सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन –I प्रभाग

Power System Planning & Appraisal-I Division

To

-As per list enclosed-

Subject: 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP) – Minutes of Meeting

Sir/ Madam,

The 1st meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP) was held on **24th January 2020** at **Jaisalmer, Rajasthan.**

Minutes of meeting are available 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).

Yours faithfully,

(Goutam Roy)
Chief Engineer

List of Addressee:

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. Uttrakhand
4.	Director (Technical), Punjab State Transmission Corporation Ltd. (PSTCL) Head Office The Mall Patiala -147001	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, 3rd Floor, Room no 330, Vidhyut Bhawan, Janpath, Jaipur-302005.	8.	Director (Technical) HVPNL Shakti Bhawan, Sector-6 Panchkula-134109	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.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 (Fax-0124-2571809)	14.	Director (System operation), POSOCO B-9, Qutab Institutional Area, Katwaria Sarai New Delhi – 110010	15	MD, SECI, Prius Platinum, D-3, District Centre, Saket, New Delhi -17
16	CMD, NTPC, NTPC Bhawan, Core 7, Scope Complex-6, Lodhi Road. New Delhi	17	CMD, NHPC, NHPC Office Complex, Sector-33, NHPC, Faridabad-121003 (Fax-0129-2256055)		

Minutes of 1st Meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP) held on 24.01.2020

List of participants is enclosed as Annexure-I.

Chairperson, CEA welcomed the participants and stated that Ministry of Power has recently constituted the Regional Power Committee (Transmission Planning) wherein, member from SECI, NTPC & NHPC has been included in the committee. Further, the terms of reference has also been changed along with the frequency of meeting (once in every quarter). He then requested CE (PSPA-I), CEA to take up the agenda item and also requested members to be specific in deliberation so that decisions could be arrived at through consensus.

Chief Engineer, CEA stated that the erstwhile Standing Committee of Transmission has now been renamed as Regional Power Committee for Transmission Planning and for Northern Region, it would now be NRPCTP. The reconstitution as well as the new TOR has been covered as a part of the agenda item. He further requested the participants to send their agenda items within one month from the last meeting. Since there would be adequate meetings so only limited nos. of agenda to be covered in a meeting so that sufficient time could be given to members to study the agenda and to have fruitful discussions during the meeting. He then requested Director, PSPA-I (CEA) to take up the agenda for discussions.

1.0 Confirmation of the Minutes of the 5th meeting of Northern Region Standing Committee on Transmission held on 13.09.2019.

1.1 Director PSPA-I (CEA) stated that the 5th meeting of Northern Region Standing Committee on Transmission (NRSCT) was held on 13.9.2019 and the minutes of the meeting were issued vide CEA letter no. File No.CEA-PS-11-21(19)/2/2019-PSPA-I Division dated 21.9.2019. She stated that POSOCO vide its letter NLDC/SO2/TS24/SCM/1404 dated 26.9.2019 has forwarded their observations on the Agenda item no. 3 of the minutes of the meeting. In the letter, POSOCO has mentioned that few suggestions provided by POSOCO in context of transmission planning studies of RE has not been incorporated in the minutes and requested to incorporate the same in the minutes of 5th meeting of NRSCT. The observations made by POSOCO were mainly regarding the decision for installation of the STATCOM at the generating end and its cost. POSOCO also raised that proper justification for preferring HVAC over HVDC may be incorporated in the minutes of the 5th meeting of NRSCT.

CEA clarified that the details regarding placing of STATCOM at the generating end were mentioned in the para no. 2.19 and 2.20 of the minutes of 5th NRSCT. The decision for the STATCOM at the generation end were taken, considering the stability issues in the Solar generation plants. Regarding the justification of preferring HVAC option over HVDC option, it had been mentioned in the minutes that the cost of HVDC system would be quite higher than the cost of HVAC system and since the transmission system would be required by Dec 2021 which would not be possible in case of HVDC system, therefore HVAC system has been preferred over HVAC system. The same has also been justified in the para no. 2.3 of the minutes of 5th NRSCT.

1.2 CEA further stated that regarding the cost of the STATCOM, CTU had informed that the cost of installing STATCOMs at above mentioned 03 locations is around INR 850 crores. The same may be incorporated in the minutes of 5th meeting of NRSCT.

1.3 CTU stated that dynamic studies for STATCOM have also been carried out and details are mentioned at the agenda point no 18.

1.4 After deliberations, the minutes of 5th meeting of NRSCT along with the modifications mentioned at para no. 1.2 above were confirmed by the constituents.

2.0 Constitution of Northern Regional Power Committee (Transmission Planning) (NRPCTP) for planning of Transmission System in the Region:

2.1 CEA stated that in supersession of Ministry of Power's Office order of even number dated 13.04.2018, constituting Northern Region Standing Committees on Transmission (NRSCT), MoP decided to revise the existing NRSCT by replacing the same with a new "Northern Region Power Committees (Transmission Planning) (NRPCTP)" vide MoP's office order dated 4.11.2019 with the following composition with immediate effect:

Northern Regional Power Committee (Transmission Planning) (NRPCTP):

1	Member (Power System), Central Electricity Authority (CEA)	Chairperson
2	Chief Operating Officer, Central Transmission Utility (POWERGRID)	Member
3	Director(System Operation), Power System Operation Corporation Ltd.	Member
4	Heads of State Transmission Utilities (STUs) of UT of Jammu & Kashmir, UT of Ladakh, Himachal Pradesh, Punjab Haryana, Rajasthan, Delhi, Uttar Pradesh, Uttarakhand, UT of Chandigarh *	Member
5	Member Secretary of Northern Regional Power Committee	Member
6	CMD/ MD/ Chairman of NTPC, NHPC and SECI	Members
7	Chief Engineer (from Power System Wing), Central Electricity Authority	Member Secretary

STUs to coordinate with their respective Distribution Companies (DISCOMs)
* To be nominated by the Central Electricity Authority.

2.2 Further, CEA stated that NTPC, NHPC and SECI are the new members of the committee, and the rest constitution of the committee remains the same. The Terms of Reference of the committee are:

I. Carry out a quarterly review of the Transmission System in the region; assess the growth in generation capacity and the demand in various parts of the region; and draw up proposals for strengthening Inter- Regional transmission system. The transmission planning is required to keep in mind the areas where the generation is likely to grow and areas where load demand will grow so that the transmission system at any point of time is capable to meet the demand in every corner of the country and comply with the mandate under the Tariff Policy of developing transmission system ahead of the generation for ensuring smooth operation of the

grid.

II. Assess the transmission system requirements in the near, medium and long term and draw up transmission schemes to meet these requirements. While doing this, a perspective plan for the next 15-20 years may also be kept in mind and accordingly the requisite allowance/margin may be factored in the system during planning process.
III. Examine applications for connectivity and access and ensure that these are granted speedily, provided that the requisite fees/charges are paid.
IV. Review the upstream and downstream network associated with transmission schemes.
V. Examine and evaluate the intra-state transmission proposals.
VI. Review and facilitate the construction of the inter-regional grid strengthening schemes.

2.3 CTU stated some points regarding the Terms of Reference:

(a) As per ToR(I), clarification is needed whether the transmission system discussed in the last quarter/meeting needs to be reviewed in the subsequent quarter or the entire transmission system planned needs to be reviewed?
(b) States and Discom's are very much aware of the load demand and can play a prominent role in this assessment of generation capacity growth. Therefore, the inputs/ information pertaining to the demand and generation capacity needs to be provided by the State Utility.
(c) Strengthening the Inter- Regional transmission system as mentioned in TOR(I), does not only imply planning inter-regional schemes, but also to takes into consideration the Inter State proposals also.

2.4 CEA stated that the review of the system is also the part of planning process that has already been carried out by the Standing Committee forum.

2.5 For ToR (II), CEA further stated that as a part of statutory function of CEA, medium term and long term studies are already being carried out by CEA for the coming 5 years period and the same is reflected in the Volume-II of National Electricity Plan (NEP)-Transmission. Assessing the same with the perspective plan of 15-20 years could also be done and the same could be revised every time for the next 5 years.

2.6 CTU stated that as the planning is done for the next 5 years, so the States are requested to provide the expected demand that they are likely to draw though ISTS. COO (CTU) explained this by giving an Example. If suppose the expected demand of Punjab by 2024 is 16000 MW, and within the region 10000 MW can be met, therefore the planning needs to be done only for the remaining 6000 MW that is supposed to be drawn through ISTS. Such system needs to be developed as this will help in proper planning and the same will be taken up for implementation. Such system will be reviewed and modified according to the changes in load pattern and growth in generation.

2.7 For ToR (III), CEA stated that CTU has been conducting meetings for the grant of LTA/Connectivity, where applicants, regional constitutes and CEA are invited. Therefore, CTU may share the same information/details with the Committee. In this regard, CTU stated that in order to meet CERC Connectivity Regulations timelines, monthly meetings related to LTA/Connectivity are held. Summary of those proceedings were shared with the Standing Committee. The Details of the Connectivity/LTA granted/agreed for grant are being shared with the Standing Committee as agenda point. In the present meeting also, the details of the Connectivity/LTA granted/agreed for grant during July'19 to Dec'19 have also been included. CTU also requested all the Constituents to regularly attend these monthly meetings.

2.8 HPPTCL raised its concern that for States, it is difficult to project the demand and generation precisely for 15 years, as the market is changing rapidly and there is poor insight of what market is doing to the system. Therefore, inputs from the power market in association with PTC are needed for insight of commercial aspects also.

2.9 In this regard, POSOCO stated that it is necessary to invest adequate time for base case preparation and carry out transmission planning studies considering seasonal variations in demand and generation during different scenarios. The base case should be frozen on an All India basis considering country wide merit order dispatch. As the schemes/projects are planned for the upcoming 3 years. He also suggested that studies may be carried out on 16 cases (4 cases for each quarter and in each quarter for four different instances of day such as morning peak, day trough, evening peak, night off-peak). POSOCO further stated that EPS stipulates broad indicative figure. Also, for better insights related to market, All-India merit order despatch details will be sufficient and PTC will no longer be required. These details will be helpful in expanding the existing transmission system along with the integration of the renewable capacity in the grid.

POSOCO further stated that other models/ tools apart from PSSE that involve production cost, could be used for transmission planning studies. POSOCO added that it is also necessary to mention timelines for each action and make efforts to complete the tasks within the timeline so that the picture at the broader level is clear. For instance, considering that we were in Jan 2020, the planning base cases for 2023 and beyond could be taken up for preparation. CTU, CEA and STUs should all use the same set of cases for any transmission planning studies.

2.10 HPPTCL stated that the historical data of load and generation can be made available. Short term projections for 2 years could also be done, however for long term projections, proper training and models are required for forecasting and testing the data on historical basis.

2.11 CEA stated that planning is based on studies which require projections for 15-20 years. Therefore, states should provide the details of the forecast and load pattern in order to successfully plan a project/scheme.

2.12 SECI stated that emphasis should be laid on the additional area of generation which are to be added or the potential which exists in various states like solar potential in Leh-Ladakh, Rajasthan etc. Also, the growth of the generation along with the possibility of export to inter-regional and cross-borders also needs to be captured while transmission planning. In this regard, CEA stated that while planning, generation must be confirmed first, whether it is actually coming or not.

2.13 After detailed deliberations, Members noted the constitution and the Terms of Reference of NRPC (TP).

3.0 Agenda by HVPNL: Creation of 132/66kV S/s at Nanakpura with LILO of Ropar – Pinjore 132kV line at Nanakpura and LILO of Pinjore-Solan 66kV line at Kalka 66kV S/s:

3.1 CEA stated that HVPNL vide its letter no. Ch-7/HSS-391 dated 22.10.2019 has mentioned that they are intending to construct 132 kV cum 66 kV AIS substation at village Nanakpur near Kalka (Haryana) to cater the increasing load demand in that area and for ensuring reliability of supply to Kalka area by making LILO arrangement of 132 kV Ropar-Pinjore D/C line (Owned by Haryana). To provide alternate source to the existing 66 kV Kalka S/Stn, proposal has also been made by making LILO arrangement of 66 KV Pinjore-Solan S/C line (owned by HP) at Kalka. The details are as follows:

(i) Creation of 132 kV cum 66 KV AIS substation at village Nanakpur (Pinjore) in Kalka constituency with 1x10/16 MVA 132/11 kV and 1x12.5/16 MVA 66/11 kV transformers capacity (already approved by HVPNL vide R-1670 / Ch-9/406/K-280 dated 12.09.2019 for FY 2021-22) to cater the load growth in Nanakpur area. Considering the scarcity of ROW and utilization of existing ROW, the connectivity to said substation has been provided by LILO arrangement of 132 kV Ropar-Pinjore D/C line at 132 kV cum 66 kV AIS substation Nanakpur.

(ii) At present, 66 kV Kalka is being fed from 220 kV Pinjore through 66 kV Pinjore-Kalka S/C line. Further to provide reliability of supply to 66 kV Kalka substation and considering utilization of existing ROW, alternate connectivity to 66 kV substation Kalka is proposed through LILO arrangement of 66 kV Pinjore –Solan S/C line at 66 KV substation Kalka. Both 132 kV Ropar –Pinjore D/C line and 66 kV Pinjore –Solan line being interstate in nature, the approval of NRPCTP has been sought by HVPNL.

3.2 CEA also stated that to discuss the above proposals, a meeting was held in CEA on 3.12.2019, wherein HVPNL informed that 132kV cum 66kV AIS substation at Kalka with 1x10/16 MVA, 132/11kV and 1x12.5/16 MVA, 66/11 kV ICTs would be created by LILO of both circuits of existing 132kV Ropar – Pinjore line (0.15sr ACSR conductor) in following way:

(i) Ropar - Nanakpur D/C line to be charged at 132kV level from Ropar

(ii) Pinjore - Nanakpur D/C line to be charged at 66kV level from Pinjore

HVPNL also informed, that for the above works that they would utilize 66/11kV spare transformer in Haryana's system. The existing 1x10/16 MVA, 132/11kV transforme at Pinjore would also be utilized at Nanakpur substation.

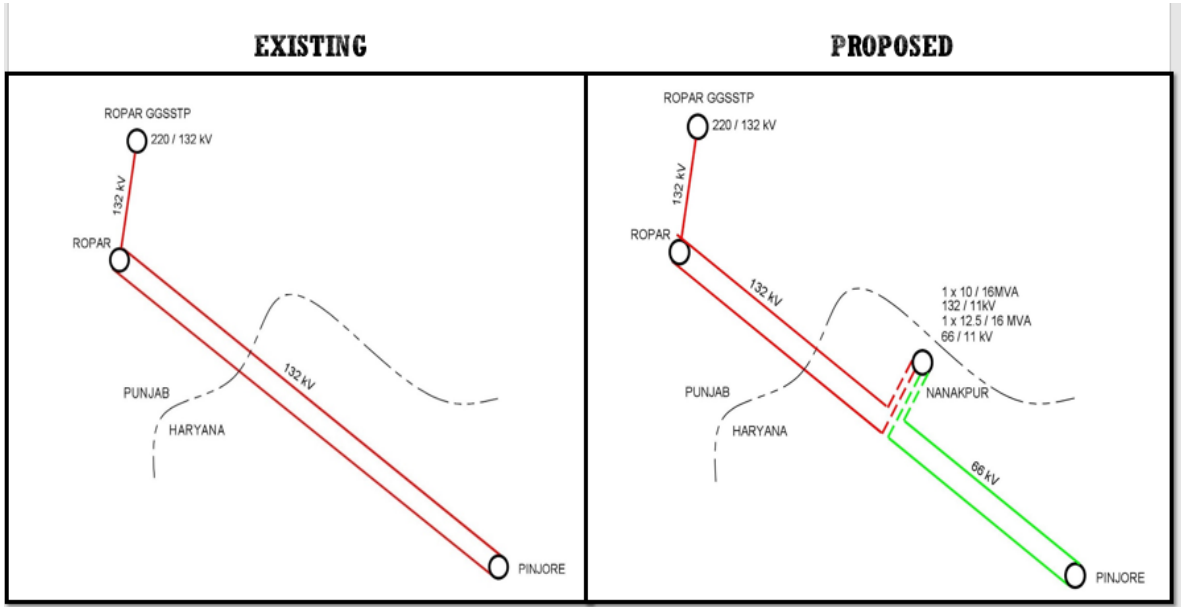
Regarding the 2nd proposal, HVPNL informed that the LILO of Pinjore - Solan 66 kV S/C line at Kalka substation has been proposed to provide reliability of supply to 66kV Kalka substation. HVPNL added that the 66kV Pinjore - Solan S/C line is a very old line and there is very small or no drawl by HP through this line. HVPNL stated that, the peak drawl of Kalka substation is around 25MVA. After the proposed LILO, length of Pinjore to Kalka portion of Pinjore- Kalka line would be around 7.45 kms and would provide alternate power supply to Kalka.
After deliberations, following was agreed, subject to ratification from NRPCTP:

I. LILO of Ropar – Pinjore 132kV D/C line at Nanakpur subject to confirmation from PSTCL.

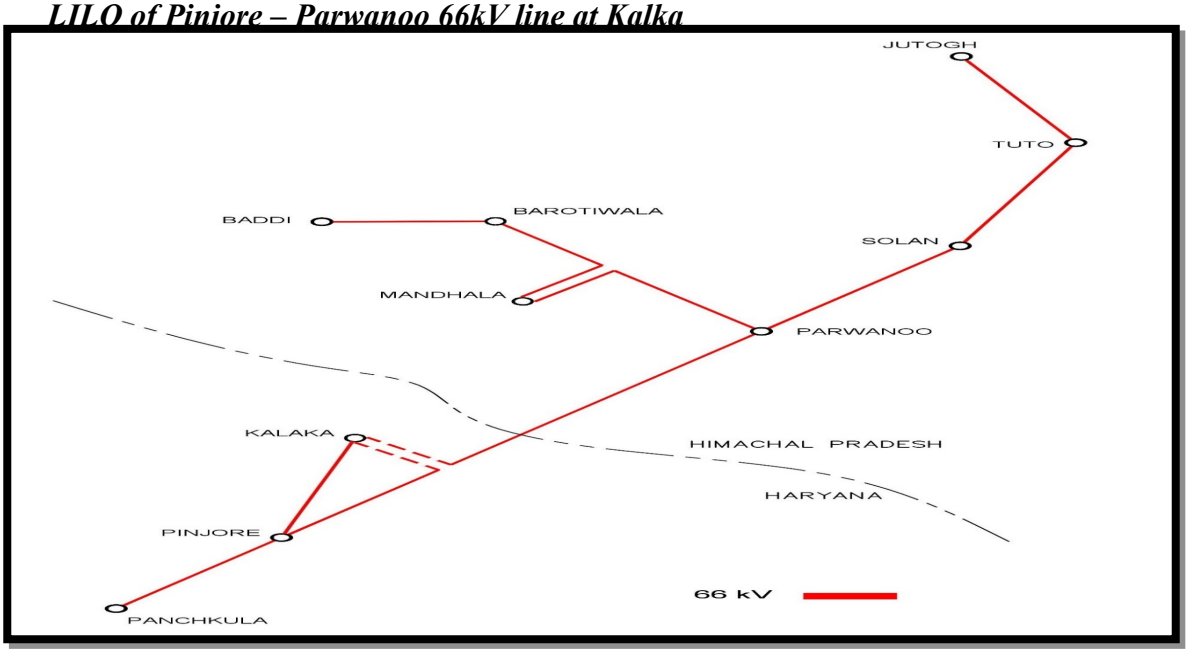
II. *LILO of Pinjore – Parwanoo 66kV line at Kalka. However, the issues related to shifting of ISTS point, ownership and commercial issues may be sorted out mutually between HPPTCL and HVPNL.*

3.3 CEA further stated that subsequently, PSTCL vide its letter no. 1039/P-1/288 dated 9.12.2019 has forwarded its consent for implementation of Nanakpura S/s by HVPNL with LILO 132 kV Ropar-Pinjore D/C line.

LILO of Ropar – Pinjore 132kV D/C line at Nanakpur



LILO of Pinjore – Parwanoo 66kV line at Kalka



3.4 Regarding the 2nd proposal, HPPTCL informed that Pinjore-Solan is a dedicated line and is used only in case of emergency. He suggested to upgrade the existing Pinjore-Kalka S/c line to a D/c line, leaving their existing line as it is because it is used for contingency flow of around 15-20 MW.

3.5 In this regard, Haryana stated that it would be difficult to convert S/c line to D/c line. With the proposed LILO, Pinjore-Kalka is ultimately becoming a double circuit. Also, the power of around 20 MW under contingency condition can easily flow with the proposed system.

3.6 After detailed deliberations following was agreed:

(i) *LILO of Ropar – Pinjore 132kV D/C line at Nanakpur wherein, Ropar - Nanakpur D/C line to be charged at 132kV level from Ropar and Pinjore - Nanakpur D/C line to be charged at 66kV level from Pinjore.*

(ii) *LILO of Pinjore – Parwanoo 66kV line at Kalka. A meeting to be scheduled between HPPTCL and HVPNL to sort out the issues related to shifting of ISTS point, maintenance, ownership and commercial issues for the LILO of Pinjore – Parwanoo 66kV line at Kalka.*

4.0 Augmentation of transformation capacity at 400/220 kV Math, Mathura(UPPTCL) substation from 2x315 MVA to 1x500+2x315MVA

4.1 CEA stated that in the 40th Meeting of Standing Committee of Northern Region held on 22.06.2018 at NRPC, New Delhi, augmentation/ replacement of 400 kV S/s Math, Mathura (UPPTCL) has been approved form 2x315 MVA to 1x315 MVA + 1x500 MVA or 3x315 MVA depending upon the availability of space. Subsequently, UPPTCL vide their letter no 3936/TP&PSS/UPPTCL/2019/CEA-SCM dated 2.11.2019 has intimated that they have planned to augment the transformation capacity of 400/220kV Mathura substation by 1x500+2x315MVA, which was earlier 2x315 MVA, due to envisaged load growth.

