar substation connection: -

1. LILO of Muradnagar –II (400)-Baghpat (400) PG 220 kV, SC UPPTCL line at 220 /33 KV, Mandola Vihar UPPTCL substation (Mandola Vihar substation will initially draw 20-25 MVA load).
2. LILO of Baghpat (PG)-Mandola Vihar 220 kV, SC line section at 220 kV, Baghpat U.P substation. (shall be done later after clearance of R.O.W).

17.2 The load flow studies are enclosed at **Annexure-XII**. Members may like to deliberate.

18.0 Approval for charging of 10 MVA 220/11 kV Power Transformer Captive Bay at Salal Power Station (6 x 115 MW), NHPC

18.1 NHPC vide their letter dated 29.03.2019 informed that constraints are observed in supply of auxiliary power to Salal Power Station (6 x 115 MW) of NHPC from 132/33 kV Jhajharkotli substation (JKPDD) through 33kV D/C line. In order to improve the reliability of auxiliary power, NHPC had planned for installation of 220/11 kV transformer in the existing 220 kV yard of Salal HEP and the works have been completed for the same. However, for issue of charging code for energizing the transformer NRLDC has requested NHPC to submit the approval of NRSCT and updated connection agreement.

18.2 To deliberate on the issue a meeting was held on 18.04.2019 in CEA with representatives from POSOCO, CTU and NHPC and charging 10 MVA 220/11 kV Power Transformer Bay at Salal Power Station of NHPC for improving reliability of auxiliary power supply was agreed in-principle. The minutes of meeting are enclosed at **Annexure-XIII**.

18.3 Members may please concur the in-principle approval of 10 MVA 220/11 kV Power Transformer Captive Bay at Salal Power Station (6 x 115 MW), NHPC.

19.0 Proposal for adding new Transmission element i.e. 400kV/22kV, 25MVA Station Transformer at existing 420kV GIS System of 1500MW Nathpa Jhakri Hydro Power Station Hydro Power Station (Expected to be commissioned in the month of June, 2019)

19.1 SJVN vide their letter dated 10.04.2019 has requested for approval of 400kV/22kV, 25MVA Station Transformer at existing 420kV GIS System of 1500MW Nathpa Jhakri

Agenda Note - 3rd meeting of NRSCT

Hydro Power Station Hydro Power Station which is expected to be commissioned in the month of June, 2019. SJVN has informed that 1500 MW (6x250MW) Nathpa Jhakri Hydro Power Station was put to commercial operation in between Oct. 2003 to May, 2004. As per original sanction scheme, the Unit Auxiliary Consumption is drawn directly from each Generating Unit by tapping 15.75kV Bus Duct through 15.75kV/0.145kV, 630KVA Unit Auxiliary Transformer. The Service Station Supply is taken from HPSEB Ltd. (DISCOM) network at 22kV Feeders from 220/66/22 Sub Station at Kotla & 66/22kV Sub Station at Nathpa. Over the years, HPSEB Ltd. had revised the schedule of tariff and it was opined that installation of own Service Station Transformer at 400kV Bus Bar at existing 420kV GIS System by NJHPS may not only more economical but the quality, reliability & availability of the power will increase manifold.

19.2 Subsequently, the matter was deliberated & referred to CEA (Hydro Engg & Technology Division) for Installation of 400kV/22kV, 25MVA Station Transformer at NJHPS in order to have independent station service supply. Accordingly, HETD division, CEA has technically approved the SJVN proposal for installation of 25MVA, 400kV/22kV substation at 1500MVA NJHPS vide their letter no 10/3HE&TD-2008/488 dated 25.06.2009. The final commissioning & charging of 400kV/22kV, 25MVA Station Transformer shall be completed in all respect by June, 2019 in order to use the reliable 400kV GRID power for meeting the auxiliary power need of Generating Unit of 1500MW NJHPS.

19.3 Members may like to deliberate.

20.0 Transmission System for evacuation of Power from potential solar energy zones (20 GW) in Northern Region.

20.1 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 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

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

20.2 For evacuation of power from potential solar energy zones for 8.9 GW in Bhadla (3.55 GW), Fatehgarh (3.5 GW), Bikaner (1.85 GW) complexes under Phase-I , following transmission system was agreed in the 2nd meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 13.11.2018.

- i) Establishment of 765/400/220kV, 3x1500MVA (765/400kV), 5x500MVA (400/220kV) pooling station at suitable location near Phalodi/ Bhadla in Jodhpur (Bhadla-II PS)**
- ii) Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Khetri **
- iii) Augmentation of transformation capacity at Bhadla (PG) by 400/220kV, 2x500MVA (6th & 7th) transformers
- iv) Creation of 220 kV level at Bikaner (PG) with Installation of 400/220kV, 2x500MVA transformers at Bikaner (PG)
- v) LILO of both circuits of Ajmer – Bikaner 765kV D/c line at Bhadla-II PS
- vi) Bhadla-II PS – Bhadla (PG) 400kV D/c Line (Twin HTLS)
- vii) Bikaner(PG) –Khatri S/s 765kV D/c line
- viii) Khatri – Jhatikara 765kV D/c line
- ix) Khatri – Sikar (PG) 400kV D/c line (Twin AL59)
- x) Augmentation with 765/400kV, 1x1500MVA transformer (3rd) at Moga S/s
- xi) Augmentation with 765/400kV, 1x1000MVA, transformer (3rd) at Bhiwani (PG) S/s
- xii) Establishment of 765/400/220kV, 4x1500MVA (765/400kV), 5x500MVA (400/220kV) pooling station at suitable location near Fatehgarh in Jaisalmer Distt (Fatehgarh-II PS)**
- xiii) Fatehgarh-II PS– Bhadla -II 765kV D/c line
- xiv) LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (op. at 400kV) at Fatehgarh-II PS so as to establish Fatehgarh (TBCB) – Fatehgarh -II 765 kV D/c line (to be op. at 400kV) and Fatehgarh-II-Bhadla (PG) 765kV D/c line
- xv) Charging of Fatehgarh-II PS –Bhadla section at 765kV level
- xvi) Ajmer (PG)– Phagi 765kV D/c line

- xvii) 1x125 MVAR (420kV), 2x240 MVAR (765kV) Bus Reactor each at Fatehgarh-II PS, Bhadla-II PS & Khatri Substation
- xviii) 1x240 MVAR Switchable Line reactors for each circuit at Jhatikara end of Khatri – Jhatikara 765kV D/c line
- xix) 1x240 MVAR Switchable line reactor for each circuit at each end of Bikaner – Khatri 765kV D/c line
- xx) 1x330 MVAR Switchable line reactor for each circuit at Bhadla-II PS end for Ajmer-Bhadla-II PS 765kV line (after LILO)
- xxi) 1x240 MVAR Switchable line reactor for each circuit at Bhadla-II PS end for Bikaner-Bhadla-II PS 765kV line (after LILO)
- xxii) 220kV line bays for interconnection of solar projects at Fatehgarh-II PS (9 nos), Bhadla-II PS (9 nos) and Bikaner (4 nos) S/s

****Space provision to be kept at Bhadla-II PS, Fatehgarh-II PS, Khetri S/s for future transformers, bays, switchable line/bus reactors etc.**

20.3 From the above agreed transmission system, the transmission schemes were formed, which were deliberated in the 2nd meeting of National Committee on Transmission (NCT) held on 04.12.2018 & 3rd ECT meeting held on 21.12.2018. The transmission scheme associated with potential RE projects in Northern Region along with recommendation of 2nd NCT and 3rd ECT regarding its implementation are as given below:

S. No.	Name of Scheme	Estd cost (Rs. Cr.)	ECT Recomd.
1	Transmission system associated with LTA application from Rajasthan SEZ Part-A	2312	RTM (POWERGRID)
2	Construction of Ajmer (PG)-Phagi 765 kV D/C line along with associated bays for Rajasthan SEZ	583 (509+74)	TBCB
3	Scheme Transmission system associated with LTA applications from Rajasthan SEZ Part-B	676	TBCB
4	Transmission system associated with LTA applications from Rajasthan SEZ Part-C	1365	TBCB
5	Transmission system associated with LTA applications from Rajasthan SEZ Part-D	1208	TBCB
6	ICT Augmentation works at existing Moga (PG) ISTS S/S associated with LTA applications from SEZs in Rajasthan	73	RTM (POWERGRID)
7	ICT Augmentation works at Bhadla (PG) associated with 1630 MW LTA granted at Bhadla	105	RTM (POWERGRID)
8	ICT Augmentation works at existing Bhiwani (PG)IST S/S associated with LTA applications from SEZs in Rajasthan	65	RTM (POWERGRID)
9	Transmission system for providing connectivity to RE projects at Bikaner(PG)*	93	Proposed for potential basis based on the LTA applications of SECI
10	Transmission system for providing connectivity to RE projects in Fatehgarh-II*	298	

11	Transmission system for providing connectivity to RE projects in Bhadla-II*	298	
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* The schemes to be taken up for implementation after receipt of connectivity/LTA applications from RE generation developers / LTA applications from SECI

The detailed scope of works with respect to the above schemes is given under **Annexure-XIV**.

20.4 Out of 8.9 GW solar energy zones, new applications for 3.1GW capacity is already granted at Bhadla, Fatehgarh and Bikaner complex. New Stage-II Connectivity applications have been agreed for grant for 1100 MW in above complexes. Further, additional Solar application for Stage-II Connectivity for 2190 MW quantum is also received in above complexes recently. LTA applications has been received for additional 600 MW Solar (Schedule-Dec'20/May'21) at Fatehgarh-II, which makes total new LTA applications for 3700 MW (3100MW granted+600MW new applications) in above complexes. 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	300 (agreed for grant)	-
3	Fatehgarh	2200	2200
4	Fatehgarh-II	2390* (agreed for grant)	600 (agreed for grant)
5	Bikaner	850 + 600 (agreed for grant)	850

20.5 Out of total 20 GW REZ [Solar], transmission system for 8.9 GW Solar has already been planned. For the balance 11.1 GW Solar, joint study meetings amongst CEA, CTU and POSOCO were held on 24.04.2019 and 25.04.2019 in order to identify the broad transmission schemes to cater to the balance REZs in NR.

20.6 The transmission system deliberated and proposed for integration of 11.1 GW solar potential in Rajasthan [Phase –II :11.1GW] from Ramgarh/Kuchheri (4 GW), Bikaner (3.15 GW), Bhadla (1.75GW) & Fatehgarh (2.2 GW) is summarized below:

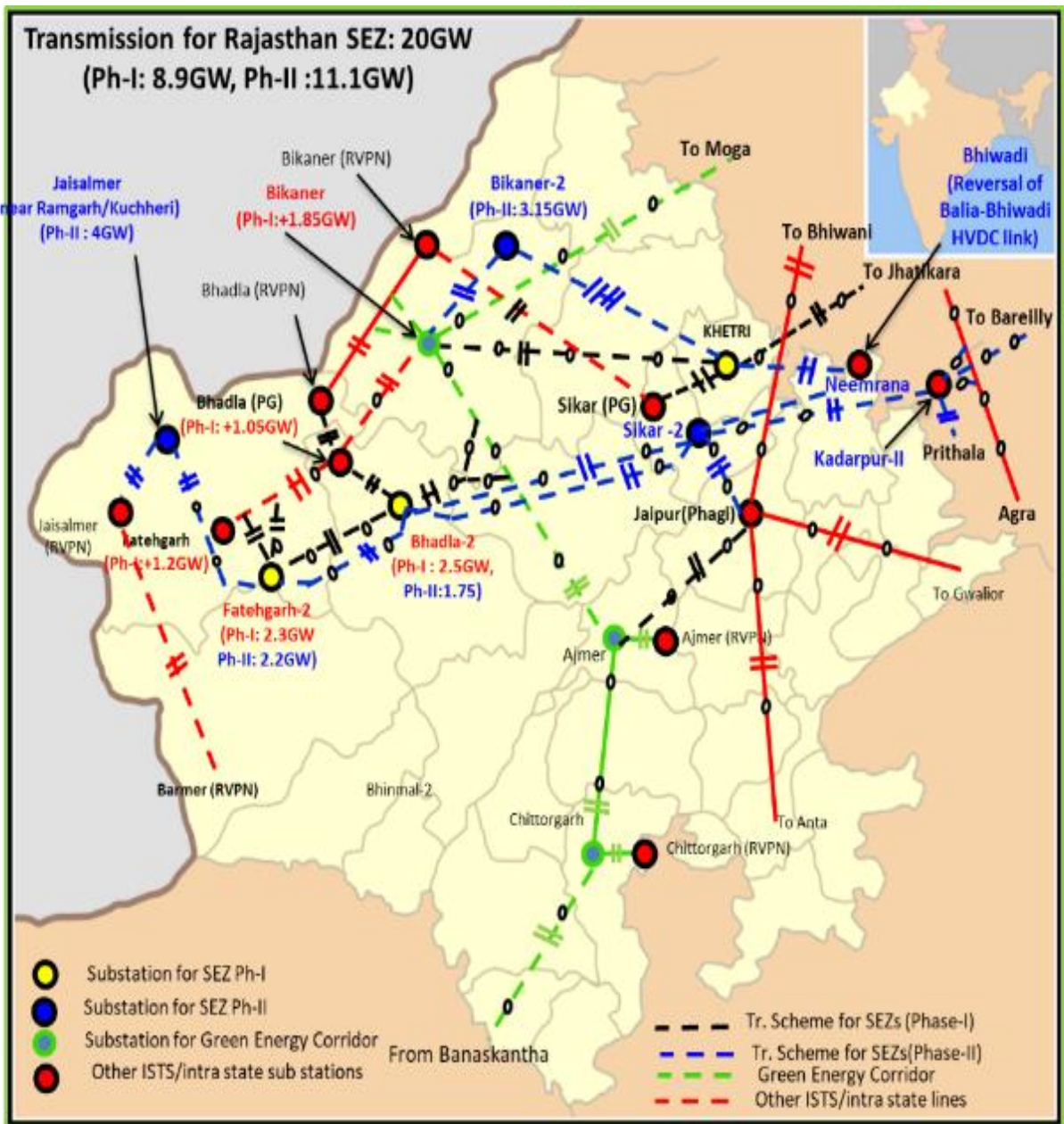
- i) Establishment of 765/400/220kV 3x1500 MVA, 8x500 MVA pooling station at suitable location near Ramgarh/Kuchheri in Distt Jaisalmer (Ramgarh-II PS)
- ii) Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Sikar (Sikar-II Substation)
- iii) Establishment of 765/400kV, 2x1500MVA substation at suitable location near Kadarapur (Kadarapur-II substation)
- iv) Establishment of 400/220kV, 7x500MVA pooling station at suitable location near Bikaner (Bikaner-II PS)

- v) Augmentation with 765/400kV, 2x1500MVA transformer (5th & 6th) at Fatehgarh-II PS
- vi) Augmentation with 400/220kV, 4x500MVA transformer at Fatehgarh-II PS
- vii) Augmentation with 765/400kV, 2x1500MVA transformer (4th & 5th) at Bhadla-II PS
- viii) Augmentation with 400/220kV, 4x500MVA transformer at Bhadla-II PS
- ix) Ramgarh-II PS –Fatehgarh-II PS 765 kV D/c Line
- x) Ramgarh-II PS – Jaisalmer-II (RVPN) 400 kV D/c Line (Twin HTLS)
- xi) Fatehgarh-II PS – Bhadla-II PS 765kV D/c line (2nd)
- xii) Bhadla-II PS – Sikar-II 765kV 2xD/c line
- xiii) Sikar-II – Kadarapur-II 765kV D/c line
- xiv) Sikar-II – Neemrana 400kV D/c line (Twin HTLS)
- xv) Sikar-II- Phagi 765kV D/c line
- xvi) LILO of 765kV Jhatikara – Agra S/c line at Kadarapur-II
- xvii) Kadarapur-II – Bareilly 765kV D/c line
- xviii) Kadarapur-II – Prithala 400kV D/c line (Twin HTLS)
- xix) Bikaner-II PS – Khetri 400kV 2xD/c line (Twin HTLS line on M/c tower)
- xx) Khetri - Bhiwadi 400kV D/c line (Twin HTLS)**
- xxi) Bikaner-II PS – Bikaner (PG) 400kV D/c line (Twin AL59)
- xxii) Reversal of Polarity of ± 500 kV, 2500MW Balia – Bhiwadi HVDC line upto 2000MW power flow capacity from Bhiwadi to Balia for solar maximized time
- xxiii) 220kV line bays for interconnection of solar projects at Bikaner-II PS (11 nos.), Ramgarh-II PS (14 nos), Fatehgarh-II PS (7 nos) & Bhadla-II PS (6 nos)
- xxiv) Associated reactive compensation (Bus/Switchable line reactors)

Estimated Cost: Rs 12,700 Cr

***There is a space/ROW constraint at Bhiwadi S/s, accordingly other suitable arrangements may need to be explored.*

20.7 Studies has been carried out for solar maximized scenario with solar generation dispatch in Rajasthan ISTS SEZ is considered as 100%, whereas Rajasthan wind generation dispatch is considered as 30% (Intra Solar is considered as 80%). All India Demand is considered as per the 19th EPS of CEA (2021-22). Based on the discussions & past trends, for solar maximized scenario, demand has been considered as about 90% of the peak demand of 19th EPS for various regions except for Northern region where it is considered as about 95% of the peak demand. In the studies, all India transmission network up to 220kV level has been simulated. This includes, existing and well as under construction transmission network incl. high capacity transmission corridors and Green Energy Corridors.



20.8 Considering envisaged RE (wind & solar) capacity addition and to achieve Load-generation balance, Thermal generation dispatch is reduced upto 55%, wherever required. At some of the locations, thermal generation is even needed to be backed down.

20.9 Results of system studies with above proposed transmission scheme for Rajasthan Ph-II SEZ is enclosed at Annexure-XV. From the studies, it is observed that line loadings are in order as per the CEA planning criteria.

20.10 Members may deliberate.

21.0 Operational Feedback (NR Region):

S. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Remarks
1	400kV Dadri-Greater Noida	All time	High MW loading also restricting flow of Rihand-Dadri HVDC. In last quarter loading of line remained in range of 800-	Remarks: Switchgear changes at Dadri, Gr. Noida and Nawada need to be carried out so that any undue event/disturbance due to high line

			1400MW for most of the time. 400kV Gr. Noida-Nawada is being opened on no. of occasions to control loading of 400kV Dadri-Gr. Noida as described in Section 2.2.	loadings may be avoided (detailed in section 7.(i)). However, as per information available with NRLDC, NTPC Dadri is replacing old switchgears by new switchgears of same ratings in Jan'19. Thus, issue of lower switchgear ratings would still persist. In a meeting held in CEA with representatives from CTU, HVPNL, POSOCO on 11.4.2019 regarding Augmentation of 400 kV substation at Nawada, HPNL agreed to replace the switchgear at Nawada. UPPTCL may take up switchgear upgradation at Gr. Noida.
2	400kV Anpara-Obra	all times	High MW loading. Lines from Anpara TPS are twin moose line for which thermal limit is ~850MW. Loading of Anpara-Obra increases in case of N-1 contingency of already heavily loaded Anpara-Sarnath 1 & 2 or Anpara-Mau. In an incident on 14.10.2018, complete outage of 400kV Obra substation had taken place, which resulted in outage of all elements at station for several weeks.	Commissioning of already planned 765kV Anpara D – Unnao S/C needs to be expedited. UPPTCL may update.
	400kV Anpara-Sarnath D/C 400kV Anpara-Mau line 765kV Anpara C-Unnao line	all times	High MW loadings on these lines and under N-1 contingency of any of line, loading on 400kV lines from Anpara increases substantially.	Commissioning of already planned 765kV Anpara D – Unnao S/C needs to be expedited. UPPTCL may update.
	400kV Anta-Kota line	All times	400kV Anta-Kota (twin moose) conductor was synchronised on 09.07.2018. It remains heavily loaded as all remaining 400kV lines connected at Anta are transferring power to Anta. Loading of this line remains in range of 800-900MW (close to thermal limits) under high generation in Chhabra-Kawai-Kalisindh complex. Under N-1 contingency of 765kV Anta-Phagi D/C line loading on 400kV Anta-Kota would cross thermal	400kV Anta-Kota and Kota-Chhabra lines were charged as 400kV Anta-Chhabra through tie bay at 400kV Anta on suggestion of NRLDC to reduce loading of 400kV Anta-Kota. Rajasthan SLDC had incorporated the same from 26 th Nov'18 for few days and after that main bays at Anta station were again closed. It can be observed from the graph that the flow on Chhabra-Kota was in the range of 300-500 MW whereas, it was 600-900 MW on Anta-Kota. In 154 th OCC meeting, Rajasthan SLDC

			limits. This is described in detail in section 7.	representative informed during that time loading of 400kV Kawai-Chhabra was high (~500-600MW) especially under low generation at Chhabra, therefore, they had again closed main bays at Anta.
	Underlying network of following substation is not available		Underlying 220kV network not available: 1. Bhiwani 2. Jind (PG) 3. New Wanpoh (PG) 4. Kurukshetra(PG) 5. Gr. Noida (765/400/220)	
ICT Constraints				
S. No	ICT/Constraint	Season/ Antecedent Conditions	Description of the constraints	Remarks
1	400/220kV Rajpura	Most time	Rajpura has 2*500MVA ICTs. Due to closure of Bhatinda TPS & 2 units of Ropar TPS, power flow through Rajpura ICTs has increased. Moreover, one 500MVA ICT at Dhuri has remained under outage for most time. Thus, loading on Rajpura ICT remained above N-1 contingency limits even in comparatively lower demand season in Punjab.	New already planned 3 rd ICT at Rajpura shall be expedited. PSTCL may respond
2	400/220kV Azamgarh	All Time	Azamgarh has two ICTs one of 315MVA and another of 500MVA; Total loading is in range 400-600 MW. It has N-1 compliance issues throughout the year.	Capacity enhancement of 2 nd ICT (315MVA to 500MVA) has been completed on 02.01.2019 by UP which has helped to relieve N-1 non-compliance issue at Azamgarh. Although in summer/monsoon months the loading may still be above N-1 contingency limit. UPPTCL may respond.

