



भारत सरकार  
Government of India  
विद्युत मंत्रालय  
Ministry of Power  
केन्द्रीय विद्युत प्राधिकरण  
Central Electricity Authority  
विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग  
Power System Planning & Appraisal - I Division

To

-As per list enclosed


विषय: पश्चिमी क्षेत्र विद्युत समिति (पारेषण योजना) (WRPCTP) की होने वाली दूसरी बैठक का एजेंडा

**Subject: Agenda note of the 2<sup>nd</sup> meeting of Western Region Power Committee (Transmission Planning) (WRPCTP)**

Sir/ Madam,

The agenda note for the 2<sup>nd</sup> meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) scheduled to be held on 04.09.2020 at 11:00AM through VC (Microsoft Teams) is available on CEA website ([www.cea.nic.in](http://www.cea.nic.in)) at the link: <http://cea.nic.in/compsplanningwr.html> i.e. Home page - Wings - Power Systems -PSP&A-1 - Standing Committee on Power System Planning Western Region. The link to join the meeting would be intimated on 03.09.2020.

Yours faithfully,

  
(Goutam Roy) 26/9/20

Chief Engineer (PSP&A-I)

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**List of Addressees:**

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1.	Member (Power System), Central Electricity Authority, Sewa Bhawan, RK Puram, Sec-1, New Delhi - 110066	2.	Member Secretary, WRPC, F-3, MIDC Area, Andheri (East), Mumbai – 400093 Fax – 022-28370193	3.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 Fax-0124-2571809
4.	Director (System Operation), POSOCO B-9, Qutub Institutional Area, Katwaria Sarai New Delhi – 110010	5.	Chief Electrical Engineer, Vidyut Bhawan, 3rd Floor, Panaji, Goa - 403001	6.	Managing Director, GETCO, Sardar Patel Vidyut Bhawan, Race Course, Vadodara-390007
7.	Managing Director, MPPTCL, Block no -2, Shakti Bhawan, Rampur, Jabalpur – 482008 (M.P)	8.	Chairman & Managing Director, MSETCL, Prakashganga, Plot No.C-19, E-Block, Bandra-Kurla Complex, Bandra (E), Mumbai - 400051	9.	Secretary (Power), Administration of Daman & Diu (U.T.), Fort Area, Moti Daman-396220
10.	Secretary (Power), UT of Dadra & Nagar Haveli, Secretariat, Amli, Silvassa - 396230	11.	Managing Director, CSPTCL, Dangania, Raipur (CG)-492013	12.	Chairman & Managing Director (NTPC), NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi - 110003
13.	Chairman & Managing Director (NHPC), N.H.P.C Office Complex, Sector-33, Faridabad - 121003 (Haryana)	14.	Managing Director (SECI), 1st Floor, D-3, A Wing, Prius Platinum Building District Centre, Saket, New Delhi - 110017		

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**Agenda note for the 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) to be held on shortly**

**1. Confirmation of Minutes of 1st meeting of Western Region Power Committee (Transmission Planning) held on 11.01.2020 at Ahmedabad**

- 1.1. The minutes of the 1<sup>st</sup> meeting of WRPCTP held on 11.01.2020 were issued vide CEA letter No.CEA-PS-11-23(19)/1/2019-PSPA-I Division/I/9489/2020 dated 12.03.2020.
- 1.2. CTU vide its email dated 25.03.2020 and GETCO vide its letter no. CE(R&C)/STU/511/1 dated 04.06.2020 (attached as Annexure-I) have requested for few modifications in the minutes of the 1<sup>st</sup> meeting of WRPCTP.
- 1.3. Based on the inputs of CTU, following modifications / corrections are being proposed:

S. No	Item No.	Para/ item as recorded in the MoM of 1 <sup>st</sup> WRPCTP	Modified/ Corrected para/item
1	4.21 (ii) ) Under Phase-I, 4.5 GW (2 GW at Khavda, 2 GW at Bhuj-II # & 0.5 GW at Bhuj PS)	... For LTA beyond 1500 MW at Bhuj-II pooling station, implementation of 1X765/400 kV ICT Augmentation at Bhuj-II pooling station under ISTS to be taken up	... For LTA beyond 1500 MW at Bhuj-II pooling station, implementation of 1X <b>1500MVA</b> , 765/400 kV ICT Augmentation at Bhuj-II pooling station under ISTS to be taken up
2	4.21 (iii) ) Under Phase-I, 4.5 GW (2 GW at Khavda, 2 GW at Bhuj-II # & 0.5 GW at Bhuj PS)	.....	<b>(c) 220 kV line bays for interconnection of solar projects (7 nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.</b>
3	4.21 (i) ) under Phase-II, 5.5 GW RE injection at Khavda	Provision of 1X125 MVAR 400 kV bus reactor on second bus	Provision of 1X125 MVAR 400 kV & <b>1x330MVAR 765kV</b> bus reactor on second bus
4	4.21 (vii) ) under Phase-II, 5.5 GW RE injection at Khavda	220 kV line bays for interconnection of solar projects (25 nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level	220 kV line bays for interconnection of solar projects ( <b>18 nos</b> ) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
5	12.3 (may be added) )	Additional para suggested for addition : It was further informed that total MTOA quantum of 1877MW has been granted after the 1st WRSCT	No modification required

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	meeting with following breakup: 897MW with injection in WR and 980MW with drawl in WR	
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1.4. GETCO inputs with WRPC(TP) minutes are tabulated below:

S. No	Item No.	Para/ item as recorded in the MoM of 1 <sup>st</sup> WRPCTP	As per GETCO	Remarks
1 )	4.18	..... The overloading of the 400 kV Intra-State lines in Gujarat may be because of backing down of conventional generation to achieve the load-generation balance. Overloading of intra-state elements due RE capacity addition under ISTS would be taken care in future in form of system strengthening schemes.	..... The overloading of the 400/220 kV Intra-State lines in Gujarat may be because of backing down of conventional generation to achieve the load-generation balance. Overloading of intra-state elements due to RE capacity addition under ISTS would be taken care in future <b>as part of associated ISTS scheme for RE integration only and not in form of regular system strengthening scheme.</b>	MoM as per the discussion held.  Issue raised can be deliberated with agenda item no. 7.
2 )	4.22		It is agreed that transmission scheme from Khavda region will be done in a way to have bare minimum scheme in Phase-I and shall be implemented as per LTA applications. Strengthening schemes may be bid out in next phase as per grant of LTA in future.	Already taken care
3 )			It is also agreed that various 400 kV / 220 kV transmission lines of GETCO surrounding North, Central & Southern Gujarat area would be getting critically loaded (as per the load flow studies results for the Khavda system) because of huge RE integration in Western Gujarat and changed load-generation scenarios. Therefore, appropriate ISTS network strengthening as a part of RE integration will be planned at later stage matching with actual RE growth.	Already covered under at S.No. (1)

1.5. Incorporating the above changes, the transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region is as given below:

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**Transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region**

**Phase-I, 4.5 GW (2 GW at Khavda, 2 GW at Bhuj-II # & 0.5 GW at Bhuj PS):**

(i) 500 MW at Bhuj pooling station (400/220 kV, 500 MVA 9<sup>th</sup> ICT ): 500 MW capacity injection at 220 kV Bhuj pooling station through dedicated transmission lines of RE developers in Khavda.