4.2 CEA enquired about the load growth of UP. In response, UP stated that at present load is around 500 MW and is expected to increase to 700 MW. Also, a new 220 kV S/s is planned at Vrindavan in order to cater the demand. Hence, a 500 MVA transformer is needed at 400/220 kV Math, Mathura (UPPTCL) substation in order to meet n-1 contingency.

4.3 After deliberations, members agreed with the augmentation of transformation capacity at 400/220 kV Math, Mathura (UPPTCL) substation from 2x315 MVA to 1x500+2x315MVA.

5.0 Proposal of DTL to replace an ICT of 315 MVA with 500 MVA ICT at Bawana 400 kV substation.

5.1 CEA stated that DTL vide its letter no. F.DTL/202/Opr(Plg)/2019-20/F-8/67 dated 9.08.2019 had submitted that the transformer No. 4 at 400 kV Bawana switchyard was installed on 1997 and due to deterioration of its health, the same was needed to be replaced. Therefore, DTL proposed for replacement of 4th 315 MVA ICT with 500 MVA ICT at Bawana 400 kV substation. DTL also mentioned that at present, the installed capacity of Bawana 400 kV substation of DTL is 1890 MVA (6X315 MVA) and with the proposed replacement, transformation capacity at Bawana would become 2075 MVA (1x500+5X315 MVA), which is higher than the maximum transformation capacity i.e. 2000 MVA for a 400 kV substation, as specified in CEA's Transmission Planning Criteria.

To discuss the above issue, a meeting was held in CEA on 26.9.2019, wherein, proposal of DTL for replacement of 1 no. of 315 MVA ICT with 500 MVA ICT at Bawana 400 kV substation was agreed, subject to ratification from NRPCTP, with the condition that in future, if any further ICT replacement is done by DTL, the capacity would not exceed much beyond 2075 MVA.

5.2 DTL ensured that in future, if any replacement is needed then capacity will be restricted and would not exceed much beyond 2075 MVA. They further informed that the replacement is expected to be done by March 2021.

5.3 CEA suggested that if the loading increases at Bawana, then the load could be shifted to other S/s. In this regard, DTL informed that with the LILO of 400 kV Bawana-Mandola at Tikrikhurd and a new 765 kV S/s planned at Narela, loads at Bawana could be shifted.

5.4 CTU enquired about the status of Gopalpur substation. On which DTL responded that it is under tendering stage and to be implemented within two years after award.

5.5 Members agreed with the proposal of DTL to replace a ICT of 315 MVA with 500 MVA ICT at Bawana 400 kV substation, with the condition that in future, if any ICT replacement is done by DTL, the capacity would not exceed much beyond 2075 MVA.

6.0 Evacuation system for Singrauli STPP Stage III (2x800 MW)

6.1. CEA stated that NTPC is implementing Singrauli STPP Stage III generation within the existing Singrauli TPS complex in UP and NTPC has commitment for purchase of 85% of power from UP. To discuss the evacuation system for Singrauli STPP-III (2x660 MW), a meeting was held in CEA on 7.05.2018, wherein, keeping in view the high short circuit level in Singrauli, Anpara generation complex, following was proposed in respect of transmission system for evacuation of power from Singrauli STPP –III:

i) Singrauli St-III to be connected to Vindhyachal 765/400kV pooling station through Vindhyachal St-IV/V.

ii) Singrauli-III–Rihand-III 400kV D/c line to provide additional evacuation path to both generations, Singrauli St-III and Rihand-III.

To examine availability of space at Vindhyachal St-V, Rihand St-III, Vindhyachal 765/400kV pooling station and feasibility of 400kV link with Rihand St-III, a site visit was carried out by CEA, CTU and NTPC during the period 01.06.2018 to 02.06.2018 wherein it was found that termination of a new D/C line may not be possible at Vindhyachal-IV due to extensive ROW constraints in the vicinity of the yard. Therefore, LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage- III along with reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line formed after LILO with HTLS conductor to meet n-1 criteria of power flow was proposed.

Matter was further discussed in 40th Standing Committee Meeting on Power System Planning for Northern Region held on 22.06.2018 wherein NTPC intimated that plant capacity of Singrauli STPP Stage III has been revised to 2x800 MW from 2x660 MW and it was decided that joint studies involving CEA, CTU and POSOCO for the increased capacity of Singrauli STPP-III generation from 2x660 MW to 2x800 MW. Now, NTPC vide its letter dated 21.06.2019 has intimated that tendering for the project is in advanced stage and has requested to finalize the evacuation system of Singrauli III project as 2x800 MW.

6.2. CEA further stated that a meeting was held in CEA on 4.10.2019, wherein, following was discussed:

(i) In the load flow studies carried out considering the evacuation system proposed in earlier meetings, no constraint have been observed in the transmission system due to revision in the plant capacity of Singrauli STPP Stage III from 2x660 MW to 2x800 MW except the high loading on 765/400kV transformers at Vindhyachal Pool. To cater the high loading, a 3rd 765/400kV transformer may be added at Vindhyachal Pool.

(ii) Regarding the issue of high short circuit level in Singrauli, Anpara generation complex, it was suggested that 3 phase fault current reduces significantly with the opening of Singrauli-Anpara 400kV line and there would not be any issue in opening this line as very less power flows on Singrauli-Anpara 400kV line and it is floating

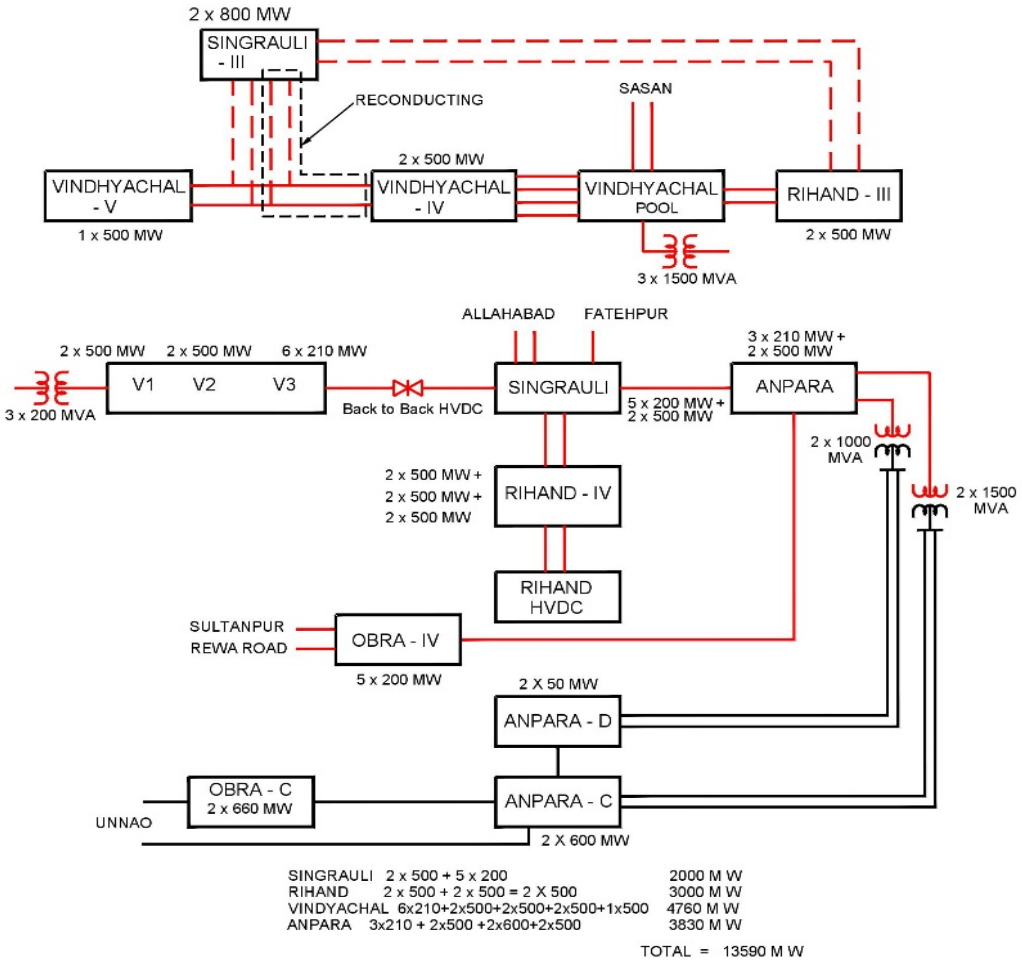
most of the time. In view of above following was agreed for evacuation of power from Singrauli Stage-III TPS (2x800 MW)

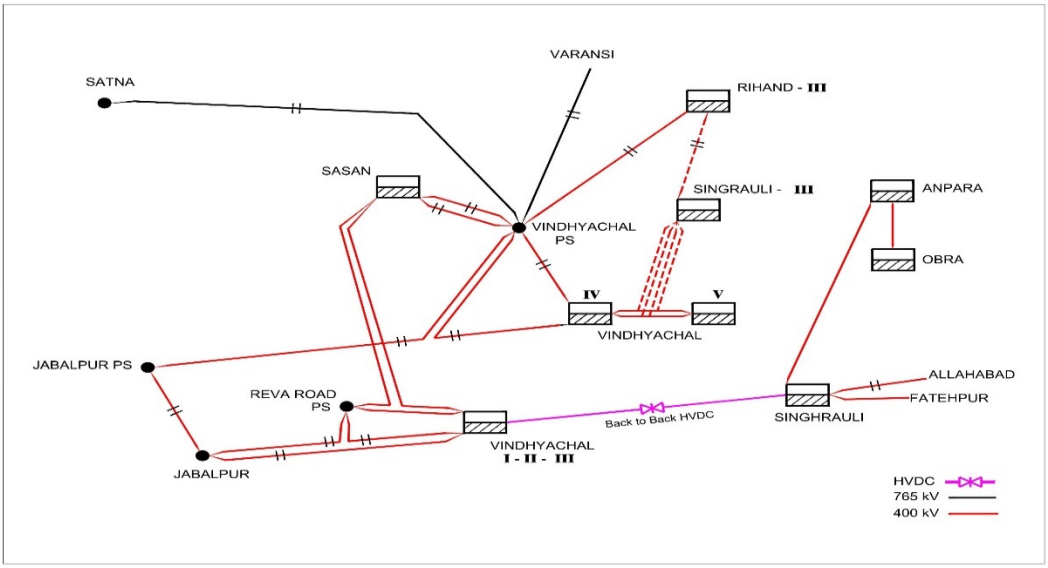
(iii) LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III.

(iv) Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor.

(v) Singrauli-III–Rihand-III 400kV D/c line

6.3. A schematic arrangement of the Anpara- Vindhyachal –Singrauli complex is enclosed herewith.





6.4. CEA enquired about the commissioning schedule of Singraulli III. Accordingly, NTPC stated that they will be get the environmental clearance in the month of March this year and the expected commissioning schedule is by 2024 end.

6.5. CTU clarified that for connectivity, the LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III as well as reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS would be in the scope of the developer and Singrauli-III–Rihand-III 400kV D/c line would be the part of LTA system and would be taken up for implementation under ISTS after grant of LTA to NTPC. CTU also stated that earlier the connectivity application for Singrauli STPP Stage III (2x660 MW) had some issues and the revised application for the capacity of 1600 MW has not been received yet.

6.6. NTPC stated that they would apply for the connectivity and LTA under ISTS as UPPTCL has confirmed to draw its share from ISTS point.

6.7. POSOCO stated that Vindhyachal Pool to Sasan is a twin moose line and is not meeting n-1 criteria. Also, if any problem arises with protection or maintenance in Singrauli III, then the system of Rihand III, Vindhyachal –IV and Vindhyachal-V may be affected. POSOCO stated that the impact of charging of Rihand III – Vindhyachal D/C line at 765kV from 400kV (presently) may be studied by CEA and CTU. This may also help to resolve issue of N-1 non-compliance of 400 kV Sasan – V'chal PS D/C.

6.8. POSOCO also enquired whether FGD is going to be installed at Vindhyachal -1 (1260MW) and Singrauli (200x5 MW) units.

6.9. NTPC stated that award has already been placed with FGD. Also, from Vindhyachal –IV quad line is present, so if any issue arises in Singrauli, then power evacuation from Vindhyachal –IV will not get affected. Also, Vindhyachal –V has only one unit of 500 MW and Rihand-III is directly connected to Vindhyachal PS. So, the system for Rihand-III and Vindhyachal IV will also not be affected.

6.10. Regarding the short circuit level, CTU informed that as per their studies, the 3-phase fault is 48.6 kA and LG fault level is around 51 kA. Such issue needs to be addressed for

evaluating the LTA system.

6.11. CEA stated that the fault level reduces significantly with opening of Singrauli- Anpara 400 kV line.

6.12. CTU enquired about the time schedule of the proposal regarding opening of Singrauli-Anpara 400 kV line. In this regard, POSOCO stated that the line may be opened with the coming of Anpara D –Unnao line, which is expected by June 2020 as informed by UP; subject to the condition that with the opening of the line, the adjacent system is not affected. In the meeting, it was agreed that 400kV Singrauli-Anpara may be kept opened after commissioning of 765kV Anpara D-Unnao to restrict high short circuit level in Singrauli-Anpara complex, however, in case of any contingency the line may be required to be taken in service.

6.13. After deliberations, following was agreed:

(i) The transmission system for evacuation of power from Singrauli III:

I. LILO of both circuits of Tie line (Vindhyachal Stage-IV to Vindhyachal Stage-V 400kV D/C Twin Moose line) at Singrauli Stage-III- under the scope of NTPC.

II. Reconductoring of Singrauli Stage-III - Vindhyachal stage-IV 400 kV D/C TM line (formed after above proposed LILO) with HTLS conductor - under the scope of NTPC

III. Singrauli-III–Rihand-III 400kV D/c line- under ISTS scope

IV. 2x125 MVAR Bus Reactor at Singrauli-III generation switchyard- under scope of NTPC

(ii) Singrauli- Anpara 400 kV line will be kept normally open (can be closed in emergency conditions) after commissioning of Anpara D –Unnao 765kV line to restrict high short circuit level in Singrauli-Anpara complex.

(iii) The short circuit level in Singrauli will again be studied by CEA and CTU and accordingly, would be discussed in the next NRPCTP meeting.

The above scheme may also be rectified in next NRPCTP meeting.

7.0 Transmission system for evacuation of power from Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEPs of CVPPL:

7.1 CEA stated that CVPPL is implementing three major HEPs viz Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEP in J&K. Works on various components of PakalDul HEP are in progress. Works of Kiru and Kwar HEPs are in advanced stage of tendering. The power from these projects was planned to be pooled to Kishtwar S/s. In the 2nd meeting of NRSCT, following was agreed in regard of the connectivity of PakalDul HEP (1000 MW):

i) 400 kV D/c (Triple HTLS Conductor) line from PakalDul 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 PakalDul 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.

The matter was again deliberated in 3rd meeting of NRSCT wherein, it was suggested that, in view of limited space for laying the transmission line corridor in Chenab Valley, it would be better that CVPPL lay a dedicated line from PakalDul HEP to Kishtwar which could be extended to Kawar and Kiru HEPs, Kirthai I and Kirthai II HEP so that beside about 2400 MW power from Pakaldul, Kawar and Kiru HEPs additional 1420 MW power from Kirthai I and Kirthai II HEP could also be evacuated from the PakalDul HEP–Kishtwar corridor. CVPPL agreed with the suggestion given by CEA to use quad HTLS for PakalDul HEP–Kishtwar line instead of triple HTLS conductor.

Subsequently, CVPPL intimated that they are facing some difficulties in implementation of PakalDul HEP–Kishtwar line with quad HTLS conductor. If 1300 MW power from Kirthai I and Kirthai II projects in Jammu & Kashmir would also be evacuated through the PakalDul HEP–Kishtwar line, current would be of the order of 5000 Amps. CVPPL also mentioned that earlier it was agreed that the GIS switchyard equipment, XLPE cables and other associated equipment may be designed for current carrying capacity of 4000 Amps, therefore, the same has been mentioned in the tender documents and works of Pakaldul HEP switchyard has been awarded accordingly. The works on various components of PakalDul HEP are already under progress. CVPPL therefore requested to plan a separate corridor for evacuation of power from Kirthai I and Kirthai II projects in Jammu & Kashmir and for evacuation of power from CVPPL projects (i.e. Pakaldul, Kiru & Kwar HEPs), the dedicated line to Kishtwar may be implemented with triple HTLS conductor.

7.2 To deliberate on the issue further, a meeting was held in CEA on 26.09.2019, wherein, CTU informed that survey was conducted in the Chenab basin and it was found two corridor are possible in that valley and the same has accordingly been reflected in the master plan i.e one corridor for 1500 MW power coming from HP in addition to Kirthai I & II and 2nd corridor for Kiru, Kwar and Pakaldul projects. Accordingly, after deliberations, following was agreed in- principle:

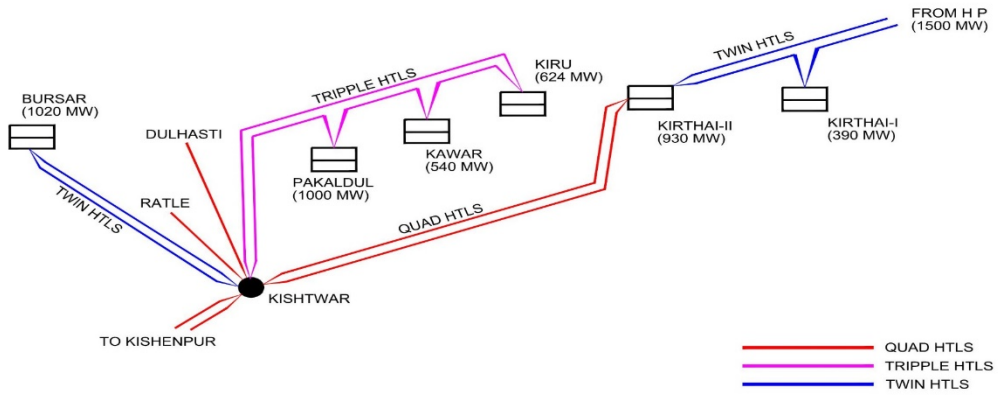
i. Implementation of Kiru-Kwar-Pakaldul to Kishtwar 400 kV D/c line with triple HTLS conductor instead of quad HTLS conductor was agreed subject to ratification from the NRSCT.

ii. The possibility of 2nd corridor in Chenab basin need to be discussed with JKPDD.

7.3 CEA also mentioned that for grant of connectivity/LTA to Pakaldul HEP, the transmission system (mentioned at 7.1 above) was agreed, which involves establishment of 400 kV

switching station at Kishtwar(GIS) by LILO one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung) as ISTS work and depending on the progress and requirement of the Generation developer, the system needs to be taken up for implementation through ISTS.

POWER EVACUATION ARRANGEMENT FROM PROJECTS IN JAMMU & KASHMIR



7.4 CTU enquired about the timeframe of all the three projects in order to take up with the implementation of Kishtwar S/s. In this regard, CVPPL informed that Pakaldul and Kiru are expected by Dec 2024 and the timelines for Kwar are not yet defined. Further, they have received the Cabinet Approval for Pakaldul and Kiru. Pakaldul has been awarded and construction is in process. PPA is yet to be signed between Govt. of J&K and NHPC wherein, 49% of the power will be purchased by J&K and the remaining power will be sold by NHPC. Kiru is expected to be awarded by April 2020.

7.5 CTU further enquired about the transmission line length. In this regard, CVPPL replied that line length from Kishtwar to Kiru is 30 kms and from Pakaldul to Kishtwar is 15 km. CTU expressed the concern that since timelines of Kwar is not defined and date of award of Kiru and Kwar are yet to be finalised, therefore there will be difficulty in getting the prior approval under Section -68 of the LILO of one circuit of Kiru-Kishtwar line at Pakaldul and Kwar. For this, CVPPL replied that LILO will be implemented only when the timelines of the generations are confirmed.

7.6 CTU opined that since Kishtwar S/s will be implemented as an ISTS S/s, therefore the transmission system pertaining to Kishtwar should match with the timeframe of the first generations project in the Chenab basin.

7.7 POSOCO suggested that the rating of switchgears as well as bays may be planned considering the plan of evacuation of Pakaldul, Kiru and Kwar (2164MW) as well as Kirthai I and II (1300MW) and other generation from Kishtwar Pooling substation. As the capacity of the Kishtwar S/s will be around 6000 MW, therefore for shutdown and maintenance purpose, possibility of providing bus sectionalizers at Kishtwar S/s may be explored. Also, instead of LILO of one circuit of Kiru - Kishtwar 400 kV D/c line at Pakaldul and Kwar, LILO of both circuits could be done for reliability purpose.

7.8 In this regard, CEA stated that since timelines for Bursar, Kirthai-I and Kirthai-II are not yet confirmed, therefore as of now, Kishtwar S/s is being planned only for about 2400 MW (considering 10% overload). POSOCO added that in near future, with the coming up of new upstream generations, a new substation could be planned in that area.