	765/400kV Phagi	Most time (Nov & Dec)	<p>Two ICTs of 1500MVA capacity each at 765/400kV Phagi S/s and not N-1 compliant beyond ~1960MW.</p> <p>Since commissioning of 400kV Phagi-Heerapura D/C & 400kV Phagi-Ajmer D/C and significant generation addition (~1000MW) at Chhabra Super Critical, loading of 765/400kV ICTs at Phagi has increased. On few occasions due to high loading of ICTs at Phagi, 400kV lines are also being opened to control loading.</p>	3 rd planned ICT of 1500MVA capacity at Phagi should be expedited. RVPN may respond.
	Reliability issues due to prolonged outage of ICT at 400/220kV Dhuri S/s		<p>3*500MVA ICTs have been commissioned at Dhuri. 500MVA ICT-2 at Dhuri was out since 19.8.17 and revived on 29.10.18. However, ICT-3 at Dhuri has again got out since 08.12.18. Effectively there has been only two out of three ICTs in service at Dhuri for most time since last one and half year.</p>	As per Punjab SLDC, when three ICTs were in service at Dhuri, one ICT had been kept at different bus (split-operation) so as to reduce fault level at 220kV side as suggested by their protection department.
	Reliability issues due to prolonged outage of ICT at 400/220kV Akal S/s		<p>Nearly 1980 MW of Renewable Energy (RE) generation (mostly wind) has been commissioned around 400/220kV Akal S/s and normally during high wind period 800-1000 MW power is evacuated through Akal ICTs with N-1 non-compliance issues at Akal. 500MVA ICT-4 and 315MVA ICT-2 at Akal are out since 05.08.18 and 22.08.18 due to fire. Therefore, only two 315MVA ICT are available for evacuation of wind power from Akal. In 150th and 151st OCC meeting, Rajasthan SLDC reported that renewable curtailment had to be done.</p>	Requirement for capacity enhancement of ICTs at Akal considering already planned network in nearby area needs to be studied and planned because N-1 violations are observed every year (especially during high wind) and need to be attended to avoid any renewable curtailments in future. RVPN may update.

3	Single ICTs at following 400kV & above Nodes:		<ul style="list-style-type: none"> • 400kV Rajwest (RVPN) • 400kV Chhabra (RVPN) • 400kV Kalisindh (RVPN) • 400kV Dehar 	<p>In the last meeting, RRVPNL stated that they are planning to establish a new GSS either at a new location or additional 765/400kV ICT at Anta.</p> <p>RVPN may update.</p>
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Minutes of the meeting held on 4th February, 2019 in CEA on RRVPNL proposal for charging of 220kV and 400kV Intra-State Transmission Systems.

List of participants is enclosed at Annexure-I.

- 1.0** CEA welcomed all the participants to the meeting and stated that the meeting has been convened to discuss the following two nos. proposal for which in-principle approval of CEA has been sought by RRVPNL.
- i) Establishment of 220/132/33 kV (1x160 MVA+1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Morak 220kV S/c line at Ranpur (Kota) (3km).
 - ii) 400 kV Double Circuit Interconnection Line between bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor.
 - iii) RRVPNL informed that the above transmission elements works have already been completed and they are ready for commissioning.
- 2.0** **Establishment of 220/132/33 kV (1x160 MVA + 1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Morak 220kV S/c line at Ranpur (3km)**
- 2.1** CEA stated that originally Kota (Rajasthan)-Ujjain (Madhya Pradesh) 220 kV D/C was an inter-regional line. In Rajasthan one circuit of this line was LILO at KTPS. The KTPS-Ujjain circuit so formed was LILO at Morak. In MP both circuits of the Kota-Ujjain 220 kV D/c line has been LILO at Badod and Bhanpura. In this manner, Morak (Raj.)-Bhanpura (MP) and Kota (Raj.)-Bhanpura (MP) has become inter-regional lines.
- CEA has sought information regarding the export and imports of power on the line from RRVPNL and the duration for which shutdown was required for establishing the LILO arrangement. The information received from RRVPNL was also circulated to the members.
- 2.2** RRVPNL had informed the following:
- i) The proposed LILOs are being done in the section, where both the 220 kV lines (Kota -Bhanpur and KTPS–Morak) are on D/C towers (part of original Kota-Ujjain 220 kV D/C line). Two new 220 kV D/C angle towers has already been installed in the exiting span of the line. The line would be de-string between two new angle towers. From the two new angle towers, one no. of 220 kV D/C line from each new tower would be laid to Ranpur on multi-circuit towers. The other works are related to telemetering, communication etc. at Kota (Sakatpur), Morak and KTPS substations.
 - ii) The total shutdown of two days are required for the period 06.02.2019 to 07.02.2019 for carrying out the LILO works at Ranpur.
 - iii) LILO of 132 kV Kota – Mandana S/c line at Ranpur (**charged**) and LILO of 132 kV Mahaveer Nagar – Deoli Manjhi S/c line at Ranpur (on the verge of completion) will provide 132 kV connectivity to Ranpur S/S.
 - iv) Loading on Ranpur 220/132 ICT is expected to be of 56 MW with 220 kV Jhalawar – Morak line open circuited after completion of the proposed LILOs at 220 kV Ranpur substation.
 - v) RRVPNL requested for in principle approval so that the shutdown could be availed on 6th and 7th February 2019 to execute the above works.

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- 2.3 POSOCO stated that, both MP and Rajasthan have done multiple LILO the original Ujjain – Kota 220 kV D/C line. Power flow to the tune of 200 MW have been observed on this line in the past on some occasions in either direction. At Rajasthan end, KTPS being the source point there may be overloading in some section of the line with increase in export of power from Rajasthan. MP and Rajasthan should do load management to avoid such instances of overloading. Both Rajasthan and MP should have pre identified arrangement for load shifting to other areas to control loading of lines under high loading conditions, else necessary transmission strengthening may be planned.
- 2.4 POSOCO further stated that Kota – Bhanpur being an interregional link, with LILO of the line at Ranpur, the metering point will shift from Kota Sakatpur) to Ranpur. On MP side Bhanpur 220 kV substation is the inter-regional point and on Rajasthan side, Ranpur and Modak would become the inter-regional points. POSOCO informed that the Bhanpura 220 kV substation in MP is having single bus configuration, which may affect the reliability of the inter-regional line and suggested double main bus switching scheme at Bhanpura (MP).
- 2.5 POCOSO also emphasized the need for fulfillment of all requirements (including telemetry and statutory clearances) by utilities seeking shut down for reconfiguration / new alignments as per new charging procedure of RLDCs before any shut down so that new elements could be energised immediately after shutdown. RRVPNL agreed for the same.
- 2.6 MPPTCL stated that they have no objections to the RRVPNL proposal of establishment of 220/132/33 kV (1x160 MVA + 1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Modak 220kV S/c line at Ranpur (3km).
- 2.7 MPPTCL further stated that 220/132/33 kV Bhanpura substation has been established with Single Main and Transfer bus scheme but space provisions for establishment of second Main bus is already there which can implemented, if required.
- 2.8 After further deliberations , the following was agreed:
- i) Establishment of 220/132/33 kV (1x160 MVA + 1x40/50 MVA) GSS at Ranpur (Kota) through LILO of Kota –Badod 220kV line at Ranpur (3km) and LILO of KTPS –Modak 220kV S/c line at Ranpur (3km) was agreed in principle. The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.
 - ii) Accordingly, on MP side Bhanpur 220 kV substation is the inter-regional point and on Rajasthan side, Ranpur and Modak would become the inter-regional points. Bhanpur and Modak are existing inter-regional points, whereas Ranpur substation would be new inter-regional point. Therefore, necessary metering arrangement would be done at Ranpur 220 kV substation by RRVPNL/POSOCO/NRLDC/CTU.
 - iii) MPPTCL to implement the 2nd main bus (220 kV) at the existing Bhanpura 220/132/33 kV substation.
- 3.0 400 kV Double Circuit Interconnection Line between Bay 401 & 402 of Chhabra Super Critical Thermal Power Plant (CSCTPP) and Bay 424 & 425 of Chhabra Thermal Power Plant(CTPP) along with 2 x 80 MVAR Bus Reactor.**
- 3.1 CEA stated that RRVPNL has forwarded the above proposal of RUVNL for in principle approval of CEA as the interconnection works has already been completed and is ready for charging. CEA enquired the purpose of the interconnection between CTPP and CSCTPP.

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- 3.2 RUVNL stated that the Interconnection Line between CSCTPP and CTPP has been made to cater to the contingency conditions and the line will be normally in open condition. RUVNL further informed that:
- i) CSCTPP switchgear rating is 50 kA, whereas the switchgear rating of CTPP is 40 kA.
 - ii) 2x80 MVAR bus reactor has been planned at CSCTPP 400 kV switchyard. 1x80 MVAR Bus reactors has already been charged on Bus-1 but the second 1x80 MVAR bus reactor could not be charged as there was some problem in the switching device. The same has been rectified and the 2nd 1x80 MVAR bus reactor would also be charged on Bus-2 in due course.
- 3.3 The short circuit implications with the interconnection of the CTPP and CSCTPP was discussed and it was observed that there is an increase of short circuit level and is about 25 kA at CSCTPP but is well within the design limits. Also with the interconnection, there is flow about 350 MW power from CSCTPP to CTPP switchyard.
- POSOCO stated that at present 400 kV Chhabra-Anta-Kota line is bypassed at Anta to avoid high loading on Anta-Kota section and the same need to be continued.
- 3.4 POCOSO also emphasized the need for fulfillment of all requirements (including telemetry and statutory clearances) by utilities seeking shut down for reconfiguration / new alignments as per new charging procedure of RLDCs before any shut down so that new elements could be energised immediately after shutdown. RUVNL agreed for the same.
- 3.5 After deliberations, the following was agreed:
- i) 400 kV Double Circuit Interconnection Line between Bay 401 & 402 of Chhabra Super Critical Thermal Power Plant and Bay 424 & 425 of Chhabra Thermal Power Plant along with 2 x 80 MVAR Bus Reactor was agreed in principle.
 - ii) Interconnection Line between CSCTPP and CTPP has been made to cater to the contingency conditions and would remain open in normal condition.
 - iii) The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.

Meeting ended with thanks to the chair.

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List of participants of the meeting held on 4th February, 2019 in CEA on RRVPNL proposal for charging of 220kV and 400kV Intra-State Transmission Systems.

S. No.	Name (S/Shri)	Designation
CEA		
1.	Awdhesh Kumar Yadav	Director (PSPA-I)
2.	Manjari Charturvedi	Director (PSPA-I)
3.	Jitesh Shrivastava	Assistant Director-I
CTU		
4.	Rajesh Verma	Sr. DGM
RVPN		
5.	S.C. Sharma	SE(P&P)
6.	Om Prakash Mahela	AEN
NRLDC, POSOCO		
7.	Rajeev Porwal	GM
8.	M.M. Hassan	GM
9.	Rahul Chakrabarti	Manager
ATL		
10.	L.N. Mishra	Head – Transmission Business
11.	Sameer Ganju	AVP

Minutes of meeting held on 19th December, 2018 to discuss the issues regarding commissioning of newly constructed/under construction transmission lines of Punjab State Transmission Corporation Limited (PSTCL).

The list of participants is enclosed as Annexure – I.

- 1.0 Chief Engineer (PSPA-I), CEA welcomed the participants to the meeting. He stated that PSTCL vide their email dated 13.12.2018 has sought CEA's permission for energization of three nos. of transmission lines, which have been completed and ready for commissioning and requested PSTCL to update the status of these lines.
- 2.0 PSTCL informed that they have completed the construction of following 220 kV lines and for commissioning of these lines POSOCO has sought CEA/NRSCT approval. Therefore, PSTCL has requested CEA for grant of in-principle approval.
 - a) Ludhiana (PG) (400kV) - Doraha, 220 kV S/C line - 27.819 km conductor 0.4sq" (Zebra)
 - b) Moga (PG) (400 kV) - Mehal Kalan 220 kV D/C line - 52.9 km conductor 0.4sq" (Zebra)
 - c) Goindwal Sahib - Bottianwala, 220 kV D/C line - 64.735 km conductor 0.4sq" (Zebra)
- 3.0 PSTCL also informed that following 220 kV line are under construction and are likely to be completed soon.
 - a) Ludhiana (PG) (400 kV) – Sahnewal 220 kV (2nd Circuit) line - 6.5 km conductor 0.5sq" (Moose)
 - b) LILO of 2nd circuit of Jalandhar (PG) (400 kV) (Kartarpur)- Kotla Jagan 220 kV line at Kartarpur – 220 kV D/C
- 4.0 POSOCO stated that at present the transformation capacity at Ludhiana (PG) is 1445 MVA (3x315+1x500 MVA) and during the last paddy season, the peak loading observed at Ludhiana (PG) was around 1100 MW and with the addition of one more 220 kV feeder to Doraha, the loading on the transformers may increase further.
- 5.0 CEA stated that from the load flow studies submitted by PSTCL, it is observed that power flows from Ludhiana (PG) remain more or less same with the implementation of Doraha line. It is seen that there is redistribution of power among various feeders. Further, in case there is increase in power flow from Ludhiana (PG) especially during paddy season, augmentation of transformation capacity may be taken up to make the system N-1 compliant.
- 6.0 On a query about availability of 220 kV bay at Ludhiana (PG), CTU informed that out of 9 no. of 220 kV bays at Ludhiana (PG), at present 7 bays have been utilized and one no. of 220 kV bay will be utilized by Ludhiana – Dohara 220 kV S/C line and one no. of bay is yet to be utilized by PSTCL. Regarding the issue raised by POSOCO about 'N-1' non-compliance at Ludhiana (PG), CTU informed that at Ludhiana (PG) 400/220 kV there is space constraint and no addition of transformer is possible. However, transformation capacity at Ludhiana (PG) can be augmented by replacement of existing 315 MVA transformers with 500 MVA transformer or PSTCL may plan for shifting of load / re-arrangement of feeders to reduce loading on Ludhiana (PG).

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- With regard to Moga (PG) (400 kV) - Mehal Kalan 220 kV D/C line, PSTCL stated that Mehal Kalan is presently connected with Pakkhowal 220 kV S/S, which in turn is getting feed from Ludhiana (PG). The above line would improve the reliability of power supply to Mehal Kalan.
- 8.0 CEA stated that Moga (PG) 400/220 kV S/S is having a transformation capacity of 1565 MVA (1x250+1x315+2x500) and in 39th meeting of SCPSPNR, PSTCL has informed about implementation of Moga – Mehal Kalan 220 kV D/C line for utilization of 2 no. of 220 kV bays at Moga (PG). Further system studies submitted by PSTCL do not indicate overloading of existing transformer at Moga (PG) and would be N-1 compliant.
- 9.0 Regarding Goindwal Sahib - Bottianwala, 220 kV D/C line, PSTCL informed that Goindwal Sahib (2x270 MW) intra-state generating station is presently connected to Chhola Sahib and Sultanpur through 220 kV D/C lines. 220 kV Goindwal Sahib - Bottianwala D/C line would provide direct feed to the load at Bottianwala and improve the reliability of power evacuation from Goindwal Sahib generating station.
- 10.0 CEA stated that in 2nd Meeting of NRSCT held on 13.11.2018, following PSTCL proposal along with re-conductoring of two circuits of 220 kV between Ludhiana (PG) and Lalton Kalan with high capacity HTLS conductor was agreed.
- Bypassing of 3rd 220 kV circuit between Ludhiana (PG) and Lalton Kalan at Lalton Kalan
 - Bypassing of Lalton Kalan - Sahnewal 220 kV S/C line at Lalton Kalan
 - Connect Ludhiana (PG) - Lalton Kalan and Lalton Kalan - Sahnewal 220 kV lines so as to form Ludhiana (PG) (400 kV) - Sahnewal 220 kV line (2nd Circuit).
- 11.0 PSTCL stated that one circuit of Jalandhar (Kartarpur) (PG) (400 kV) - Kotla Jangan 220 kV D/C line has already been LILOed at Kartarpur (PSTCL) S/s and now they are implementing LILO of 2nd circuit of Jalandhar (Kartarpur) (PG) (400 kV) - Kotla Jangan line at Kartarpur (PSTCL).
- 12.0 After further deliberation, 'in principle' approval for charging of following 220 kV lines was agreed. The same will be put to next meeting of NRSCT for ratification.
- Ludhiana (PG) (400kV) - Doraha, 220 kV S/C line
 - Moga (PG) (400 kV) - Mehal Kalan 220 kV D/C line
 - Goindwal Sahib - Bottianwala, 220 kV D/C line
 - Ludhiana (PG) (400 kV) – Sahnewal 220 kV (2nd Circuit) line formed by bypassing at Lalton Kalan as mentioned above.
 - LILO of 2nd circuit of Jalandhar (PG) (400 kV) (Kartarpur)- Kotla Jangan 220 kV line at Kartarpur – 220 kV D/C

Meeting ended with thanks to the chair.

Annexure I

R.T.O

I/3252/2018(2) List of participants of meeting held on 19th December, 2018 to discuss the issues regarding commissioning of newly constructed/under construction lines of Punjab State Transmission Corporation Limited (PSTCL).

S.No.	Name (S/Shri)	Designation
I CEA		
1	Ravinder Gupta	Chief Engineer (PSPA-I)
2	Awdhesh Kumar Yadav	Director (PSPA-I)
3	Manjari Chaturvedi	DD (PSPA-I)
4	Priyam Shrivastava	AD (PSPA-I)
5	Jitesh Shrivastava	AD (PSPA-I)
II PSTCL		
6	Paramjit Singh	S.E
7	Kamal Krishan	Addl. SE/Plg.
III POWERGRID		
8	Mukesh Khanna	CGM(CTU)
IV NRLDC		
9	Kamaldeep	Manager
10	Gaurav Malviya	Assistant Manager

Meeting ended with thanks to the chair

I/3943/2019

Minutes of Meeting held on 04.02.2019 to discuss the issues pertaining to commissioning of newly constructed / being constructed 220 kV lines of PSTCL

CEA welcomed the participants to the meeting and stated that the meeting has been convened to discuss following two nos. proposal for which in-principle approval of CEA has been sought by PSTCL:

- (i) Upgradation of Alawalpur 132kV S/s to 220kV along with LILO of one circuit of Jalandhar (BBMB)-Pong 220 kV D/c line at Alawalpur 220 kV substation and
- (ii) Upgradation of Badhni Kalan 132kV S/s to 220kV along with LILO of Himmatpura- Moga (PG) 220 kV line at Badhni Kalan 220 kV S/S.

CEA added that PSTCL had informed that works for the above transmission elements have already been completed and they are ready for commissioning. The meeting notice was issued to PSTCL, CTU, POSOCO and BBMB. There was no participation from BBMB in the meeting. The list of participants is enclosed as Annexure.

1. Upgradation of Alawalpur 132kV S/s to 220kV along with LILO of one circuit of Jalandhar (BBMB)-Pong 220 kV D/c line at Alawalpur 220 kV substation

- 1.1. PSTCL stated that existing Alawalpur 132 kV S/s has transformation capacity of 1x25 MVA, 132/66 kV & (12.5+20) MVA, 132/11 kV, which is getting its feed mainly from Jalandhar (BBMB) 220/132kV substation. The 220/132 kV auto transformers at Jalandhar (BBMB) 220/132 kV substation are very old and have almost completed their life. To reduce loading on transformer at 220/132 kV Jalandhar (BBMB) substation, up gradation of existing 132 kV Alawalpur substation to 220 kV voltage level along with provision of 1x100 MVA, 220/66 kV and 2x20 MVA, 66/11 kV transformers has been planned. The 220 kV connectivity has been planned through LILO of existing Jalandhar (BBMB)-Pong 220 kV line at Alawalpur (LILO is 220 kV D/C line - 6 km with 0.4 sq." Conductor).

PSTCL further clarified that with the proposed upgradation, the existing load which was being fed through 132/66/11 kV substation would now be fed through 220/66/11 kV substation. The 66 kV and 11 kV switchyard of the existing 132/66/11 substation would be utilized for establishing the 220/66/11 kV Alawalpur substation. The existing Alawalpur 132/66/11 has been established through LILO of Jalandhar (BBMB)-Bhogpur 132 kV S/C line. After upgradation to 220 kV level, there would be no 132 kV bus at Alawalpur and the Jalandhar (BBMB)-Bhogpur 132 kV S/C line would be bypassed at Alawalpur.

- 1.2. CEA enquired about the connectivity of 66 kV and 11 kV substations, whether radially connected to feeding source or interconnected at others points also. PSTCL clarified that the 66 kV and below network is owned by Punjab State Power Corporation Ltd (POWERCOM). Normally, the substation are connected with other substations but during actual operation, they are radially connected to feeding source.
- 1.3. CEA stated that establishment of 220/66 kV Alawalpur substation is being done with provision of 1x100 MVA, 220/66 kV ICT. In case of outage of the single ICT, feed to 66 kV would be lost and the entire incidental load on 66kV Alawalpur would not be served. CEA suggested installing another ICT at Alawalpur 220/66 kV substation to take care of outage of ICT.