(ii) 2000 MW at Bhuj-II pooling station (765/400/220 kV): Bhuj-II pooling station with 2x1500 MVA, 765/400 kV, 4X500 MVA, 400/220 kV capacity is currently under implementation. Bhuj-II pooling station has future provisions for another 2x1500 MVA, 765/400 kV and 4x500 MVA, 400/220 kV transformation capacity.

2000 MW capacity injection at 220/440 kV level at Bhuj-II pooling station through dedicated transmission lines of RE developers in Khavda. For LTA beyond 1500 MW at Bhuj-II pooling station, implementation of **1X1500 MVA, 765/400 kV ICT Augmentation at Bhuj-II pooling station under ISTS** to be taken up.

(iii) 2000 MW at Khavda pooling station

a) Establishment of Khavda 765/400, 3x1500MVA, 400/220kV, 4x500MVA\* PS (GIS) with 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor (765/400/220 kV Khavda pooling station to be created with future provisions for pooling total 7.5 GW RE capacity. Two bus sections with bus sectionalizer to be created at 765kV & 400kV level with 4x1500MVA, 765/400kV ICTs in each section. Bus sectionalizer at 765kV level shall normally be closed and bus sectionalizer at 400kV level shall normally be open. Each 400 kV section to have RE capacity of maximum 4000 MW. The RE capacity can be directly connected at 400 kV level or at 220 kV level through 400/220 kV transformer. Two bus sections with bus sectionalizer are to be created at 220 kV level for each 400 kV Bus section with maximum RE capacity of 2000 MW in each 220 kV section. 220 kV bus sectionalizers to be normally kept open).

\* (400/220kV, 4x500MVA substation to be taken up after the grant of connectivity/LTA at 220kV level. Not required if connectivity is granted at 400 kV level)

b) Khavda PS(GIS) – Bhuj PS 765 kV D/c line

c) 220 kV line bays for interconnection of solar projects (7 nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.

**Phase-II, 5.5 GW RE injection at Khavda**

i) Augmentation of Khavda PS(GIS) by 5x1500MVA, 765/400kV ICTs and 12X500 MVA, 400/220 kV ICTs ( 400/220 kV ICTs augmentation to be taken up as per

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the LTA/connectivity granted at 220 kV level). Provision of 1X125 MVAR 400 kV & 1x330MVAR 765kV bus reactor on second bus.

- ii) Khavda PS (GIS) – Lakadia PS 765kV D/c line with 330 MVAR line reactors at Khavda end
- iii) Lakadia PS – Ahmedabad 765kV D/c line with 240 MVAR line reactors on both ends
- iv) Establishment of Ahmedabad 765/400kV,2X1500 MVA S/s (towards eastern side of Ahmedabad) along with associated 400kV interconnections (LILO of Pirana (PG) – Pirana (T) 400kV D/c line at Ahmedabad S/s with twin HTLS along with reconductoring of Pirana (PG) – Pirana(T) line with twin HTLS conductor)
- v) Ahmedabad – Indore 765kV D/c line with 330 MVAR line reactors on both ends
- vi) Ahmedabad – Vadodara 765kV D/c line
- vii) 220 kV line bays for interconnection of solar projects (**18** nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- viii) Spare reactors and transformers

1.6. Members may kindly confirm the minutes of the 1<sup>st</sup> meeting of WRPCTP held on 11.01.2020 were issued vide CEA letter No.CEA-PS-11-23(19)/1/2019-PSPA-I Division/I/9489/2020 dated 12.03.2020 with modifications at item 1.5.

## **2. Modification of the Transmission Scheme for evacuation of 10 GW RE power from potential RE zones in Khavda region by National Committee on Transmission.**

2.1. In the 3<sup>rd</sup> meeting of NCT held on 26th and 28th May, 2020 the following transmission elements of the Khavda scheme were reviewed:

- i) *2000 MW capacity injection at 220/440 kV level at Bhuj-II pooling station through dedicated transmission lines of RE developers in Khavda. For LTA beyond 1500 MW at Bhuj-II pooling station, implementation of 1X1500, 765/400 kV ICT Augmentation at Bhuj-II pooling station under ISTS to be taken up.*

Director SECI, special invitee to the meeting, made the submission that 2 GW RE capacity injection at Bhuj-II PS through dedicated transmission lines of RE developers in Khavda approved by WRPC (TP) under Phase-I of the scheme is not feasible from developers point of view. The distance between Khavda and Bhuj-II is appx. 90 km. Already, owing to geographical conditions of Khavda, the tariff of the RE developers would be on higher side and none of the developers would be interested in implementing the dedicated transmission line from Khavda as it would result in further increase in their generation tariff. Accordingly, had requested to review the proposed arrangement for evacuation of 2 GW out of 4.5 GW RE potential of Khavda planned

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under Phase-I. The alternative could be establishment of a second 400/220 kV pooling station at Khavda along with 400 kV D/c line upto Bhuj-II P.S.

NCT decided that the planned system for evacuation of 2000 MW capacity of Khavda area from Bhuj-II P.S through dedicated transmission line by developers may be dropped.

ii) 16X500 MVA 400/220 kV transformation capacity planned by WRPC(TP) at Khavda pooling station:

CTU stated they have received Stage-I and Stage-II connectivity application of Adani for 2500 MW and 500 MW respectively at Khavda P.S. Stage-II connectivity for 500 MW has been granted at 400 kV voltage level. CTU further stated that 330 MVAR , 765 kV bus reactor on second 765 kV bus has been missed out in the final scheme and it needs to be included. The 125 MVAR, 400 kV bus reactor on second 400 kV bus has already been included in the scheme.

CEA stated that in WRPC (TP) meeting, it was agreed that implementation of 400/220 kV transformers at Khavda P.S. to be taken up only after the grant of connectivity/LTA at 220kV level. They would not be required if connectivity is granted at 400 kV level. Accordingly, if SECI confirms that developers would be seeking connectivity at 400 kV level, the 400/220 kV transformation capacity at Khavda P.S. can be dropped or their capacity/numbers can be reduced.