7.9 After deliberations, the following was agreed:

i) Implementation of of Kiru-Kwar- Pakaldul- Kishtwar 400 kV D/C Triple HTLS connectivity line to be implemented by M/s CVPPL. M/s CVPPL to phase the implementation of the dedicated line as per the implementation timelines of the three HEPs ie. Kiru, Kwar & Pakaldul

ii) One and a half breaker switching scheme at 400kV Generation switchyard.

iii) 2 bays at each end of Kishwar and Pakaldul - under the scope of generator.

iv) 420 kV, 125 MVAR Bus Reactor at PakalDul HEP -under scope of generation developer

v) 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

8.0 Establishment of 400 kV switching station at Kishtwar(GIS) under ISTS:

8.1 CEA stated that in the 2nd meeting of NRSCT, transmission system was agreed for grant of Connectivity/LTA to PakalDul HEP (1000 MW) which included establishment of Kishtwar GIS 400 kV switching station by LILO one circuit of Kishenpur – Dulhasti 400kV D/c (Quad) line (Single Circuit Strung) and Stringing of second circuit from Kishtwar to Dulhasti on Kishenpur – Dulhasti 400kV D/c line(single circuit strung)

8.2 CEA enquired about the finalization of location for Kishtwar S/s. In this regard, CVPPL replied that POWERGRID is Consultant for preparation of DPR of the scheme and POWERGRID has identified a tentative location and for the finalization of location, a committee needs to be formed.

8.3 CTU opined that future provisions needs to be taken up adequately for Kishtwar S/s at both 765 kV and 400 kV end. After deliberations, it was decided that a committee will be formed consisting of CEA, CTU, JKPDD and CVPPL for finalizing the location of Kishtwar Pooling station and accordingly, the proposal would be deliberated in the next NRPCTP meeting.

9.0 RVPN's proposal regarding uprating, updating and strengthening intra-State transmission schemes for Renewable Energy Evacuation in Western Rajasthan to be implemented by RVPN:

9.1 Director CEA stated that RVPN vide letter no. RVPN/SE(P&P)/XEN-2(P&P)/AE-2/F/D/974 dated 22.10.2019 has submitted a proposal for the Transmission System regarding Uprating, Upgrading and Strengthening of Intra-State Transmission Schemes for

Renewable Energy Evacuation in Western Rajasthan to be implemented by RVPN. The proposal includes (i) 765 kV Up-gradation of GSS Jodhpur, (ii) A new 400 kV GSS at Pokaran along with associated transmission lines, (iii) Four nos. of 220 kV GSS, (iv) Three no. of new Transmission lines, (v) Transformer augmentation at 3 locations, (vi) Up-rating of 8 nos. of 200 kV and 13 nos. of 132 kV lines, (vii) Addition of shunt reactors at 8 locations, (viii) TCR at 4 locations and (ix)Power Flow Control Device for 2 transmission lines.

CEA also stated that with the above proposal of RVPN, total 6311 MW of renewable capacity will be added by the end of 2022-23, and the total installed capacity would become 15052 MW. RVPN has also carried out the studies, considering 75% of the RE generation capacity. The following transmission schemes were proposed for renewable energy evacuation from Western Rajasthan:

PART-A

9.1.1 Proposed 765 kV GSS Kankani (Jodhpur) (Up-gradation)

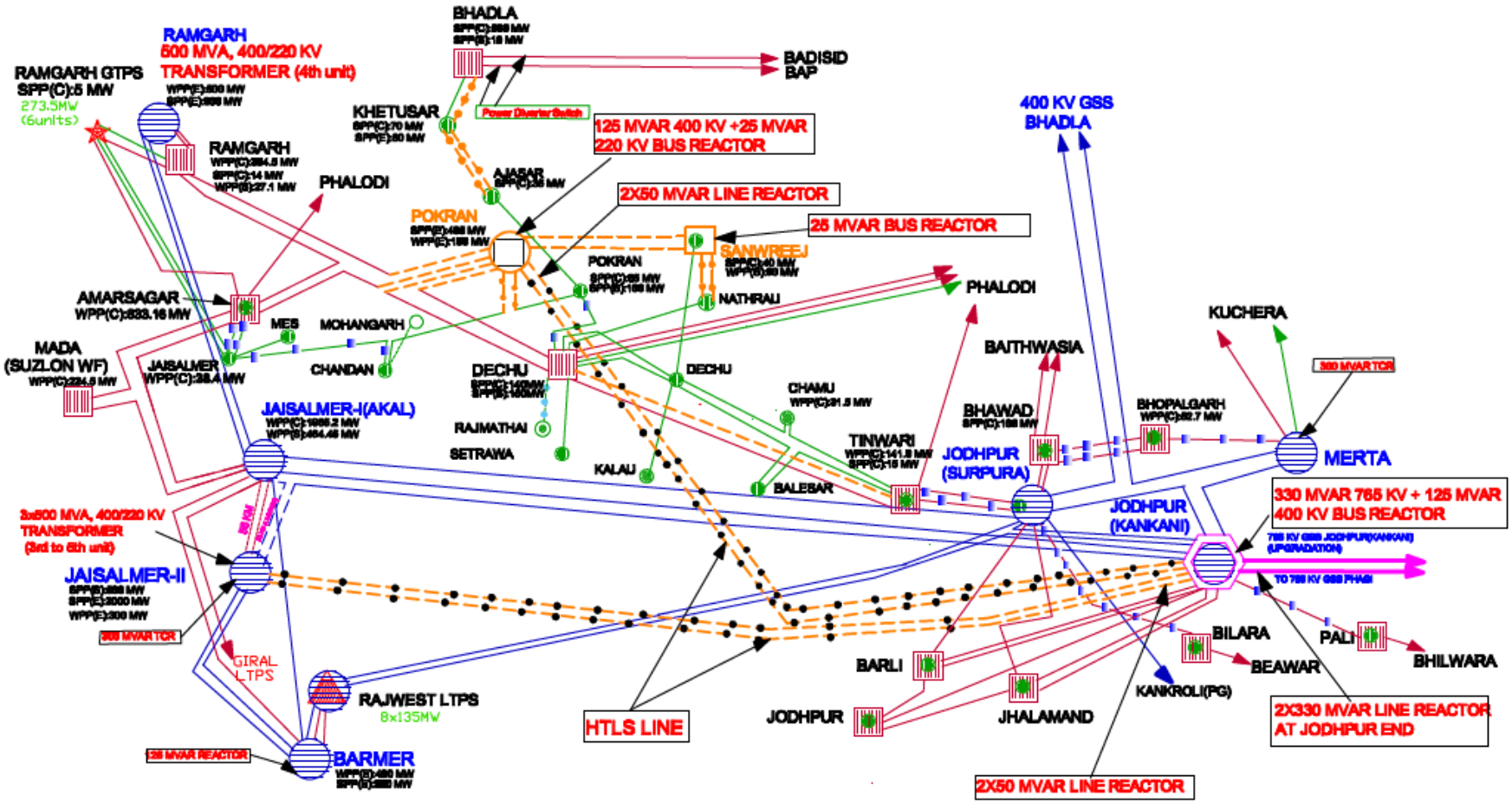
- 3x1500 MVA, 765/400 kV Substation by upgrading 400 kV GSS Kankani(Jodhpur) with 1 x 330 MVAR 765 kV Bus Reactor.
- 300 km, 765 kV D/C Kankani (Jodhpur) - Phagi line with 2x330 MVAR switchable reactors at Kankani (Jodhpur) end and 2x240 MVAR switchable reactors at Phagi end of the line.
- 200 km 400 kV D/C Kankani (Jodhpur)-Jaisalmer-II twin HTLS line with 2x50 MVAR, 420 kV switchable reactors at Kankani (Jodhpur) end of the line.

PART-B

9.1.2 400 kV GSS Pokaran and associated transmission lines

- 2x500 MVA, 400/220 kV and 2x160 MVA, 220/132 kV Power Transformers at 400 kV GSS Pokaran (Proposed) with 125 MVAR, 420 kV Shunt Bus Reactor and 25 MVAR, 245 kV Shunt Bus Reactor.
- 150 km 400 kV D/C Twin HTLS line from 400 kV GSS Pokaran to 765 kV GSS Kankani (Jodhpur) with 2x50 MVAR, 420 kV switchable reactors at Pokaran end of the line.
- 25 km LILO of 220 kV S/C Ramgarh-Dechu line at 400 kV GSS Pokaran (Proposed)
- 25 km LILO of 220 kV S/C Amarsagar-Dechu line at 400 kV GSS Pokaran (Proposed)
- 30 km LILO of 132 kV S/C Chandan-Pokaran (132 kV GSS) line at 400 kV GSS Pokaran (Proposed)

Fig: Proposed 765 kV GSS Kankani (Jodhpur) (Up-gradation) and 400 kV GSS Pokaran with associated transmission lines



9.1.3 220 kV GSS at Sawa and associated transmission lines

- 1x160 MVA, 220/132 kV Power Transformer and 1x20/25 MVA, 132/33 kV Power Transformer and 25 MVAR, 245 kV Bus Reactor at 220 kV GSS Sawa (Proposed)
- 100 km 220 kV D/C line from 400 kV GSS Barmer to 220 kV GSS Sawa(Proposed)
- 50 km LILO of 220kV S/C Dhorimanna-Sanchore line at 220 kV GSS Sawa (Proposed)
- 5 km LILO of existing 132 kV S/C Sawa (132 kV GSS)-Chouhtan line at 220 kV GSS Sawa (Proposed)
- 5 km LILO of existing 132 kV S/C Sawa (132 kV GSS)-Ranasar line at 220 kV GSS Sawa (Proposed)

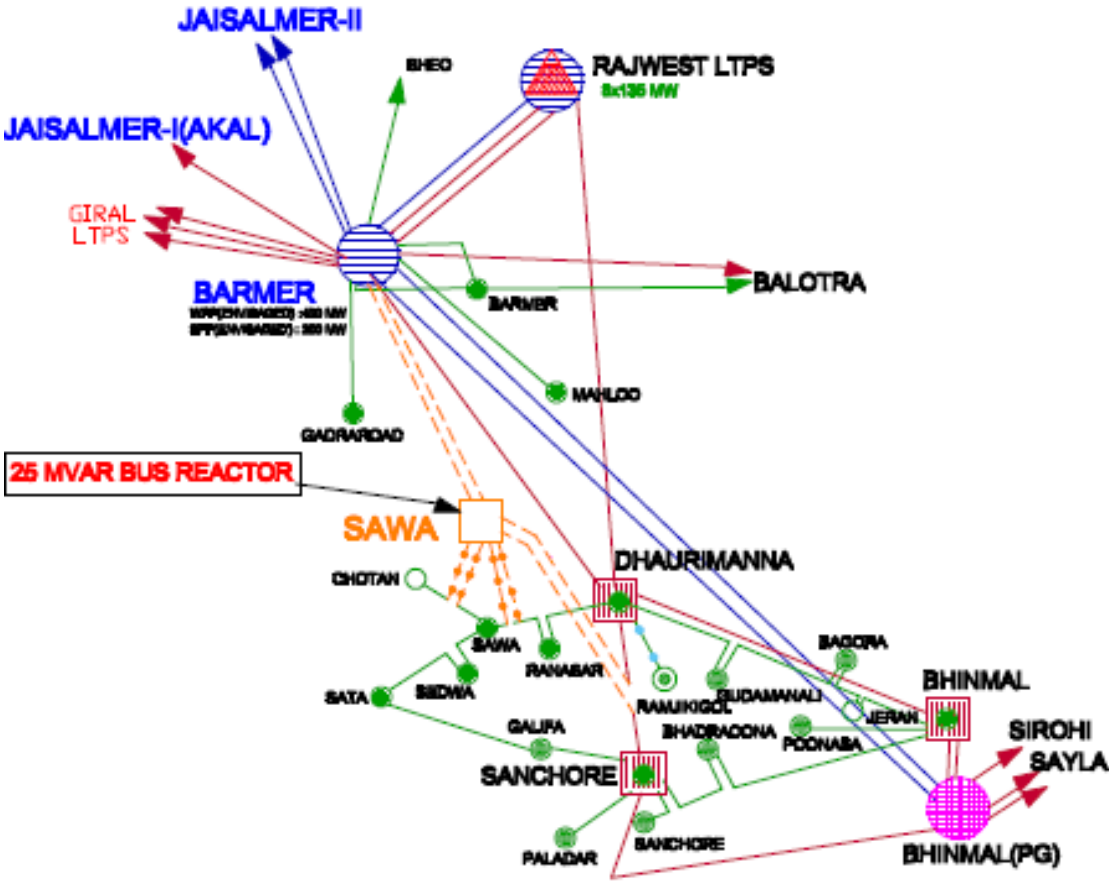
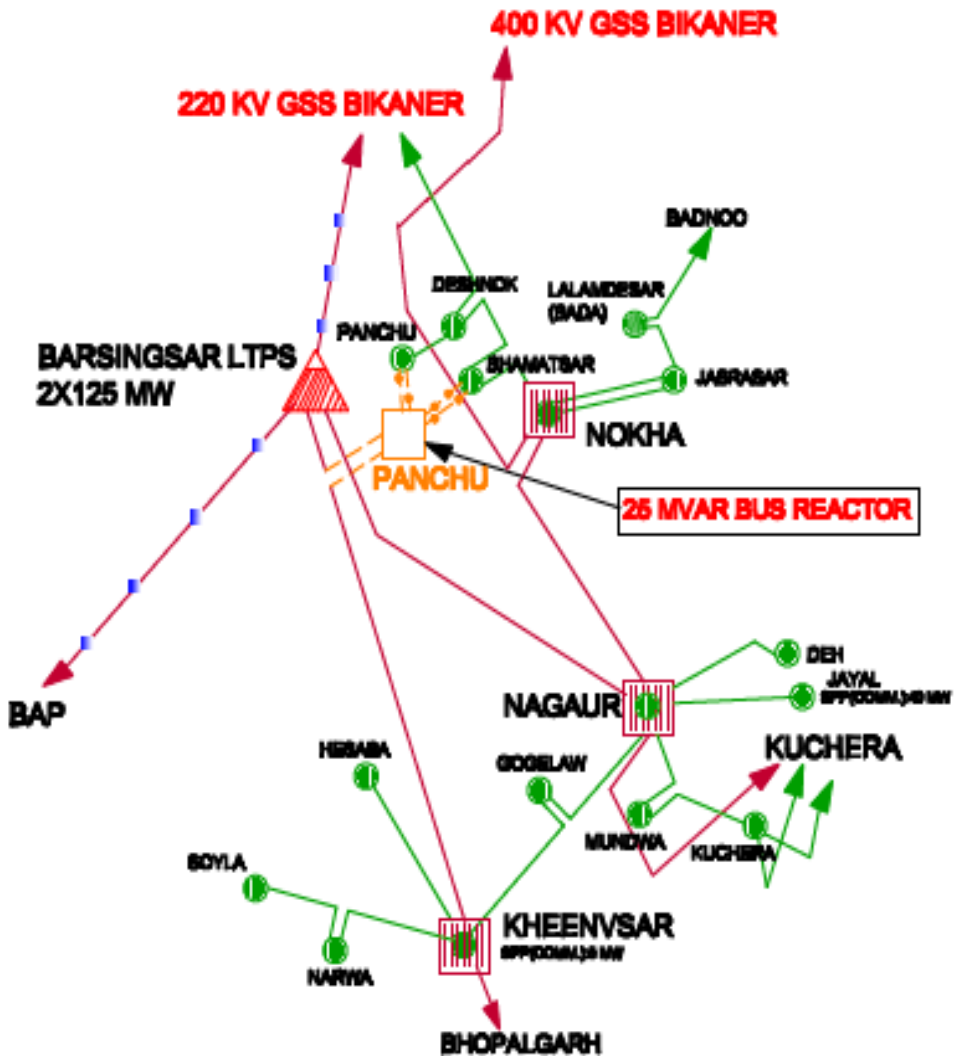


Fig: 220 kV GSS at Sawa and associated transmission lines

9.1.4 220 kV GSS Panchu and associated transmission lines

- 1x160 MVA, 220/132 kV Power Transformer and 1x20/25 MVA, 132/33 kV Power Transformer and 25 MVAR, 245 kV Bus Reactor at 220 kV GSS Panchu (Proposed)
- 3 km LILO of existing 220 kV S/C BLTPS-Khinvsar line at 220 kV GSS Panchu(Proposed)
- 0.6 km 132 kV D/C line from 220 kV GSS Panchu (Proposed) to 132 kV GSS Panchu (Existing)
- 28 km 132 kV D/C Panchu (220 kV GSS)-Bhamatsar line

Fig: 220 kV GSS Panchu and associated transmission lines



9.1.5 220 kV GSS Lohawat and associated transmission lines

- 1x160 MVA, 220/132 kV Power Transformer and 1x40/50 MVA, 132/33 kV Power Transformer and 25 MVAR, 245 kV Bus Reactor at 220 kV GSS Lohawat (Proposed)
- 70 km 220 kV D/C HTLS Transmission line from 220 kV GSS Badisid to 220 kV GSS Lohawat(Proposed)
- 5 km LILO of 220 kV Phalodi-Tinwari line at 220 kV GSS Lohawat(Proposed).
- 10 km 132 kV D/C line from 220 kV GSS Lohawat (Proposed) to 132 kV GSS Lohawat (Existing)
- 35 km 132 kV D/C line from 220 kV GSS Lohawat (Proposed) to 132 kV GSS Matora

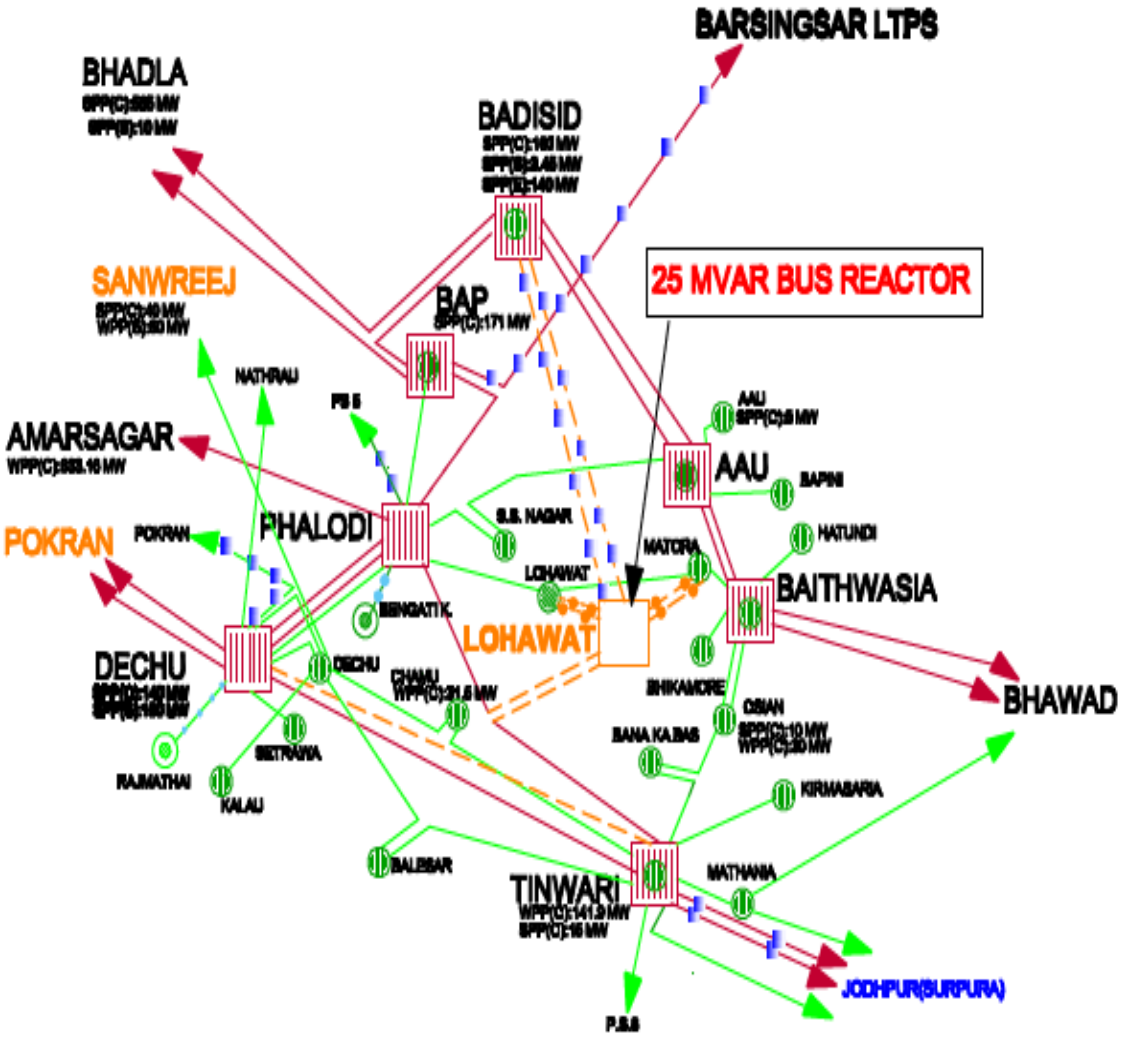
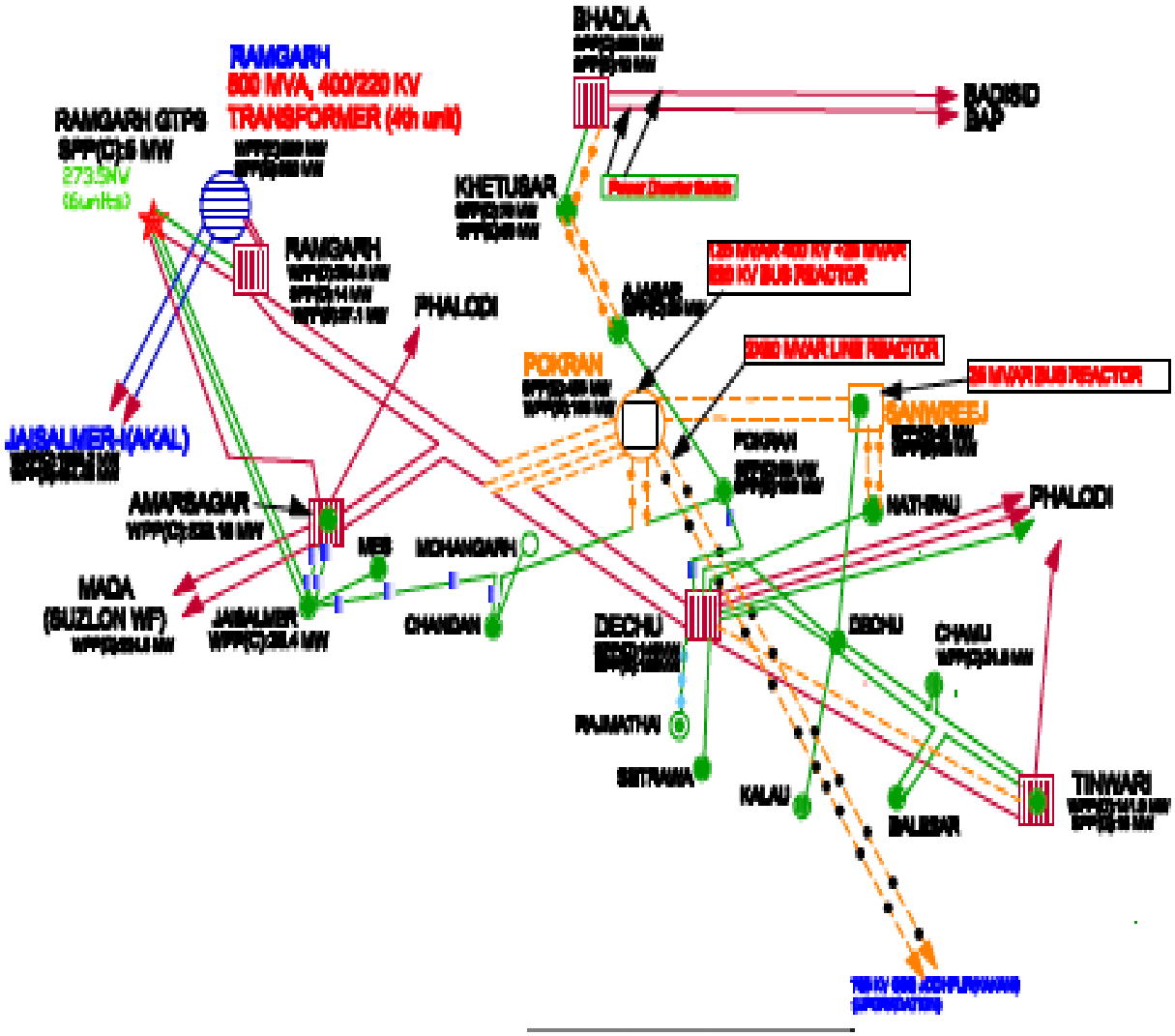