I/3943/2019

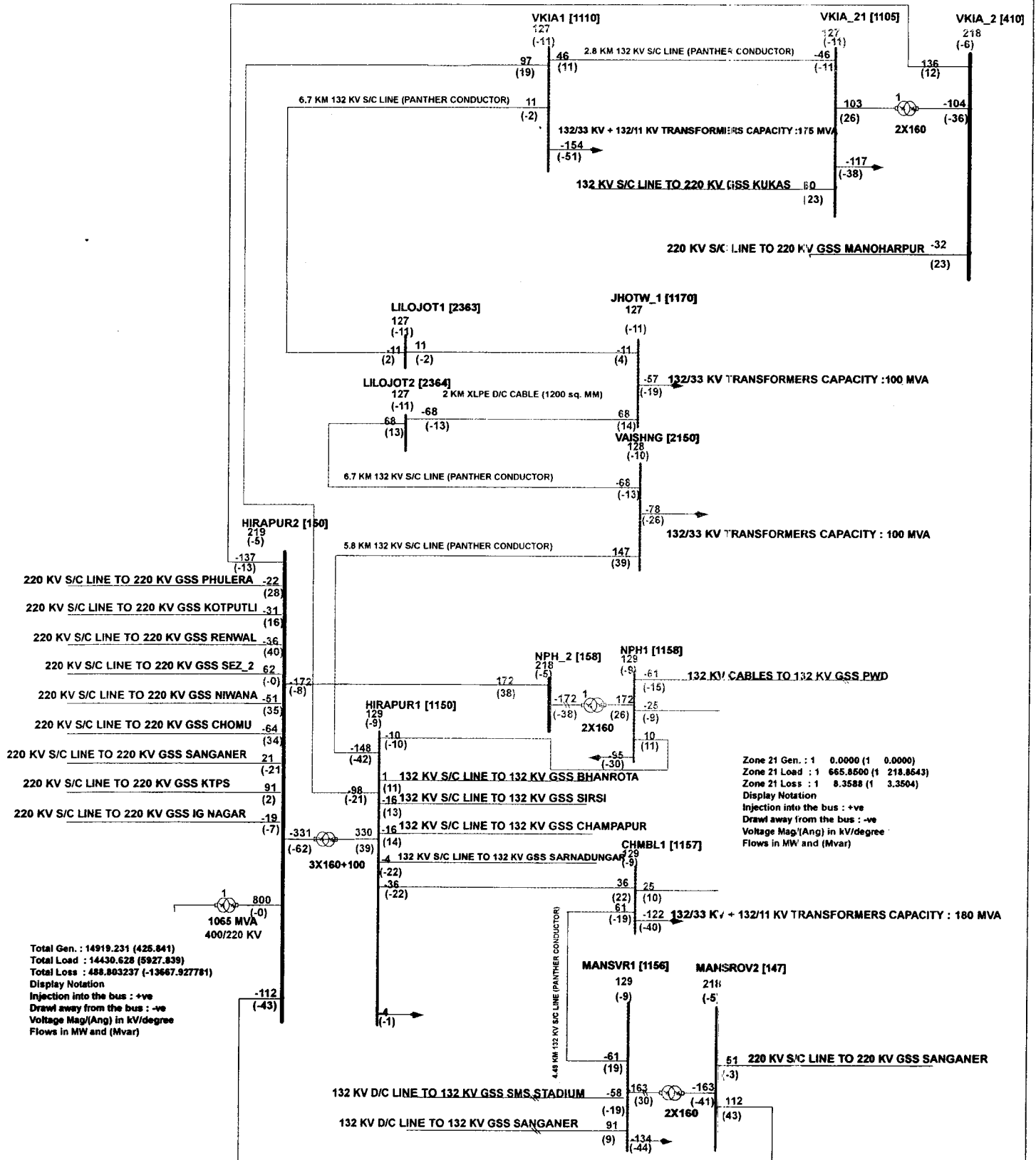
- 1.4. POSOCO and CTU stated that Jalandhar (BBMB)-Pong 220 kV D/c line is owned by BBMB and is an ISTS line. With implementation of LILO of one circuit at Alawalpur 220 kV S/s, Alawalpur would also become a metering point and would require installation of energy meter. PSTCL was advised to coordinate with RLDC and CTU for installation of energy meter at Alawalpur 220/66/11 kV substation.
 - 1.5. On a query from CEA, whether consent of BBMB has been taken for the above proposal, PSTCL confirmed that the proposal has already been discussed with BBMB and BBMB has agreed for the same.
 - 1.6. After further deliberations, the following was agreed:
 - i) Upgradation of existing Alawalpur 132 kV S/s (132/66 kV: 1x25 MVA, 132/11 kV: (12.5+20) MVA) to 220kV (220/66 kV: 1x100 MVA, 66/11 kV: 2x20 MVA) along with LILO of one circuit of Jalandhar (BBMB)-Pong 220 kV D/c line at Alawalpur substation. The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.
 - ii) PSTCL to coordinate with RLDC and CTU for installation of energy meter at Alawalpur 220/66/11 kV substation.
 - iii) PSTCL to intimate all Intra - State transmission schemes, which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 400 kV Intra-State schemes, which are already under implementation and has not been intimated earlier in Standing Committee on Power System Planning, as agenda in the next meeting of NRSCT.
 - iv) PSTCL to include all new/planned 220kV & 132 kV Intra - State transmission schemes as an agenda for the next meeting of NRSCT.
- 2. Upgradation of Badhni Kalan 132kV S/S to 220kV along with LILO of Himmatpura-Moga (PG) 220 kV line at Badhni Kalan 220 kV S/S**
- 2.1. PSTCL stated that existing Badhni Kalan 132 kV substation has an installed capacity of 45 MVA (1x25+1x20), 132/66 kV & 40 MVA (2x20), 66/11 kV. The existing Badhni Kalan 132 kV substation is being fed from 220/132 kV Moga (Singh Wala) substation through 132 kV S/c line. To provide some relief to existing 220 kV S/S Moga (Singh Wala), the upgradation of existing Badhni Kalan 132 kV substation to 220 kV voltage level along with provision of 1x100 MVA, 220/66 KV and 2x20 MVA , 66/11 kV transformers has been planned. The 220 kV connectivity to Badhni Kalan S/S has been planned through LILO of existing Moga (PG) - Himmatpura 220 kV line (formed after LILO of one circuit of Moga (PG)-Jagraon 220 kV D/C line).

PSTCL further clarified that with the proposed upgradation, the existing load, which was being fed through 132/66/11 kV substation would now be fed through 220/66/11 kV substation. The 66 kV and 11 kV switchyard of the existing 132/66/11 substation would be utilized for establishing the 220/66/11 kV Badhni Kalan substation. The new feed to 220 kV Badhni Kalan would be from Moga 400/220 kV substation instead of the existing feed from 220/132 kV Moga (Singh Wala) substation at 132 kV level. With upgradation to 220 kV level, the 132 kV S/C line from Moga (Singh Wala) would not be in use, however it's RoW would be utilized for installation of lines in future.
 - 2.2. CEA enquired about the connectivity of 66 kV and 11 kV substations, whether radially connected to feeding source or interconnected at others points also. PSTCL clarified that the

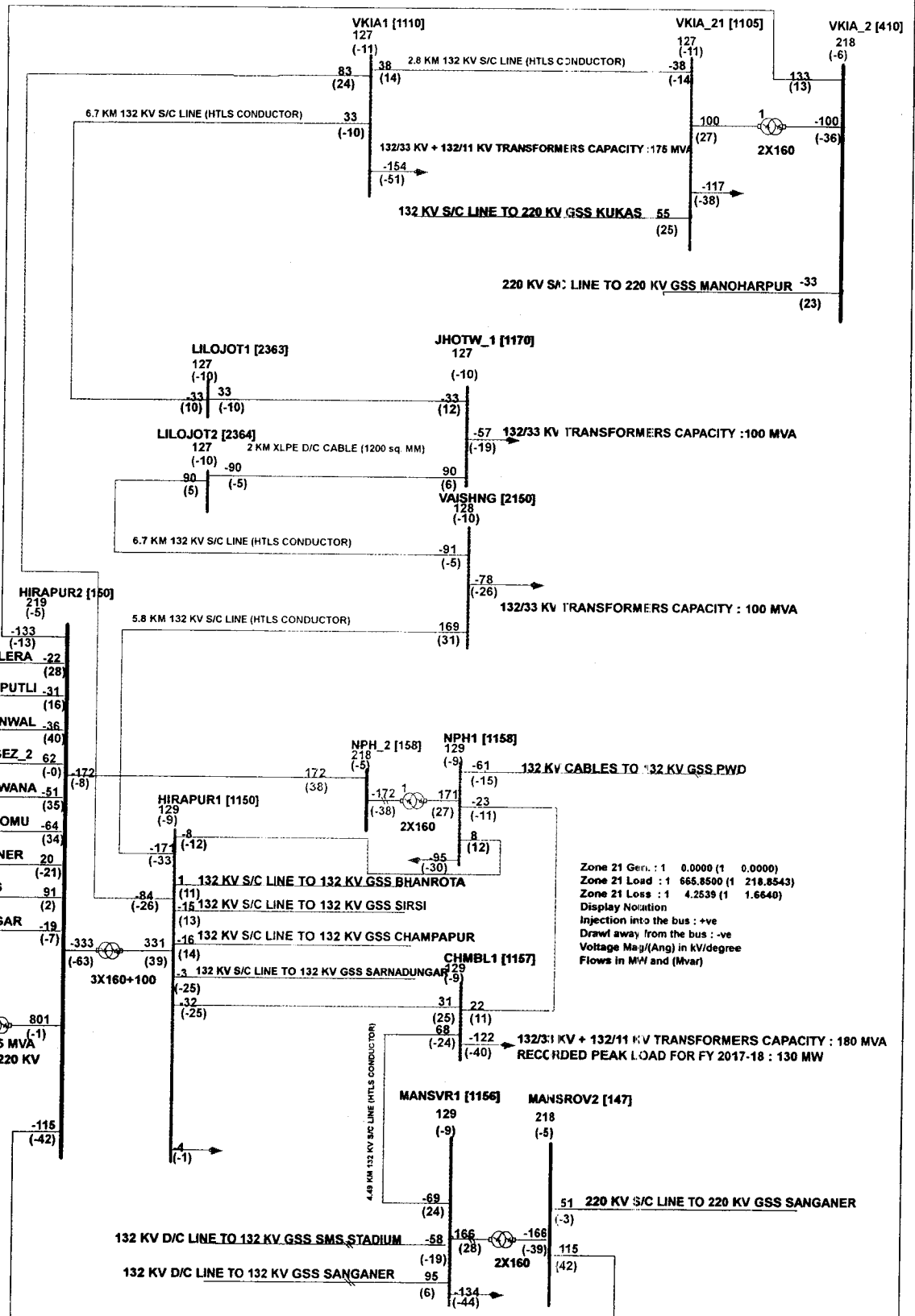
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66 kV and below network is owned by Punjab State Power Corporation Ltd (POWERCOM). Normally, the substations are connected with other substations but during actual operation, they are radially connected to feeding source.

- 2.3. CEA stated that upgradation of existing Badhni Kalan 132 kV substation to 220 kV is being done with provision of 1x100 MVA, 220/66 kV ICT. In case of outage of the single ICT, feed to 66 kV would be lost and the entire load incident on 66kV Badhni Kalan would not be served. CEA suggested installing another ICT at Badhni Kalan 220/66 kV substation to take care outage of single ICT.
- 2.4. POSOCO stated that although the proposal of upgradation of existing Badhni Kalan 132 kV S/S to 220 kV level may relieve 220/132 kV transformers at Moga, however, it may not relieve the 400/220 ICT loading at Ludhiana. During paddy season, to avoid overloading on Ludhiana 400/220 kV ICTs, 220 kV feeds to Jagraon substation are kept open.
- 2.5. POSOCO and CTU stated that the proposal involves LILO of an intra- state transmission line, therefore, there is no issue related to metering. However, PSTCL will be required to intimate the telemetry data of the new substation to NRLDC.
- 2.6. POCOSO also emphasized the need for fulfillment of all requirements (including telemetry and statutory clearances) by utilities seeking shut down for reconfiguration / new alignments of transmission elements as per new charging procedure of RLDCs before any shut down so that new elements could be energized immediately after shutdown. PSTCL agreed for the same.
- 2.7. After further deliberations, the following was decided:
 - i) Upgradation of existing Badhni Kalan 132/66/11 kV substation (132/66 kV: 1x25+1x 20 MVA, 66/11 kV: 2x20 MVA) to 220/66/11 kV (220/66 kV: 1x100 MVA, 66/11 kV: 2x20 MVA) along with LILO of Moga (PGCIL) - Himmatpura 220 kV line at Badhni Kalan substation.
 - ii) The proposal would be formalized in the next meeting of Standing Committee on Transmission for Northern Region.

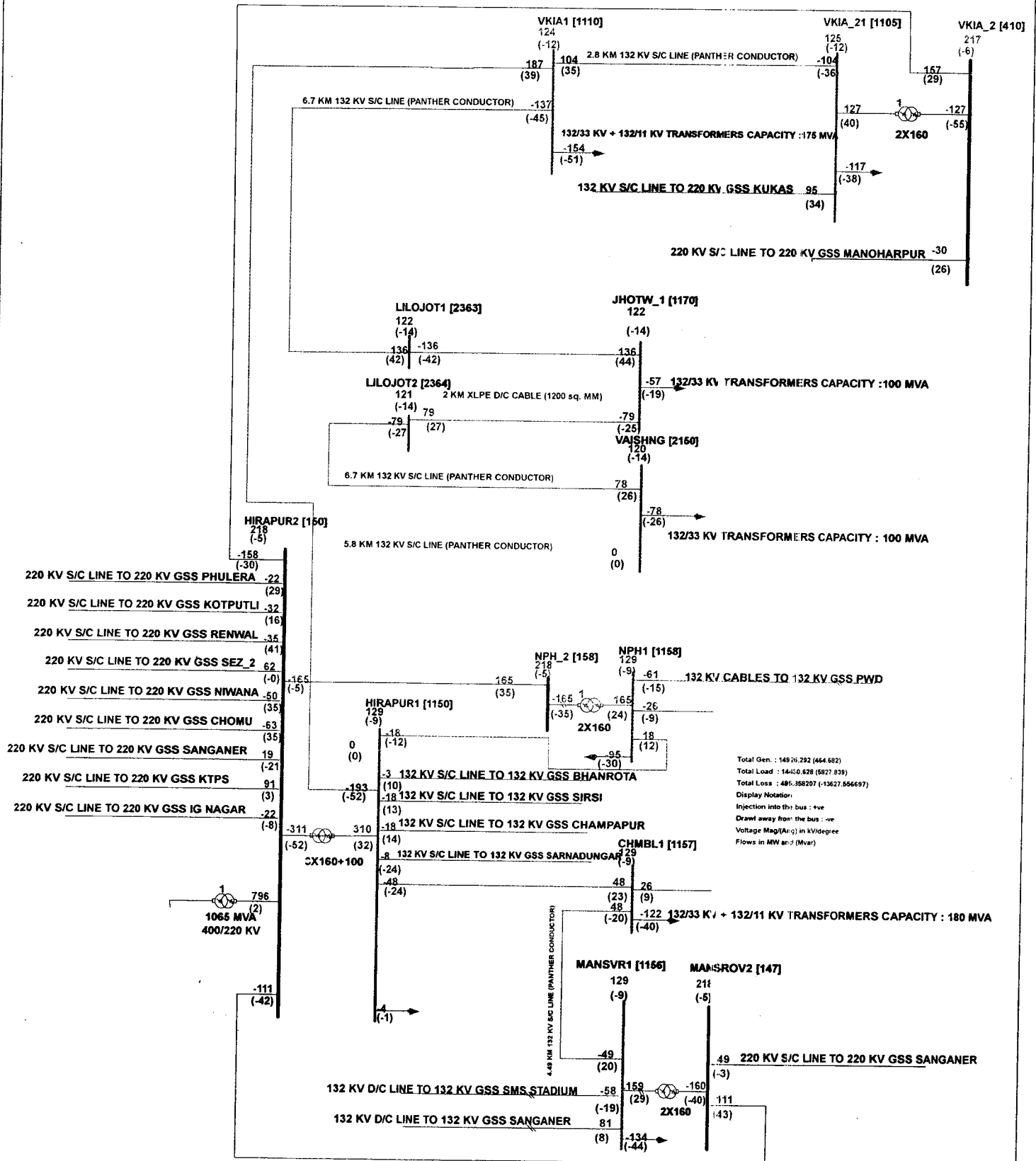


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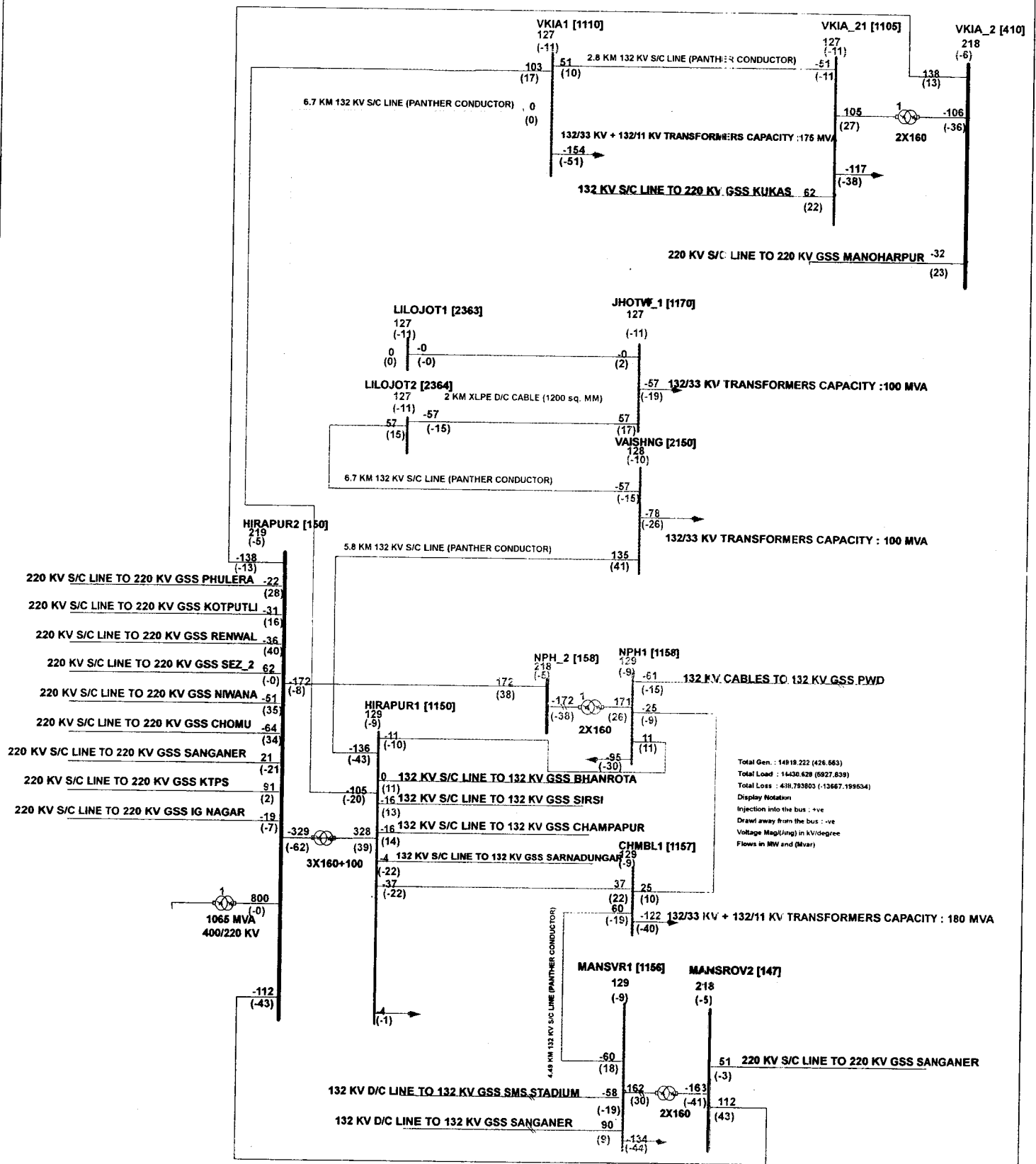


Total Gen. : 14919.582 (422.422)
 Total Load : 14430.628 (5927.839)
 Total Loss : 489.164262 (-13671.626283)
 Display Notation
 Injection into the bus : +ve
 Drawl away from the bus : -ve
 Voltage Mag/(Ang) in p.u/degree
 Flows in MVA and (Angle)

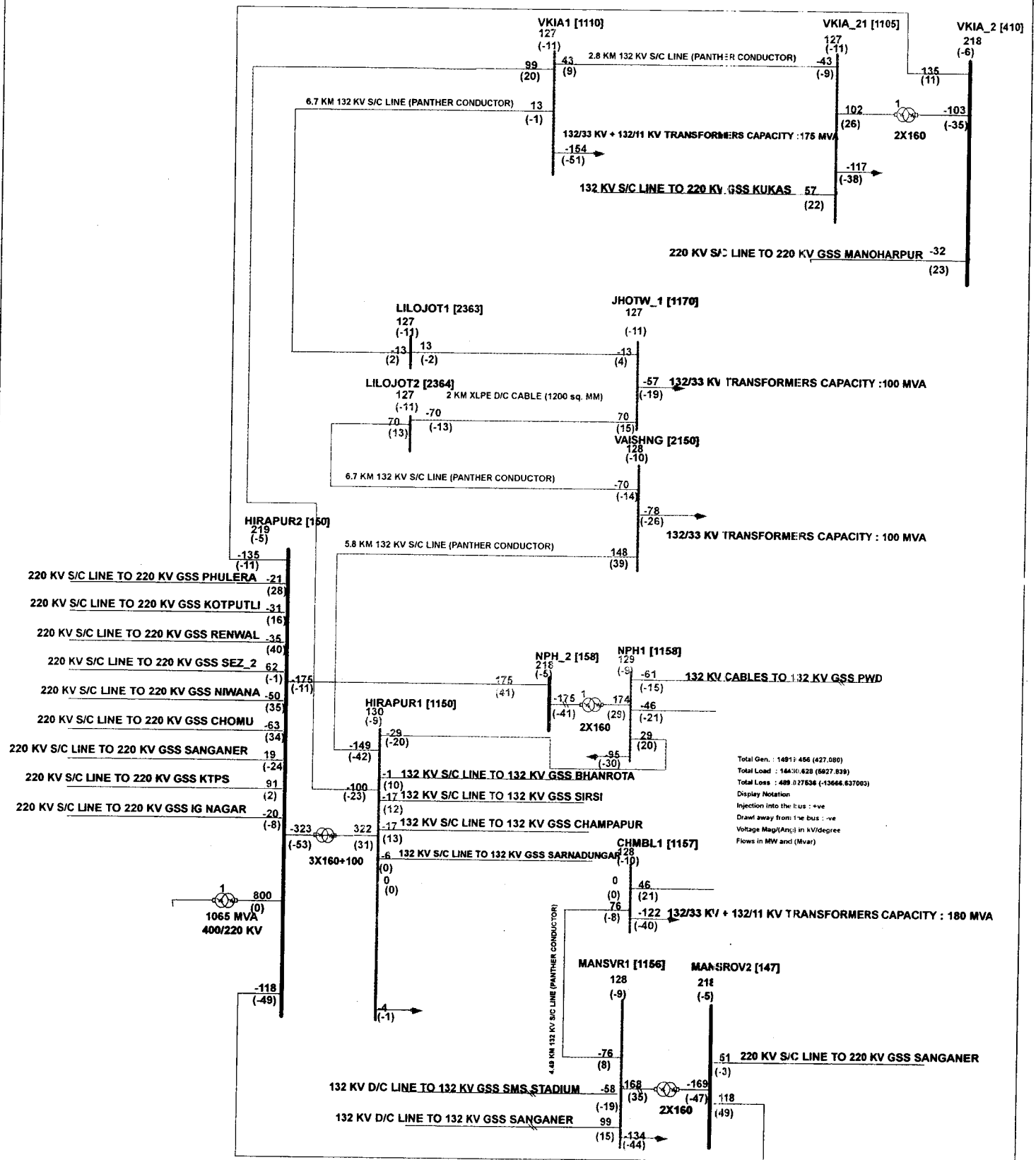
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Power Flow in Transmission Lines

Base Case: The 220 kV GSS Heerapura, 220 kV GSS Mansarover, 220 kV GSS NPH, 132 kV Chambal, 132 kV GSS Vaisahli Nagar, 132 kV GSS Jhotwara, 132 kV GSS VKIA and associated transmission lines have been considered for the proposed study.