SECI confirmed that if the injection is being planned at 400 kV level, the clause of seeking connectivity at 400 kV level would be incorporated in the tender for Khavda area.

After detailed deliberations, the committee agreed for provision 4X500 MVA, 400/220 kV transformation capacity at Khavda pooling station instead of 16X500 MVA 400/220 kV transformation capacity planned by WRPC(TP). With this configuration at Khavda pooling station, 2 GW RE could be injected at 220 kV level and balance 5.5 GW RE injection would be at 400 kV level.

2.2. Accordingly, NCT in its 3<sup>rd</sup> meeting has approved the following phase-wise Transmission Scheme for evacuation of 8 GW RE power from potential RE zones in Khavda region :

- A. 500 MW injection at Bhuj pooling station through dedicated transmission lines of RE developers in Khavda region.
- B. Establishment of Khavda pooling station and associated transmission lines for evacuation of 7.5 GW in two phases

Phase-I, 3.0 GW RE injection at Khavda pooling station



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- (i) Establishment of Khavda 765/400, 3x1500MVA, 400/220kV, 2x500MVA PS (GIS) with 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor (765/400/220 kV Khavda pooling station to be created with future space provisions for pooling total 4.5 GW RE capacity under phase-II. Provision for two bus sections with bus sectionalizer to be created at 765kV & 400kV level with 4x1500MVA, 765/400kV ICTs in each section. Bus sectionalizer at 765kV level shall normally be closed and bus sectionalizer at 400kV level shall normally be open. Each 400 kV section to have RE capacity of maximum 4000 MW. Under Phase-I only one bus section at 765 kV and 400 kV is to be implemented.)
- (ii) Khavda PS(GIS) – Bhuj PS 765 kV D/c line
- (iii) 220 kV line bays (4 nos.) for interconnection of solar projects, implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- (iv) Spare reactors and transformers
  - 1x500MVA, 765/400kV (single phase) Spare transformer at Khavda PS
  - 110MVAR, 765kV switchable single phase reactor (spare unit for bus/line reactor) at Khavda PS

Phase-II, 4.5 GW RE injection at Khavda

- (i) Augmentation of Khavda PS(GIS) by 4x1500MVA, 765/400kV ICTs and 2X500 MVA, 400/220 kV ICTs ( 400/220 kV ICTs augmentation to be taken up as per the LTA/connectivity granted at 220 kV level). Provision of 1X330 MVAR 765 kV bus reactor and 1X125 MVAR 400 kV bus reactor on second 765 kV and 400 kV bus respectively.
- (ii) Khavda PS (GIS) – Lakadia PS 765kV D/c line with 330 MVAR switchable line reactors at Khavda end
- (iii) Lakadia PS – Ahmedabad 765kV D/c line with 240 MVAR switchable line reactors on both ends
- (iv) Establishment of Ahmedabad 765/400kV, 2X1500 MVA S/s with provision of 1X125 MVAR 400 kV & 1x330MVAR 765kV bus reactor (towards eastern side of Ahmedabad) along with associated 400kV interconnections (LILO of Pirana (PG) – Pirana (T) 400kV D/c line at Ahmedabad S/s with twin HTLS along with reconductoring of Pirana (PG) – Pirana(T) line with twin HTLS conductor with minimum capacity of 2100 MVA per circuit at nominal voltage)

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- (v) Ahmedabad – Indore 765kV D/c line with 330 MVAR switchable line reactors on both ends
- (vi) Ahmedabad – Vadodara 765kV D/c line
- (vii) 220 kV line bays (4 nos.) for interconnection of solar projects, implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level.
- (viii) Spare reactors and transformers
  - 1x500MVA, 765/400kV (single phase) Spare transformer at Ahmedabad S/s
  - 80MVA 765kV single phase switchable line reactors (spare units) each at Lakadia & Ahmedabad S/s
  - 110MVA 765kV single phase switchable reactor (spare unit for bus/line reactor) at Ahmedabad S/s
  - 110MVA 765kV single phase switchable line reactor (spare unit) at Indore S/s

2.3. Members may kindly note the same.

### 3. Evacuation system for Singrauli STPP Stage III (2x800 MW) of M/s NTPC

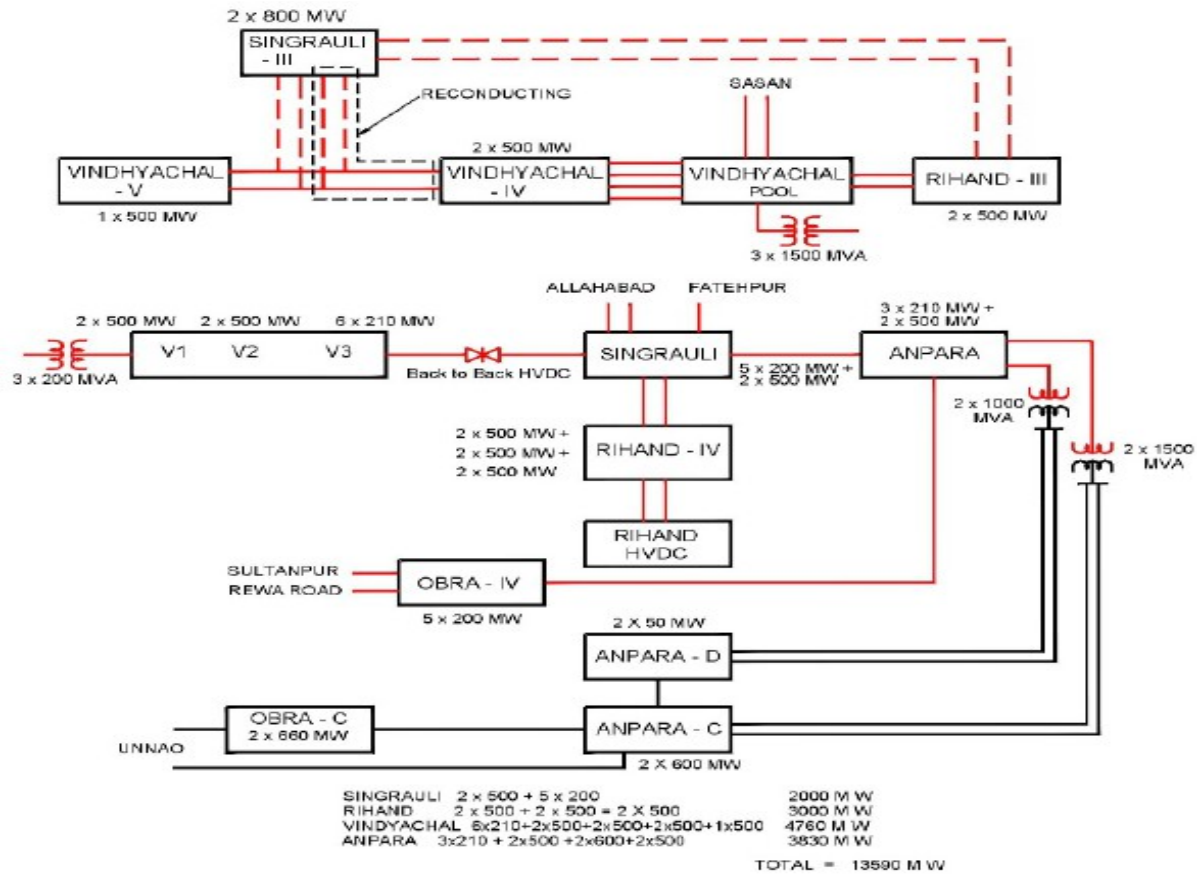
- 3.1. NTPC is implementing Singrauli STPP Stage III generation within the existing Singrauli TPS complex in UP and NTPC has commitment for purchase of 85% of power from UP. To discuss the evacuation system for Singrauli STPP-III (2x660 MW), a meeting was held in CEA on 07.05.2018, wherein, keeping in 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.
- 3.2. To examine availability of space at Vindhyachal St-V, Rihand St-III, Vindhyachal 765/400kV pooling station and feasibility of 400 kV 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.
- 3.3. The 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