Fig: 220 kV GSS Lohawat and associated transmission lines

9.1.6 220 kV GSS Sawareej (Upgradation) and associated transmission lines

- 1x160 MVA, 220/132 kV Power Transformer and 25 MVAR, 245 kV Bus Reactor at 220 kV GSS Sanwreej (Proposed)
- 30 km 220 kV D/C line from 400 kV GSS Pokaran to 220 kV GSS Sanwreej(Proposed)
- 38 km 132 kV D/C line from 132 kV GSS Sanwreej to Nathrau

Fig: 220 kV GSS Sawareej (Upgradation) and associated transmission lines



9.1.7 New EHV Lines/ Circuits

- 72 km 220 kV S/C line from 220 kV GSS Dechu to 220 kV GSS Tinwari
- 38 km 132 kV D/C Khetusar-Ajasar line
- 28 km stringing of second circuit of existing 132 kV S/C Bhadla-Khetusar line on D/C towers

9.1.8 New Transformer Additions-

- 1x500 MVA, 400/220 kV ICT at Bhadla
- 1x500 MVA, 400/220 kV ICTat Ramgarh
- 3x500 MVA, 400/220 kV ICTs at Jaisalmer-II

9.1.9 Up-rating of Existing Transmission Corridors

A. 220 kV LINES

1. 46.6 km, 220 kV D/C Bhawad-Bhopalgarh Line
2. 56.89 km, 220 kV S/C Bhopalgarh- Merta(400 kV) Line
3. 38.21 km, 220 kV S/C Tinwari-Jodhpur(400 kV) Line (First Circuit)
4. 28.947 km, 220 kV S/C Tinwari-Jodhpur(400 kV) Line (Second Circuit)
5. 142.2 km, 220 kV S/C Bap-Barsinghsar LTPS Line
6. 36 km, 220KV S/C Barsingsar-Bikaner line
7. 61.8 km, 220KV S/C Jodhpur(New)- Pali line
8. 81.18 km, 220KV S/C Jodhpur (Surpura)-Bilara line

B. 132 kV LINES

1. 8 km, 132 kV S/C Phalodi(220 kV) -PS(5) Line
2. 22 km, 132 kV S/C PS(5) -PS(4) Line
3. 12 km, 132 kV S/C PS(4) -PS(3) Line
4. 12 km, 132 kV S/C PS(2) -PS(1) Line
5. 58 km, 132 kV S/C PS(1) -Bajju Line
6. 45.845 km, 132 kV S/C Bajju-Kolayat Line
7. 21.815 km, 132 kV S/C Kolayat - Gajner Line
8. 39.97 km, 132 kV S/C Gajner-Bhinasar Line
9. 21.815 km, 132 kV S/C Gajner-Pugal Road Line
10. 19.25 km, 132 kV S/C Pugal Road-Bikaner(220 kV) Line
11. 9.61 km, 132 kV D/C Amarsagar-Jaisalmer Line
12. 43.9 km, 132 kV S/C Jaisalmer- Chandan Line
13. 41.754 km, 132 kV S/C Pokran-Dechu(220 kV) Line

9.1.10 Reactive Power Compensation

Proposed Static Reactors:

S. no.	Name of GSS	Voltage level	Capacity of Shunt Reactor in MVAR
1	765 kV GSS Anta	765 kV	240
		420 kV	125
2	400 kV GSS Heerapura	420 kV	125
3	400 kV GSS Ajmer	420 kV	125
4	400 kV GSS Bhilwara	420 kV	125
5	400 kV GSS Babai	420 kV	125
6	400 kV GSS Chhitorgarh	420 kV	125
7	400 kV GSS Jodhpur(Kankani)	420 kV	125
8	400 kV GSS Barmer	420 kV	125

	Total (765 kV)		240 MVAR (1 no.)
	Total (400 kV)		1000 MVAR (8x125 MVAR)

Proposed Dynamic Reactors:

S. No.	Name of 400 kV GSS	Voltage level	Capacity of TCR in MVAR
1	400 kV GSS Merta	420	300
2	400 kV GSS Bikaner	420	300
3	400 kV GSS Bhadla	420	300
4	400 kV GSS Jaisalmer-2	420	300
	Total		1200 MVR (4x300)

9.1.11 Power flow Control Device/ Solution

Power flow control devices with degree of compensation for each device/solution equal to 45MVAR (at 245 kV) are proposed on the following transmission lines:

- 220 kV S/C Bhadla-Bap line
- 220 kV S/C Bhadla-Badisid line

9.2 Director CEA further stated that to discuss the above proposal, a meeting was held on 13.11.2019 in New Delhi with participation from CEA, CTU and RVPNL, wherein, it was pointed out that the load flow studies for RE power evacuation from Rajasthan has already been done by CTU and CEA incorporating the proposed transmission system of RVPN and it has been found that the system is adequate for evacuation of RE power from western Rajasthan and would supplement the ISTS system already been agreed for RE power evacuation. In the meeting, RVPN informed that the Transmission schemes are divided in two parts. Part-A includes the transmission schemes which are proposed to be funded from domestic financial institutions such as PFC, REC etc. or through TBCB and Part-B includes the Transmission schemes which are proposed to be funded through ADB .The proposal submitted by RVPN was agreed in principle, subject to ratification in the next NRSCT/ Northern Region Power Committee (Transmission Planning).

9.3 CEA requested Rajasthan to present the studies of the proposed intra-state transmission system.

9.4 RVPN stated that as the Govt. of India had set a target for establishing 175 GW renewable capacity by 2022 and accordingly 20 GW of RE Potential have been identified in Rajasthan, wherein 17 GW has already been planned under ISTS and the balance 3 GW needs to be planned by RVPN.

9.5 RVPN further stated that they have carried out the studies for 2022-23 considering the total installed capacity by 2022-23 will be of 15000 MW. They informed that the existing transmission system is capable of evacuating 10000 MW, therefore, they have planned a transmission system for the remaining 5000 MW.

With respect to the above proposal, Rajasthan informed the following:

1. In compliance to RERC Order dated 11.01.2019, Rajasthan Discoms have proposed following year wise trajectory for RE bids for Solar & Wind capacity addition to meet RPO upto FY 2023-24:

Particulars	2020-21	2021-22	2022-23	Total

Proposed Solar Capacity addition	1500 MW	1600 MW	1785 MW	4885 MW
Proposed Non-Solar /Wind Capacity addition	500 MW	500 MW	426 MW	1426 MW
Total	**2000 MW**	**2100 MW**	**2211 MW**	**6311 MW**

2. Based on above trajectory, following Solar & Wind capacity has been considered for load flow study for condition corresponding to FY 2022-23:

RE Projects	**Installed Capacity (as on 31.3.2019)**	**Balance approved capacity to be commissioned**	**Envisaged RE Projects**	**Total Installed capacity**	**Generation Schedule @75% considered in LFS**
Solar	3074 MW*	864 MW	4885 MW	8823 MW	6618 MW
Wind	4310 MW	492 MW	1426 MW	6228 MW	4671 MW
Total	7385 MW	1356 MW	6311 MW	15052 MW	11289 MW

***Excluding Captive Solar Projects

9.6 RVPN also expressed the concern that in Rajasthan, Generation is mainly confined in the Western part whereas Load is present at the other end. Hence, there is a problem of high voltage and overloading for lines which are directly connected to the pooling S/s near to solar and wind generators. In this regard, uprating and upgrading of lines with HTLS conductor are proposed, utilizing the existing Right of Way. Also, in order to control the voltage profile, static and dynamic reactors are planned for the system. Further, Power from Bhadla tends to flow more towards the 220 kV side rather than 400 kV side, therefore two Power flow Control Devices are proposed.

9.7 CEA enquired about the location and capacity of upcoming generation expected by 2022-23. Accordingly, RVPN has informed the following:

Jaisalmer District	
Ramgarh	900 MW
Jaisalmer 2	2000 MW
Pokaran	485 MW
Jodhpur District	
Bhadla	400 MW
Kanasar	250 MW
Badisid	150 MW
Ketusar	80 MW
Bikaner District	
Gajner	250 MW
Koliat	3 MW
Barner district	
Barmer	200 MW
Sriganganagar district	
Srivijay Nagar	80 MW
Raisingnagar	80 MW

9.8 POSOCO raised the issue whether the system is planned for n-1 complaint. In this regard, RVPN explained that the RE generation considered is mix of solar and wind generation and in Rajasthan both wind and solar are complementary in nature, therefore, the proposed system would capable of evacuating the power without any overloading concern.

9.9 POSOCO suggested to check the wind profile for the period from 11 AM to 1 PM. In this regard, RVPN stated that as per the load curves, wind is at its peak for 1 hour from 8 AM-9 AM. Also, till date such condition has not been observed when both solar and wind generation are at their peak.

9.10 CTU enquired about the details regarding Power Flow Control Devices proposed for two lines. For this, RVPN stated that they are 245 kV power electronics devices capable of controlling 45MVAR reactance of the line. Further, this device contains 9 sections of 5 MVAR each and according to the requirement; the reactance of the line can be changed by injecting the requisite voltage in series with the line.

9.11 CTU raised the concern regarding the effect of this device on protection system, as to how the distance protection would work. Also, as the device would be the first to be implemented in the country, therefore, CTU suggested RVPN to further study and analyse the design specifications of this device and may explore any other possibility.

9.12 POSOCO and CTU further suggested to implement STATCOM instead of TCR's, as in case of TCR's, filters would be needed to prevent the harmonics entering into the system. In this regard, RVPN stated that STATCOM's are costly and are already been planned in that area by POWERGRID, therefore they are considering a different option at their own Bhadla S/s.

9.13 CTU enquired about the total cost of the transmission system proposed. In this regard, RVPN stated that the cost will be around 5200 Cr.

9.14 After deliberations, following was decided:

a) The intra-state transmission schemes mentioned in Para 9.1 above was agreed.

b) RVPN has been requested to make a presentation in the next NRPCTP meeting regarding the power flow control devices.

10.0 Connectivity of 220kV transmission line from 400kV GSS Ajmer to 220/25kV TSS Kishengarh through 2 phase line on double circuit towers and associated bay at 400kV GSS Ajmer

10.1 CEA stated that Indian Railways vide their letter dated 5th September, 2019 has requested CEA to issue technical advisory to RVPNL to grant two-phase connectivity for 220 kV transmission line between 400 GSS Ajmer to 220/25 kV TSS Kishangarh. In its letter, Indian Railways have intimated that Rajasthan has conveyed its unwillingness in providing the two-phase connectivity to the TSS of Railways at 220 kV voltage level on account of the unbalance created by 2-phase load. This meeting has been convened to deliberate upon this issue.

10.2 To deliberate on the issue, a meeting was held on 8.11.2019 in CEA. In the meeting, RVPNL opined that with rapid growth in Railway electrification, traction load is increasing

significantly. Traction load is intermittent, creates unbalanced loadings and generates harmonics in the power system. With increase in connectivity of Indian Railways in State Transmission network, STU is directly subjected to intermittent and unbalanced traction loads. Therefore, there is a need for suitable guidelines from CEA for grant of connectivity to Railway Traction loads. After deliberations, following was agreed in the meeting:

(i) Indian Railways may be granted two phase connectivity for 220 kV transmission line between 400/220 kV GSS Ajmer to 220/25 kV TSS Kishengarh subject to the following conditions:
   (a) Grant of such two phase connectivity is limited to this case only.
   (b) Necessary filters for limiting the current/ voltage harmonics within permissible limits as specified in CEA (Technical Standards for Connectivity to Grid) Regulations 2007 and amendments thereof, would be implemented by Indian Railways at their 220/25 kV Kishangarh TSS.

(ii) Indian Railways to explore the option of drawing three phase supply from grid substation and converting it into single-phase 25 kV supply for their traction load at their TSS to address the associated operational and protection issues associated with 2-phase supply from Grid substation.

10.3 Subsequently, RVPN vide its letter dated 4.12.2019 has requested for modification under para no 9.0(ii) of the minutes of meeting held on 8.11.2019 *(para no 9.0(ii) is mentioned as 10.2(ii) above)*

Therefore, following para 9.0(iii) is added below para 9(ii):

(iii) In future, all connectivity from any State grid S/s to any TSS of Indian railways on 220 or 132kV voltage level for catering traction load shall be given on 3 phase and Indian railways shall install Scott Connection Transformer (s) at their TSS to convert 3 –phase supply to 1-phase or 2-phase. Indian Railways shall also install filters at their TSS for limiting the current/voltage harmonics as specified in CEA (Technical Standards for Connectivity to Grid) Regulations 2007 and amendments thereof, at their own cost.

10.4 Railways stated that single phase supply is needed for traction load. This problem of harmonics and unbalancing is only pertaining to few locations. Further, for the heavily loaded traction Scott transformers are utilized. However, in the present case, Kishangarh TSS will be used to cater light loads. As such, low capacity Scott transformer is not designed or available in India and would have to be imported. Railways further informed that nowhere in the world Scott Connected transformers are used under light load conditions and 2 phase supply is provided for TSS.

10.5 RVPNL stated that two-phase supply to Railway TSS from 220 /132 kV Grid substation results in generation of harmonics, unbalanced current and many technical issues which needs to be addressed. These includes:

i) Provision of Distance protection not possible due to non-availability of 3 phase line CVTs
ii) Paralleling of two feeders at Railway TSS causes delay in tripping as there is no protection system at TSS for feeder.
iii) 2-phase supply results in under-utilization of transformer, requires blocking of broken conductor protection, negative sequence current in transformer etc.
iv) Losses becomes 4 times due to the open-access load drawn by traction.

RVPN suggested Railways to draw the traction load using 3-phase supply.

10.6 Railways added that they have no issue in taking 3-phase supply and in providing

compensation like filters, dynamic compensators etc at the places where they are genuinely required. However, based on this particular case, such restrictions as mentioned in the minutes like "Grant of two phase connectivity is limited to this case only" should not be imposed as many contracts are already been assigned and therefore, the matter may be taken up with Railway Board. Penalty clauses may be incorporated by RVPNL for Railway Traction load category.

10.7 Haryana also raised the issue of unbalanced loading and harmonics and suggested Railways to use Scott transformers wherever required. UP also suggested Railways to draw 3 phase supply to avoid unbalancing the grid.

10.8 POSOCO stated that the issues of unbalance in voltages due to usage of two-phase supply as well as harmonics injection in power system due to Railways are common concerns of several states, therefore the issue may be taken up by CEA with Railway Board.

10.9 Member Secretary (NRPC), added that undertaking should be taken from Railways before giving supply that they will comply with those standards.

10.10 After deliberations, following was agreed:

(i) Indian Railways to be granted two phase connectivity for 220 kV transmission line between 400/220 kV GSS Ajmer to 220/25 kV TSS Kishengarh. The grant of such two phase connectivity is limited to this case only.

(ii) Necessary filters for limiting the current/ voltage harmonics within permissible limits as specified in CEA (Technical Standards for Connectivity to Grid) Regulations 2007 and amendments thereof, would be implemented by Indian Railways at their 220/25 kV Kishangarh TSS.

(iii) CEA to convene a meeting to discuss the issues related to the of supplying traction power to railways at 3 phase using Scott transformer and the issue of unbalanced loading as well as harmonics in the system due to traction load.

11.0 Additional transmission system proposed for obviating the evacuation constraints in Kalisindh- Chhabra- Kawai generation which includes (i) Construction of 400/220kV, 2X500MVA GSS at Sangod with 220/132kV, 160 MVA transformer and associated lines (ii) Revised interconnections at Kalisindh TPS".

11.1 CEA stated that at present the installed capacity of Generations and Associated Transmission System in the Kalisindh, Chhabra and Kawai generation complex is as under:-

S.No.	Generating Plant	Installed capacity in MW	
1.	Kalisindh TPS	2x 600	1200
2.	Kawai TPS	2x 660	1320
3.	Chhabra TPS	4x 250	1000
4.	Chhabra SCTPS	2x 660	1320
TOTAL			**4840**

Further, the issue of evacuation constraints in Kalisindh-Chhabra- Kawai Generation Complex due to single 315 MVA, 400/220kV ICT each at Chhabra and Kalisindh as well as non-compliance of (N-1-1) Transmission Planning Criteria was continuously raised by OCC, TCC/NRPC and NRSCT. Therefore, in the 2nd meeting of Northern Region Standing Committee on Transmission, the following transmission system had been agreed to be implemented by RVPNL as intra-state transmission system:

i) 2x500 MVA, 400/220 kV power transformers at existing 765 kV GSS Anta (Distt. Kota)

ii) 2x160 MVA, 220/132 kV Power transformers at proposed 220 kV GSS Sangod (Distt. Kota)
iii) Anta (765)-Baran (220) 220kV D/C line-6 km
iv) Anta (765)-Sangod (220) (Proposed) 220 kV D/C line - 30 km
v) Extension of existing Dahra (220)-Anta (NTPC) 220 kV S/C line upto Anta (765) 220 kV S/C line - 44 km

Subsequently, RVPN vide their letter dated 19.11.2019 has informed that, they have reviewed the above mentioned transmission system due to the following reasons:-

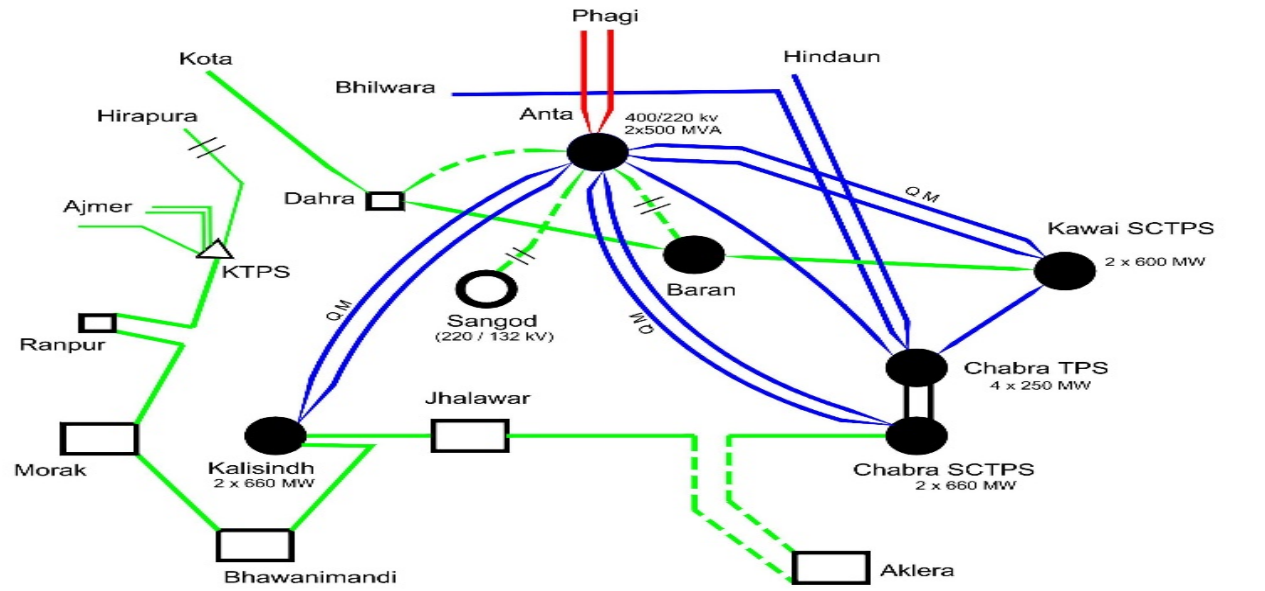
a. With installation of 400/220 kV transformer at 765/400 kV Anta GSS, it would expose the 400 kV bus to frequent faults that would occur on 220 kV systems & they would directly travel to generating power systems connected to this bus.
b. There is no space in alignment of 400 kV Bus at Anta to accommodate an additional 400 kV transformer bay so the 400 kV bus would be extended (L shape) and bus sectionaliser would be provided between 765/400 kV and 400/220 kV switchyard at 400 kV.
c. Construction of 220 kV bus bar arrangement at 765 kV Anta GSS is possible only in the space reserved for future 2 No. of 765 kV bays i.e. future 765 kV interconnections would be eliminated. These bays may be required as RVPN is in the process of planning expansion of 765 kV network in the state.