Proposed Case: To strengthen the 132 kV network at 132 kV GSS Chambal, Vaishali Nagar, Jhotwara, VKIA the uprating and refurbishment using HTLS conductor of following 132 kV S/C lines are considered

- 132 kV Heerapura-VKIA with LILO at Vaishali Nagar (Route length: 19.276 km).
- 132 kV VKIA-220 kV VKIA (Route length: 2.859 km).
- 132 kV Mansarover-Chambal (Route length: 3.775 km)

Contingency 1: Base case with 132kV S/C Heerapura-Vaishali Nagar line open circuited

Contingency 2: Base case with 132kV S/C VKIA-Jhotwara line open circuited

Contingency 3: Base case with 132kV S/C Mansarover-Chambal line open circuited

The power flow on important lines during the base case, proposed case and contingency conditions is provided in Table below.

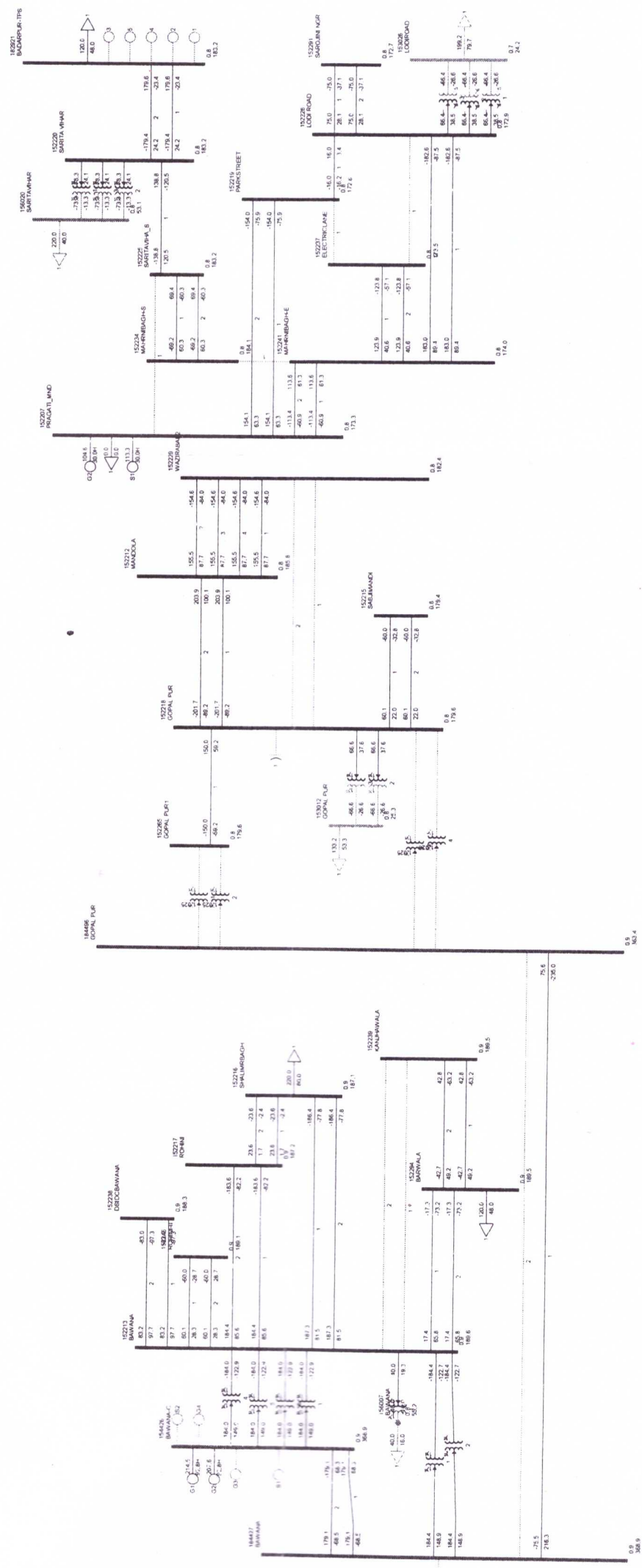
S. No.	Particulars	Base Case	Proposed Case	Contingency-1	Contingency-2	Contingency-3
A		EXHIBIT-1	EXHIBIT-2	EXHIBIT-1A	EXHIBIT-1B	EXHIBIT-1C
1	132 kV S/C VKIA (220 kV)-VKIA(132 kV) line	46	38	104	51	43
2	132 kV S/C VKIA (220 kV)-Kukas(220 kV) line	-60	-55	-95	-62	-57
3	132 kV S/C VKIA (132 kV)-Heerapura (132 kV) line	-97	-83	-187	-103	-99
4	132 kV S/C VKIA (132 kV)-Jhotwara (132 kV) line	-11	-33	137	0	-13
5	132 kV S/C Jhotwara(132 kV)-vaishali nagar (132 kV) line	-68	-90	79	-57	-70
6	132 kV S/C Vaishali nagar (132 kV)-Heerapura (132 kV) line	-147	-169	0	-135	-148
7	132 kV S/C Heerapura (132 kV)-NPH(132 kV) line	10	8	18	11	29
8	132 kV S/C Heerapura (132 kV)-Chamble(132 kV) line	36	32	48	37	0
9	132 kV S/C NPH (132 kV)-Chamble(132 kV) line	25	23	26	25	46
10	132 kV S/C Chamble (132 kV)-Mansarover(132 kV) line	-61	-68	-48	-60	-76



SLD for Load Flow Study of Existing Network for Last Delhi Peak demand (i.e., 7016MW)



SLD for Load flow study of future Delhi network considering peak demand of 8500MW



0.9
MS.4

0.9
MS.9

Minutes of meeting held on 22nd January, 2019 to discuss the issues related to transmission system for evacuation of power for Bajoli Holi HEP (3x60 MW) of M/s GMR BHPPL in Himachal Pradesh.

The list of participants is enclosed as Annexure-I.

1. Chief Engineer (PSPA-I), CEA welcomed the participants to the meeting. Chief Engineer (PSPA-I) requested HPPTCL and GMR Bajoli Holi Hydro Power Private Limited (GMR BHPPL) to update the status of transmission works and generation projects respectively.
2. HPPTCL informed the following status of transmission works:
 - i. **400/220 kV Lahal Pooling Station:**

Awarded to M/s L&T and is targeted for completion by the end of September, 2019. The torrential rains in Sept, 2017 has damaged the road and hampered 400/220 kV transformers transportation to site from Chamba. However, the 220 kV side works of the 400/220 kV S/s would be completed by January 2019.
 - ii. **Bajoli Holi-Lahal Pooling Station 220 kV D/C:**

Awarded to M/s Apar Industries Ltd. and the line is expected to be commissioned by June 2020.
 - iii. **Lahal P.S. – Chamera P.S. 400 kV D/C line:**

Awarded to M/s Apar Industries Ltd. and the line is expected to be commissioned by March 2021. The stage-I forest clearance has already been obtained and documents for Stage-II forest clearance have been uploaded and clearance is expected by Feb 2019.
 - iv. **Lahal - Budhil 220 kV S/C line:**

Awarded to M/s Apar Industries Ltd. and the line is expected to be commissioned by May 2019.
3. M/s GMR BHPPL informed that the expected commissioning schedule of Bajoli Holi HEP had been shifted from March 2019 to September 2019 due to snowfall and other unavoidable natural constraints. The expected commissioning date of first, second and third unit of Bajoli Holi HEP is September, October and November 2019 respectively. It was informed that only about 900 m of HRT works remains to be completed out of total 16 km. M/s GMR requested HPPTCL to commission the Bajoli Holi – Lahal Pooling Station 220 kV D/C line and Lahal P.S. in matching time frame of September 2019.
4. CEA stated that for implementation of interim arrangement Bajoli Holi – Lahal Pooling Station 220 kV D/C line, 220kV side of 400/220 kV Lahal P.S. and Lahal P.S.- Budhil 220 kV S/c line are required in timeframe of September 2019. As per the commissioning schedule of various elements indicated by HPPTCL, Bajoli Holi – Lahal P.S. 220 kV D/C line is expected by June 2020. To implement the interim arrangement for evacuation of power from Bajoli Holi, this line is critical. Therefore, this line needs to be expedited matching with the commissioning of 1st unit of Bajoli Holi.
5. CTU stated that Chamera III and Budhil HEP has already been granted LTA of 230 MW and 70 MW respectively. Budhil HEP is connected to Chamera III through a 220 kV S/C dedicated line. The injection point for both these HEPs is Chamera III 220 kV Switchyard. Chamera III HEP is connected to 2x315 MVA, 400/220 kV Chamera Pooling Station through 220 kV D/C line with twin moose conductor.
6. HPPTCL informed that their Karian 220/33 kV S/s has already been commissioned and is also connected to Chamera 400/220 kV Pooling Station through 220 kV S/C line. There is an injection of about 20-30 MW of power from Small Hydro Projects (SHPs) at Karian 220/33 kV S/s.

I/3954/2019(6)

CEA, CTU and POSOCO observed that with 70 MW of LTA of Budhil HEP and 230 MW LTA of Chamera III HEP, there is no margin for any additional injection on 220 kV side at 400/220 kV, 2x315 MVA Chamera Pooling Station. Additional injection of power from Bajoli Holi HEP through interim arrangement was possible only in case of reduced generation from Chamera III and Budhil HEP. In the event of outage of one 315 MVA transformer at Chamera III, any additional injection by M/s GMR BHPPL may cause overloading of the other 315 MVA ICT transformer at Chamera 400/220 kV Pooling Station. To avoid overloading of 400/220 kV, 2 x 315 MVA ICTs at Chamera Pooling Station during outage of one 315 MVA ICT (during n-1 conditions) M/s GMR (Bajoli Holi developer) needs to implement necessary Special Protection System (SPS) to back down/trip their generation.

8. M/s GREENKO (Budhil HEP) stated that a joint survey by M/s GMR BHPPL and M/s GREENKO should be undertaken to ascertain hotspots, maximum operating temperature, bus bar rating, circuit breaker rating and other technical parameters of Budhil HEP - Chamera 220 kV S/C line and switchgear rating of Chamera III 220 kV switchyard.
9. POSOCO stated that metering point for Budhil HEP and Bajoli Holi HEP is Chamera – III 220 kV switchyard (ISTS point). M/s GMR (Bajoli Holi HEP developer) needs to arrive at mutual agreement with M/s GREENKO (Budhil HEP developer) for the sharing of the Budhil HEP - Chamera 220 kV S/C line, the dedicated line of Budhil HEP and consent for the same needs to be taken from Central Electricity Regulatory Commission (CERC). Also, M/s GREENKO (Budhil HEP developer) needs to act as lead generator for M/s GMR BHPPL during the period of interim arrangement for energy accounting, scheduling, deviation settlement, billing etc.

After further deliberations, following was agreed:

- a. There is a requirement of interim arrangement during the period from September 2019 to March 2021 as first unit of M/s GMR BHPPL is expected to be commissioned by September 2019, whereas it's planned evacuation system under implementation by HPPTCL is expected to be commissioned by March 2021.
- b. HPPTCL agreed to expedite the completion of Bajoli Holi – Lahal P.S. 220 kV D/C line (completion schedule June 2020) required for implementation of interim arrangement for evacuation of power from Bajoli Holi of M/s GMR BHPPL. HPPTCL also agreed to expedite the completion of Lahal P.S. – Chamera P.S. 400 kV D/C line before or by March 2021.
- c. Special Protection System (SPS) to be implemented by M/s GMR BHPPL during interim arrangement period to back down/trip their generation to avoid overloading of 400/220 kV, 2 x 315 MVA ICTs at Chamera Pooling Station in the event of outage of one 315 MVA ICT.
- d. A joint survey by M/s GMR BHPPL and M/s GREENKO could be undertaken to ascertain hotspots, maximum operating temperature, bus bar rating, circuit breaker rating and other technical parameters for Budhil HEP - Chamera 220 kV S/C line and switchgear rating of Chamera III 220 kV switchyard. The joint survey to quantify the permissible power flow over Budhil HEP - Chamera 220 kV S/C line during interim arrangement.
- e. M/s GMR (Bajoli Holi HEP developer) needs to arrive at mutual agreement with M/s GREENKO (Budhil HEP developer) for sharing of Budhil HEP - Chamera 220 kV S/C line and consent for the same need to be taken from Central Electricity Regulatory Commission (CERC).
- f. Next meeting to further deliberate the issues would be held in May/June 2019.

Meeting ended with thanks to the Chair.

Annexure-I

List of Participants of the meeting held at CEA on 22.01.2019 to discuss the issues related to transmission system for evacuation of power for Bajoli Holi HEP (3x60 MW) of M/s GMR BHPPL in Himachal Pradesh.

S. No.	Name (Shri)	Designation
CEA		
1	Ravinder Gupta	CE(PSPA-I)
2	Awdhesh Kumar Yadav	Director
3	Jitesh Shrivastava	Asstt. Dir.
4	Kanhaiya Singh Kushwaha	Asstt. Dir.
POWERGRID		
5	Mukesh Khanna	Ch. Gen. Manager (CTU-Plg.)
NLDC		
6	N. Nallarasani	Sr. Gen. Manager
7	Rajeev Porwal	Gen. Manager
HPPTCL		
8	Sandeep Sharma	AGM (Planning)
9	Vivek Sharma	Dy. Mgr (Plg.)
GMR BHPPL		
10	Ajaya Kumar Nathain	Head Trans
11	Gopendra Saravat	AVP Trans
12	G. Muralidhar Gupta	AGM
GREENKO		
13	Y.K. Sehgal	ED
14	P.S. Ahluwalia	Vice President
15	Anish Pasrija	DGM

Simulation Study for impact at Dehar S/s due to integrated operation at Kangoo

Date: 16.08.2018

Objective: To assess the impact at Dehar S/s due to integrated operation at Kangoo S/s.

Assumptions: Peak load scenario of NR for winter scenario has been considered for the study.

Studies were performed on present network and expected future network in Kangoo region.

Case study 1: Winter scenario (present network)

Load Generation balance:

S. No.	Description	Considered Values (MW)
1	NR Load	53709
2	NR Generation	43048
3	NR Import	12550
4	HP Load	1650
5	HP Generation	450
6	HP Import	1220
7	Dehar generation (400kV) (660MW)	330
8	Dehar generation (220kV) (330MW)	165
9	Larji generation	62

System of HP with present transmission network operation (bus-split at Kangoo)