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capacity of Singrauli STPP Stage III has been revised to 2x800 MW from 2x660 MW and it was decided to conduct the joint studies involving CEA, CTU and POSOCO for the increased capacity of Singrauli STPP-III generation from 2x660 MW to 2x800 MW.

- 3.4. Accordingly, a meeting was held in CEA on 04.10.2019, wherein, following was discussed and agreed:
- (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.
- 3.5. Subsequently, in the 1<sup>st</sup> NRPC(TP) meeting held on 24.01.2020, the following transmission system was agreed for evacuation of power from Singrauli STPP Stage 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. Re-conductoring 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 Stage-III – Rihand-III 400kV D/c line - under ISTS scope
  - iv. 2x125 MVAR Bus Reactor at Singrauli Stage-III generation switchyard - under scope of NTPC.

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3.6. Members may deliberate and concur the same.

#### 4. Phasing of Rajgarh Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh:

4.1. The transmission scheme “Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh” was discussed in 2<sup>nd</sup> meeting of WRSCT held on 21.05.2019 and was recommended for implementation through TBCB in the 4<sup>th</sup> meeting of NCT held on 31.07.2019. M/s RECTPCL has been appointed as BPC for the scheme by MoP vide Gazette notification dated 24.01.2020. The transmission scheme is currently under bidding. The scope of works of the aforesaid scheme, broadly comprises of the following elements:

- i. Establishment of 400/220 kV, 5X500 MVA at Rajgarh SEZ
- ii. Rajgarh SEZ PP – Bhopal (Sterlite) 400 kV D/c line
- iii. Rajgarh SEZ PP – Shujalpur 400 kV D/c line

4.2. Subsequently, two meetings were held on 28.02.2020 and 30.03.2020 with participation from CEA, CTU, MNRE, SECI, MPNRED, MPPTCL and MPUVND to discuss the request of MPNRED regarding change of location of Rajgarh ISTS pooling station to Agar/Shajapur area. MPNRED informed that at the identified location at Rajgarh, there are

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issues of land availability. As such, setting up of pooling station in Rajgarh district would not be of much use. Also, they intimated that 550 MW Solar Park in Agar and 450 MW Solar Park in Shajapur districts are being developed under Ultra Mega Renewable Energy Power Projects (UMREPP) scheme of MNRE and the RfP for setting up of these solar projects had already been floated in January, 2020. Accordingly, MPNRED proposed to shift the location of Rajgarh ISTS Pooling station to village Pachora, tehsil Agar, district Agar (coordinates 23.7177N 76.12333E) where land is available for the pooling station. In view of above, it was decided location of Rajgarh P.S. would be shifted to Pachora, Agar and the transmission system for evacuation of power from RE projects in Agar/Shajapur/Rajgarh (2.5 GW) SEZ in Madhya Pradesh would be implemented in two Phases i.e. under Phase-I (timeframe July, 2022) the transmission system for evacuation of 1 GW from Agar/Shajapur district. Under Phase-II (timeframe December 2022) the Transmission system for evacuation of the balance 1.5 GW RE power from Rajgarh area. It was also decided that the transmission elements required under each phase should be matched with the timeframe of each phase of generation development.

- 4.3. Accordingly, in a meeting held with CTU on 01.05.2020, the following transmission elements required under Ph-I (1000 MW) and Ph-II (1500 MW) were agreed:

**Transmission system for evacuation of power from RE projects in Rajgarh (1000 MW) SEZ in Madhya Pradesh : Phase-I**

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1	Establishment of 400/220 kV, 2X500 MVA at Pachora SEZ PP with 420kV (125 MVAR) bus reactor  <u>Future provisions:</u> Space for 400/220kV ICTs along with bays: 6 400kV line bays: 8 nos. 220kV line bays: 11 nos 420kV bus reactor along with bays: 1 no  220kV Bus sectionalizer bay: 2 nos. (One no. bay for each Main Bus)	400/220 kV, 500 MVA ICT – 2  400 kV ICT bays – 2 220 kV ICT bays – 2 400 kV line bays – 2 220 kV line bays – 4 (for Agar & Shajapur solar park interconnection) 125 MVAR, 420 kV reactor 420 kV reactor bay – 1
2	Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line (Quad/HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) along with 80MVAR switchable line reactors on each circuit at Pachora end	Length – 160  Switchable line Reactors (at Pachora end) – 420kV, 2x80MVAR  Line reactor bays (at Pachora) – 2 nos.
3	2 no. of 400 kV line bays at Bhopal (Sterlite) for Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line (Quad/HTLS) (with minimum	400 kV line bays – 2

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	capacity of 2100 MVA/ckt at nominal voltage)	
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Note: (i) M/s BDTCL ( Bhopal Dhule Transmission Company Limited) to provide space for 2 no. of 400 kV line bays at Bhopal (Sterlite) for termination of Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line.

(ii) Space for future provisions for 400 kV line bays to be kept including the space for switchable line reactors.