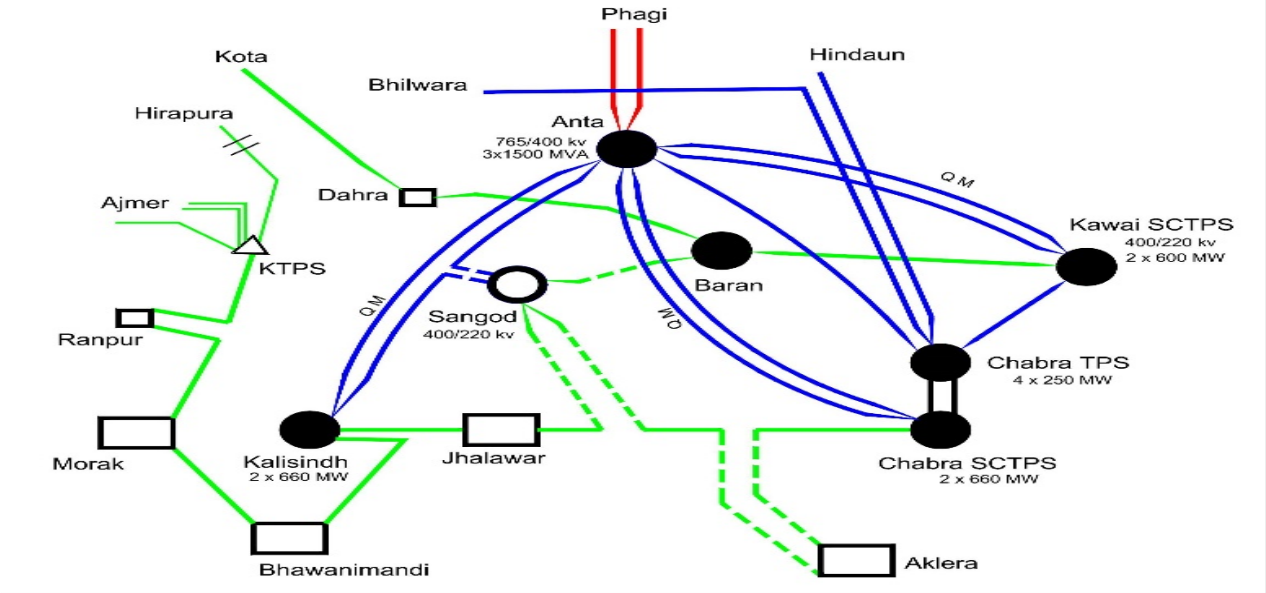
11.2 RVPN stated that a sub-committee of NRSCT was formed to resolve the above issue and its first meeting was held on 2.04.2018 wherein CEA had advised to explore the possibility of creating a new 400kV GSS by RVPN in this corridor in place of additional ICT each at Chhabra TPS and Kalisindh TPS.Various proposals viz. creating 400kV GSS at Dahara/ Sangod/ Anta or placing additional ICT at Chhabra and augmenting capacity of ICT at Kalisindh by 500 MVA, 400/220 kV instead of existing 315MVA were considered. The proposals were examined on the basis of results of load flow studies, the feasibility of their constructions was explored w.r.t available ROW other physical constraints and also financially compared based on their tentative cost to consider most suitable alternative. Further, to feed load centres in and around Jhalawar, Modak and Baran through alternate source and to mitigate load contingencies in this corridor, a new 400/220kV GSS or a 220/132 kV GSS at Sangod found to be necessary.

11.3 RVPN added that a proposal was forwarded to RVUN to consider replacement of 1x315 MVA, 400/220 kV ICT with 1x500 MVA, 400/220 kV ICT at Kalisindh TPS and provide one additional 220 kV feeder as a deposit work of RVPN. The feasibility of creating a new 220 kV feeder bay at Kalisindh TPS has been examined and it was proposed to RVUN that new 220 kV bay can be created by shifting Bus Coupler from existing place to in between Main Bus-I and Main Bus-II by inserting circuit breaker, CT and isolator and the line breaker, CT, CVT and LA in front of bus coupler towards line end as the sufficient space is available. The consent letter from RVUN has been received.

11.4 The load flow studies have been carried out by RVPN for the total system load of 14430 MW corresponding to FY 2021-22. RVPN has considered creation of 400/220 kV system at 765 kV Anta GSS and 220 kV GSS at Sangod at Proposed Case-1 and have considered creation of 400/220 kV GSS at Sangod along with associated transmission line at proposed case-2 as given below:

Proposed Case-1	Proposed Case-2
400/220 kV system at 765 kV Anta GSS and 220 kV GSS at Sangod.	400/220 kV GSS at Sangod (Distt. Kota) along with associated 400 kV and 220 kV Interconnecting lines
• 2x 500MVA, 400/220 kV Power Transformer at existing 765kV GSS Anta (Distt. Kota).	• 2x500MVA, 400/220 kV Power Transformer at proposed 400kV GSS Sangod (Distt. Kota).
• 1x160MVA, 220/132kV Power Transformer at proposed 220kV GSS Sangod (Distt. Kota).	• 1x160MVA, 220/132kV Power Transformer at 400kV GSS Sangod (Distt. Kota).
• 220kV D/C Anta (765kV)-Baran (220kV) line (6 kM)	• LILO of one circuit of 400kV D/C Kalisindh TPS (400kV)-Anta (765kV) line at 400kV GSS Sangod (20kM)
• 220kV D/C Sangod (220kV)(Proposed)-Anta (765kV) line (35kM)	• 220kV D/C line Sangod (400kV)-Baran (220kV) line(35kM)
• 220kV S/C line extension of existing 220kV S/C Dahara (220kV)-Anta (NTPC) line upto Anta (765) -(15 kM)	• LILO of 220kV S/C Aklera-Jhalawar line at 400kV GSS Sangod (40kM)
• LILO of 132 kV S/C Sangod-Khanpur line at 400 kV GSS Sangod (Approx. 5KM)	• LILO of 132 kV S/C Sangod-Khanpur line at 400 kV GSS Sangod (Approx. 5KM)
• LILO of 132 kV S/C Sangod-Bapawar line at 400 kV GSS Sangod (Approx. 7KM)	• LILO of 132 kV S/C Sangod-Bapawar line at 400 kV GSS Sangod (Approx. 7KM)





11.5 Further, to evaluate the sufficiency of above proposed transmission system, the following contingency conditions have been considered.

Contingency-1: Outage of 2xS/C 765 kV Anta-Phagi lines.

Contingency-2: Outage of 400 kV Anta-Kota (PG) line and 1X500 MVA, 400/220 kV ICT at Kalisindh TPS.

Contingency-3: Outage of 400 kV S/C Chhabra TPS-Hindaun line and 400 kV S/C Chhabra TPS-Bhilwara line.

Observations for both the cases is summarsied as follows:

Case-I	**Case-II**
• The existing and new transmission system are sufficient for all N-1-1/N-2 contingencies except when both 765	• The existing and new transmission system is sufficient for all N-1-1/N-2 contingencies except when both

kV 2xS/C Anta- Phagi line are out, the frequency of occurance of which is very rare. • With installation of 400/220 kV transformer at 765/400 kV Anta GSS it will expose the 400 kV and 765 kV buses to the frequent faults that would occur on 220 kV systems & they will directly travel to generating power systems connected to this bus. • There is no space in alignment of 400 kV Bus at Anta to accommodate an additional 400 kV transformer bay so the 400 kV bus would be extended (L shape) and bus sectionaliser would have to be provided between 765/400 kV and 400/220 kV switchyard at 400 kV. • Construction of 220 kV bus bar arrangement at 765 kV Anta GSS is possible only in the space reserved for future 2 No. of 765 kV bays i.e. further 765 kV interconnections would be eliminated. • Total system losses would reduce from 503.203 MW to 492.617 MW, thus saving of approximate 10.586 MW (400.608 LUs/Annum).	765 kV 2xS/C Anta- Phagi line are out, the frequency of occurance of which is very rare. • LILO of one circuit of 400 kV D/C Kalisindh TPS-Anta (765 kV) line can be used to provide inter-connectivity to proposed 400 kV GSS at Sangod. This would obviate laying of long 400 kV lines from 765/400 kV Anta GSS. • By creating new 400/220 kV switchyard at Sangod will help to reduce the loading on the 220 kV lines in the regions under contingency conditions compared to the Proposed Case-1. • This will also help to avoid any constraints during future expansion at 765 kV GSS Anta. • Total system losses would reduce from 503.203 MW to 493.407MW, thus saving of approximate 9.796 MW (370.712LUs/Annum).

Further, in both cases, revised inter-connection at Kalisindh TPS has been considered which are as follows:

i. 1x500 MVA, 400/220 kV ICT in place of 1x315 MVA, 400/220 kV ICT
ii. 220 kV D/C Kalisindh TPS-Jhalawar line.(Work involved : Removal of T-off of one circuit)
iii. 220 kV S/C Kalisindh TPS-Bhawanimandi line (by utilising the 220 kV feeder bay)(Work involved: Construction of 1.5241 KM 220 kV S/C line from Kalisindh to T-off point) and 220 kV Bay at Kalisindh TPS.

11.6 RVPN added that the proposed case-I was needed to be reviewed, as under n-2 condition when both 765 kV Anta-Phagi lines were out, overloading was observed in Anta-Kota (PG) line. Also, there were space constraints for placing a 400/200 kV transformer at Anta. Therefore, creation of 400/220 kV GSS at Sangod seems to be technically more suitable and feasible compared to the 400/220 kV System at 765 kV GSS Anta.

11.7 RVPN informed that the major load stations are Baran, Jhalawar and Akhlera which are more dependent on the transformer placed at Kalisindh and Chhabra. With the new 400 kV substation proposed at Sangod, an alternate source of power would be made available to the load centres.

11.8 POSOCO stated that in the proposed case-II also, 220 kV lines will face the problem of overloading. POSOCO further stated that 220kV lines such as 220kV Sangod-Baran (D/C), 220kV Sangod -Jhalawar (S/C), 220 kV Kalisindh - Jhalawar (D/C) line etc. are heavily loaded in contingency conditions. For this, RVPN stated that lines are getting overloaded to the extent of 180 MW, which is under thermal limit. The issue of overloading can be seen only when the two 765 kV lines are out.

POSOCO added that even with proposed system there would be need for backing down under N-1-1/N-2 contingency of 765kV Anta-Phagi and therefore requirement of SPS would still be there.

The issue of high loading of 400kV Anta-Kota was also highlighted. RVPN was asked to carry out further studies to assess measures required to ensure loading of 400kV Anta-Kota within safe limits.

11.9 CEA enquired about the schedule of Sangod S/s. For this, RVPN stated that they have applied to RERC for tariff approval. The expected schedule is by March, 2023.

11.10 After deliberations, following was agreed:

I. 400/220 kV GSS at Sangod (Distt. Kota) along with associated 400 kV and 220 kV Interconnecting lines.
   a) 2x500MVA, 400/220 kV Power Transformer at proposed 400kV GSS Sangod (Distt. Kota).
   b) 1x160MVA, 220/132kV Power Transformer at 400kV GSS Sangod (Distt. Kota).
   c) LILO of one circuit of 400kV D/C Kalisindh TPS (400kV)-Anta (765kV) line at 400kV GSS Sangod (20kM)
   d) 220kV D/C line Sangod (400kV)-Baran (220kV) line(35kM)
   e) LILO of 220kV S/C Aklera-Jhalawar line at 400kV GSS Sangod (40kM)
   f) LILO of 132 kV S/C Sangod-Khanpur line at 400 kV GSS Sangod (Approx. 5KM)
   g) LILO of 132 kV S/C Sangod-Bapawar line at 400 kV GSS Sangod (Approx. 7KM)

II. Revised inter-connection at Kalisindh TPS which are as follows:
   a) 1x500 MVA, 400/220 kV ICT in place of 1x315 MVA, 400/220 kV ICT
   b) 220 kV D/C Kalisindh TPS-Jhalawar line.(Work involved : Removal of T-off of one circuit)
   c) 220 kV S/C Kalisindh TPS-Bhawanimandi line (by utilising the 220 kV feeder bay)(Work involved: Construction of 1.5241 KM 220 kV S/C line from Kailisindh to T-off point) and 220 kV Bay at Kalisindh TPS.

12.0 Charging of second Bus Reactor of 125 MVAr, 400KV at SSCTPP, RVUNL, Suratgarh

12.1 CEA stated that power evacuation system for Suratgarh Super Critical TPS (2x660 MW) had been approved in the 38th Standing Committee meeting held on 30thMay, 2016 wherein 1x125 MVAR, 400 kV bus reactors was approved. RVUN has proposed second Bus Reactor of 125MVAr Capacity at 400kV switchyard of SSCTPP, Suratgarh which is required to avoid/minimize tripping on overvoltage protection during the charging. Also, it has been proposed that this reactor will be utilized whenever the voltage profile of 400KV system at SSCTPP becomes high during the event of low generation at STPS and SCSTPS.

12.2 In view of above, RVUNL has requested to grant approval for second bus reactor of 125 MVAr, 400 KV rating at SSCTPP, RVUNL, Suratgarh so that the same could be charged at the earliest.

12.3 Members agreed with the above proposal.

13.0 Creation of 400/220 kV, 2x315 MVA S/S at Akhnoor/Rajouri as ISTS

13.1 CEA stated JKPDD had submitted a comprehensive transmission plan for Jammu Region which inter-alia included establishment of 400/220 kV, 2x315 MVA S/s at Akhnoor/ Rajouri as ISTS works. The issue of establishment of Akhnoor S/s was also deliberated in 37th meeting of Standing Committee on Power System Planning held on 20th Jan 2016, wherein, it was decided that proposal of new substation at Akhnoor may be considered only after the 220 kV downstream from Samba, New Wanpoh and Amargarh are takenup for implementation by JKPDD. JKPDD was advised to implement their downstream network expeditiously so as to optimally utilize the already created transmission elements.

13.2 Now, JKPDD vide their letter dated 26.12.2019 has requested to take up 400/220kV Akhnoor S/s for implementation.

13.3 Since no representative from JKPDD was present in the meeting, therefore, it was decided to convene a separate meeting with JKPDD and accordingly would be deliberated in the next NRPCTP meeting.

14.0 Transmission works to be implemented in Jammu Region under Intra –State transmission system

14.1 CEA stated that in order to strengthen the transmission system in Jammu region, JKPDD submitted a comprehensive transmission plan for Jammu Region which included some transmission elements to be implemented by JKPDD under Intra-state transmission works. These transmission works mainly includes creation of 5 nos. of 220kV substations, 2 nos. of 132kV substations along with associated transmission lines, some transformer augmentation works, works related to replacement of conductors and replacement of bus bars at some S/Ss. The list of these transmission works are given at **Annexure-II.**

14.2 CEA has carried out the system studies considering the load of 4200 MW for 2021-22 wherein, no issue was observed.

14.3 Members agreed with the above proposal.

14.4 Subsequently, JKPDD vide its letter dated 15.2.2020 has requested to include some additional transmission works which are augmentation works, thickening of bus bar and creation of one 132/33kV S/s. The same is listed as additional works under Annexure-II.

15.0 New Butwal (Nepal) – Gorakhpur PG (India) cross border 400kV D/c (Quad) line

15.1 CEA stated that in the 39th meeting of SCPSPNR held at New Delhi on 29th-30th May 2017, New Butwal (Nepal) – Gorakhpur (New) 400kV D/c (Quad) line along with a new 400kV switching station at Gorakhpur (New) was discussed. In this meeting, it was informed that sharing of cost for the project between India and Nepal was not finalised until that moment. As and when the cost sharing methodology between India and Nepal would be decided the proposal would be put up in the SCPSPNR for the consent of the constituents.

In a joint meeting of Technical Teams of India and Nepal, it was decided that New Butwal – Gorakhpur 400kV D/c (Quad Moose) line can be terminated by constructing 2 no. of 400kV GIS line bays in existing Gorakhpur (POWERGRID) S/s instead of investing in construction of a new switching station at Gorakhpur.

Accordingly, the transmission system for the Gorakhpur – New Butwal line has been modified as given below:

Indian Side

(a) Indian Portion of Gorakhpur – New Butwal 400 kV D/c (Quad) line [approx. 120km]
(b) 2 nos. 400kV GIS line bays for termination of Gorakhpur – New Butwal (Nepal) 400kV D/c (Quad Moose) line at Gorakhpur S/s

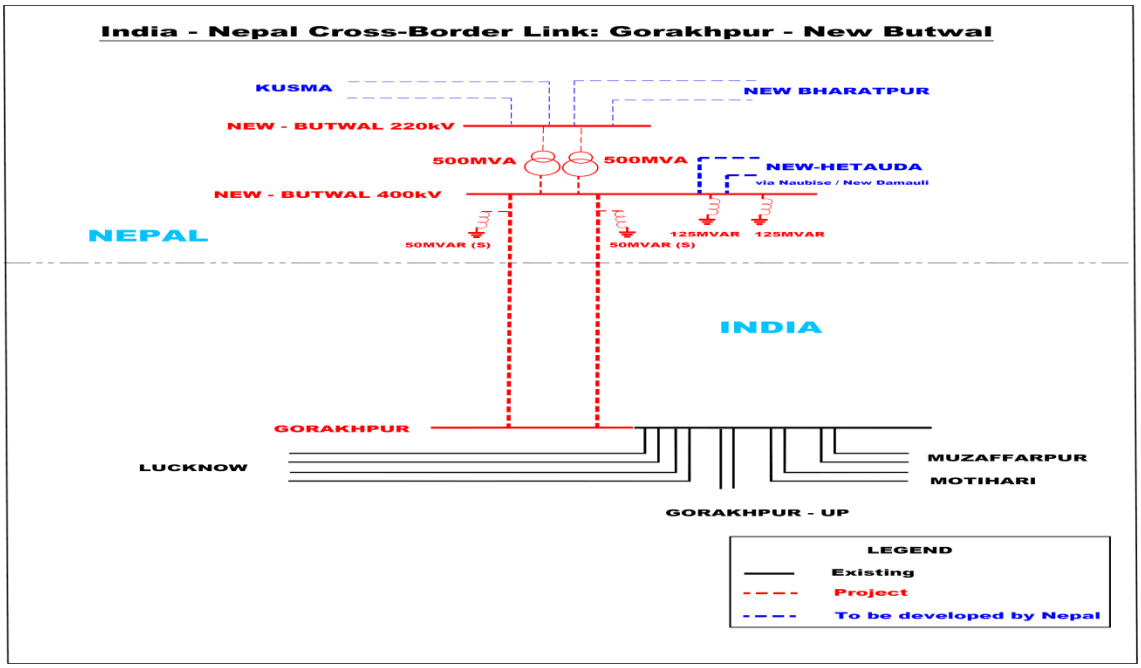
Nepal Side

(a) Nepal Portion of Gorakhpur – New Butwal 400 kV D/c (Quad) line [approx. 20km]
(b) Up-gradation of 220kV New Butwal S/s to 400/220kV level with 2x500MVA ICTs
(c) 2 nos. 400 kV line bays along with 420 kV, 50 MVAR Switchable Line Reactors at New Butwal end for the termination of Gorakhpur – New Butwal 400 kV D/c (Quad) line
(d) 2 nos. 420 kV,125 MVAR Bus reactors at New Butwal

15.2 CEA further stated that subsequently, in the 7th meeting of JWG/JSC on India – Nepal Cooperation in Power Sector held on 14th-15th Oct 2019 at Bangalore, the above modification was informed. In the meeting, it was also decided that Nepal Electricity Authority (NEA) will pay the transmission service charges of the Indian portion of the line for 25 years for availing the entire capacity of the Indian portion of the transmission line. Further, following was agreed with regard to implementation of Indian portion of the cross-border line:

(i) Formation of JV company between NEA and POWERGRID with 50:50 equity participation and 80:20 debt-equity ratio.
(ii) Signing of Implementation & Transmission Service Agreement (ITSA) between JV company and NEA (the ITSA may also inter alia include detailed scope of works).