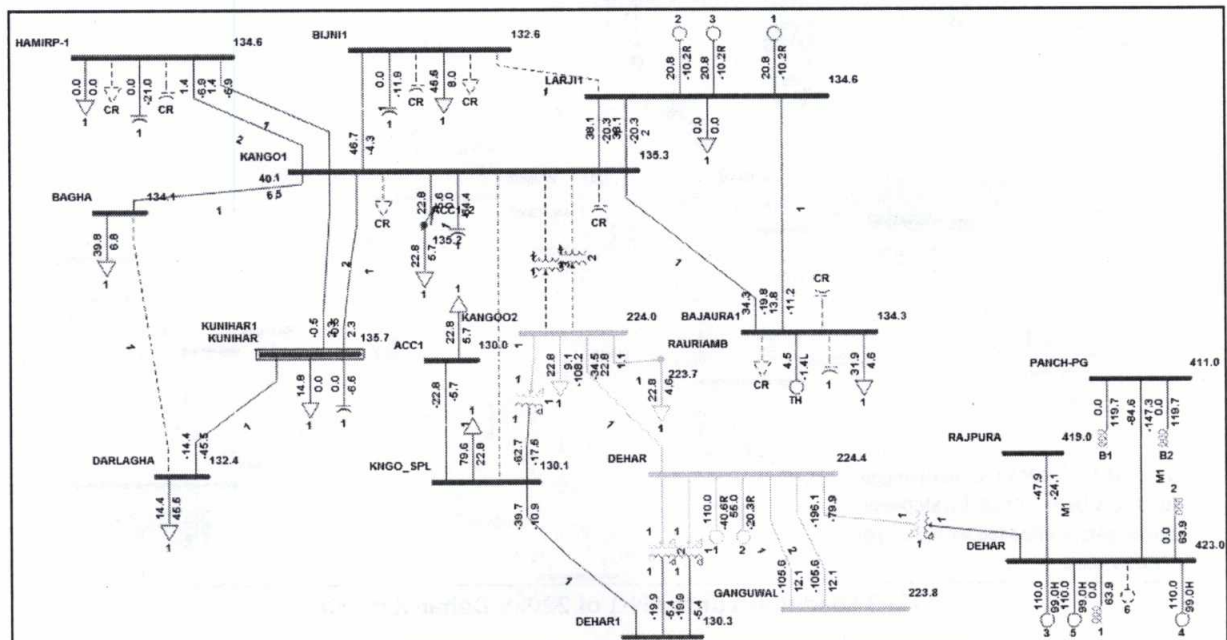


Fig.1 Load flows under present network connectivity

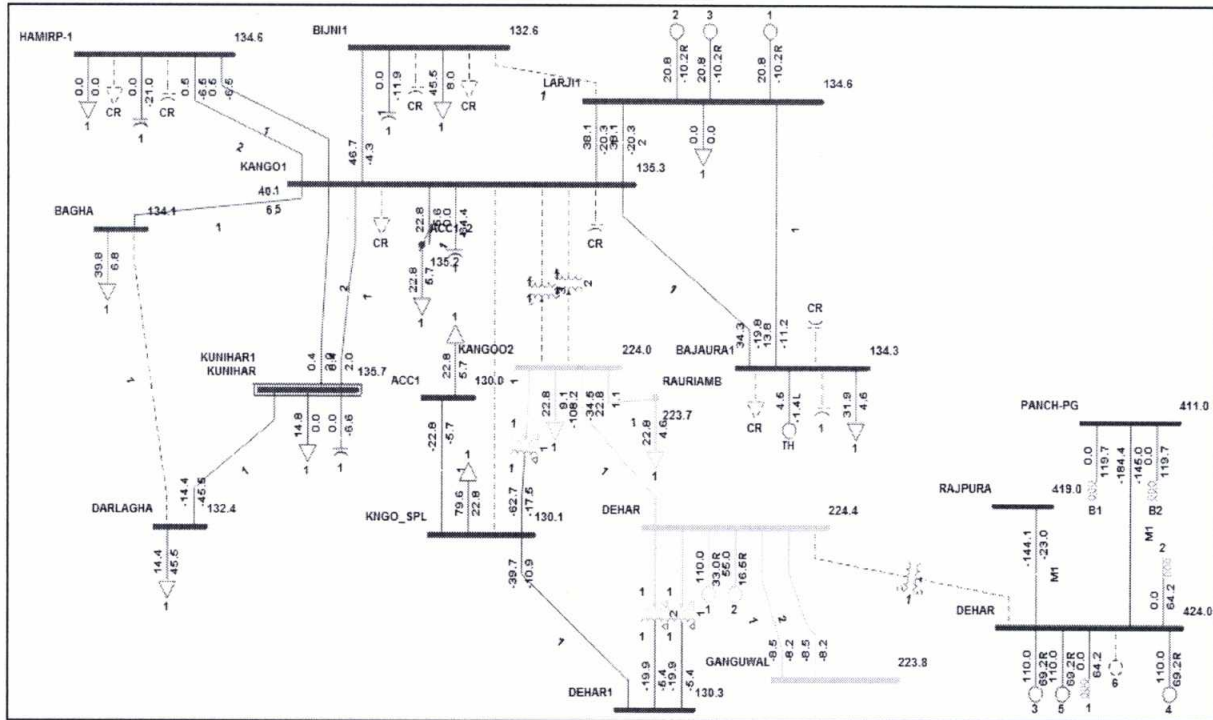


Fig.2 Load flows under N-1 of 400/220kV ICT at Dehar

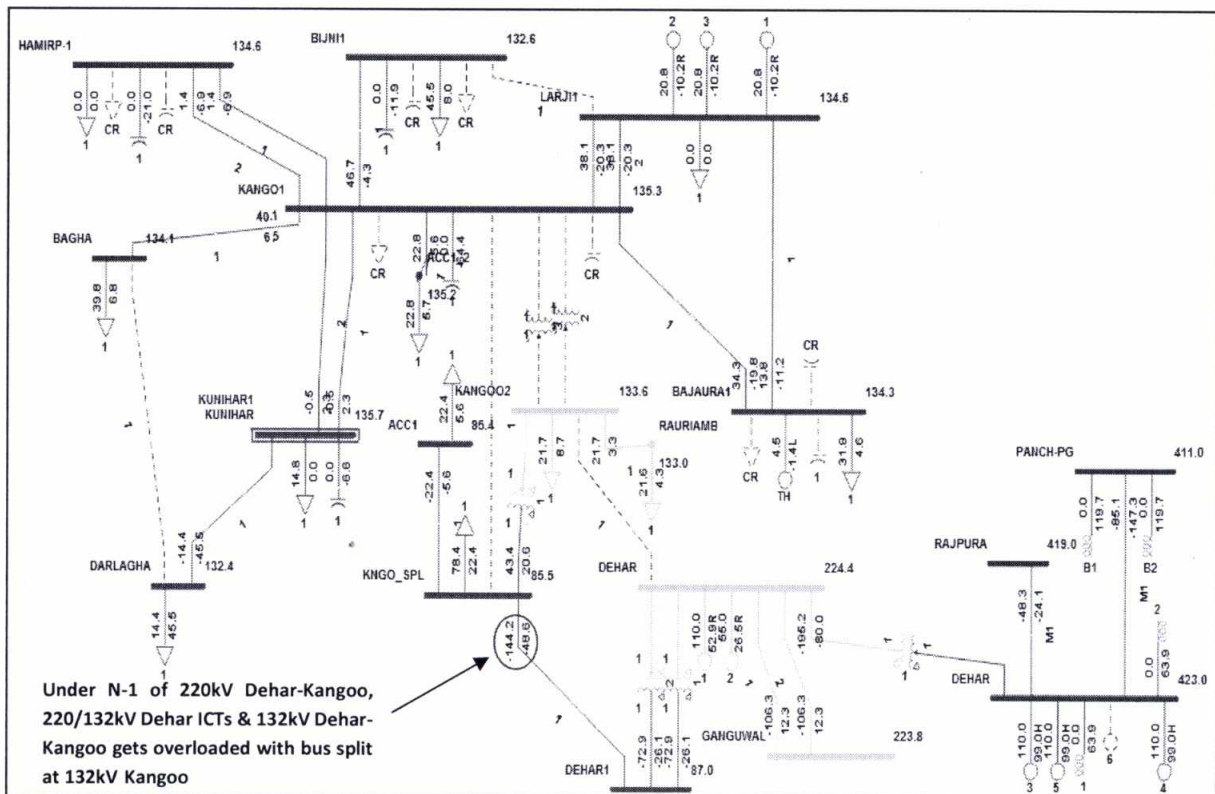


Fig.3 Load flows under N-1 of 220kV Dehar-Kangoo

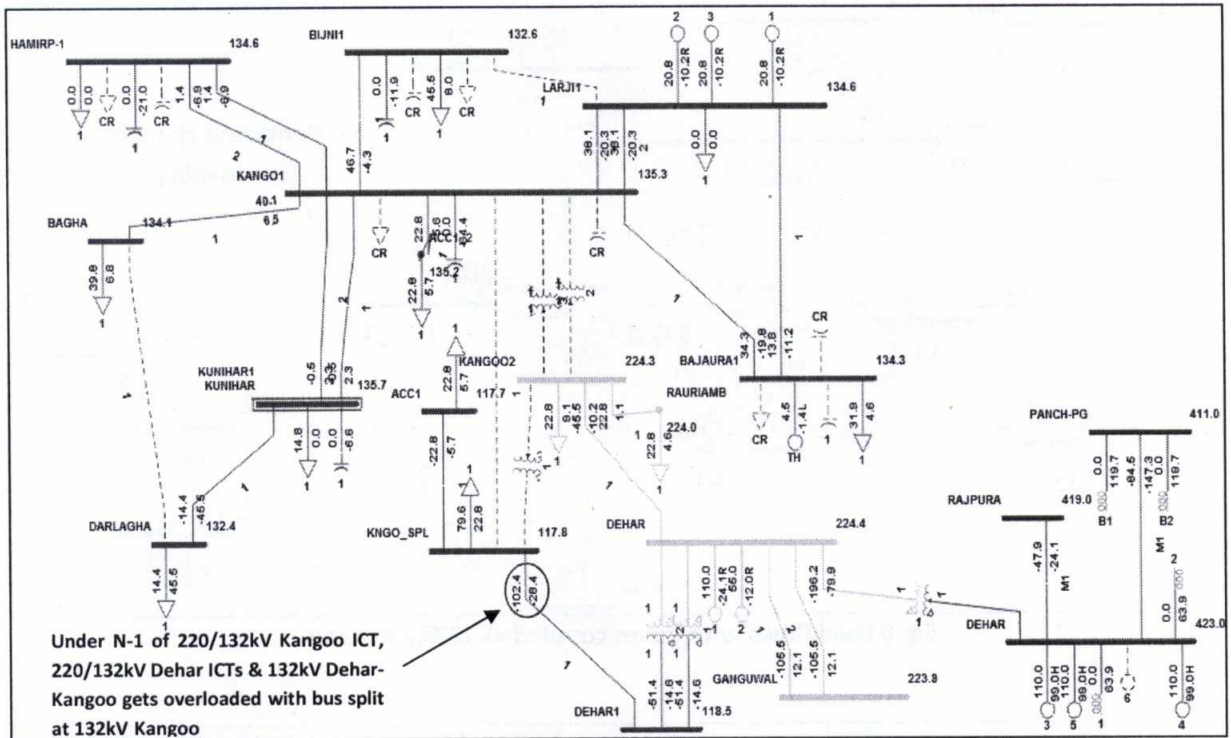


Fig.4 Load flows under N-1 of 220/132kV Kangoo ICT

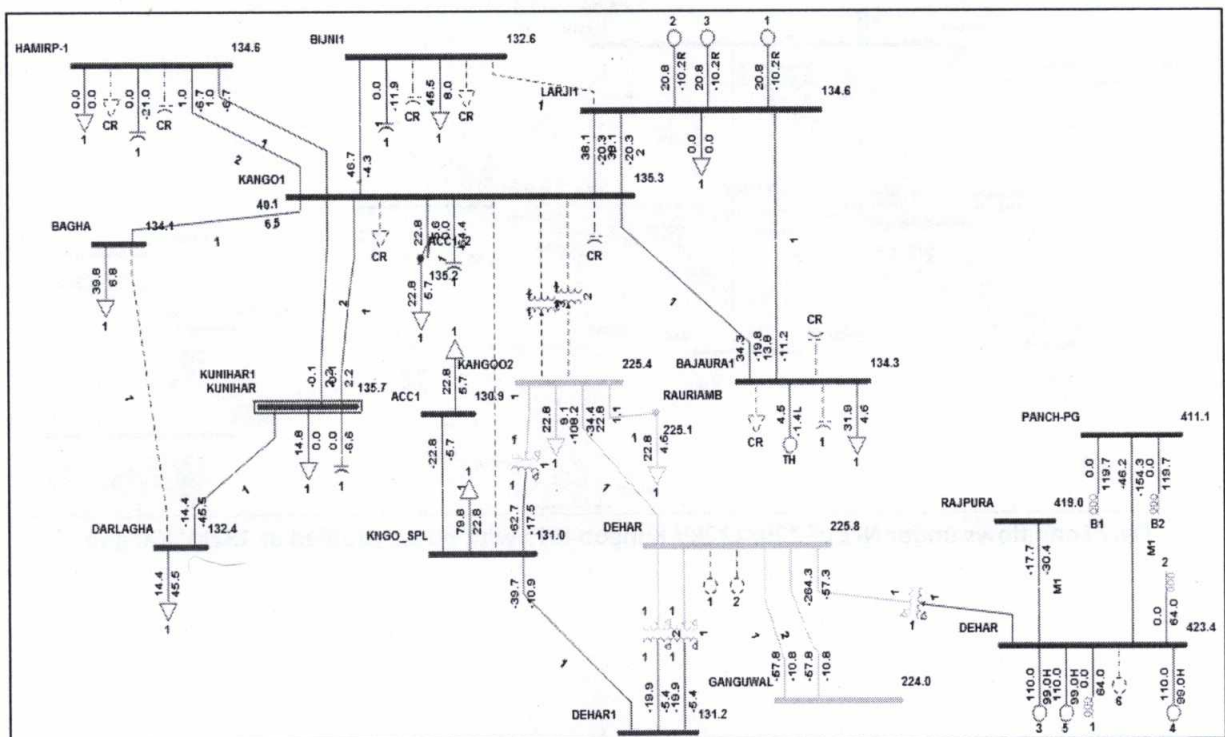


Fig.5 Load flows under no generation at 220kV Dehar

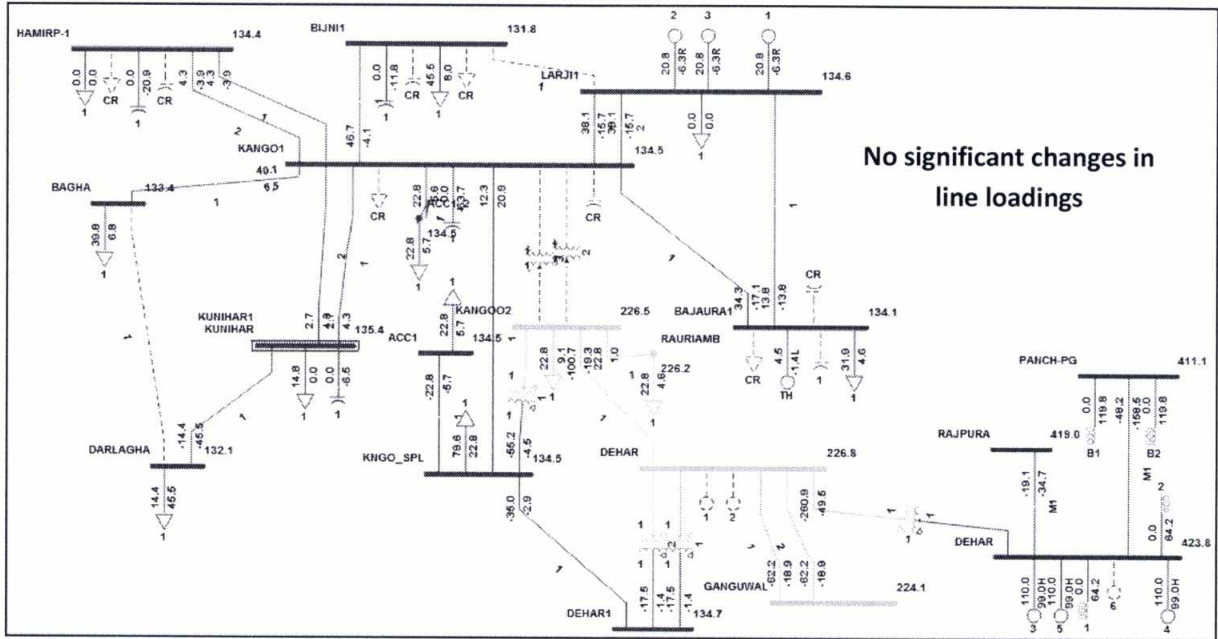


Fig.6 Load flows with buses coupled at 132kV Kangoo

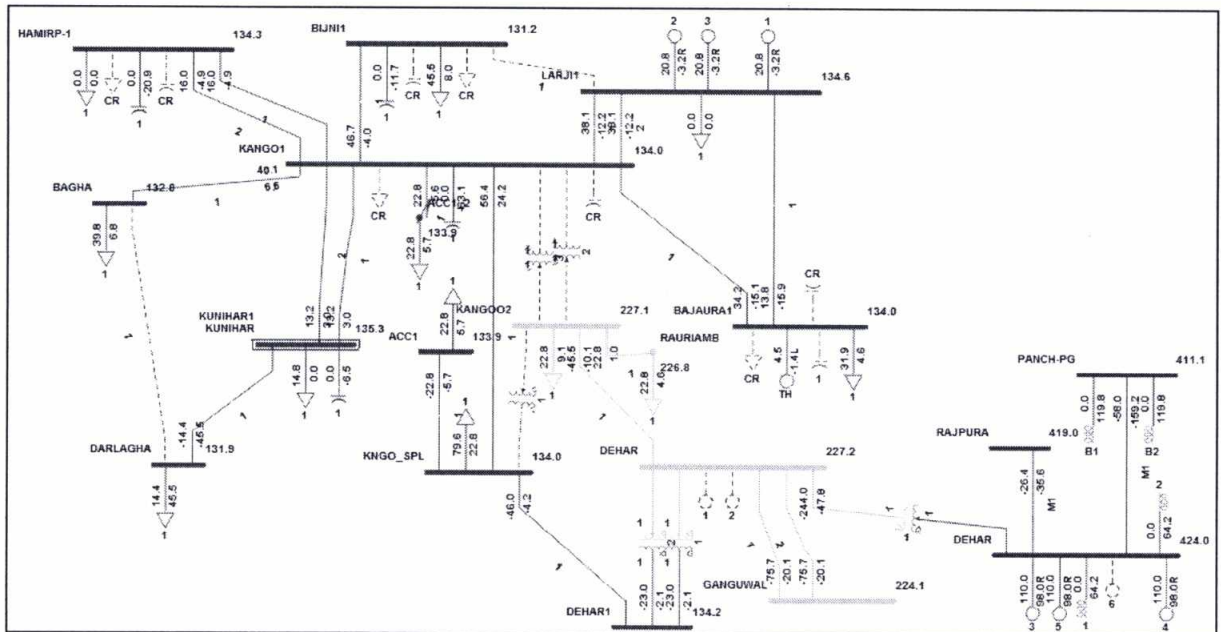


Fig.7 Load flows under N-1 of 220/132kV Kangoo ICTs with buses coupled at 132kV Kangoo

Case study 2: Winter scenario (future network) with bus split at 132kV Kangoo

New connectivity considered:

1. New 220kV Dehar-Kangoo line (220kV Dehar-Kangoo D/C considered)
2. Capacity enhancement at 400/220kV Dehar(BBMB) Substation (2*315MVA considered)
3. Capacity enhancement at 220/132kV Kangoo Substation (2*80+1*100MVA considered)

Load Generation balance:

S. No.	Description	Considered Values (MW)
1	NR Load	53910
2	NR Generation	43048
3	NR Import	12760
4	HP Load	1850
5	HP Generation	450
6	HP Import	1425
7	Dehar generation (400kV) (660MW)	330
8	Dehar generation (220kV) (330MW)	165
9	Larji generation	62

Considering an increase of 10-12% (~200MW) in load of HP after two years load of HP comes out as 1850MW.

Since only one 220kV bus is available at Kangoo S/S, two more ICTs (total 300MVA capacity) which would be commissioned in future would be connected at 220kV level to the same bus, therefore for split operation of ICTs at Kangoo on different buses, it is required that new 220kV bus may be commissioned at Kangoo S/s.

Thus, for future scenario the case of 132kV coupled operation of buses at Kangoo has been considered for simulation studies.

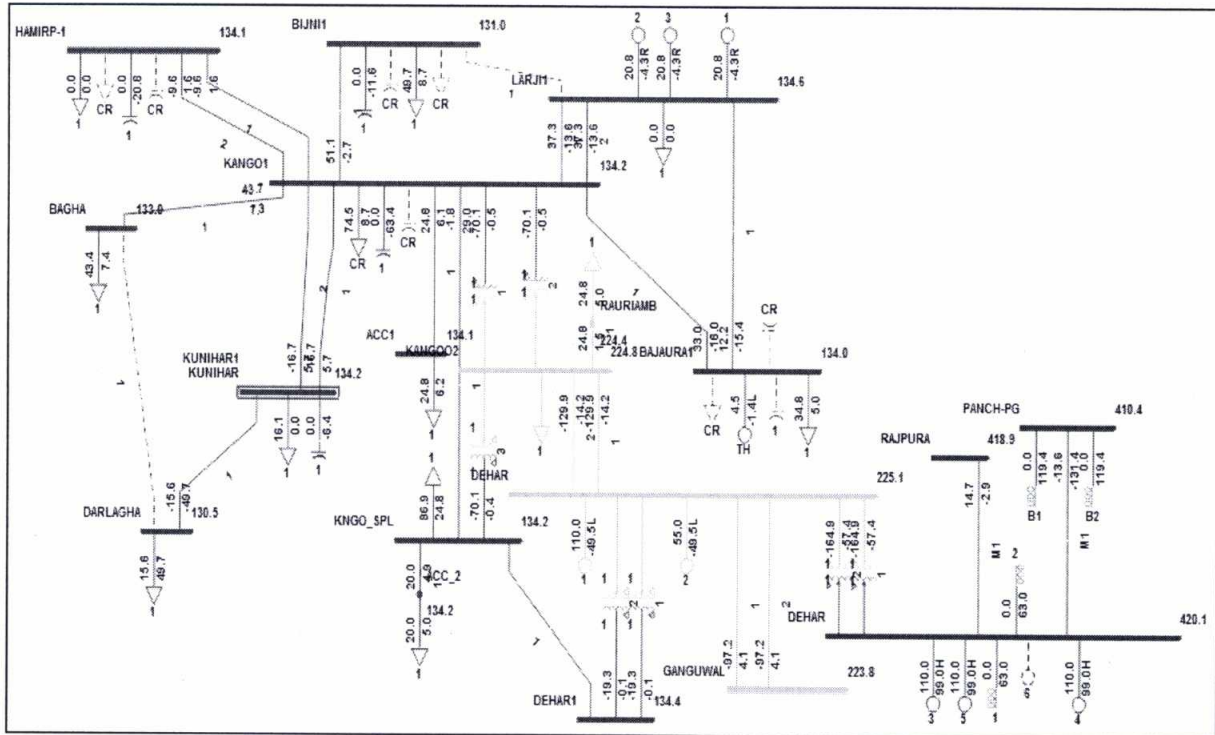


Fig.8 Load flows under proposed future network connectivity

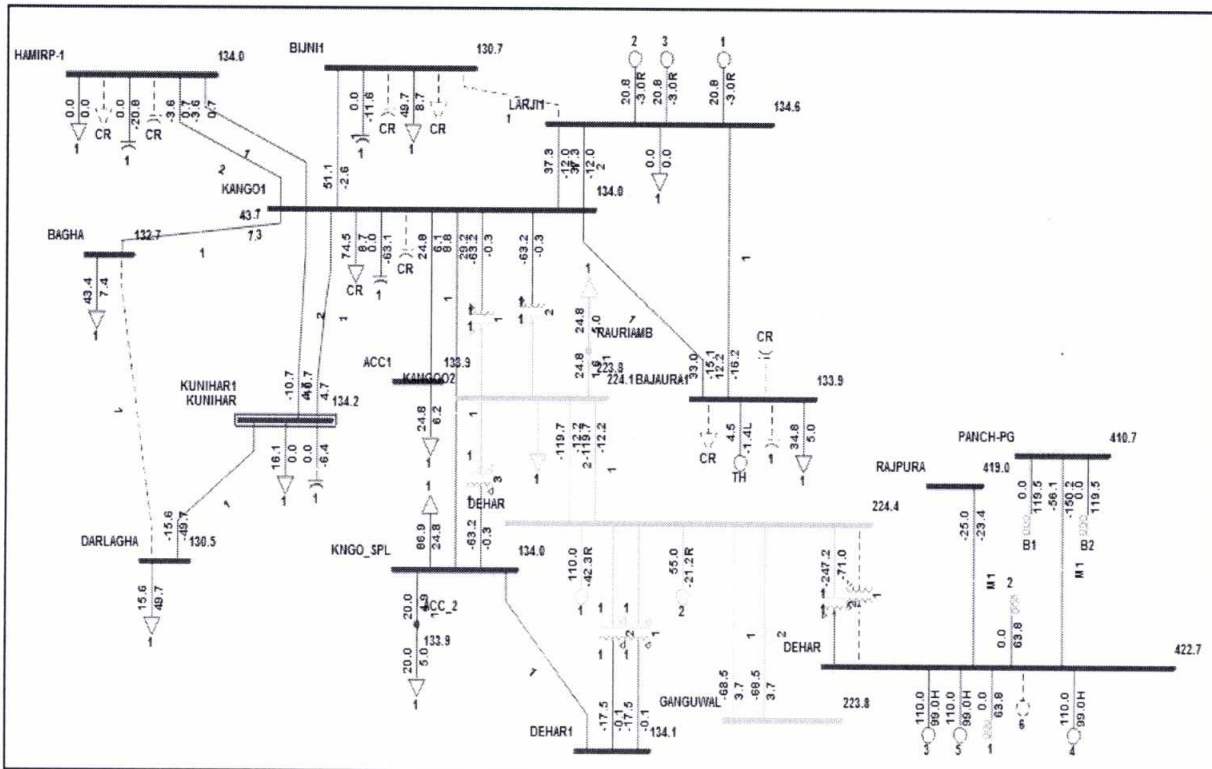


Fig.9 Load flows considering only one 400/220kV ICT at Dehar

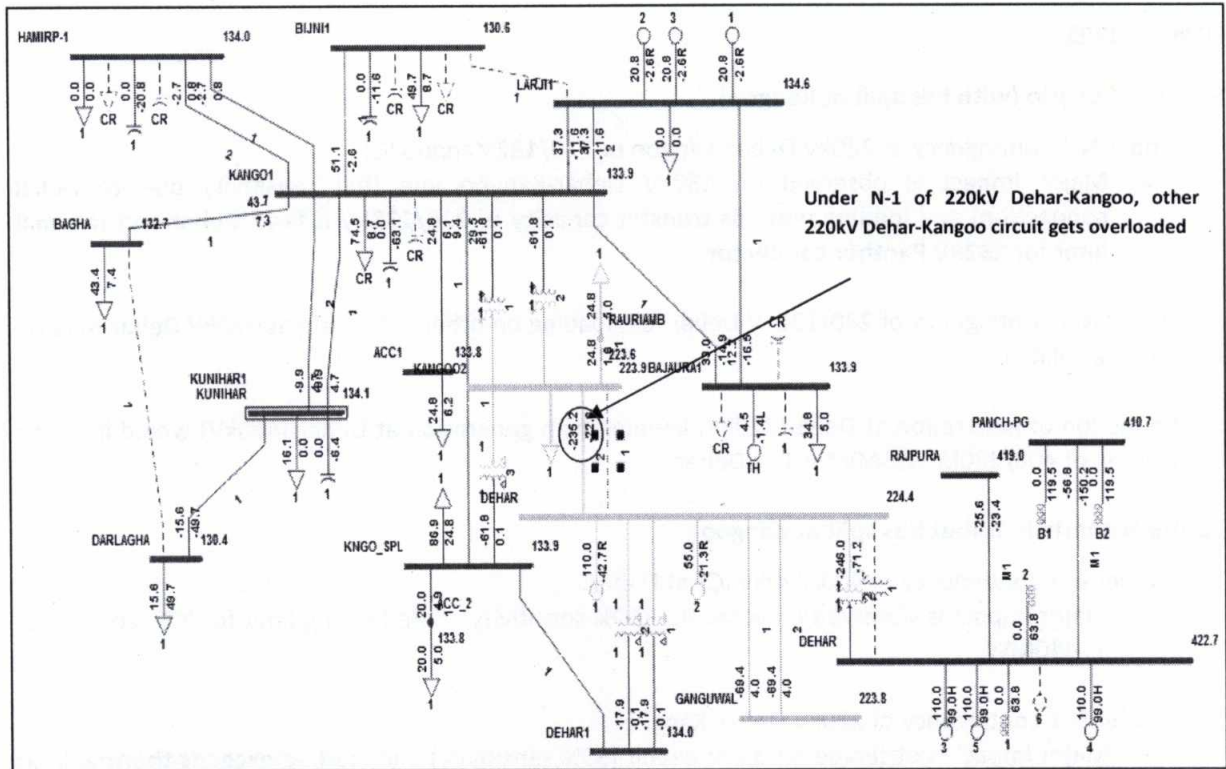


Fig.10 Load flows under N-1 of 220kV Dehar-Kangoo considering only one 400/220kV ICT at Dehar