**The completion schedule for the scheme is July' 2022** (the completion schedule to be reviewed before submission of RfP bids considering visibility of RE generators and sufficient implementation time for the TSP)

### **Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh: Phase- II**

Transmission elements required to cater to evacuation requirement of 1500 MW RE from Rajgarh REZ under Phase-II, which would be required in the implementation timeframe of December' 2022 would comprise of the following:

- 1) Augmentation of Pachora S/s by 3X500 MVA, 400/220 kV ICTs
- 2) Pachora-Shujalpur (PG) 400 kV D/c line or any other better alternative in view of re-distribution of RE potential zones by MPNRED\*

*\*Requires augmentation of Shujalpur (PG) by 1x500MVA, 400/220kV ICTs and reconductoring of Shujalpur(PG)-Shujalpur(MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage)*

- 4.4. The above phasing of Rajgarh scheme and shifting of the location of Rajgarh pooling station in Agar district (at Pachora) has been noted by NCT in their 3rd meeting held on 26.05.2020 & 28.05.2020. It was also intimated to the NCT that in case of any change in the scheme under Phase-II, the same would be discussed and formalized in the upcoming meeting of Western Region Power Committee (Transmission Planning).
- 4.5. With shifting of location of the pooling station from Rajgarh to Pachora, the length of line upto Bhopal (Sterlite) would decrease from 160km to 130km. Studies carried out with updation of downstream Intra-state network of MPPTCL shows that the Pachora PS – Shujalpur 400kV D/c line leads to overloading of 2x315MVA, 400/220kV ICT at Shujalpur (N-1 condition) as well as the overloading on Shujalpur(PG) - Shujalpur(MPPTCL) 220kV D/c line ( N-1 condition). This would require augmentation of 400/220 kV ICT at shujalpur and reconductoring of the existing line (Shujalpur (PG) – Shujalpur (MPPTCL) 220 kV line) with high capacity conductor/ or additional 220 kV line.

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- 4.6. A joint study meeting was held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO in which various alternatives were studied and the following alternatives were proposed as under Phase-II :

**Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh: Phase-II**

- i) 500 MW injection at Pachora pooling station
  - 400/220 kV, 1x500MVA ICT augmentation at Pahora PS along with associated ICT bays and 220kV line bays (2 nos.)
- ii) 1000 MW injection at Pachora PS (for injection beyond 1500 MW).

Alternative I

- 400/220 kV, 2x500MVA ICT augmentation at Pahora PS along with associated ICT bays and 220kV line bays (4 nos.)
- Augmentation of Pachora PS by 2x500MVA, 400/220kV ICTs
- Pachora PS – Ujjain (MP) 400kV D/c (Quad) line ~ 80 km

Note: Ujjain (MP) – Indore (PG) 400kV D/c line is already under implementation. This scheme enables interconnection of Pachora PS to Intra-State GEC corridor of MPPTCL. Further, as informed by MPNRED, major beneficiary of Agar & Shajapur Solar Parks would be MP DISCOMs and hence in this case, MP may directly draw power from Ujjain (MP) 400/220 kV S/s.

Alternative II

- 400/220 kV, 2x500MVA ICT augmentation at Pahora PS along with associated ICT bays and 220kV line bays (4 nos.) - under ISTS
- LILO of Nagda – Shujalpur 400kV D/c line at Pachora PS ~ 35km [so as to form Pachora – Nagda (~119km.) & Pachora – Shujalpur (~104km.) line sections.] - under ISTS
- Augmentation of Shujalpur(PG) by 1x500MVA, 400/220kV ICTs - under ISTS
- Reconductoring of Shujalpur (PG)-Shujalpur (MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage) or 2<sup>nd</sup> 220 kV D/C line. (Under Intrastate by MPPTCL)

Alternative III

- 400/220 kV, 2x500MVA ICT augmentation at Pahora PS along with associated ICT bays and 220kV line bays (4 nos.) - under ISTS

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- Pachora – Shujalpur 400kV D/c line#
- Augmentation of Shujalpur(PG) by 1x500MVA, 400/220kV ICTs - under ISTS
- Reconductoring of Shujalpur (PG)-Shujalpur (MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage) or 2<sup>nd</sup> 220 kV D/C line. (Under Intrastate by MPPTCL)

Time-frame (Phase-II): Dec-22 as indicated by MPNRED / SECI to match with RE generation projects in Rajgarh / Agar area. To be taken up after grant of Stage-II connectivity / LTA to RE generation developers.

- 4.7. Members may ratify the scope of works under Phase-I of the scheme and concur the scope of works to be taken up under Ph-II (Alternative III). This will be inline with the original scheme which has been phased out for implementation into two phases.

**5. Evacuation system from the RE potential areas in Madhya Pradesh after the Re-assessment of RE potential by MNRE:**

- 5.1. The RE potential of 5 GW (SEZ) in Madhya Pradesh was included in the total 66.5 GW RE potential for which evacuation system has already been finalised. For evacuation of power from solar energy zones in MP (5 GW), the following schemes have already been discussed and approved by 2<sup>nd</sup> Western Region Standing Committee on Transmission held on 21.05.2019:

1. Transmission system for evacuation of power from RE projects in Rajgarh (2500MW) SEZ in Madhya Pradesh.
2. Transmission system for evacuation of power from RE projects in Khandwa (2500 MW) SEZ in Madhya Pradesh.

- 5.2. MNRE vide letter dated 15.04.2020 (attached as Annexure-II) has granted approval for revised RE potential zones totaling **6850MW** in the state of Madhya Pradesh as under and has requested CEA to plan the ISTS network in consultation with the Govt. of MP in the allotted/earmarked land.:

- i) Agar-Shajapur region - new Rajgarh substation: 1000 MW
- ii) Further potential identified by SECI in the region surrounding the new Rajgarh substation: 1500 MW
- iii) Chhatarpur (Bijawar and NTPC-Barethi): 1500 MW
- iv) Neemuch: 1000 MW (500 MW RfP already issued by MP in Singoli tehsil)
- v) Khandwa (floating solar power project and others): 600 MW
- vi) Morena: 1250 MW - land identified in Jhiniya village



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- 5.3. Accordingly, a joint study meeting was held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO to plan the transmission system for evacuation of power from RE potential areas in Madhya Pradesh for 6.85 GW and **Review of Transmission System for REZ in Gujarat**. The following Study considerations were taken in the meeting:

**Study considerations:**

- i) **Time-frame:** Studies are carried out for the 2021-22 time frame
- ii) **Demand:** All India demand is considered as per the 19<sup>th</sup> EPS of CEA (2021-22). Based on the discussions & past trends, for solar maximized scenario, demand has been considered as about 90% of the peak demand of 19<sup>th</sup> EPS for various regions except for Northern region where it is considered as about 95% of the peak demand. In view of the above, demand of 65 GW has been considered in Western Region.
- iii) **Study considerations:**
  - In the studies, all India transmission network up to 220 kV level has been simulated. This includes, existing and well as under construction transmission network including high capacity transmission corridors and Green Energy Corridors.
  - The transmission planning criteria was generally followed for transmission design considerations.
  - Considering envisaged RE (wind & solar) capacity addition and to achieve Load-generation balance, Thermal generation dispatch is reduced upto technical minimum of various generations, wherever required. At some of the locations, thermal generations are even needed to be switched off.
- iv) **RE Dispatch Scenario:** During the 2<sup>nd</sup> WRSCT, studies were discussed with following scenarios: 70% Wind and 80% Solar has been considered on All India basis except in Rajasthan where wind dispatch is considered as 30%.