The schematic of the cross border interconnection is shown below. The detailed scope of works is attached at **Annexure-III.**

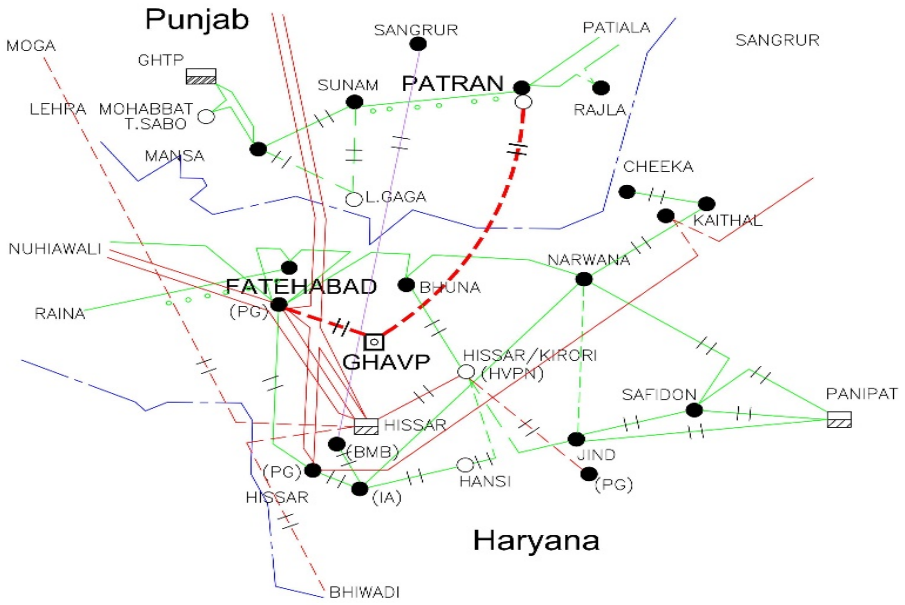


15.3 Members agreed with the above proposal.

16.0 Transmission system for grant of LTA & Connectivity to Nuclear Power Plant (4X700 MW) of NPCIL in Haryana:

16.1 CEA stated that Connectivity and LTA application was received in November, 2014 from NPCIL for 1400 (2x700) MW for their Nuclear power project in Haryana, however, the total plant capacity was 2800MW). Same was discussed during the 36th, 37th& 38th Standing Committee Meeting of Northern Region. During the meetings, HVPNL informed that NPCIL has acquired land in Haryana for total 2800 MW of generation. It was also discussed that a suitable scheme for power evacuation should be planned taking implementation of the capacity of 4x700 MW in a phased manner as the final capacity of the plant would be 4x700 MW. After detailed deliberations, it was agreed that the connectivity and LTA applications for 2x700MW may be closed and NPCIL may re-apply for total capacity of 2800 MW.

Subsequently, NPCIL applied for Connectivity and LTA application for 2800 MW in June'2019 for proposed Nuclear power project (4 x 700 MW) in Gorakhpur, Fatehabad (Haryana). The commissioning schedule of generation as per the application is progressively from 31st Oct'2024 till 31st March 2027.



16.2 CEA further stated that the proposal for grant of Connectivity and LTA was discussed in 25th meeting of NR for Connectivity & LTA Applications held on 29/07/2019. The commissioning schedule of generation is progressively from 31st Oct'2024 till 31st March'2027. During the meeting, it was deliberated that due to increase in short circuit level with the connection of this large quantum of Nuclear capacity at proposed connectivity points at Fatehabad & Kaithal, the proposal needs to be studied further. Accordingly, the proposal was reviewed and again discussed in 30th meeting of NR for Connectivity & LTA Applications held on 30/12/2019 and following transmission system was agreed in principle for grant of Connectivity & LTA (Target NR) subject to approval of Standing Committee/RPC(TP) in NR. For transfer of 2800 MW to NR (Target) studies have been carried out wherein loading on various transmission lines is in order with the following proposed LTA/Connectivity system. Also, short circuit values at proposed connectivity points with the proposed transmission system is also well within the limits. :

Transmission system for Connectivity:

- Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP) - Fatehabad (PG) 400 kV (Quad) D/c line along with 400 kV bays at both ends – under the scope of applicant.
- Gorakhpur Haryana AnuVidyut Pariyojana (GHAVP) – Patran (TBCB) 400 kV (Quad) D/c line along with 400 kV bays at both ends – under the scope of applicant.
- 2x125 MVAR Bus Reactor at Generation switchyard of NPCIL (under scope of NPCIL)

Transmission system for LTA:

- 1x500 MVA ICT along with associated bay at Patran 400/220 kV (TBCB) substation – to be implemented under ISTS (due to overloading observed at Patran)

16.3 CTU enquired about the schedule of Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP). Accordingly, NPCIL replied that connectivity may be granted from 30th November' 2025 and LTA from 31st March' 2026. PPA is not yet signed and beneficiaries are also not

assigned. Location is identified and construction is in process.

16.4 Director (SO), POSOCO suggested that considering need for two alternate sources for Nuclear Power plant as per Transmission Planning criteria, possibility of providing one source from 220kV lines by means of 400/220kV transformer at GHAVP may also be studied. However, NPCIL opined that for providing connectivity at 220 kV, the provision of 220 kV level is required to be kept at their switchyard which is not possible at this stage.

16.5 CTU informed that space confirmation from Patran (TBCB) S/s is awaited.

16.6 NPCIL requested the lines to be executed under ISTS. In this regard, CEA replied that as per the CERC Connectivity Regulation, the connectivity lines are to be constructed by the generation developer. However, NPCIL can approach the CERC for its proposal.

16.7 Subsequently, M/s Patran Transmission Company Ltd. vide their email dated 17.02.2020 has confirmed the availability of space for 2 no. of 400 kV bays and space for 1 no. of 400/220 kV ICT at Patran S/s.

16.8 After deliberations, it was decided that Connectivity/LTA may be granted to NPCIL with the above proposed Tr. System with revised dates.

17.0 Long Term Access (LTA) to NTPC Ltd. for 356.78 MW for its proposed Tanda TPS Stage-II (1320MW)

17.1 CTU stated that Long Term Access (LTA) was granted to NTPC Ltd. for 356.78 MW for its proposed Tanda TPS Stage-II (2x660 MW) vide Intimation Ref. no. C/CTU/N/07/1200000954 dated 17/01/2019 with following transmission system:

(i) 1st Unit (178.39 MW LTA with proportionate quantum of NR beneficiaries w.e.f. 01/07/2019 or availability of following UPPTCL Transmission system, whichever is later) :

i) LILO of Azamgarh–Sultanpur 400 kV S/C line at Tanda TPS by UPPTCL
ii) 400/220 kV, 2x315 MVA ICTs at Tanda TPS by NTPC
iii) Tanda (NTPC)-Tanda (New) (UPPTCL) 220 kV D/C line including 220 kV bays Tanda (NTPC) by UPPTCL

(ii) 2nd Unit [balance 178.39 MW (cumulative 356.78 MW LTA) w.e.f. 01/01/2020 or availability of following UPPTCL transmission system, whichever is later]:

Following is the alternate transmission system till availability of Tanda – Gonda – Sahajahanpur 400kV D/C line:

i) Establishment of 400/220/132 kV, 2x500 + 2x200 MVA GIS substation at Basti
ii) Construction of Tanda TPS–Basti 400 kV D/C quad line
iii) On completion Tanda-Gonda 400 kV D/C (Quad) line, one ckt. of Tanda – Basti 400 kV D/C line and one ckt of Tanda - Gonda would be connected bypassing Tanda TPS 400 kV switchyard (due to limited 400 kV bays at Tanda TPS), resulting in following configuration:
    a) Tanda TPS–Gonda 400 kV S/C Quad line.
    b) Tanda TPS–Basti 400 kV S/C Quad line.
    c) Gonda–Basti 400 kV S/C Quad line.

(iii) Upon commissioning of planned transmission system of UPPTCL associated with Tanda TPS Stage-II mentioned below, the same shall be treated as part of LTA system as under:

i) Tanda TPS–Gonda 400 kV S/C Quad line

ii) Tanda TPS–Basti 400 kV S/C Quad line
iii) Gonda–Basti 400 kV S/C Quad line
iv) Gonda–Shahjahanpur (PG) 400kV D/C Quad line
v) Establishment of 2x315 MVA, 400/220kV S/s at Shahjahanpur by LILO of both circuits of Lucknow (PG)–Bareilly (PG) 400kV D/C line
vi) Establishment of 2x315 MVA, 400/220 kV substation at Gonda
vii) LILO of Azamgarh-Sultanpur 400 kV S/C line at Tanda TPS
viii) Tanda (NTPC)-Tanda (New) (UPPTCL) 220 kV D/C line including 220 kV bays Tanda (NTPC)
ix) NTPC to provide space at Tanda TPS Generation Switchyard for two nos. of 220 kV bays

Based on the information from UPPTCL regarding commissioning of transmission system, LTA of 178.39 MW associated with 1st unit of Generation project has already been operationalized w.e.f. 24/09/2019.

17.2 CTU further stated that regarding LTA granted with 2nd unit, status fromUPPTCL was requested vide email dated 12/12/2019 regarding the commissioning status of the transmission elements so as to facilitate operationalization of the LTA from 01/01/2020. UPPTCL, vide email dated 21/12/2019 has furnished the status of commissioning/expected commissioning dates for transmission elements as per following: -

Sr. No.	Transmission Elements - In reference to LTA granted for 2nd Unit of Tanda TPS Stage-II [balance 178 MW (cumulative 356.78 MW LTA) w.e.f. 01/01/2020 or availability of following transmission elements, whichever is later]	Commissioning /Expected Commissioning Date	Remark
1.	400/220/132 kV, 2x500+2x200 MVA GIS S/s at Basti	30/04/2020	400 kV system for evacuation shall be ready by this date. The line will be ready by 31.03.2020
2.	Tanda TPS – Basti 400 kV D/C quad line	30/04/2020	
3.	Tanda – Gonda 400 kV D/C quad line (on completion of this line one ckt. of Tanda – Basti 400 kV D/C line and one ckt. of Tanda – Gonda 400 kV D/C line would be connected bypassing Tanda TPS 400 kV switchyard due to limited 400 kV bays at Tanda TPS, resulting in following configuration:- a. Tanda TPS – Gonda 400 kV S/C quad line b. Tanda TPS – Basti 400 kV S/C quad line c. Gonda – Basti 400 kV S/C quad line		Being constructed under PPP mode. Work held up due to insolvency of ISOLUX.

17.3 UPPTCL further informed that alternate connectivity w.r.t Sr. no. 3 mentioned above table has already been agreed in 40th meeting of SCPSPNR held on 22/06/2018 and 1st meeting of NRSCT held on 11/09/2018 which is given below:-

"LILO of two ckts (ckt. no. 3rd& 4th) of Gorakhpur(PG)- Lucknow(PG) 400 kV D/C (twin) existing PGCIL line at Basti"
UPPTCL requested that the same may kindly be incorporated in place of "Tanda – Gonda 400 kV D/C quad line" and "Gonda-Shahjahanpur (PG) 400 kV D/C quad line" mentioned against planned transmission system of UPPTCL in LTA (356.78 MW) granted to NTPC vide intimation Ref no. C/CTU/N/07/1200000954 dated 17/01/2019 as Construction Work of above line has been completed and all 4 ckts shall be commissioned by 30.04.2020 alongwith 400 kV Basti substation.

17.4 Accordingly, UPPTCL requested to modify transmission system for LTA to NTPC Ltd. for 356.78 MW for its Tanda TPS Stage-II (1320MW) as below :

(iv) 1st Unit (178.39 MW LTA with proportionate quantum of NR beneficiaries w.e.f. 01/07/2019 or availability of following UPPTCL Transmission system, whichever is later) :

i) LILO of Azamgarh–Sultanpur 400 kV S/C line at Tanda TPS by UPPTCL
ii) 400/220 kV, 2x315 MVA ICTs at Tanda TPS by NTPC
iii) Tanda (NTPC)-Tanda (New) (UPPTCL) 220 kV D/C line including 220 kV bays Tanda (NTPC) by UPPTCL

(v) 2nd Unit [balance 178.39 MW (cumulative 356.78 MW LTA) w.e.f. 01/01/2020 or availability of following UPPTCL transmission system, whichever is later]:
Following is the alternate transmission system till availability of Tanda – Gonda – Sahajahanpur 400kV D/C line:

i) Establishment of 400/220/132 kV, 2x500 + 2x200 MVA GIS substation at Basti
ii) Construction of Tanda TPS–Basti 400 kV D/C quad line
iii) LILO of two ckts (ckt. no. 3rd& 4th) of Gorakhpur(PG)- Lucknow(PG) 400 kV D/C (twin) existing PGCIL line at Basti

(vi) Upon commissioning of planned transmission system of UPPTCL associated with Tanda TPS Stage-II mentioned below, the same shall be treated as part of LTA system as under:

i) Tanda TPS–Gonda 400 kV S/C Quad line
ii) Tanda TPS–Basti 400 kV S/C Quad line
iii) Gonda–Basti 400 kV S/C Quad line
iv) Gonda–Shahjahanpur (PG) 400kV D/C Quad line
v) Establishment of 2x315 MVA, 400/220kV S/s at Shahjahanpur by LILO of both circuits of Lucknow (PG)–Bareilly (PG) 400kV D/C line
vi) Establishment of 2x315 MVA, 400/220 kV substation at Gonda
vii) LILO of Azamgarh-Sultanpur 400 kV S/C line at Tanda TPS
viii) Tanda (NTPC)-Tanda (New) (UPPTCL) 220 kV D/C line including 220 kV bays Tanda (NTPC)
ix) NTPC to provide space at Tanda TPS Generation Switchyard for two nos. of 220 kV bays
x) LILO of two ckts (ckt. no. 3rd & 4th) of Gorakhpur(PG)- Lucknow(PG) 400 kV D/C (twin) existing PGCIL line at Basti

17.5 CTU stated that during the 40th meeting of Standing Committee on NR it was discussed that there are two nos. of 400 kV D/C quad line between Lucknow (PG) and Gorakhpur (PG) with FSC on both D/C line at Lucknow end. Both the 400 kV D/C line has got 63 MVAR switchable line reactors at both ends. After LILO, the Gorakpur- Lucknow 400 kV D/C line at Basti, Basti-Lucknow section would be about 225 km in length, for which, UPPTCL needs to provide line reactors at Basti end along with 125 MVAR bus reactor at Basti.

17.6 CTU added that earlier Tanda- Gonda line and Gonda- Shahjahanpur line were part of the LTA system. But now, as informed by UPPTCL vide email dated 21/12/2019 that since these lines are delayed, therefore UP had requested to modify system as a part of LTA. CTU stated that with this addition, the LTA system approved earlier for Tanda-Gonda line and Gonda- Shahjahanpur line would not be included in the revised LTA. The revised LTA system would include LILO of two ckts (ckt. no. 3rd & 4th) of Gorakhpur(PG)-Lucknow(PG) 400 kV D/C (twin) existing PGCIL line at Basti.

17.7 CTU enquired regarding the timeframe of 2nd unit of Tanda TPS and Tanda-Basti line. In this regard, NTPC informed that the 2nd unit is delayed and is expected by August, 2020. For Tanda-Basti line, UP informed that it will be completed by April, 2020.

17.8 POSOCO representative stated that considering FSC in 400kV Lucknow-Gorakhpur line and its close proximity to Tanda TPS, before LILO of 400kV Gorakhpur (PG) – Lucknow (PG) D/C at Basti (PG), sub synchronous studies may be carried out.

17.9 Members including Rajasthan (as one of the beneficiary) suggested to match the timeframe of the commissioning schedule of 2nd unit of Tanda TPS and Tanda-Basti line as only 3 months difference is there.

17.10 UP stated that this may be discussed with NTPC as the line is almost ready and tariff issues would arise. Accordingly, they will intimate CTU.

17.11 After deliberations, following LTA system was agreed for 356.78 MW for Tanda TPS:

(i) 1st Unit (178.39 MW LTA with proportionate quantum of NR beneficiaries w.e.f. 01/07/2019 or availability of following UPPTCL Transmission system, whichever is later) :

i) LILO of Azamgarh–Sultanpur 400 kV S/C line at Tanda TPS by UPPTCL
ii) 400/220 kV, 2x315 MVA ICTs at Tanda TPS by NTPC
iii) Tanda (NTPC)-Tanda (New) (UPPTCL) 220 kV D/C line including 220 kV bays Tanda (NTPC) by UPPTCL

(ii) 2nd Unit [balance 178.39 MW (cumulative 356.78 MW LTA) w.e.f. 30/04/2020 or availability of following UPPTCL transmission system, whichever is later]:

i) Establishment of 400/220/132 kV, 2x500 + 2x200 MVA GIS substation at Basti along wth 125 MVAR Bus Reactor
ii) Construction of Tanda TPS–Basti 400 kV D/C quad line
iii) LILO of two ckts (ckt. no. 3rd& 4th) of Gorakhpur(PG)- Lucknow(PG) 400 kV D/C (twin) existing PGCIL line at Basti by UPPTCL. After LILO, the Gorakpur- Lucknow 400 kV D/C line at Basti, Basti-Lucknow section would be about 225 km in length, for which, UPPTCL needs to provide line reactors at Basti end.

17.12 It was informed that LTA would be operationalized with the above mentioned transmission system based on the confirmation from UPPTCL and the payment of the charges shall be in accordance with the applicable CERC Regulations.

18.0 Transmission scheme for Solar Energy Zones (SEZs) in Rajasthan (11.1 GW – 8.1 GW ISTS + 3 GW Intra state) under Phase-II

18.1 CEA stated that transmission scheme for SEZs in Rajasthan under Phase-II was agreed in the 5th meeting of NRSCT held on 13.09.2019. The subject scheme also includes following transmission elements:

a. Removal of LILO of Bawana – Mandola 400kV D/c(Quad) line at Maharani Bagh/ Gopalpur S/s. Extension of above LILO section from Maharani Bagh/Gopalpur up to Narela S/s so as to form Maharanibagh – Narela 400kV D/c(Quad) and Maharanibagh -Gopalpur-Narela 400kV D/c(Quad) lines
b. ± 600 MVAr STATCOM along with 4x125 MVAR MSC & 2x125 MVAr MSR each at Fatehgarh-II & Bhadla-II S/s

18.2 CTU has informed that the LILO of Bawana-Mandola 400kV D/c (Quad) at Maharanibagh is presently being carried out using Twin HTLS conductor on Multicircuit tower. Considering that LILO is already being constructed with HTLS conductor, it would be prudent to construct extension of LILO section with Twin HTLS conductor instead of Quad conductor. Further, considering RoW issues in Delhi area, it was proposed to construct extension of LILO section also on multi-circuit towers.

Members agreed with the above proposal.

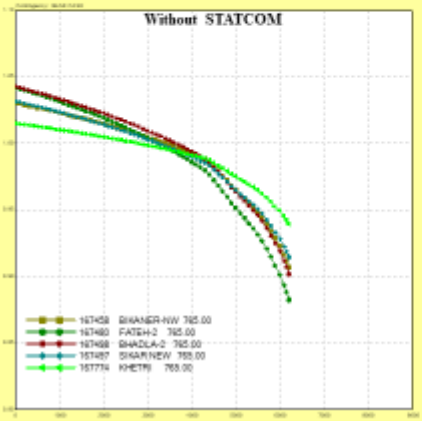
18.3 CEA stated that in view of increased penetration of Renewable Capacity, STATCOMs were agreed to provide dynamic reactive power support & reliable power evacuation from REZ at Bhadla-II, Fatehgarh-II & Bikaner. Regarding implementation of STATCOMs at Fatehgarh-II & Bhadal-II S/s, following issues/difficulties may be encountered with +/- 600MVAr STATCOM:

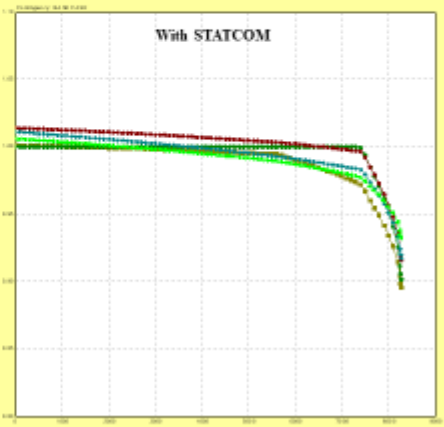
- +/-600MVAr STATCOM; 4x125MVAr MSC; 2x125MVAr MSR, maximum continuous rating is 1100MVAr (approx.) which require a Coupling Transformer of 1200MVAr (approx.) capacity. Coupling Transformer of such large capacity may not be feasible in 400kV class.
- In case of single STATCOM station unit running at full capacity, tripping of STATCOM station (i.e. sudden outage of 1100MVAr) may affect system stability.
- The 400kV Bus is also proposed to be divided into two sections. Therefore, by providing complete STATCOM station in only one section of the 400kV Bus will lead to the complete outage of STATCOM station in case of outage of corresponding 400kV Bus Section.
- MV Bus current continuous rating shall be so high such that Switchgear for required rating may not readily be available.

18.4 Dynamic & voltage Stability Studies were also presented by CTU wherein it was informed that switchable line reactors in Rajasthan are required to be opened matching with ramping up of solar generation for reliable transfer of ISTS power. Otherwise transfer of power beyond 5 GW-6 GW may result into voltage collapse under any major contingency. Provision of STATCOM enhances voltage stability & additional 8.1 GW identified under Rajasthan SEZ Phase-II system can be transferred with reliability.