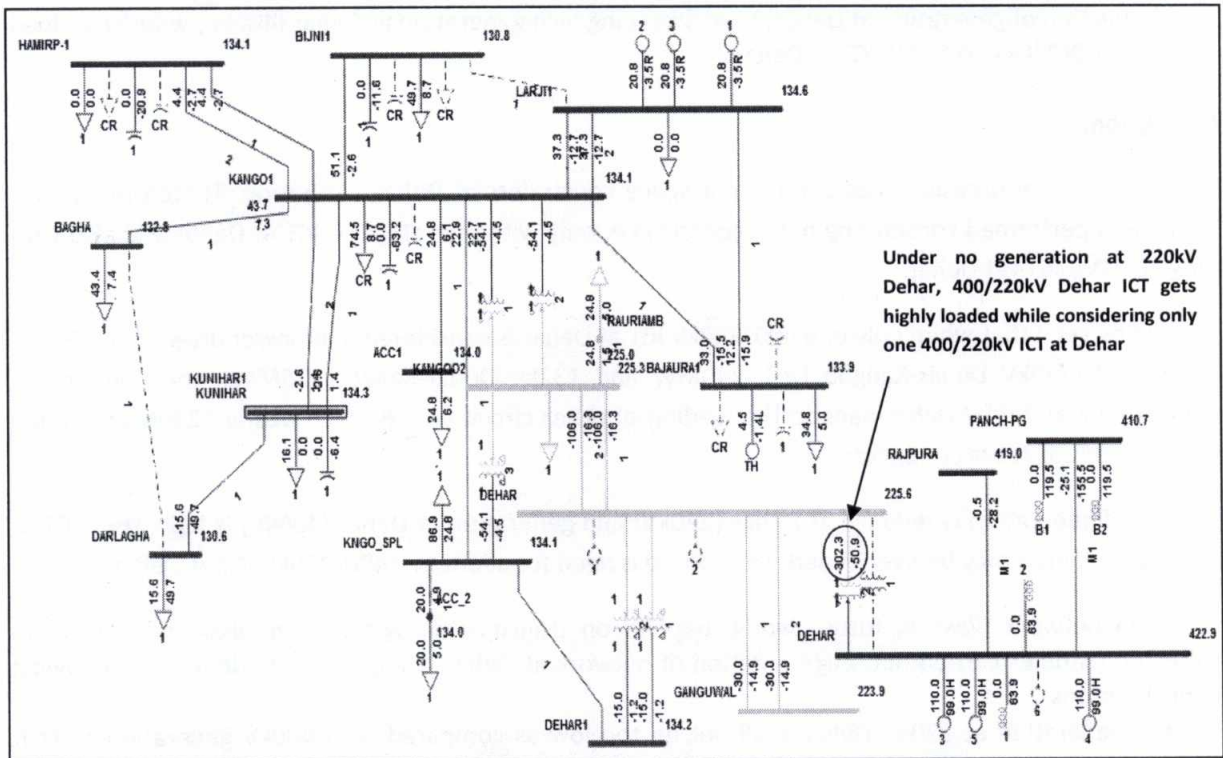


Fig.11 Load flows under no generation at 220kV Dehar considering only one 400/220kV ICT at Dehar

Observations:**Present Scenario (with bus split at Kangoo):**

1. Under N-1 contingency of 220kV Dehar-Kangoo or 220/132 Kangoo ICT:
 - Major impact is observed on 132kV Dehar-Kangoo line (full sensitivity due to radial connection) and **loading exceeds transfer capacity of 220/132kV ICTs at Dehar and thermal limit for 132kV Panther conductor.**
2. Under N-1 contingency of 220/132kV Dehar ICT, loading on other ICT is safe as 220kV Dehar-Kangoo line is available.
3. Reduction of generation at Dehar(220kV) keeping high generation at Dehar (400kV) would increase loading of 400/220kV 315MVA ICT at Dehar.

Future Scenario (without bus split at Kangoo):

1. Under N-1 contingency of 400/220kV ICT at Dehar:
 - Major impact is observed on other ICT (50% sensitivity). Safe loading limit for ICTs comes out as 440MW.
2. Under N-1 contingency of 220kV Dehar-Kangoo:
 - Major impact is observed on other circuit (95% sensitivity) and **loading exceeds thermal limit for 220kV Zebra conductor.**
3. Reduction of generation at Dehar(220kV) keeping high generation at Dehar (400kV) would overload the 400/220kV 315MVA ICT at Dehar.

Conclusion:

BBMB on several occasions has cited about space constraints at Dehar substation. Therefore, studies have been performed considering both scenarios i.e. only with one 315MVA ICT at Dehar and also with two 315MVA ICTs at Dehar.

It could be seen that when only one 400/220kV ICT at Dehar is considered and power drawn from Dehar is 275MW (220kV Dehar-Kangoo D/C: 240MW and 132kV Dehar-Kangoo: 35MW), then under N-1 contingency of 220kV Dehar-Kangoo the loading of other circuit would reach nearly ~230MW nearing thermal limit of Zebra conductor.

Further, if generation is reduced at Dehar (220kV) and generation at Dehar (400kV) is high, then ICT at 400/220kV Dehar may be overloaded. Thus, there is need for additional 400/220kV ICT at Dehar.

Although network flows in future would depend on transmission system commissioned. Based on simulation studies carried out, augmentation of network at Dehar, Kangoo can be done with following considerations:

- Generation at 220kV Dehar shall not be too low as compared with 400kV generation so that loading of 400/220kV ICT remains within safe limit. Further, commissioning of 315MVA ICT-2 at Dehar shall be completed alongwith other transmission elements planned.
- Loading of 220kV Dehar-Kangoo lines, 220/132kV Dehar ICTs needs to restricted upto safe loading limits.

- Conductor replacement for 220kV Dehar-Kangoo line may be done for transmission capability enhancement and better reliability.
- Approval of standing committee may be taken for new proposed transmission elements.

File No.CEA-PS-11-22(13)/1/2019-PSPA-I Division

I/4620/2019(3)

Minutes of meeting held on 11.04.2019 in CEA regarding augmentation of Nawada 400 kV substation of HVPNL

The meeting was chaired by Chief Engineer (PSPA-I), CEA. The list of participants is enclosed as Annexure – I.

1. Chief Engineer (PSPA-I), CEA welcomed all the participants to the meeting and stated that Nawada 400 kV S/s was approved in 23rd meeting of Standing Committee on Power System Planning of Northern Region and the sub-station was commissioned with transformation capacity of 2 x 315 MVA. HVPNL vide their letter dated 09.04.2019 has informed that they have completed the work of augmentation of the transformation capacity at Nawada 400/220 kV S/s by adding third transformer of capacity 315 MVA to meet n-1 reliability criteria and for charging the 3rd transformer, NRLDC has sought the approval of the NRSCT.
2. HVPNL stated that there was failure of one of the 315 MVA 400/220 kV transformer at Nawada, which was replaced with 250 MVA transformer. The present transformation capacity at 400/220 kV Nawada S/s is 1x315+1x250 MVA i.e. 565 MVA. HVPNL also clarified that 250 MVA transformer will be replaced by 315 MVA transformer after repair / refurbishment of failed 315 MVA transformer. The peak demand observed at Nawada during 2018-19 was 364 MW. Thus in the event of outage of one transformer, there would be constraints in meeting the load served from Nawada S/S. Therefore, to improve the reliability of power supply, HVPNL has planned addition of 3rd 315 MVA 400/220 kV transformer at Nawada S/s.
3. With regard to concern of high loading of 400 kV Dadri– Greater Noida section of Dadri– Greater Noida–Nawada–Samaypur 400 kV line, CTU stated that the Samaypur-Dadri 400 kV D/C line (one circuit of which is LILO at Nawada and Greater Noida and other circuit is LILO at Maharani Bagh) is built with Quad Bersimis conductor. The line has thermal capacity of about 2300 MVA, but line loading is restricted because of switch gear rating at Nawada and Greater Noida 400 kV sub-stations is of 2000A. In order to utilize the line capacity fully, HVPNL and UPPTCL need to change switch gears at Nawada and Greater Noida respectively from 2000A to 3150A. HVPNL agreed to change the switch gear rating at 400 kV Nawada S/S from 2000A to 3150A.
4. POSOCO stated that in order fulfill n-1 criteria, third transformer is required to at Nawada. It was emphasized that any new/planned Intra - State transmission element, which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 220kV & above Intra–State schemes should be included as agenda for the regional Standing Committee on Transmission for its approval.
5. After further deliberations, the augmentation of transformation capacity at Nawada 400/220 kV S/s by adding third transformer of capacity 315 MVA was agreed in principle subject to ratification in the forthcoming meeting of NRSCT. HVPNL was also requested to intimate all Intra–State transmission schemes, which involve reconfiguration of ISTS elements, inter-connection with ISTS elements and all 400 kV Intra-State schemes, which are already under implementation/planned and has not been intimated earlier in NRSCT.

File No.CEA-PS-11-22(13)/1/2019-PSPA-I Division

I/4620/2019(3)

HVPNL also agreed to change the switch gear rating at Nawada 400 kV S/S from 2000A to 3150A

Meeting ended with thanks to the chair.

I/4669/2019(5)

Minutes of Meeting held on 26.03.2019 in CEA to discuss the issues related to transfer of Connectivity of Manala-II HEP - Regarding.

List of participants is enclosed at Annexure-I.

1.0 Chief Engineer, PSPA-I welcomed the participant to the meeting and stated that following transmission system for evacuation of power from Malana II HEP (2x50 MW) was agreed in the 32nd meeting of standing Committee on Power System Planning of Northern Region held on 31-08-2013 at New Delhi.

a) Malana-II HEP-Chhaur 132 kV D/c line – by M/s Everest Power Pvt. Ltd.(EPPL)

b) Chhaur 220/132 kV 7x25 MVA single phase (one spare) ICT - by M/s EPPL

c) Chhaur-Parbati Pooling Station (PG) 220 kV D/C line – by HPPTCL

2.0 He added that in view of delay in implementation of Chhaur-Parbati Pooling Station (PG) 220 kV D/C line (by HPPTCL), at present, the power generated from Malana II HEP (2x50 MW) is being evacuated through following interim arrangement to Nalagarh 400/220 kV S/S of POWERGRID. The interim arrangement was agreed in 31st meeting of Standing Committee on Power System Planning of Northern Region held in 2nd January 2013.

a) LILO of one circuit of AD HEP – Nalagarh 220 kV D/c line (of M/s AD Hydro) at 220/132kV Chhaur S/S.

As per the information furnished by M/s EPPL, the 220 kV Chhaur – Parbati Pooling Station (PG) (Banala) transmission line will be completed shortly. M/s EEPL has requested CEA/CTU to address certain issues like PoC charges, change in LTA/BPTA, financial liability etc. before shifting of connectivity of Malana II HEP.

3.0 CEA said that issues raised by Malana-II would be discussed in the meeting, however, it may be noted that presently power from Malana-II is being evacuated through an interim arrangement and after the completion of planned transmission system, Malana-II has to switch over to the planned system.

4.0 CTU stated that as per the present PoC mechanism, entire Himachal Pradesh comes under one slab. The PoC charges will be applicable as per the regulation in vogue. For Malana II, M/s EPPL has taken LTA of 86 MW, therefore, PoC charges of 86 MW shall be applicable. It was also informed that PoC mechanism is being reviewed by CERC / MoP. Therefore, it is difficult to comment on the amount of PoC charges, which will be applicable after shifting of the connectivity of Malana-II.

5.0 PSPCL stated that with shifting of connectivity, PSPCL has to bear STU charges also. It was clarified that at present PSPCL is bearing the charges for transmission of power from Malana II to Nalagarh through M/s AD Hydro line i.e. AD HEP – Nalagarh 220 kV D/c line. So instead of these charges, they have to bear charges of Chhaur – Banala 220 kV D/c line.

6.0 CTU stated that M/s EPPL has to apply for connectivity to STU and submit no objection certificate (NoC) from the STU to CTU. Based on which, CTU will issue revised LTA intimation to M/s EPPL.

I/4669/2019(5)

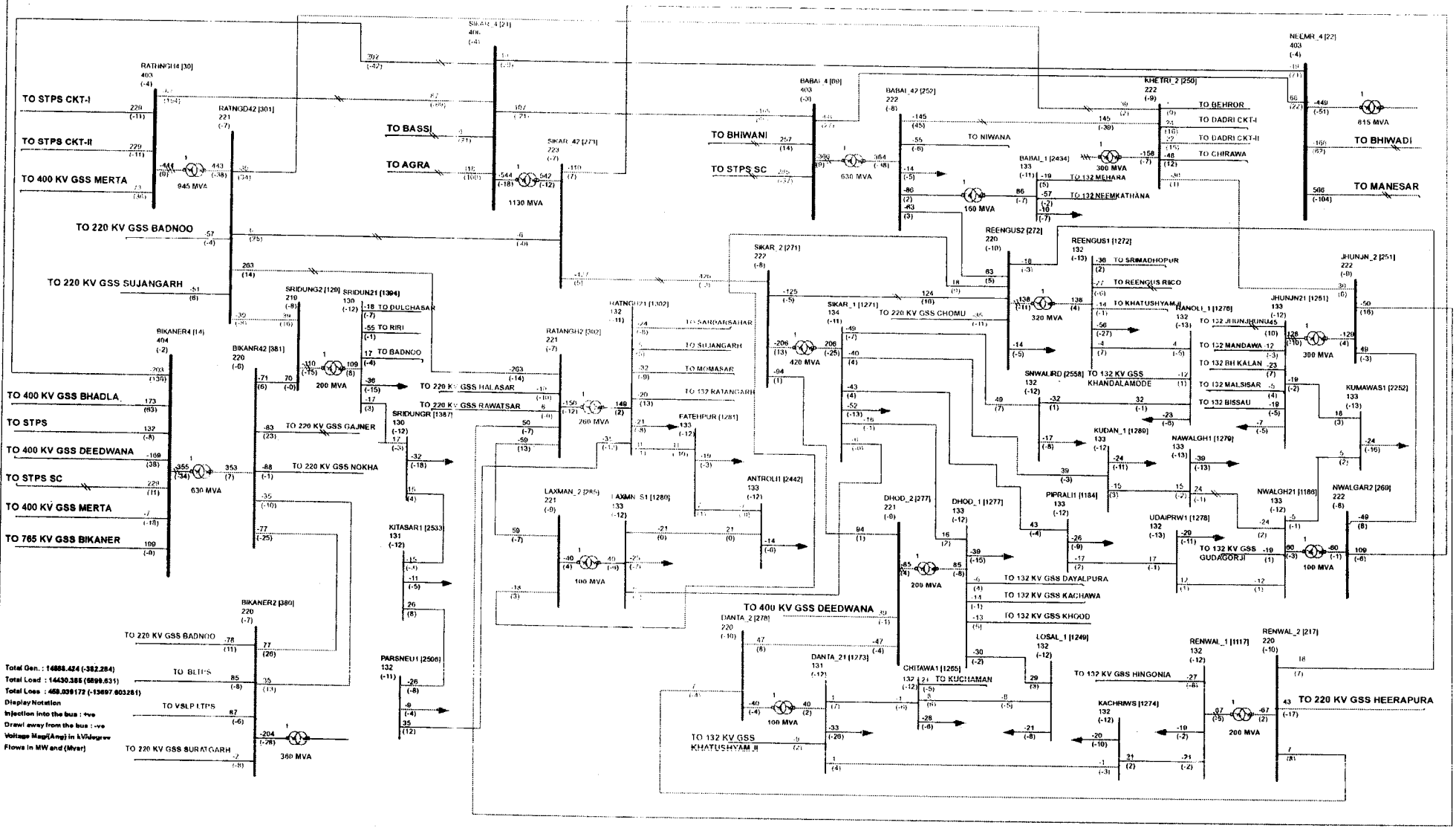
- 7.0 HPPTCL stated that the Chhaur–Banala 220 kV D/c line would be carrying mostly the ISTS power, they have plan to get deemed ISTS status for the line. However, POSOCO clarified that for declaration of a line as deemed ISTS, the line has to carry more than 50% of the power of Inter State nature, which is examined based on reports of power flow on the line for at least last two quarters and HPPTCL have to approach NRPC for the same.
- 8.0 POSOCO highlighted that with change in injection point of Malana - II from ISTS to intra-state the scheduling will be done by HP SLDC, who in turn will coordinate with NRLDC. The deviation settlement will be done by HP SLDC.
- 9.0 On a query regarding status of 220/132 kV Chhaur substation and Chhaur – Banala 220 kV D/c line, HPPTCL informed that the line will be completed by April 2019 and they are planning to terminate the same at Chhaur S/s of M/s EEPL as their 220/132 kV Chhaur substation may be delayed and is expected to commission by November/December 2019.
- 10.0 Representative of M/s AD Hydro stated that matter of sharing of transmission charges of AD HEP – Nalagarh 220 kV D/c line is under litigation and at present, they are getting only 60 percent of applicable charges from Malana II HEP. He raised concern for recovery of balance 40 percent of the charges after shifting of connectivity of Malana II HEP. As the matter is still under litigation, it was clarified that the recovery of transmission charges would be as per the final judicial verdict.
- 11.0 CEA stated that AD Hydro, EPPL and HPPTCL should coordinate among themselves in order to minimize the shutdown period required for changeover from interim arrangement to final arrangement. Also the timing of shut down may be chosen in consultation with POSOCO, so as to minimize the generation loss.
- 12.0 After further discussions following was agreed:
- a) Shifting of the connectivity of Malana-II HEP from the interim arrangement i.e. LILO of one circuit of AD HEP – Nalagarh 220 kV D/c line (of M/s AD Hydro) at 220/132kV Chhaur substation to the final arrangement i.e. Chhaur–Banala 220 kV D/c line
 - b) M/s EPPL to apply for connectivity to STU and NoC granted by STU to be submitted to CTU for revised LTA intimation to M/s EPPL.
 - c) M/s AD Hydro, EPPL and HPPTCL to coordinate among themselves to minimize the shut down time for smooth switch over from interim arrangement to final arrangement.
 - d) M/s AD Hydro, EPPL and HPPTCL to coordinate among themselves and with POSOCO to plan shut down timing to minimize generation loss during the shutdown.

List of participants of meeting held on 26.03.2019 in CEA to discuss the issues related to transfer of Connectivity of Manala-II HEP.