Further, during the joint study meetings after 2<sup>nd</sup> WRSCT meeting, the following dispatch scenario was considered based on feedback from respective state utilities:

<b>Gujarat</b>		<b>Maharashtra</b>		<b>Madhya Pradesh</b>	
• 90% dispatch	Solar	• 80% dispatch	Solar	• 80% Solar dispatch	
• 75% dispatch	Wind	• 75% dispatch	Wind	• 70% Wind dispatch	

For MP ISTS connected SEZ 90% solar dispatch is considered for simulating worst case scenario

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5.4. **Transmission system for evacuation of power from Agar & Shajapur (1000 MW) and Rajgarh SEZ (1500 MW).** It includes 1000 MW solar parks in Agar (550 MW) and Shajapur (450 MW) region and balance 1500 MW potential identified by SECI in the region surrounding the new Rajgarh substation. For evacuation, pooling station at Pachora in Agar district has been proposed and the transmission scheme has been proposed to be implemented in two phases and same is detailed at Agenda item no. 5.

5.5. **Transmission system for evacuation of power from Khandwa SEZ (600 MW):** Initially SEZ potential of 2500 MW was indicated which now has been reduced to 600 MW (floating solar and others) by MNRE. The following scheme which originally planned for 2500MW REZ in Khandwa area is currently deferred due to land issues in Khandwa area as decided in meeting held at MOP on 09.12.2019:

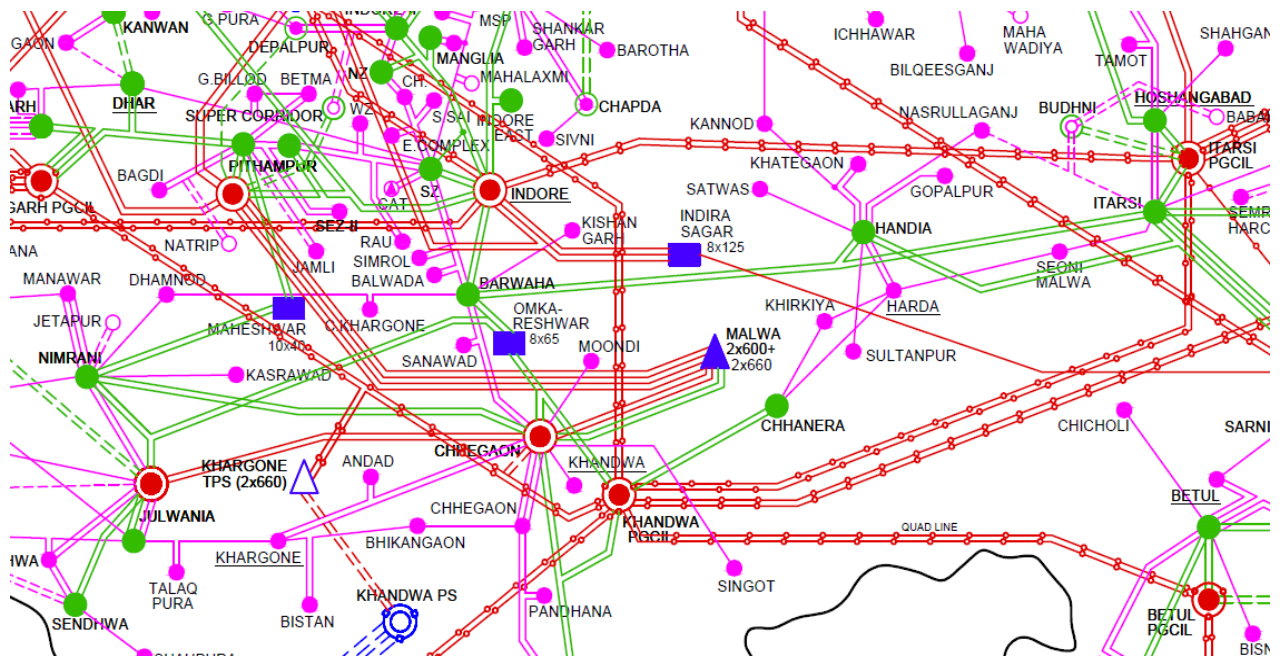
- Establishment of 400/220 kV, 5X500 MVA at Khandwa SEZ PP
- Khandwa SEZ PP - Khandwa Pool 2xD/c (Twin HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage) line~ 50 km
- Augmentation of 1X1500 MVA, 765/400kV ICT at Khandwa Pool (Sterlite)
- 220 kV line bays for RE Interconnection – 9 nos.

5.5.1. As per revisions proposed to Report of Committee on Evaluation of Solar Zones in the state of Madhya Pradesh by GoMP, Khandwa has two major dams, namely, Indira Sagar and Omkareshwar Sagar and there is a lot of possibility of setting up of floating solar projects. Presently, a 500 MW and a 100 MW project in Khandwa is under examination by RUMSL and Narmada Hydroelectric Development Corporation (NHDC) respectively. Floating solar projects at Omkareshwar reservoir are being planned in 1<sup>st</sup> Phase.

5.5.2. In the meeting held on 10.08.2020, it was agreed that the power from the proposed floating solar projects at Indira Sagar and Omkareshwar Sagar could be evacuated through the existing evacuation system of Omkareshwar and Indira Sagar HEP transmission system. For this matter needs to be further deliberated with M/s RUMS and NHDC.

RUMS / MPNRED may intimate the status of projects in the area.