PV Analysis without & with STATCOM

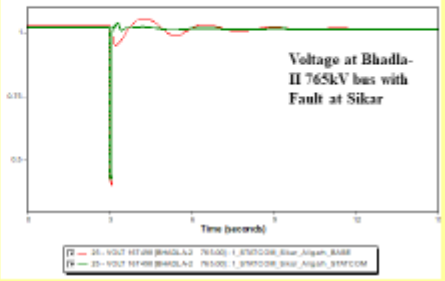
- Due to non-availability of Reactive power support from RE generation, it is observed that voltage is varying over very wide range with disturbances in network.
- From PV analysis, it is observed that for reliable transfer of power STATCOMs are required.

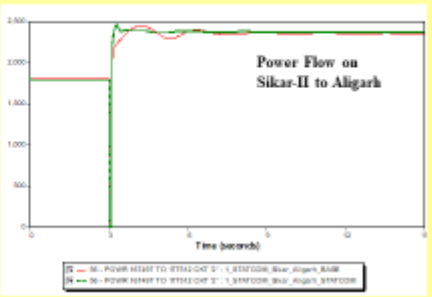




Dynamic Simulation without & with STATCOM

- Dynamic simulation is carried out by creating 3-Ph Fault close to Sikar 765kV bus on Sikar – Aligarh 765kV D/c line and subsequent outage of one circuit of Sikar-II – Aligarh 765kV D/c line within 100ms. Voltages at Bhadla-II S/s and Power flow on other circuit of Sikar-II -Aligarh 765kV D/c are compared
- It is observed from various contingencies that voltage was recovered in about 0.5-1 seconds with STATCOM compared to about 8-9 seconds, which is significantly faster compared to recovery without STATCOM.
- It is also observed that oscillation are also damping out in about 1-2 second compared to 8-9 seconds without STATCOM.





In view of above, CTU proposed to split the total STATCOM capacity into two equal set of STATCOM (+/-300MVAr STATCOM; 2x125MVAr MSC; 1x125MVAr MSR) one on each side of 400kV Bus Section for both Fatehgarh-II & Bhadla-II S/S.

18.5 Director (SO), POSOCO stated that based on information available from various technical papers, journals, studies etc. it has been observed that synchronous condenser is also viable tool for reactive power support. Moreover, since it is proposed to split the total STATCOM capacity into two equal sets of STATCOM, one of the set could be replaced by installing synchronous condenser.

18.6 CEA and CTU stated that the same would be suitably considered for future transmission

planning studies; however any change in the present scheme for Rajasthan would cause a delay in the project implementation.

18.7 After deliberations, members agreed with the above proposals.

19.0 220kV Outlets at Neemrana, Kotputli & Jaipur (South) 400/220 kV POWERGRID substations

19.1 CEA stated that during 23rd meeting of Standing Committee on Power System planning of NR held on 16/02/2008, due to increasing demand density, the norms for providing 220 kV bays at 400/220 kV ISTS substations were agreed as below:

- For 2x315 MVA - 6 nos. of line bays
- For 3rd 315 MVA transformer - 2 line bays
- For 500 MVA transformer - 4 nos. of line bays

In line with above decision all the new substations were being constructed with the above agreed norms for 220 kV bays. Accordingly, while implementing the new S/s at Jaipur(South), Kotuputli, Neemrana 8,6 & 6 nos. of 220kV line bays were provided respectively.

19.2 Recently RVPNL, vide letter No. RVPN/ SE (P&P)/XEN-2(P&P)/AE-2/F.2/D dated 04/10/2019 has forwarded CERC order dated 05/08/2015 & requested that POWERGRID may get the norms revised/withdrawn which were earlier approved in 23rd Standing Committee meeting for providing 220kV bays with 400/220kV transformers at their GSS and the 220kV bays be decided in-consultation with STUs as per the requirement.

The above issue has already been deliberated during 39th NRPC meeting held on 01-02/May/2017and it was agreed that 220 kV outlets at all 400 kV ISTS stations shall be constructed in consultation with concerned STUs as per their requirement and same is being followed.

19.3 RVPN stated that at Kothputli and Neemrana, the requirement of 4 bays of 220 kV was intimated, but 2 extra bays have been formed and the same was conveyed to CTU. CTU requested for the details of communication made by RVPNL in this regard. It was reiterated by CTU that the bays at Neemrana, Kotputli & Jaipur (South) S/s have been implemented based on the prevailing norms. Now, as per the revised methodology, the bays are being constructed in consultation with concerned STUs as per their requirement.

20.0 Up-gradation of Tehri Pooling Station–Meerut 765kV 2xS/c lines (operated at 400 kV) at its rated voltage

20.1 CTU stated that under Tehri PSP (1000 MW) transmission system, 4x800 MVA, 765/400 kV ICTs and GIS Tehri/Koteshwar Pooling station along with charging of Tehri-Merrut at 765 kV & modification of series capacitors for operation at 765 kV level were agreed. However, during the 39th SCM of NR, the issue of oscillations at Tehri complex (1400 MW-existing) under contingency condition was discussed and it was agreed to de-link the up-gradation of Tehri-Meerut 765 kV 2 x S/C lines (presently operated at 400 kV) along with reactive compensation with the commissioning of Tehri PSP generation project. Considering power evacuation requirement from Tehri generation complex is only 1400 MW so 3x800 MVA ICTs & charging of Tehri-Meerut at 765 kV is proposed to be covered as part of system strengthening and 4th 800 MVA ICT along with other associated elements

is proposed to be covered as part of transmission system associated with Tehri PSP.

CTU added that the above transmission system is under advance stage of implementation and upon operationalization of LTA granted to THDC for Tehri PSP, the applicable transmission charges shall be payable by THDC/beneficiaries in accordance with the CERC Regulations.

20.2 CEA suggested that since commercial issue is involved, therefore consent from Tehri is needed.

20.3 CTU stated that for evacuation of 1400 MW power from from Tehri HEP the transformer requirement is only 3x800 MVA, so, it is always beneficial from transmission tariff point of view to charge only three transformer instead of 4x800 MV. As such, the 4th 800 MVA ICT could be charged with the commissioning of Generation at Tehri PSS. Accordingly, following proposals were agreed:

- For power evacuation requirement from Tehri HEP, only 3x800 MVA ICTs may be covered under strengthening scheme along with charging of charging of Tehri-Merrut at 765 kV & modification of series capacitors for operation at 765 kV level.
- Charging of and 4th ICT should be matched with Tehri PSP generation .

Members agreed to the above proposal subject to consent from THDC.

21.0 Operational feedback of POSOCO

21.1 The operational feedback of POSOCO for Q2 of 2019-20 was published by POSOCO on 25/10/2019 respectively. The transmission constraints in ISTS network for this quarters and their remedial actions as mentioned in Operational Feedback and are enclosed as **Annexure- IV** along with CTU inputs on the matter.

POSOCO stated that apart from the points mentioned in the agenda, several other important issues highlighted below also need attention:

- N-1 non-compliance at other stations also such as 400/220kV Bhadla (Raj) and Akal.
- During long outage of ICTs at stations such as Allahabad(PG), Sarnath, Agra(UP) N-1 non-compliance issues were observed.
- Work progress of 765 kV Anpara D – Unnao and 765 kV Bara – Mainpuri line (second line).
- Switchgear upgradation at Dhanonda, Mahindergarh and other stations of Haryana
- No dedicated bay for bus reactor at some stations (UP state owned, Koteshwar, Dadri).
- In winter months, daily more than 60 nos, 400kV and above lines are being opened in Northern region alone for voltage control at various nodes.

22.0 Agenda for charging of Fatehgarh-II – Bhadla Section (After LILO of Fatehgarh – Bhadla 765kV D/c line (to be operated at 400kV) at Fatehgarh-II)

22.1 CEA stated that Fatehgarh – Bhadla 765kV D/c line (to be operated at 400kV) is under implementation by Fatehgarh Bhadla Transmission Ltd. (FBTL) under TBCB and expected to be completed by March, 2020. Further, LILO of this line at Fatehgarh-II PS along with

charging of Fatehgarh-II – Bhadla Section at 765 kV is also under implementation with completion schedule as December, 2020.

22.2 Further CTU informed that initially Fatehgarh – Bhadla 765kV line would be terminated at 400kV switchyard of Bhadla S/s and later on it would be required to terminated at 765kV switchyard of Bhadla S/s. However, 400kV Switchyard and 765kV Switchyard are at two extreme ends of the substation. Thus, to facilitate charging of Fatehgarh-II – Bhadla Section at 765kV re-routing of the line for about 3 km shall be required.

22.3 Members agreed to the above proposal.

23.0 Interim arrangement at Moga substation for the intermediate period between commissioning of Bikaner-Moga 765 kV D/c line and implementation of proposed 400 kV bus splitting at Moga

23.1 CEA stated that in order to address the issues of high loading on 765/400kV & 400/220 kV ICTs and high short circuit level at Moga (PG) 400kV bus, following bus splitting arrangement at Moga was agreed in the 3rd Meeting of NRSCT held on 24.05.2019:

400kV Bus Section-1 (GIS Bus)

- 400kV Kishenpur D/c feeders
- 400kV Hisar D/c feeders
- 2 nos. 765/400kV transformers
- 1 No. 50 MVAR

400kV Bus Section-2 (AIS Bus)

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

During the above meeting, it was agreed that above scheme would become part of Bikaner-Moga 765 kV D/C line as a supplementary strengthening scheme under ISTS. This scheme shall remain associated with the transmission scheme of Bikaner-Moga 765 kV D/C line and would require to be completed in same time of the line. However, since Bikaner-Moga line is in advance stage of implementation, suitable operational measures in consultation with POSOCO shall need to be taken up. It was also agreed that a separate meeting may be convened with CEA, CTU, POSOCO and PSTCL to finalise the interim arrangement at Moga substation for the intermediate period between commissioning of Bikaner-Moga 765 kV D/c line and implementation of 400kV bus splitting at Moga.

CEA further stated that to deliberate the above, a meeting was held in CEA on 03.12.2019 among CEA, CTU, POSOCO and PSTCL. During the meeting, CTU stated that as of now, 1430 MW Solar Generation projects are connected at ISTS in Bhadla/Bikaner complex which are being evacuated even in the absence of Bikaner – Moga 765kV D/c line. Till the month of June 2020, no additional solar power generation is expected to be commissioned. New solar generation of 50 MW is expected in the month of July, 2020. Further, CTU stated that they have carried out studies for two scenarios i.e. Paddy season (mid June to September) and non-paddy season and with & without Bikaner-Moga 765kV D/c line and without 400kV Bus Splitting arrangement at Moga (PG). From the load flow studies of

paddy season scenario it was observed that upto 2600 MW power transfer on Bikaner-Moga 765kV D/c line the flow on the downstream system at Moga remains under normal limits. Further as per studies no overloading in Punjab system is expected during the non-paddy season. Accordingly, it was proposed to go ahead with the commissioning of Bikaner – Moga line.

23.2 CTU stated that Load Flow Studies for Feb'2020, June'2020 and Dec'2020 time frame were shared by CTU with CEA, PSTCL and POSOCO. From studies, it was observed that loading on Moga 765/400kV and 400/220kV ICTs even under n-1 contingency is within permissible limits without proposed splitting of the bus at Moga S/s till Dec'20 timeframe. Also, no critical loading was observed on 220kV underlying network at Moga of Punjab.

23.3 PSTCL stated that as per the studies done by CTU, there is variations in generation figures and the same need to be corrected. In this regard, CTU stated that these minor nature corrections shall not affect the study results.

23.4 PSTCL stated that the actual generation of Punjab is about 6000 MW, however, 6950MW generation has been considered in June'20 scenario. PSTCL further stated that Punjab demand has been considered as 13300MW, however, Punjab has touched 13700MW during previous paddy season. In this regard, CTU stated that as per information available on Punjab SLDC website, the ATC of Punjab is 6400 MW, accordingly in the studies Punjab import is restricted to 6400 MW. CTU enquired that with ATC of 6400MW and with self-generation of about 6000 MW, how Punjab could met the peak demand of 13700 MW and there seems to be some discrepancy in the details. Punjab stated that they have increased their internal generation to about 6900MW. On this CTU stated that they have considered Punjab generations as 6950MW for carrying out the studies.
It was discussed that as per studies no constraint is observed in Punjab system for Feb'20 and Dec'20 i.e. non-paddy season with Bikaner-Moga 765 kV D/c line and without proposed splitting of the bus at Moga S/S. Thus, there is no constraint in commissioning of Bikaner – Moga 765kV D/c line. The peak load of Punjab usually occurs during 3-4 months from June to September and from the studies, it is observed that there is no overloading in Punjab system except during this period. Accordingly, it was agreed that PSTCL would carry out necessary modifications in the study file shared by CTU earlier and shall share the revised base case with CEA, CTU, NRPC & POSOCO. Subsequent to which, the matter shall be discussed in a separate meeting for suitable interim operation measures if any.

23.5 CTU emphasised that the Bikaner- Moga line is expected to be completed by Feb 2020, which is a non-paddy season for Punjab, hence, the line may be charged. The load flow studies would be repeated for paddy season and based on the studies in the proposed separate meeting suitable SPS may be panned if the loading on 220kV network of Punjab increases beyond permissible limits.

23.6 After detailed deliberations, it was agreed that:

i. No constraint is observed in Punjab system with Bikaner-Moga 765 kV D/c line, under n-1 contingency, in the off- Peak conditions, without proposed splitting of the bus at Moga S/S. Thus, there is no constraint in commissioning of Bikaner – Moga 765kV D/c line.
ii. PSTCL would carry out necessary modifications in the study file shared by CTU earlier and shall share the revised based case with CEA, CTU, NRPC & POSOCO

iii. A separate meeting to be convened by CEA for Revised studies for Punjab Peak Load for capturing the realistic scenario of Generation additions in Rajasthan so that suitable interim measures including implementation of SPS may be worked out for restricting the flow in Punjab downstream system through 765/400kV ICTs in Moga.

24.0 Data Requirements from STUs for Transmission Planning

24.1 CEA stated to ensure proper development of ISTS system it is important to timely assess generation capacity & demand growth in various parts of the region and to review the upstream & downstream network associated with the transmission schemes
The CERC Planning Regulations, 2018 also mandates that Regional Power Committee(s) shall assist in preparation of base case in consultation with STUs/ Distribution licensees of the region.
Further, the MoP Order No 15/3/2017-Trans dated 04-11-2019, the ToR of NCT states that *CTU shall also make a comprehensive presentation before the National Committee every quarter for ensuring development of an efficient, co-ordinated and economical inter-State transmission system for smooth flow of electricity.* Accordingly, inputs are required from states for carrying out the above task.

24.2 CTU stated that the data requirements from STUs pertain to the following broad categories:

i. Demand Projection (peak & off-peak, on quarterly & annual basis)
ii. Intra-state Generation capacity addition plans along with expected commissioning schedules.
iii. Existing and under-construction intra-state transmission network up to 220kV level except NER where data upto 132kV level shall be required.
iv. Intra state network augmentation plans of STUs along with expected commissioning schedules.

24.3 Members suggested to circulate and share the above mentioned MoP order with the STU's and accordingly, states shall be requested to provide the requisite data upto 2024-25 timeframe. Also, States shall be required to provide dynamic model data for state connected power system elements including generators, FACTS devices, HVDCs, etc. in PSS®E standard models. It was agreed that the requisite data/ details may be furnished by respective STUs at the earliest to CTU & CEA and shall intimate their nodal officers to CTU/CEA in this regard. Format for required data shall be provided shortly by CTU.

25.0 Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II - Provision of spare ICT/Reactors and future space in the already agreed transmission scheme.

25.1 CTU stated that transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II was agreed in the 5th meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 13/09/2019. Subsequently, transmission system for solar energy zones (8.1GW) under Phase-II along with provision of spares and future space was agreed & recommended for implementation during 6th NCT meeting held on 30/09/2019. The details of spares & future space under aforesaid schemes is given below:

Sr. No.	Approved in 5th NRSCT Meeting held on 13.09.2019	Corresponding Future Space and Spare ICTs/Reactors Unit
1	Establishment of 400/220 kV, 4x500	Future provisions:

	MVA at Ramgarh – II PS with 420kV (2x125 MVAR) bus reactor	Space for 400/220 kV ICTs along with bays: 2 400 kV line bays along with switchable line reactor:2 220 kV line bays:4 420 kV reactors along with bays: 1
2	1x240 MVAr Switchable line reactor for each circuit at each end of Fatehgarh-II – Bhadla- II 765kV D/c line (2nd)	1x80 MVAr spare reactor each at Fatehgarh-II and Bhadla-II to be used as spare for Fatehgarh-II – Bhadla-II 765kV D/c line (2nd)
3	Establishment of 765/400 kV, 2x1500 MVA at Sikar – II with 400kV (1x125 MVAR) and 765 kV (2x330 MVAr) bus reactor	765/400kV, 500 MVA spare single phase ICT-1 110 MVAR, 765 kV, 1 ph Reactor spare unit -1 Future provisions: Space for- 765/400kV ICT along with bays -2 765 kV line bays along with switchable line reactors – 10 400 kV line bays along with switchable line reactor –6 400/220kV ICT along with bays -4 220kV bays -8 400kV bus reactor -2
4	Establishment of 400/220 kV, 6x500 MVA Pooling Station at Bikaner –II PS with suitable bus sectionalisation at 400 kV and 220 kV level and with 420kV (2x125 MVAR)bus reactor	Future provisions: Space for 400/220 kV ICTs along with bays:4 400 kV line bays:6 220 kV line bays:6 420 kV reactors along with bays: 2
5	Establishment of 765/400 kV, 3X1500 MVA GIS substation at Narela with 765 kV (2x330 MVAr) bus reactor and 400 kV (1x125 MVAR) bus reactor	765/400kV, 500 MVA spare ICT (1-phase) – 1 110 MVAR, 765 kV, 1-Ph Bus Reactor (spare unit) -1 (1x110 MVAr spare reactor at Khetri to be used as spare for Khetri – Narela 765 kV D/c line) Future provisions: Space for 765/400kV ICTs along with bays: 1 765 kV line bays along with switchable line reactor: 6 400 kV line bays: 6+4 765kV reactor along with bays:2 400/220 kV ICTs along with bays:8 220 kV line bays: 12 400 kV bus reactor along with bays:2
6	1x330 MVAr switchable line reactor for each circuit at each end of Sikar-II – Aligarh 765kV D/c line	110 MVAR, 765 kV, 1 Ph Reactor (spare unit) -1 at Aligarh

25.2 Members agreed.

26.0 Down Stream network by State utilities from ISTS Station:

CTU stated that augmentation of transformation capacity in various existing substations as well as addition of new substations along with line bays for downstream network are under implementation at various locations in Northern Region. For utilization of these transformation capacities, implementation of downstream 220kV system needs to be commissioned. Monitoring of downstream network is also being carried out in monthly OCC meetings. STUs are requested to furnish the updates of the downstream system planned/under construction associated with the listed ISTS substation. Accordingly, the data to be provided by STU's in this regard is enclosed as Annexure V, which may be updated and sent to CEA & CTU within 15 days of issuance of Minutes of this meeting. (Data from HVPNL has already been updated in the Annexure)

27.0 Summary of LTA/Connectivity granted in Bhadla/Fatehgarh/Bikaner Complex

27.1 CTU stated that the Transmission System for Solar Energy Zones in Rajasthan (8.9GW) under Phase-I and Transmission schemes were agreed for Solar Energy Zones (SEZs) in Rajasthan (8.1 GW) under Phase-II was agreed in 2nd NRSCT meeting and 5th NRSCT meeting held on 13.11.2018 and 13.09.2019 respectively. Summary of Stage-II Connectivity/LTA granted in various Connectivity/LTA meetings is given below:

S.No	Substation	Stage –II Connectivity		LTA	
		Applied (MW)	Granted/Agreed for Grant (MW)	Applied (MW)	Granted/Agreed for Grant (MW)
1	Bhadla PS	1250 (8 nos.)	1050	1050 (6 nos.)	1050
2	Bhadla-II PS	3080 (7 nos.)	1830	1175 (2 nos.)	1175
3	Bikaner	2400 (8 nos.)	1800	2400 (8 nos.)	1800
4	Fatehgarh	1200 (4 nos.)	1200	1200 (4 nos.)	1200
5	Fatehgarh-II	5120 (14 nos.)	3420	2340 (7 nos.)	1590
6	Ramgarh	500 (1 Nos.)	-	-	-
	Total	**13550**	**0**	**7865**	**0**

27.2 Details of Connectivity/LTA agreed/granted during 25th – 30th Connectivity and LTA meeting of NR Constituents held from July'19 to Dec'19 is given at Annexure-VI. Further, during aforesaid period the list of MTOA applications received & granted involving Northern Region is attached at Annexure-VII.