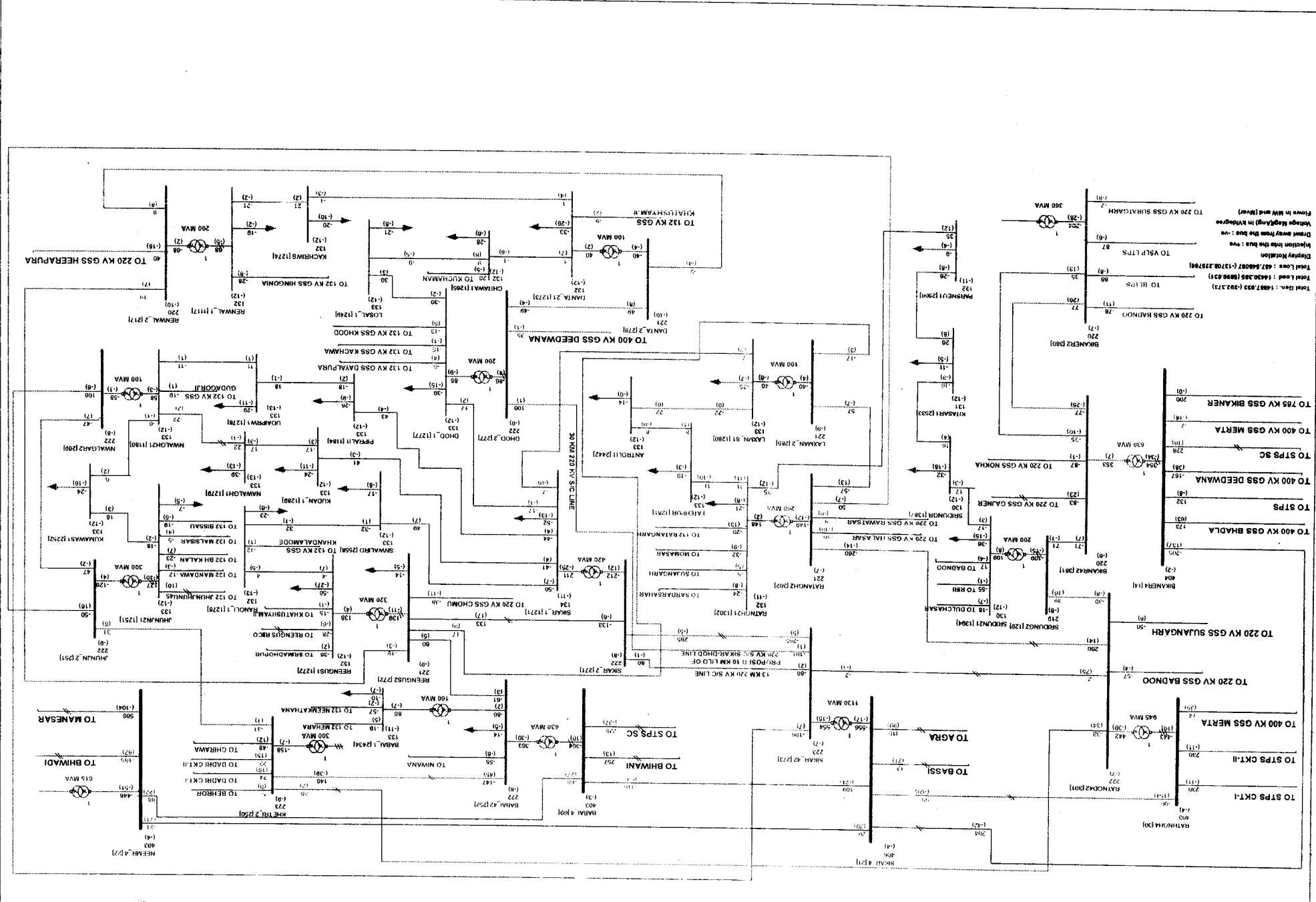
S. No.	Name (Shri)	Designation
CEA		
1	Ravinder Gupta	Chief Engineer
2	Awdhesh Kumar Yadav	Director
3	Manjari Chaturvedi	Director
4	Priyam Shrivastava	AD-I
5	Jitesh Shrivastava	AD-I
CTU		
6	Mukesh Khanna	AGM (CTU-PLG)
PTC		
7	Ravi Shankar	AVP
8	Hiranmay De	EVP
EPPL		
9	S.S. Garhia	COO
10	Gagan Agarwal	Head Connected
11	K. Seethayya	President
12	Ankit Narula	Sr. Ex.
13	Satyanarayana	AGM-Finance
14	Tushar Mallik	Engineer
PSPCL		
15	Kulbir Singh	Sr. Xen
16	Sunil Kr. Gupta	Sr. Xen
17	Jatinder Singh	SE/SLDC Projects
HPPTCL		
18	Kaushalesh Kapoor	GM (COO)
19	Sandeep Sharma	AGM (Plg.)
HPSLDC		
20	N.K. Sharma	CE
21	Ravinder Kumar	Sr. Xen.
NRLDC, POSOCO		
22	Rajeev Porwal	Chief Manager
23	Paresh Khandelwal	Chief Manager
ADHPL		
24	Praveen Kr. Giri	GM Electrical
25	Sumit Garg	Sr. GM
26	Kakoli Sengupta	Executive

BASE CASE: LOAD FLOW STUDY FOR CONDITION CORRESPONDING TO FY 2021-2022 FOR TOTAL SYSTEM LOAD OF 14430 MW

EXHIBIT-1

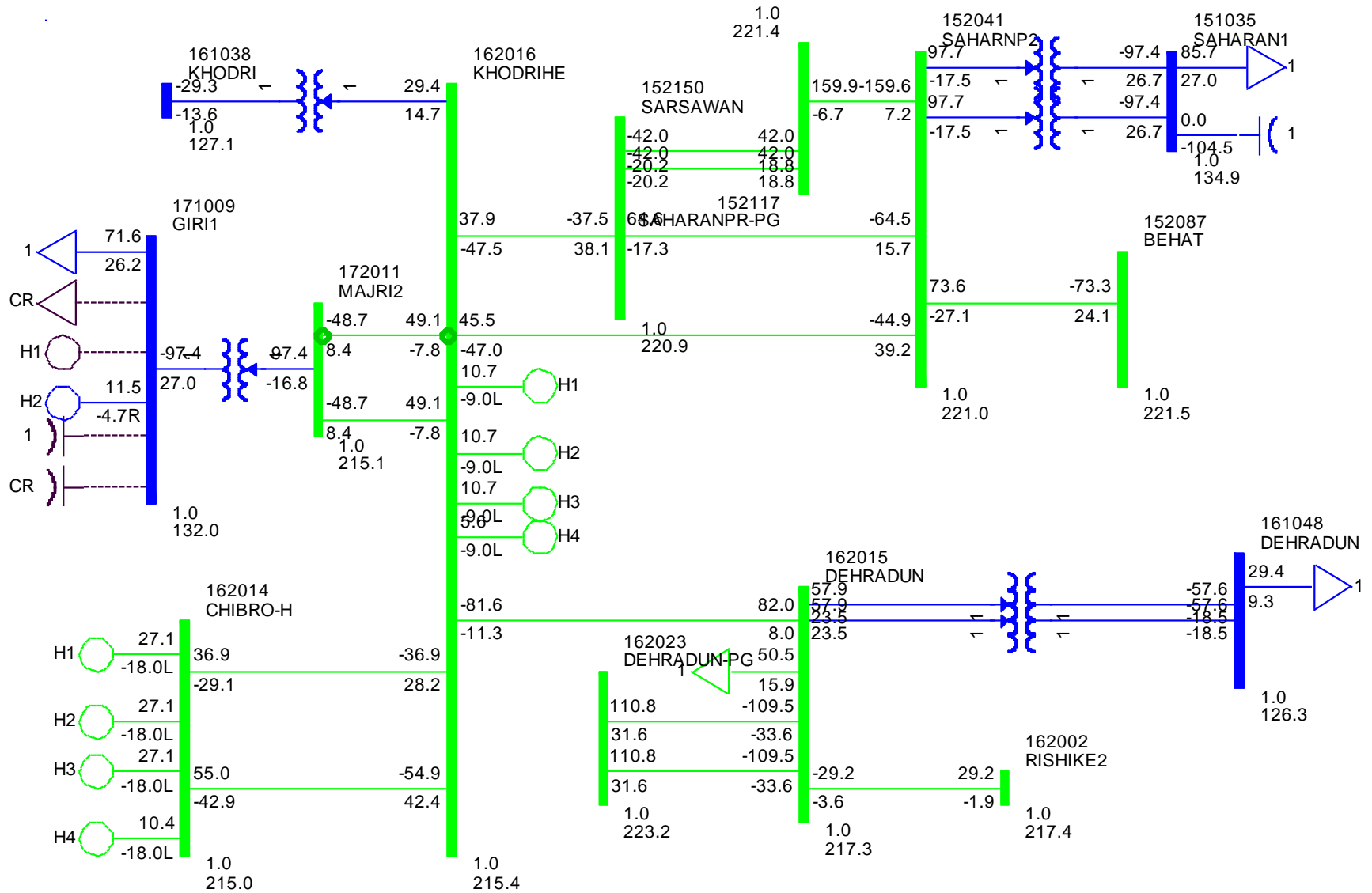


PROPOSED CASE 2: PROPOSED 10 KM L/O OF 220 KV S/C SIKAR-DHOD LINE

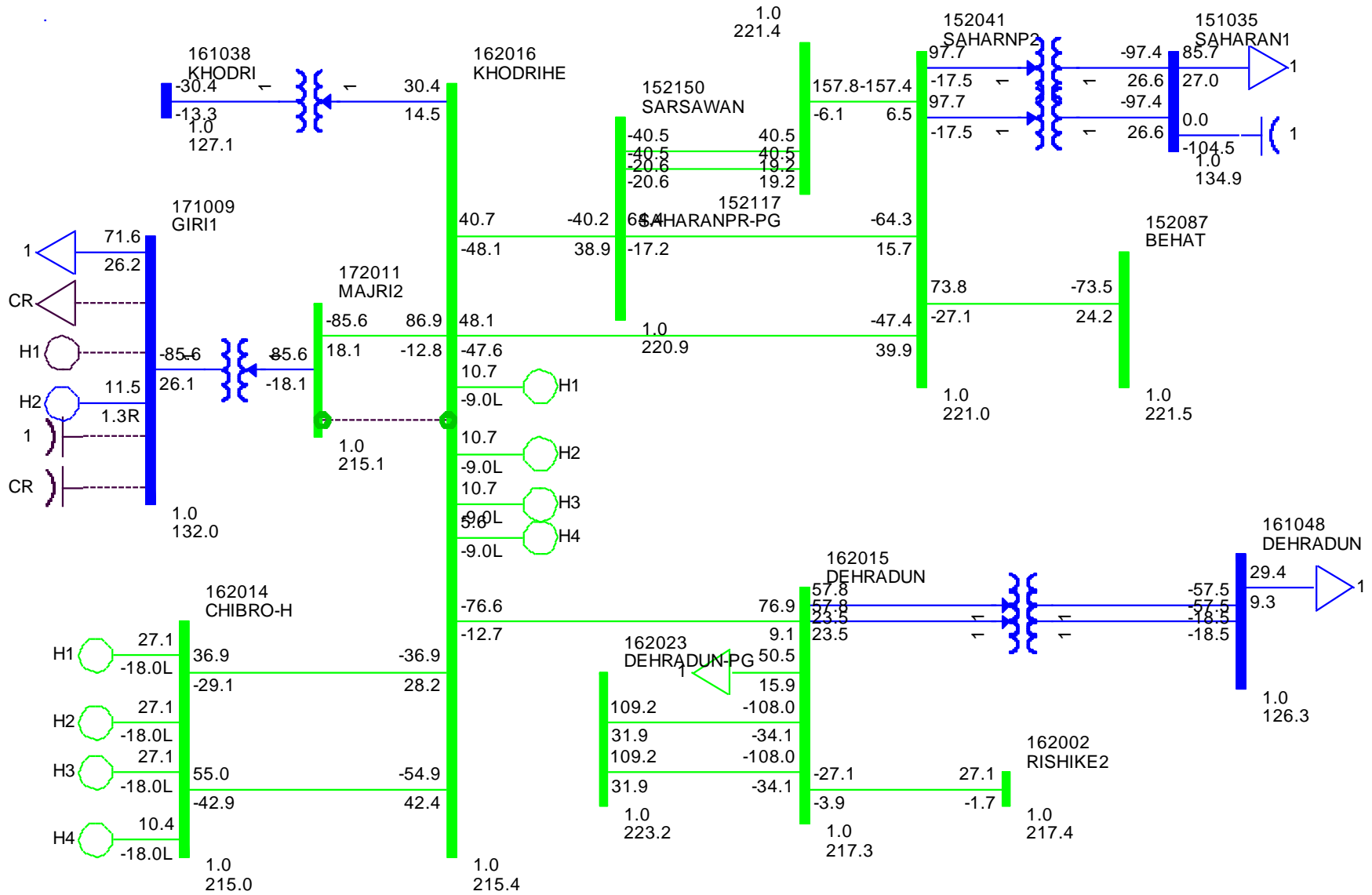


Total Gen : 1489.833 (-392.372)
Total Load : 487.54807 (-137.0825794)
Display Location
Position from the bus : -ve
Voltage Reg(Fang) in KV/Grage
Flows in MW and MVar

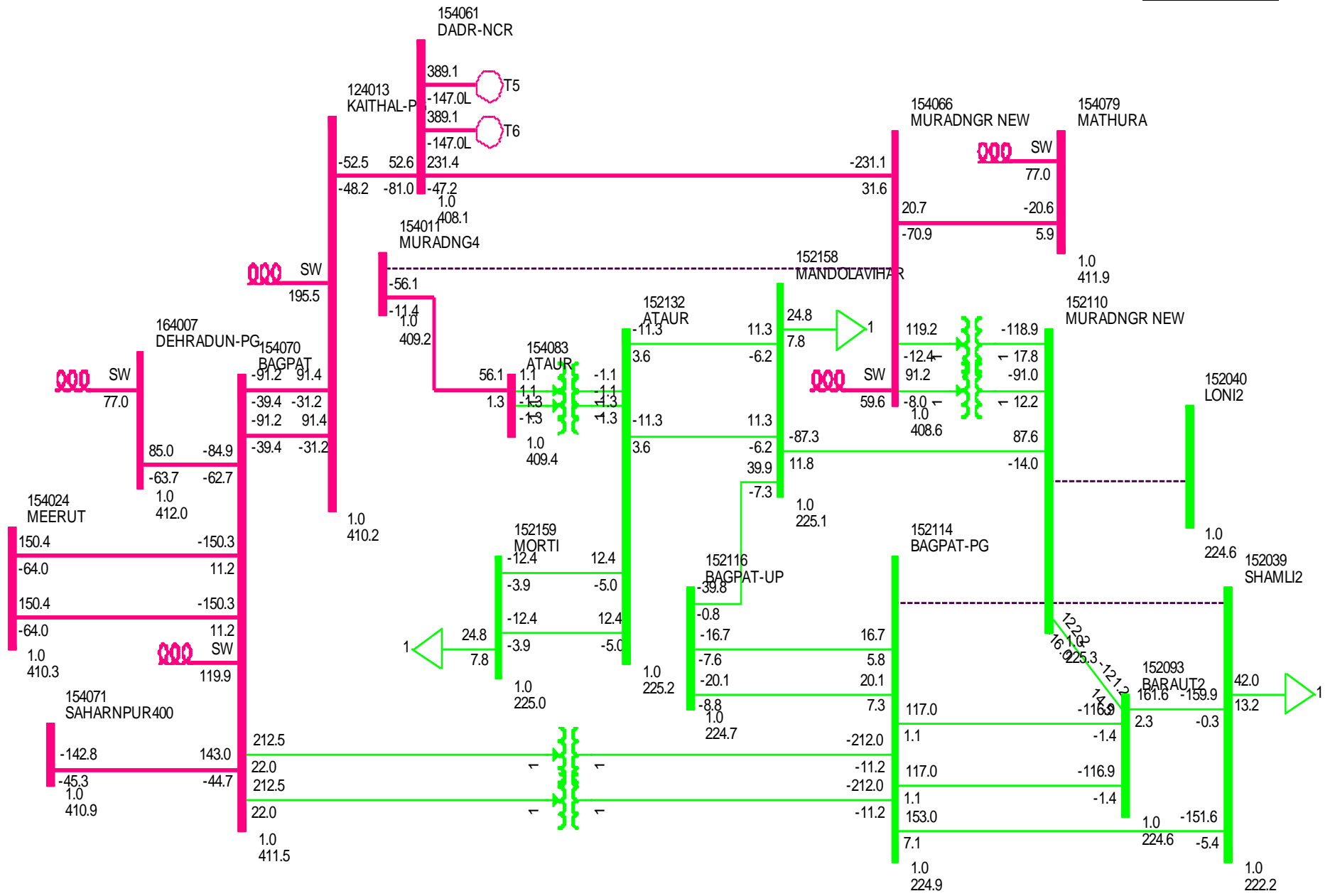
Annexure XI



Annexure XI



Annexure XII



I/4755/2019(3)

Minutes of meeting held on 18.04.2019 in CEA regarding charging of 10 MVA 220/11 kV Power Transformer Bay at Salal Power Station (6 x 115 MW), NHPC.

The meeting was chaired by Chief Engineer (PSPA-I), CEA. The list of participants is enclosed as Annexure – I.

1. Chief Engineer (PSPA-I) welcomed all the participants to the meeting and requested NHPC to explain the existing arrangement for supply of Auxiliary Power at Salal Power Station.
2. NHPC stated that presently there are two sources of supply of auxiliary power at Salal HEP station. One source is through DG set and second source is through 33/11 kV D/C line from 132/33 kV Jhajharkotli S/S of JKPDD. NHPC informed that the 33kV D/C line is about 50 km long and constraints in supply of auxiliary power are being observed due to frequent outage of the 33 kV line. In order to improve the reliability of auxiliary power supply, NHPC had planned installation of 220/11 kV transformer in the existing 220 kV switchyard of Salal HEP. Further, CERC vide petition no. 236/GT/2014 dated 12.05.2015 has approved installation of 10 MVA 220/11 kV Power Transformer Bay at Salal Power Station. NHPC also informed that works of installation of the power transformer have been completed and POSOCO has been requested for charging code for charging the power transformer. POSOCO has sought approval of standing committee before allowing charging of the transformer.
3. POSOCO pointed out that bus isolators for the 10 MVA 220/11 kV Power Transformer Bay and 220 kV Kishanpur line are common. NHPC clarified that this arrangement has become necessitated due to space constraint at Salal HEP.
4. POSOCO stated that as the new element is added in system, connection agreement between CTU and NHPC need be revised as per the grid code. NHPC stated that since voltage level and Point of Connection with the grid is not changed, there is no need for revision in connection agreement as per clause 12 (Amendment to the Connection Agreement) of Connection Agreement already signed between NHPC & CTU on 14th May 2015. The same has already been intimated to CTU. It was decided that NHPC would take up the issue of revision of connection, if any, separately with CTU.
5. After further deliberations, in principle approval of charging 10 MVA 220/11 kV Power Transformer Bay at Salal Power Station of NHPC for improving reliability of auxiliary power supply was agreed. The proposal would be put up in forthcoming meeting of NRSCT for ratification.

Meeting ended with thanks to the chair.

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Annexure I

List of participants of meeting held on 18.04.2019 in CEA regarding charging of 10 MVA 220/11 kV Power Transformer Bay at Salal Power Station (6 x 115 MW), NHPC.

S. No.	Name (Shri)	Designation
CEA		
1	Ravinder Gupta	Chief Engineer (PSPA-I)
2	Awdhesh Kumar Yadav	Director (PSPA-I)
3	Jitesh Shrivastava	Assistant Director-I
POSOCO/NRLDC		
4	Kamaldeep	Chief Manager
NHPC		
5	V K Sinha	General Manager

Annexure -XIV

1. Transmission system associated with LTA applications from Rajasthan SEZ Part-A(RTM):

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 3x1500MVA (765/400kV), Fatehgarh-2 Pooling station at suitable location near Fatehgarh 400kV S/s in Jaisalmer Distt with 765kV (2x240MVAR) and 400kV (1x125 MVAR) bus reactor <u>Future provisions:</u> Space for 765/400kV ICT along with bays: 3 nos 400/220kV ICTs along with bays: 10 nos. 765kV line bays: 4 nos 400kV line bays: 6 nos. 220kV line bays: 18 nos 400kV bus reactor along with bays: 1no 765kV bus reactor along with bays: 1no	3x1500MVA, 765/400kV, 765kV ICT bay-3 400kV ICT bay-3 400kV line bay-2 765kV line bay-2 125 MVAR reactor-1 240 MVAR reactor-2 765kV reactor bay-2 400kV reactor bay-1	369
2.	LILO of Fatehgarh (TBCB) – Bhadla (PG) D/c (765kV line op. at 400kV) line at Fatehgarh-2 so as to establish Fatehgarh (TBCB) – Fatehgarh -2 400kV D/c line (765kV line op. at 400kV) and Fatehgarh -2- Bhadla 400kV D/c line (765kV line op. at 400kV)* Charging of Fatehgarh-2 –Bhadla section at 765kV level	10km	106
3.	2 no of 765kV bays at Bhadla for charging of Fatehgarh-2 –Bhadla section at 765kV level	765kV line bay-2	37
4.	Establishment of 765/400kV, 2x1500MVA (765/400kV) Bhadla-2 Pooling station at suitable location near Phalodi/ Bhadla in Jodhpur with 765kV (2x240MVAR) and 400kV (1x125 MVAR) bus reactor Future provisions: Space for 765/400kV ICT along with bays: 2 Nos 400/220kV ICTs along with bays: 9 nos.	2x1500MVA, 765/400kV, 765kV ICT bay-2 400kV ICT bay-2 400kV line bay-2 765kV line bay-4 125 MVAR reactor-1 240 MVAR reactor-2 765kV reactor bay-2 400kV reactor bay-1	333

	765kV line bays: 6nos 400kV line bays: 6nos. 220kV line bays: 16 nos 400kV bus reactor along with bays: 1 no 765kV bus reactor along with bays: 1 no		
5.	Bhadla-2 – Bhadla (PG) 400kV D/c Line (Twin HTLS)*	30km	56
6.	LILLO of both ckts. 765kV Ajmer – Bikaner D/c line at Bhadla-2	270 route km	1249
7.	1x240 MVAR Switchable line reactor at Bhadla-2 end for Bikaner-Bhadla-2 765kV line (after LILLO)	240 MVAR reactor-2 765kV reactor bay-2	76
8.	1x330 MVAR Switchable line reactor at Bhadla-2 end for Ajmer-Bhadla-2 765kV line (after LILLO)	330 MVAR reactor-2 765kV reactor bay-2	86
Total Rs (in Crore)			2312

* with charging of Fatehgarh-II –Bhadla section at 765kV level, 2nos. of 400kV bays would be spared at Bhadla S/s, which could be utilized for Bhadla-II – Bhadla (PG) 400kV D/c line.

Note:

- a) The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- b) POWERGRID and RVPN to provide space for 2 nos. of 765kV bays at Ajmer(PG) and Phagi (RVPN) respectively for termination of Ajmer (PG)– Phagi 765kV D/c line

Implementation time frame is September 2020 i.e. in a compress time schedule of 21 months: (18 months implementation + 3 months bidding)

2. Construction of Ajmer (PG)-Phagi 765 kV D/c line along with associated bays for Rajasthan SEZ.

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Ajmer (PG)– Phagi 765kV D/c line	110km	509
2.	765kV bays at Ajmer(PG) and Phagi for Ajmer (PG)– Phagi 765kV D/c line	765kV line bay-4	74
Subtotal Rs (in Crore)			583

Implementation time frame is September 2020 (21 months: 18 months implementation + 3 months bidding)

3. Transmission system associated with LTA applications from Rajasthan SEZ Part-B:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Fatehgarh-2 – Bhadla -2 765kV D/c line	130km	602
2.	2 no of 765kV bays at both Fatehgarh-2 & Bhadla -2 for Fatehgarh-2 – Bhadla-2 765kV D/c line	765kV line bay-4	74
Total Rs (in Crore)			676

Note:

- a. The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- b. Developer of Fatehgarh-2 and Bhadla -2 to provide space for 2 nos of 765kV bays at Fatehgarh-2 and Bhadla -2 for termination of Fatehgarh-2 – Bhadla -2 765kV D/c line

Implementation time frame to be decided based on connectivity/LTA applications at Fatehgarh-II.