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5.6. **Transmission system for evacuation of power from Chhatrapur SEZ (1500 MW):** This includes setting up of two solar parks, namely, 550 MW at Barethi by M/s NTPC and 950 MW at Bijawar by M/s RUMS. In the meeting held on 10.08.2020, the following two alternatives were discussed for the evacuation of RE power from Bijawar/Chhatrapur area:

#### Alternative-I

- Establishment of 3x500MVA, 400/220kV Pooling Station at Chhatrapur
- Chhatrapur PS – Satna 400kV D/c (Quad) line ~ 140 km
- Augmentation of Satna (PG) by 1x500MVA, 400/220kV ICTs
- 1X125 MVAR, 420 kV bus reactor at Chhatrapur PS

(Short Circuit Ratio at Chhatrapur PS is less than 5 in this alternative)

#### Alternative-II

- Establishment of 3x500MVA, 400/220kV Pooling Station at Chhatrapur
- LILO of both circuits of Satna - Bina 400kV (1<sup>st</sup>) D/c line at Chhatrapur PS\*~ 60 km
- 1X125 MVAR, 420 kV bus reactor at Chhatrapur PS

\*There are four 400kV circuits between Satna and Bina, out of which one circuit has been LILOed at Sagar (MPPTCL) substation. Out of the remaining 3 circuits, one double circuit is proposed to be LILOed at Chhatrapur S/s.

CTU stated that as per CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof, Short Circuit Ratio at the interconnection

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point where the generating resource is proposed to be connected shall not be less than 5. However, SC MVA of Chhatarpur PS for Alternative-I is 5370 MVA which is less than desired 7500 MVA to obtain SCR of 5. Power flow studies indicate that line loadings are in order in both the alternatives.

5.6.1. Based on deliberations , the following transmission system is proposed :

- i. Establishment of 3x500MVA, 400/220kV Pooling Station at Chhatarpur
- ii. LILO of Satna - Bina 400kV (1<sup>st</sup>) D/c line at Chhatarpur PS\*~ 60 km
- iii. 1X125 MVAR, 420 kV bus reactor at Chhatarpur PS

*\*There are four 400kV circuits between Satna and Bina, out of which one circuit has been LILOed at Sagar (MPPTCL) substation. Out of the remaining 3 circuits, one double circuit is proposed to be LILOed at Chhatarpur S/s.*

Regarding the location of Chhatarpur Pooling Station , it is observed that establishment of PS at Bijawar is most optimal and cost effective as Bijawar is located between Chhatarpur (NTPC Barethi) and LILO point. Also the solar capacity planned at Bijawar is about 950 MW but at NTPC Barethi is 550 MW.

**5.7. Transmission system for evacuation of power from Neemuch Solar Park (1000 MW):**

In the meeting held on 10.08.2020, the following three alternatives were discussed for the evacuation of RE power from Neemuch Solar Park (Studies were carried out assuming all units under operation at KTPS (operating at their technical minimum capacity)):

**Alternative-I**

- Establishment of 2x500MVA, 400/220kV Pooling Station at Neemuch
- Neemuch PS – Kota 400kV D/c line~ 70 km
- 1X125 MVAR, 420 kV bus reactor at Neemuch PS

**Alternative-II**

- Establishment of 2x500MVA, 400/220kV Pooling Station at Neemuch
- Neemuch PS - Chittorgarh (PG) 400kV D/c line ~130 km
- Augmentation of Chittorgarh (Rajasthan) by 1x500MVA, 400/220kV ICTs
- 1X125 MVAR, 420 kV bus reactor at Neemuch PS

**Alternative-III**

- Establishment of 2x500MVA, 400/220kV Pooling Station at Neemuch
- Neemuch PS – Mandsaur (MP) 400kV D/c line~ 120 km
- 1X125 MVAR, 420 kV bus reactor at Neemuch PS

5.7.1. CTU had informed in the meeting that Stage-II connectivity application for Neemuch Solar Park (500MW) seeking ISTS connectivity from 30.06.2022 has been received from M/s Rewa Ultra Mega Solar Limited as Renewable Power Park Developer and the same was discussed in the 48<sup>th</sup> meeting of WR constituents for Connectivity & LTA

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Applications held on 30.06.2020. CTU suggested Alternative-I is more prudent from techno-economic point of view.

5.7.2. POSOCO had observed that power was getting injected towards KTPS generation and in case of low level of at KTPS, then the 400/220 kV ICTs at Kota would become N-1 non-compliant.

5.7.3. After the deliberations, the following transmission system was proposed in the meeting:

- i) Establishment of 2x500MVA, 400/220kV Pooling Station at Neemuch
- ii) Neemuch PS – Kota 400kV D/c line~ 70 km
- iii) 1X125 MVAR, 420 kV bus reactor at Neemuch PS

The issue of ICT becoming N-1 non-compliant with low generation at KTPS would be studied further. The transmission scheme also needs to be deliberated in NRPC-TP.

#### 5.8. **Transmission system for evacuation of power from Morena Solar Project (1250MW):**

In the meeting held on 10.08.2020, the following three alternatives were discussed for the evacuation of RE power from Neemuch Solar Park:

##### **Alternative-I**

400/220kV Morena S/s already exists in the vicinity of the proposed solar project in Jhiniya village. Hence, the following transmission system is proposed for evacuation of power from the above project:

##### **For 950 MW Injection:**

- Establishment of 2x500MVA, 400/220kV Pooling Station at Morena
- Morena PS – Gwalior (PG) S/s 400kV S/c line (on D/c tower) (conductor with minimum capacity of 2100MVA at nominal voltage) line ~ 55km.

##### **For 300MW Injection:**

- 300 MW can be injected at 220 kV existing Morena 400/220 kV S/s (220kV Connectivity line to be developed by applicant)

##### **Alternative-II**

- Establishment of 3x500MVA, 400/220kV Pooling Station at Morena
- Morena PS - Morena(Adani) S/s (existing) 400kV S/c (on D/c tower) (conductor with minimum capacity of 2100MVA at nominal voltage) line
- Augmentation of Morena S/s by 1x500MVA, 400/220kV ICTs
- Augmentation of 220 kV downstream network at Morena (Morena-Malanpur 220kV S/c section is N-1 non-compliant and needs be opened to control overloading)

##### **Alternative-III**

- Establishment of 3x500MVA, 400/220kV Pooling Station at Morena

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- Morena PS- Orai (PG) 400 kV D/c (Quad equivalent) line ~ 130 km