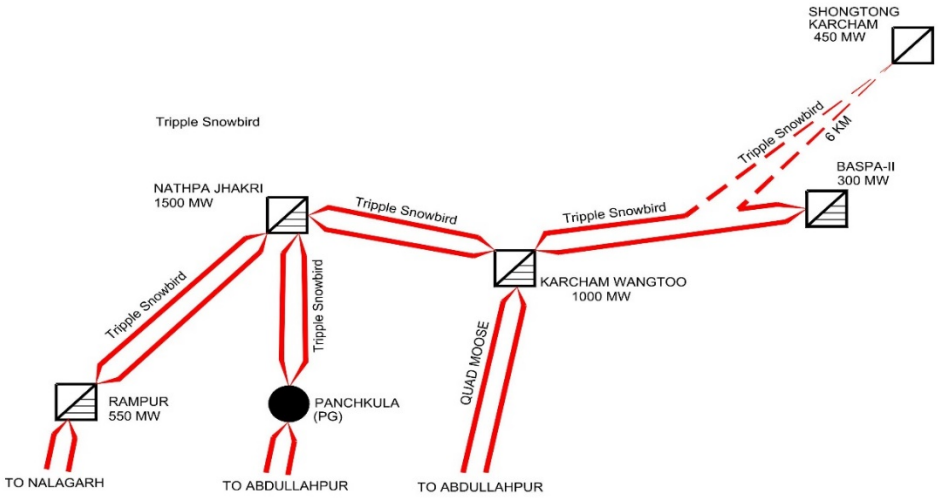
27.3 Members noted the same.

28.0 Evacuation arrangement of Shongtong Karcham (450MW) in Himachal Pradesh.

28.1 CEA stated that as per the Master Plan for Satluj basin, power of Shongtong Karcham (450 MW) HEP has been planned through 400 kV D/C (Quad HTLS) line up to 400/220/66 kV substation of HPPTCL at Wangtoo. In the 40th meeting of Standing Committee on Power System Planning-NR held on 22.6.2018, it was decided that this line would be developed as dedicated line of Shongtong Karcham HEP by HPPTCL.

Subsequently, in the 1st meeting of NRSCT held on 11.9.2018, for evacuation of power from Shongtong HEP, HPPTCL had proposed LILO of one circuit of 400 kV Baspa-II-Karcham Wangtoo D/C (Triple Snow bird) line of M/S JSW at Shongtong Karcham HEP as an interim arrangement, till the upstream projects get materialized. LILO (LILO length about 6 Kms.) to be done with Quad HTLS conductor. After materialization of upstream generations, the LILO would be opened and extended to 220/400 kV Wangtoo substation of HPPTCL. And it was decided that a separate meeting may be convened to discuss the above proposal.

The same was discussed in a meeting held in CEA on 12.09.2019 in participation with CTU, POSOCO, HP and JSW. After detailed deliberation, it was decided that Shongtong to Wangtoo (length-18 km) should be considered with triple tower design and with Twin Moose conductor. With this configuration, the overall cost of the 18km direct line with Twin Moose conductor would be more or less same as with the proposed LILO of 400 kV Baspa-II-Karcham Wangtoo D/C (Triple Snow bird) line of M/S JSW at Shongtong Karcham HEP with Quad conductor (6km). Also, HPPTCL was advised to explore the possibility of above suggestion and were requested to carry out detailed survey based on the above proposal.



Interim Arrangement

28.2 CEA further stated that in a meeting held on 3.01.2020, HPPTCL stated that looking into the cost economics, instead of laying 18 km Quad line from Shongtong to Wangtoo substation, it is proposed to LILO 400 kV Baspa-II-Karcham Wangtoo D/C (Triple Snow bird) line of M/S JSW at Shongtong Karcham HEP (about 6 km) as an interim arrangement. In future, the line can be extended to Wangtoo substation with the upstream projects.

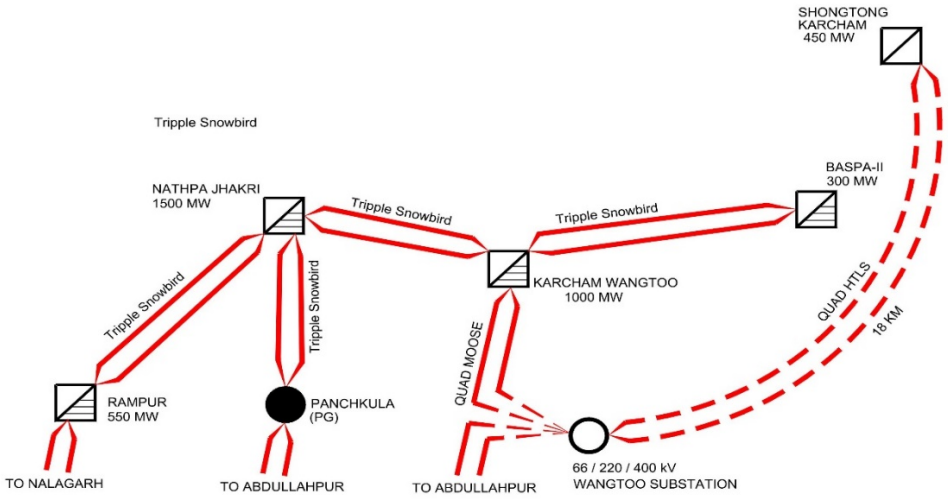
28.3 CEA added that JSW informed that two set of cables are running parallel and replacement of the cable with higher capacity is time consuming and troublesome due to space constraints, safety concerns and generation losses. They have no objection for the implementation of the above LILO proposal of HPPTCL and under n-1 condition, SPS may be considered at Shongtong generating station.

28.4 HPPTCL intimated that the timeline for Shongtong is 2024-25 and the upstream project of Shongtong i.e. Jangithopan (780 MW) is likely to be come by 2030 timeframe. As such, investing heavily for direct line upto Wangtoo and two line bays at Wangtoo can be avoided presently with the proposed system. Further, the construction of direct system to Wangtoo, would be costly and capacity of the system would remain under utilised till upstream projects are materialised. So in the margins available in the existing system, the power from Shongtong HEP can be easily evacuated through the LILO arrangement. After deliberations, following was agreed for evacuation of power from Shongtong HEP, subject to ratification from NRPCTP:

(i) LILO of 400 kV Baspa-II-Karcham Wangtoo D/C (Triple Snow bird) line of M/S JSW at Shongtong Karcham HEP (about 6km with Triple Snow bird conductor) as an interim arrangement.

(ii) Provision of SPS at Shongtong generation switchyard to take care for n-1 condition.

(iii) The line from the LILO would be extended to Wangtoo, with 2 no. of bays at Wangtoo Switchyard for evacuation of power with the projects in that area upstream of Shongtong Karcham HEP .



FINAL ARRANGEMENT

28.5 CTU stated that with this proposal, there is an issue as to where to apply for LTA/Connectivity for Shongtong as Baspa- Karcham is a dedicated line and connectivity at Baspa is ISTS. Also, metering issue will also arise.

28.6 CEA suggested that the system for evacuation could be approved and system for LTA/Connectivity can be finalised at later stage.

28.7 ON enquiry by POSOCO regarding the time schedule of Shongtom Karcham, HPPTCL informed that it is expected by December 2024.

28.8 POSOCO also suggested that in case Baspa-II –Karcham Wangtoo line trips due to overloading, then fast communication is required at Shongtong end.

28.9 After further deliberations, following was agreed:

A. Evacuation system for Shongtong Karcham HEP (450 MW):

(i) LILO of 400 kV Baspa-II-Karcham Wangtoo D/C (Triple Snow bird) line of M/S JSW at Shongtong Karcham HEP (about 6km with Triple Snow bird conductor) as an interim arrangement.

(ii) Provision of SPS at Shongtong generation switchyard to take care for n-1 condition.

(iii) The line from the LILO would be extended to Wangtoo, with 2 no. of bays at Wangtoo Switchyard for evacuation of power with the upstream projects in that area.

B. The above system is agreed subject to the condition that in case there is an outage/ overloading observed on Baspa-II –Karcham Wangtoo line, then one unit of Shongtong Karcham HEP (150 MW) will be backed down.

C. Connectivity/LTA related matter shall be discussed in a separate meeting to be convened by CEA.

29.0 Transmission works to be implemented in UP under Intra-State transmission system

29.1 CEA stated that UPPTCL vide their letter dated 10.01.2020 has proposed the following intra-state work to strengthen the network for additional loads & reliability and some minor modification in previously approved work.

1. Modification in Creation of 400/220/132 kV Mohanlalganj (Lucknow) GIS Substation.

Creation of 400/220/132 kV Mohanlalganj (Lucknow) GIS Substation has been approved in the 4th meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 25.07.2019. However, some modifications are proposed in the construction work of 400/220/132 kV Mohanlalganj S/s as below:

S.No	Approved in 4th NRSCT dated 25.07.2019	Modification Proposed as
1	Creation of 400/220/132 kV S/S Mohanlalganj, Lucknow (2x500,2x200 MVA)	No Change
2	LILO of 400 kV SC line Sarojini Nagar (Lucknow)-Unnao(765)(Original length of line 39 km) at Mohanlalganj(400) -37 km	No Change
3	LILO of 400 kV SC line Luchnow (PGCIL)400 Sultanpur (400)UPPTCL line (original length of line 164 km) at Mohanlalganj (400)-6km	No Change
4	220 kV DC line Mohanlalganj (400)-Sultanpur Road(Awas Vikas)(220 /33 kV 5x60 MVA) -15 km on Moose Conductor	No Change
5	220 kV DC line Mohanlalganj (400)-Bijnor (Lucknow) (220 /132/33 kV 2x160+2x40	No Change

	MVA)-20 km	
6	LILO of 220 kV SC line Chinhat (220)-CG City 220/33)at Mohanlalganj(400)-31.7 km (on Moose Conductor)	No Change
7	LILO of one ckt of 220 kV DC line Barabanki (220)- Satrikh Road (220) at Mohanlalganj(400)-20km	No Change
8	Nearby 132 KV Downstream	**132 kV DC Interconnector line Mohanlalganj (400)-Mohanlalganj (132/33 kV) S/S U/C -0.15km(U/G 1000 sq mm copper cable with optical fiber approach cable)**
9	--	**125 MVAR Bus Reactor at 400kV S/S Mohanlalganj (to be added to contain system over voltages).**

2. Modification in Creation of 765/400/200 kV Gurusarai, Jhansi

In 40th meeting of SCPSPNR held on dated. 22.06.2018 evacuation plan for 4000 MW power from solar plants in Bundelkhand region of Uttar Pradesh under GEC-II (in phased manner in four years 2020-23) has been approved. For evacuation of 1000 MW Solar Power in 3rd Year connectivity of 765 kV Guru Sarai has a typographical error which is to be modified as below-:

S.No	Approved in 40th SCM dated 22.06.2018	Proposed as
1	Creation of 765/400/220 KV ,2x1500+3x500 MVA Gurusarai , Jhansi	No Change
2	Gurusarai (Jhansi)-Manipuri 765 kV SC line -185 km	No Change
3	Construction of 765 kV bay at Manipuri S/S	No Change
4	400kV Gurusarai –Orai (Quad) DC line-100 km	Gurusarai –Orai PG 765 (Quad) 400 KV DC line -100km
5	1x125kV MV Ar. 420 kV bus reactor	No Change
6	1x330 MV Ar. 765 kV Bus Reactor	No Change

3. Augmentation at 400 kV S/S Sultanpur from (2x315 +1x240) MVA to (3x315 +1x240 MVA)

Augmentation at 400 kV S/S Sultanpur from (2x315 +1x240) to 3x315 +1x240 MVA to meet out the future load in Sultanpur district and to meet out the N-1 criteria. It was also

informed that 240 MVA T/F was very old and its installation date was 16.02.1981.

4. Augmentation at 400 kV S/S Aligarh UPPTCL (from 2x500 to 2x500 +1x315 MVA)

Augmentation at 400 kV S/S Aligarh UPPTCL (from 2x500 to 2x500 +1x315 MVA) to meet out future load in Aligarh district in compliance of N-1 criteria.

29.2 Members agreed with the above proposal and modifications related to the Intra-State Transmission works by UPPTCL.

30.0 Additional 220 kV downstream to 400 kV Kursi Road, Lucknow and Shahjahanpur PGCIL substations

30.1 CEA stated that UPPTCL vide its letter dated 01.01.2020 has informed that 400/220kV, 2x500 MVA Kursi Road Lucknow & 2x500 MVA Shahjahanpur PGCIL substations are connected/ to be connected with existing and under construction UPPTCL substations as follows:

1. 400 kV Shahjahanpur (PG) substation :

- Shahjahanpur PG – Hardoi 220 kV S/C existing line.

(220/132/33 kV 2x160, 2x63 MVA existing Hardoi is also presently connected to 220 kV Shahjahanpur s/s of UPPTCL).

- 220 kV Bay utilized at PGCIL s/s – 01 no.

2. 220/132/33 kV 2x160, 2x40 MVA Malawan, Hardoi (Under Construction) New s/s (Approved in 1st Standing Committee meeting on 11.09.2019) ;-

- Hardoi Road (400) Zehta, Lucknow – Mallawan, 220 kV DC line (Each ckt on moose)
  (Zehta UPPTCL 400 kV s/s is under Construction)
- Mallawan – Hardoi 220 kV DC line
  (Only one ckt proposed for termination at Hardoi 220 kV s/s)
- Removal of Shahjahanpur PG- Hardoi 220 kV SC line from Hardoi s/s end and to connect with 220 kV 2nd ckt of Zehta (400) – Mallawan DC line.
- Utilization on 220 kV PG Bay – NIL

3. Shahjahanpur PG – Azizpur, Shahjhanpur 220 KV D/c line.
   (Approved in 40th Standing Committee meeting on 22.06.2019)
   (Azizpur, Shahajahanpur 220/132/33 kV 2x160,2x40 MVA UPPTCL new s/s is under construction and also planned to be connected to Shahjahanpur (220) UPPTCL substation with SC new 220 kV line in the area)
   Utilization of 220 kV PGCIL Bays – 2 nos.

4. Shahajahanpur (PG) – Gola (Khiri) 220 kV D/c line (each ckt on Moose conductor)
   (Approved in 1st Standing Committee meeting on 11.09.2019)
   (Gola, Khiri 220/132/33 kV 2x160, 2x40 MVA is an under construction UPPTCL new substation and also to be connected with LILO of Shahjahanpur – Nighasan 220kV S/C Line)

- 220 kV PGCIL Bay utilization – 2 no.

All above (1) to (4) UPPTCL connectivity and new construction have already been noted and also approved in the standing committee meetings of CEA.

5. Further, UPPTCL has also proposed to construct 220/132/33 kV, 2x200, 2x63 MVA Sitapur substation. With the new 220 kV substation proposed at Kundani (Sitapur), following is the proposed connectivity :-

- Construction of new 220/132/33 kV 2x200, 2x63 MVA UPPTCL Kundni, Sitapur substation.
- 400/220 kV Kursi Road, Lucknow- Kundini 220 kV D/C line – 60 Km. (Each ckt on moose) (220 kV Bays – 2 no. already exists at Kursi Road PGCIL substation).
- LILO of Sitapur – Shahjahanpur 220 kV SC line at Shahjahanpur PGCIL 400 kV substation- 10 Km.
- LILO of Sitapur – Nighasan 220 kV SC Existing line at Kundni 220 kV s/s -30 Km.
- Utilization of 220 kV PG Bays-
  220kV – 1 no. Additional 220 kV Bay is proposed to be constructed under ISTS scheme)
  1 no. 220 kV constructed Bay already exists at Shahjahanpur PGCIL substation.

With above proposal, existing 220 kV 6 no. bays at 400 kV Shahjahanpur PGCIL s/s shall be fully utilized and one additional 220 kV new Bay at this PGCIL S/s proposed to be constructed under ISTS. Also, 400/220 kV PGCIL Kursi Road, Lucknow substation is already connected with 220 kV UPPTCL substation namely Chinhat Lucknow s/s with S/C line, Kursi Road Lucknow substation with D/C line and BKT UPPTCL S/s with S/C line .

30.2 In this regard, UPPTCL has requested to approve the new construction proposal given at '5' along with utilization of 6 no. 220 kV existing Bays at Shahjahanpur and implementation of 1 no. of 220kV bay(7^{th}) under ISTS at Shahjahanpur PG S/s. CTU requested that time frame for 220 kV bay at Shahjahanpur S/s may be informed by UPPTCL. After deliberations, following was agreed:

(i) Construction of 220/132/33 kV, 2x200,2x63 MVA Sitapur substation

- 400/220 kV Kursi Road, Lucknow- Kundini 220 kV D/c line – 60 Km. (Each ckt on moose) (220 kV Bays – 2 no. already exists at Kursi Road PGCIL substation).
- LILO of Sitapur – Nighasan 220 kV S/c existing line at Kundni 220 kV s/s -30 Km
- LILO of Sitapur – Shahjahanpur 220 kV S/c line at Shahjahanpur PGCIL 400 kV substation- 10 Km.

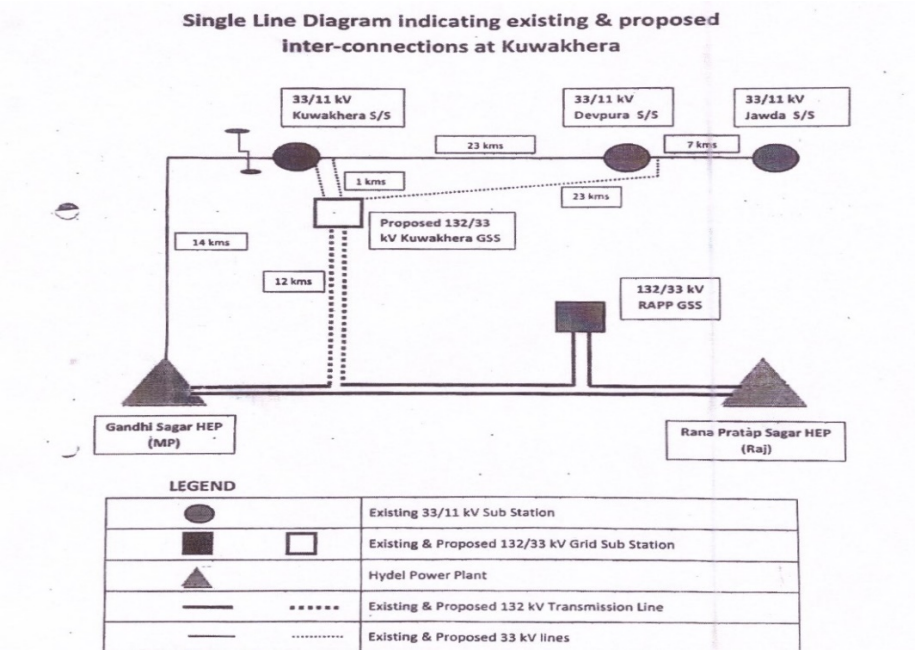
  (For LILO one no. of existing 220kV bay at Shahjahanpur PGCIL would be utilized)

- Construction of one no. of 220kV bay at Shahjahanpur PGCIL under ISTS for LILO of Sitapur – Shahjahanpur 220 kV S/c line at Shahjahanpur PGCIL 400 kV (May be taken up under ISTS in matching timeframe of LILO of Sitapur – Shahjahanpur 220 kV S/c line at Shahjahanpur)

31.0 Approval for charging of 132/33 kV, 1x20/25 MVA substation at Kuwa Khera in Chittorgarh district, Rajasthan by LILO of one circuit of 132 kV D/C Rana Pratap Sagar (RPS) [Rajasthan]- Gandhi Sagar (GS) [MP] line (RAPP-Gandhi Sagar section).

31.1 CEA stated that RVPNL vide its letter no RVPN/SE(P7P)/XEN-2(P&P)/AE-2/D1324 dated 16.1.2020 has informed that to provide supply to 3 nos. 33/11 kV substations RVPNL has planned a 132/33kV 20/25 MVA GSS S/s at Kuwakhera in Chittorgarh district, Rajasthan with LILO of one circuit of Gandhi Sagar HEP and Rana Pratap HEP 132kV D/c line (the circuit is already LILO at 132/33kV RAPP GSS). These 3 nos.33/11 kV substation in the nearby area of Kuwakhera village are presently being fed from existing 132/33 kV GSS Gandhi Sagar Hydel Power Station (GSHPS) which is a shared project of Rajasthan & Madhya Pradesh. GSHPS is located in MP and operated and maintained by M.P Power Generation Company (MPPGCL). It was also informed by RVPNL that as per M.P State Regulatory directives, MPPGCL intimated Rajasthan that supply to the Rajasthan border villages is to be discontinued from Gandhi Sagar on 33 kV and alternative supply arrangement is to be made by Rajasthan from its own sources. Therefore, the 132/33 kV, 20/25 MVA GSS Kuwakhera was planned by LILO of one circuit of 132 kV D/C Rana Pratap Sagar (RPS) [Rajasthan] – Gandhi Sagar (GS) [MP] line (RAPP-Gandhi Sagar section) (LILO length 12km). The S/s and LILO works had completed and charging code from NRLDC was awaited for want of clearance from CEA/NRPC(TP).

31.2 The proposal was examined by CEA. The 132 kV line between Gandhi Sagar and Rana Pratap Sagar being inter-state in nature, the matter was taken up with MPPTCL. MPPTCL vide its email dated 20.1.2020 has informed that they have no objection in allowing RVPNL for LILO of Gandhi Sagar-RP Sagar 132kV line at Kuwakhera in Rajasthan, however, before charging the line, RAPP and local authorities of MPPTCL/MPPGCL may kindly be informed to change the relay settings at Gandhi Sagar and RAPP GSS end. Accordingly, CEA vide its letter dated 22.1.2020 had given in-principle approval to RVPN for above works subject to ratification in the forthcoming meeting of NRPCTP.



31.3 After deliberations, members agreed to the above proposal of construction of 132/33kV, 20/25 MVA GSS S/s at Kuwakhera in Chittorgarh, Rajasthan with LILO of one circuit of Gandhi Sagar HEP and Rana Pratap HEP 132kV D/c line (the circuit is already LILO at 132/33kV RAPP GSS).

Meeting ends with thanks to the chair.