4. Transmission system associated with LTA applications from Rajasthan SEZ Part-C

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Khetri with 765kV (2x240MVAR) and 400kV (1x125 MVAR) bus reactor <u>Future provisions:</u> Space for 400/220Kv ICTs along with bays: 4 nos. 765kV line bays: 4nos 400kV line bays: 4nos. 220kV line bays: 7 nos	2x1500MVA, 765/400kV, 765kV ICT bay-2 400kV ICT bay-2 400kV line bay-2 765kV line bay-2 240 MVAr (765kV) Bus Reactor -2 125 MVAr (765kV) Bus Reactor -1 765 KV Reactor bay - 2 400 kV Reactor bay -1	296
2.	Khetri – Sikar (PG) 400kV D/c line	70 km	151

	(AL59)		
3.	400kV line bays at Sikar (PG) for Khetri – Sikar (PG) 400kV D/c line (Twin AL59)	400kV line bay-2	19
4.	Khetri –Jhatikara 765kV D/c line	170 km	786
5.	765kV bays at Jhatikara for Khetri – Jhatikara 765kV D/c line	765kV line bay-2	37
6.	1x240 MVAR Switchable Line reactors for each circuit at Jhatikara end of Khetri – Jhatikara 765kV D/c line along with reactor bays	240 MVAR Line reactor -2 765 kV Reactor bay -2	76
Total Rs (in Crore)			1365

Note:

- a. The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- b. POWERGRID to provide space for 2 nos of 400kV bays at Sikar (PG) for termination of Khetri – Sikar (PG) 400kV D/c line
- c. POWERGRID to provide space for 2 nos of 765kV line bays & space for 2nos. of 240 MVAR Switchable Line reactors along with reactor bays at Jhatikara for termination Khetri –Jhatikara 765kV D/c line.

Implementation time frame is December 2020 i.e in 24 months (19 months implementation + 5 months bidding time).

5. Transmission system associated with LTA applications from Rajasthan SEZ Part-D

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Bikaner(PG) – Khetri S/s 765kV D/c line	220km	1018
2.	765kV Bays at Bikaner(PG) & Khetri for Bikaner(PG) – Khetri S/s 765kV D/c line	765kV line bay-4	37
3.	1x240 MVAr Switchable line reactor for each circuit at each end of Bikaner – Khetri 765kV D/c line along with reactor bays	1x240 MVAr Line reactor -4 765 kV Reactor bay -4	153
Total Rs (in Crore)			1208

Note:

- a. *The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.*
- b. *Powergrid to provide space for 2 nos of 765kV bays & space for 2x240 MVAR switchable line reactors at Bikaner(PG) for termination of Bikaner(PG) – Khetri S/s 765kV D/c line*
- c. *Developer of Khetri S/s to provide space for 2 nos of 765kV bays at Khetri S/s & space for 2x240 MVAR switchable line reactors for termination of Bikaner(PG) – Khetri S/s 765kV D/c line*

Implementation time frame is December 2020 i.e in 24 months (19 months implementation + 5 months bidding time).

6. ICT Augmentation works at existing Moga (PG) ISTS S/S associated with LTA applications from SEZs in Rajasthan:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Augmentation with 765/400kV, 1x1500MVA transformer (3 rd) at Moga S/s	1x1500MVA, 765/400kV 765kV ICT bay-1 400kV ICT bay-1	73
Total Rs (in Crore)			73

Implementation time frame is September 2019 i.e. in a compress time schedule of 9 months

7. ICT Augmentation works at Bhadla(PG) associated with 1630 MW LTA granted at Bhadla:

Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
1.	Additional 3x500 MVA, 400/220kV 5 th , 6 th & 7 th ICT at Bhadla Pooling station.	3x500 MVA, 400/220kV 400 kV ICT bay-3 220 kV ICT bay-3	105

Implementation time frame is August 19/ September 19 i.e. in a compress time schedule of 8/ 9months

8. ICT Augmentation works at existing Bhiwani (PG) ISTS S/S associated with LTA applications from SEZs in Rajasthan

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Augmentation with 765/400kV , 1x1000MVA, transformer (3 rd) at Bhiwani (PG) S/s	1x1500MVA, 765/400kV, 765kV ICT bay-1 400kV ICT bay-1	65
		Rs (in Crore)	65

Implementation time frame is September 2020

Transmission system for providing connectivity to RE projects at Bikaner(PG), Fatehgarh-II & Bhadla –II:

9. Name of Scheme: Transmission system for providing connectivity to RE projects at Bikaner (PG):

Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
	Creation of 220 kV level at Bikaner (PG) with transformation capacity of 2x500MVA, 400/220kV transformers 4 nos. of 220kV line bays	2x500 MVA, 400/220 kV 400 kV ICT bay-2 220 kV ICT bay-2 220kV line bays-4	93

10. Name of Scheme: Transmission system for providing connectivity to RE projects in Fatehgarh-II:

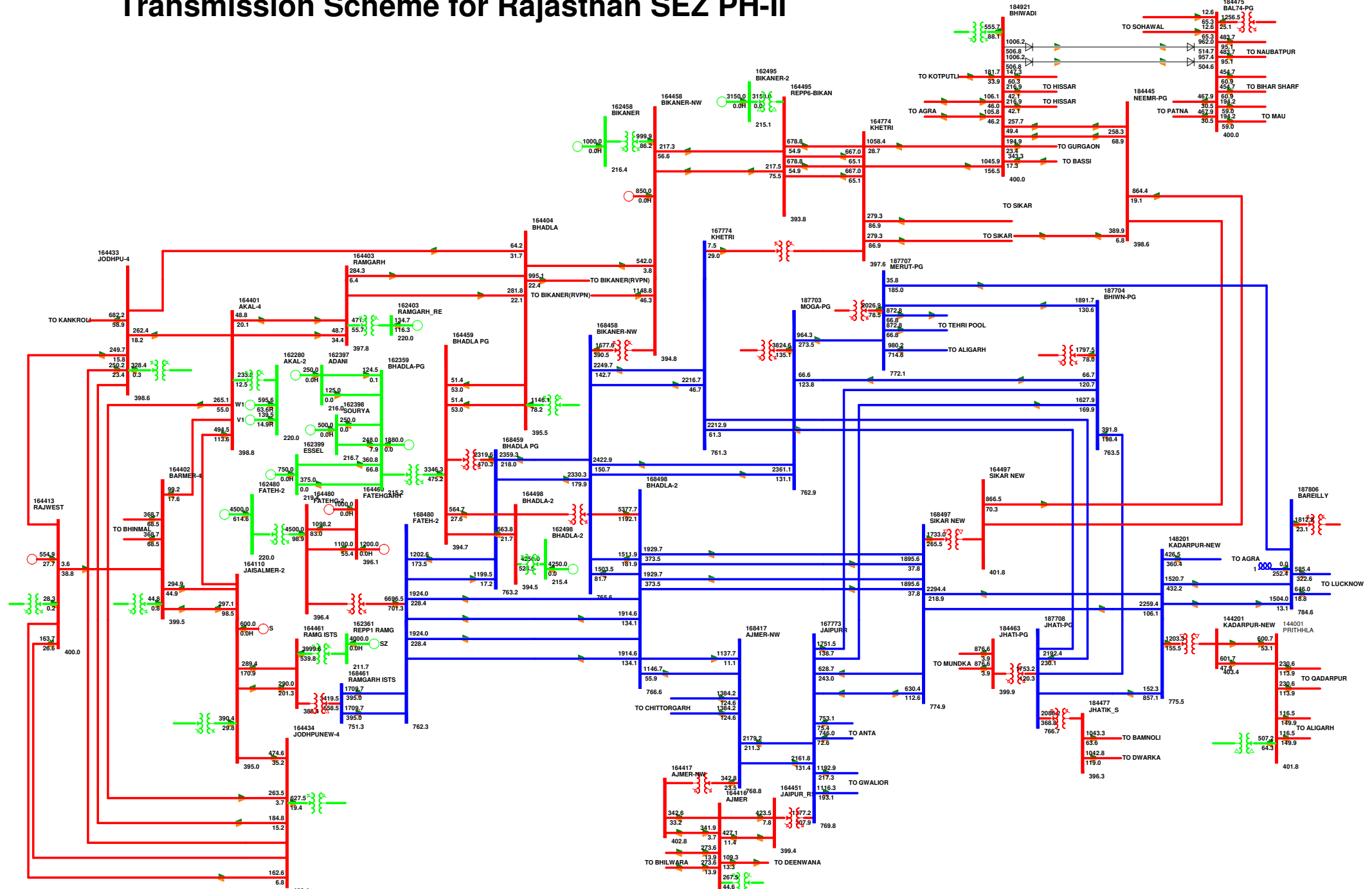
Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
1	Additional (4 th) 765/400kV transformer at Fatehgarh-II	1x1500MVA, 765/400kV	298
2	Creation of 220kV level Fatehgarh -2 in Jaisalmer Distt (Fatehgarh-2) 9 nos. of 220kV line bays	5x500 MVA, 400/220 kV 765 kV ICT bay-1 400 kV ICT bay-6 220 kV ICT bay-5 220kV line bays- 9	

11. Name of Scheme: Transmission system for providing connectivity to RE projects in Bhadla-II:

Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
1	Additional (3 rd) 765/400kV transformer at Bhadla-II	1x1500MVA, 765/400kV 5x500 MVA, 400/220 kV	298
2	Creation of 220kV level at Bhadla-II 9 nos. of 220 kV line bays	765 kV ICT bay-1 400 kV ICT bay-6 220 kV ICT bay-5 220kV line bays- 9	

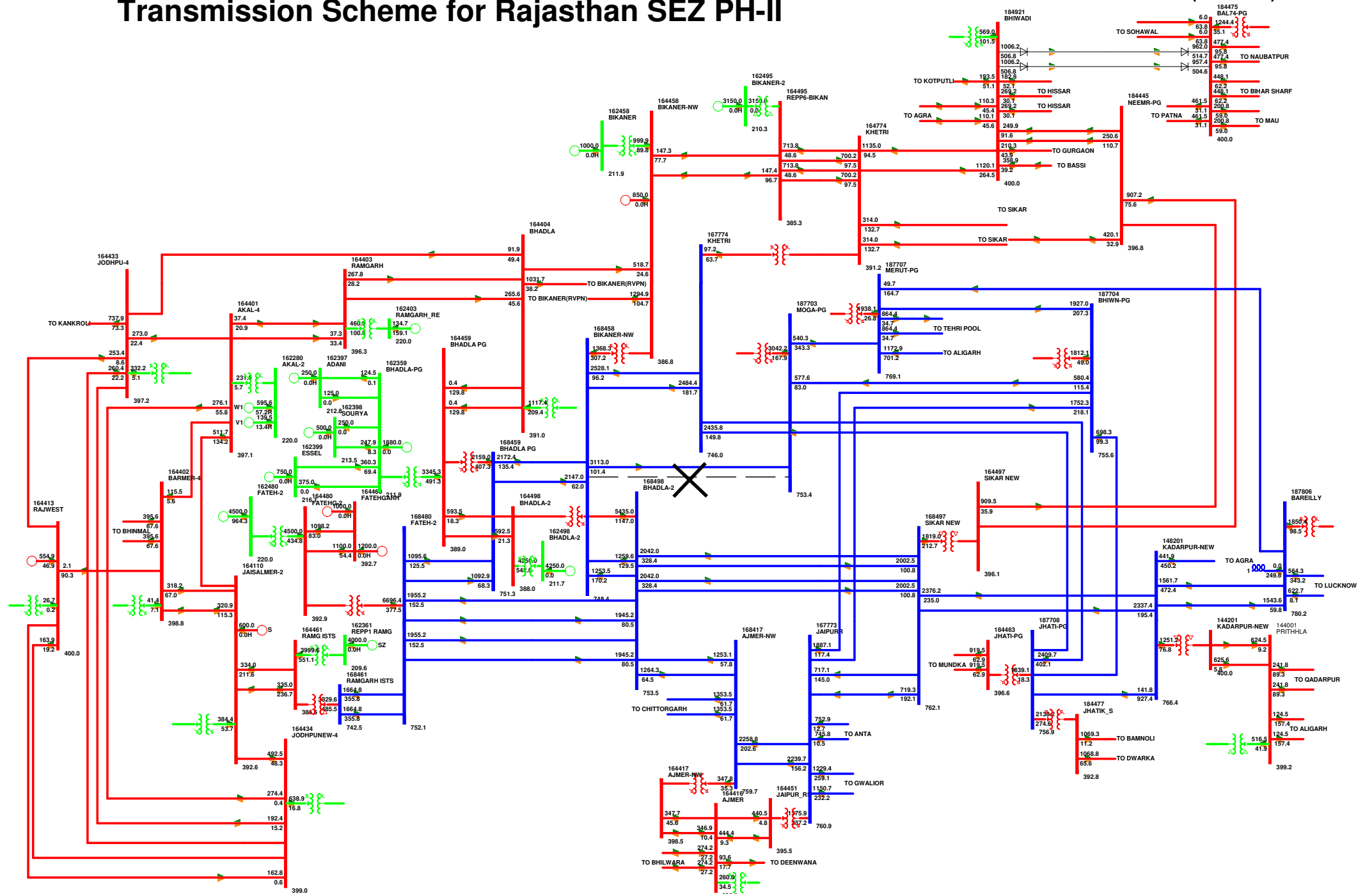
Transmission Scheme for Rajasthan SEZ PH-II

Bhiwadi - Balia HVDC(2000 MW)



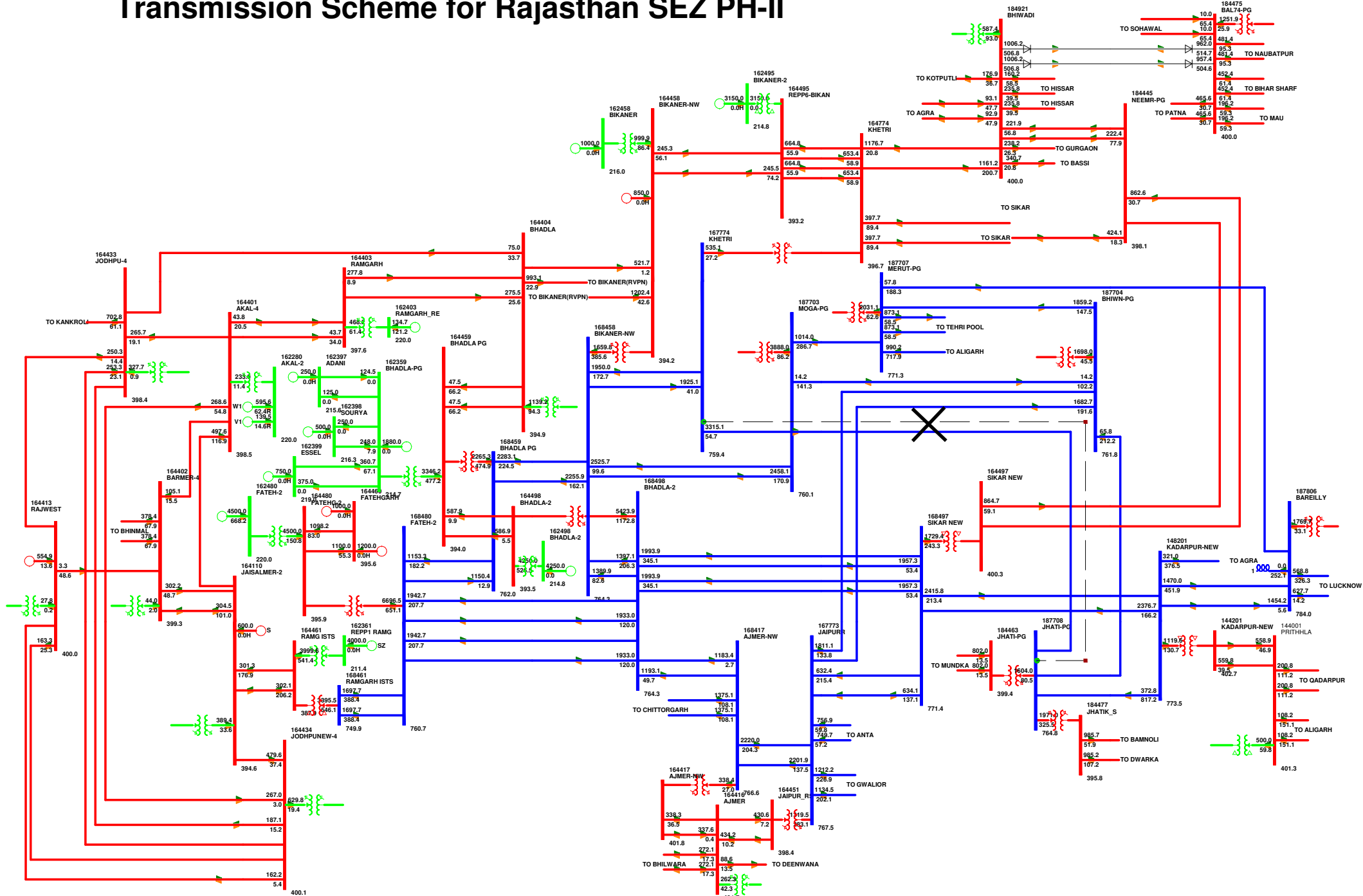
Base Case

Transmission Scheme for Rajasthan SEZ PH-II



Outage of one ckt of 765 kV Bikaner- Moga D/c Line

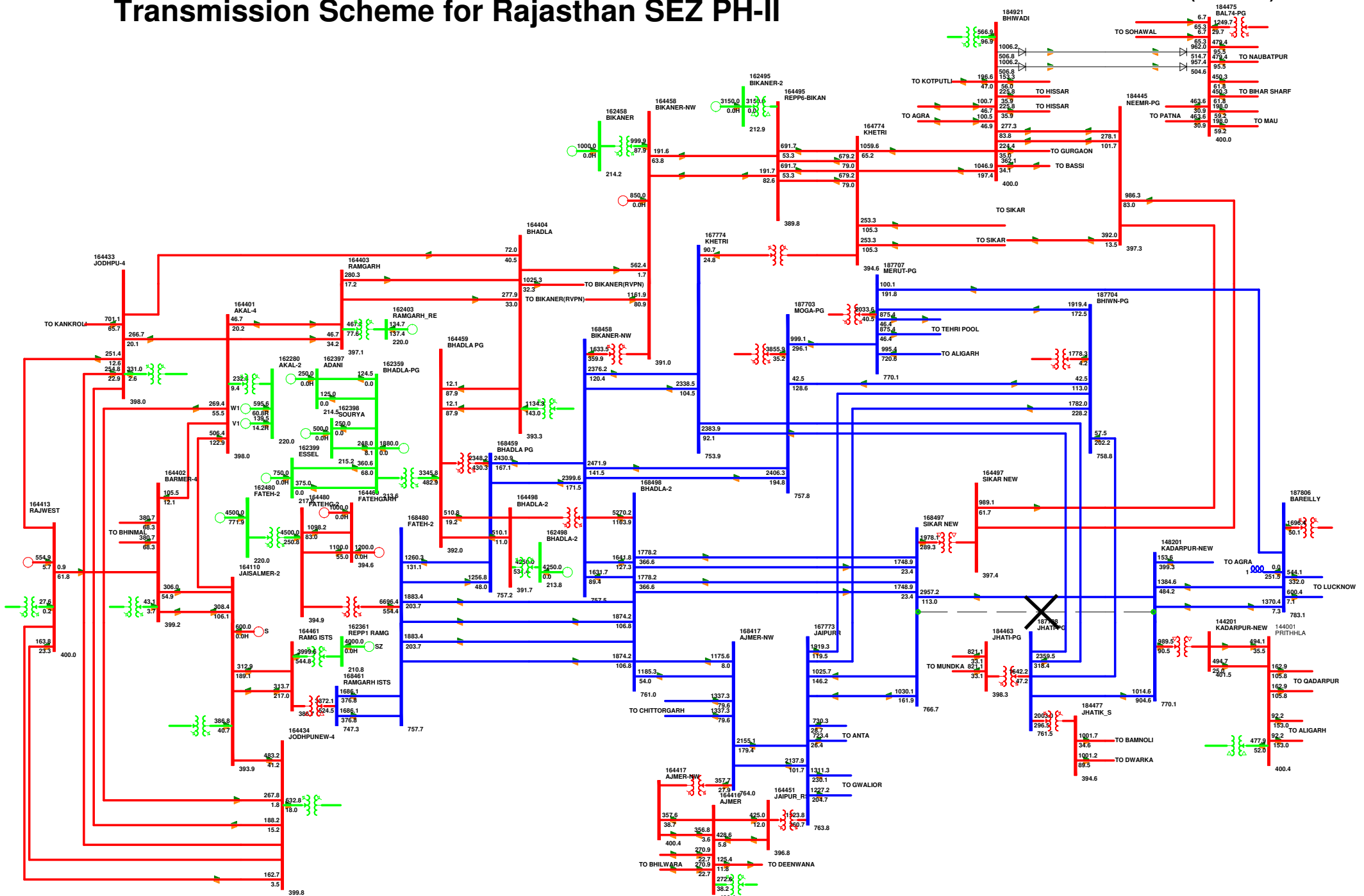
Transmission Scheme for Rajasthan SEZ PH-II



Outage of one ckt of 765 kV Khetri-Jhatikara D/c Line

Transmission Scheme for Rajasthan SEZ PH-II

Bhiwadi - Balia HVDC (2000 MW) Annexure-XV



Outage of one ckt of 765 kV Sikar- Kadarpur D/c Line