- 5.8.1. MPPTCL observed that the transmission line distance considered in the above alternatives need to be relooked as location of Jhiniya village is not near Morena 400/220 kV substation.
- 5.8.2. CEA enquired about the 220 kV network in the area near the proposed Morena Solar Project in Jhiniya. MPPTCL informed that there was existing Sabalgarh 220 kV substation which is connected to Shivpuri 220 kV substation through 220 kV D/C line and with Morena 400/220 kV (TBCB) substation through 220 kV D/C line. The existing load in sabalgarh area was about 300 MW.
- 5.8.3. It was suggested that being the MPPTCL is main beneficiary, the power from Morena Solar Project may be evacuated through Intra-state network. The existing 220 kV network may be utilised for evacuation of power from solar park. Prima facie, it was observed that about 600 MW power could be evacuated through the existing 220 kV network of MPPTCL.
- 5.8.4. After deliberations it was proposed that solar park may be implemented in two phases. Initially for evacuation of power from phase –I (600 MW) of the solar park, intra-state network may be used. Based on the actual development of Morena solar park under phase-I, development of evacuation system for balance 650 MW would be taken up in Phase-II.
- 5.8.5. The following is proposed for evacuation of power from Morena Solar Park in Jhiniya in Madhya Pradesh:

**Transmission system for evacuation of power from Morena Solar Project (1250MW)**

**Phase-I (600 MW):**

- LILO of both circuits of Sabalgarh – Shivpuri 220 kV D/c line at proposed Morena Solar Project at Jhiniya village (Under the scope of solar park developer)

**Phase-II (650 MW):**

The evacuation system for remaining 650 MW would be planned in future based on the actual development of Morena Solar Project.

- 5.9. Short Circuit Ratio / SC MVA at the proposed pooling stations in MP for evacuation of RE power are as given below:

Pooling Station	System	Potential	SC MVA	SC Current (A)
Pachora PS 400kV bus	Pachora PS – Bhopal (Sterlite) 400kV D/c (Quad) line	Phase-I (1GW): For & Agar Shajapur	6991.98	10092.0
Pachora PS	Pachora PS – Indore(PG)	2.5 GW	16209.84	23396.9

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Pooling Station	System	Potential	SC MVA	SC Current (A)
400kV bus	400kV D/c (Quad) line	(Phase-I + 1.5 GW)		
	Pachora PS – Ujjain (MP) 400kV D/c (Quad) line		16868.26	24347.2
	Pachora PS – Shujalpur(PG) 400kV D/c line		15177.55	21906.9
	LILO of Nagda – Shujalpur 400kV D/c line at Pachora PS		18282.34	26388.3
Morena 400kV bus	Morena PS – Gwalior (PG) S/s 400kV S/c line	0.95 GW	8338.59	12035.7
Morena 400kV bus	Augmentation of Morena S/s by 1x500MVA, 400/220kV ICTs	1.25 GW	12696.62	18326.0
	2x1600MVA 10 degrees Phase shifting transformers in series with each circuit of Morena – Gwalior(PG) 400kV D/c (Quad) line	1.25 GW	9909.11	14302.6
Morena PS 400kV bus	Morena PS- Orai (PG) 400 kV D/c(Quad) line	1.25 GW	8175.91	11800.9
Chhatarpur PS 400kV bus	Chhatarpur PS – Satna 400kV D/c (Quad) line	1.5 GW	5370.39	7751.5
	LILO of Satna - Bina 400kV (1st) D/c line at Chhatarpur PS		9810.49	14160.2
Neemuch PS 400kV bus	Neemuch PS – Kota 400kV D/c line	Phase-I: 0.5 GW	10222.16	14754.4
	Neemuch PS - Chittorgarh (PG) 400kV D/c line		6899.35	9958.4
	Neemuch PS – Mandasaur(MP) 400kV D/c line		5376.29	7760.0
Neemuch PS 400kV bus	Neemuch PS – Kota 400kV D/c line	1 GW (Phase-I+0.5 GW)	10747.34	15512.4
	Neemuch PS - Chittorgarh (PG) 400kV D/c line		7425.75	10718.1
	Neemuch PS – Mandasaur(MP) 400kV D/c line		5901.26	8517.7

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5.10. Members may deliberate.

**6. High fault level at substations in Gujarat-Vadodara (PGCIL), Dehgam (PGCIL), Ranchhodpura (GETCO) and Asoj (GETCO).**

- 6.1. The Fault level of 400 kV substation in Gujarat , namely, Vadodara(PG), Asoj(GETCO), Dehgam(PG) and Ranchhodpura(GETCO)) observed in the studies for 2021-22 conditions are about 46 kA, 46 kA, 49 kA and 42 kA. Asoj and Vadodara are contributing about 20 kA to each other. At Dehgam S/s, there is more than 20kA contribution from Ranchhodpura (Vadavi) and Pirana/Nicol (Torrent) 400kV lines. Detailed break up of fault current contribution at Vadodara, Asoj & Dehgam substations is enclosed at Annexure-III. Assuming these 400 kV substations have been designed for 40 kA switchgear, fault level observed is beyond design limit.
- 6.2. A joint study meeting among CEA, CTU, POSOCO, MPPTCL & GETCO was held on 10.08.2020. In the meeting, the following solutions were proposed:

**A. To control the fault level of Vadodara(PG) & Asoj(GETCO) S/s:**

- i) Bypassing of Vadodara(PG) – Asoj(GETCO) 400kV D/c line at Asoj S/s and connecting one circuit with Asoj - Kosamba(GETCO) 400kV S/c line and second circuit with Asoj - Sardar Sarovar 400kV S/c line so as to form:
- Vadodara(PG) – Kosamba(GETCO) 400kV S/c line
  - Vadodara(PG) – Sardar Sarovar 400kV S/c line

The above may be done on outskirts of Asoj S/s or if feasible, within the switchyard itself through appropriate switching arrangements depending upon arrangement of lines in Asoj S/s.

On the above proposal GETCO has observed that Asoj – Kosamba (GETCO) 400kV S/c line and Asoj - Sardar Sarovar 400kV S/c line are with twin moose conductor whereas Vadodara(PG) – Asoj(GETCO) 400kV D/c line is with quad conductor. GETCO was requested to further study the proposal and suggest alternative scheme to control the fault level.

**B. To control the fault level of Dehgam(PG) & Ranchhodpura(GETCO) S/s, the following was proposed :**

- i) Bypassing of Ranchhodpura(GETCO) – Dehgam(PG) 400kV D/c line at Dehgam(PG) S/s and connecting it with Dehgam(PG) – Pirana 400kV D/c line (one circuit via Nicol) so as to form Ranchhodpura(GETCO) – Pirana(PG) 400kV D/c line (one circuit via Nicol)

The above proposal could be achieved by swapping the termination of Dehgam – Ranchhodpura 400kV lines I & II at Dehgam S/s with Dehgam – Nagda 400kV line I and Dehgam – Sami 400kV line I. After the above swapping, the bays of Ranchhodpura(GETCO) 400kV D/c line and Pirana 400kV D/c line shall fall in the same diameter and hence, the bypassing shall be from within the substation switchyard so that the individual lines (i.e. Ranchhodpura(GETCO) – Dehgam(PG) 400kV D/c line &



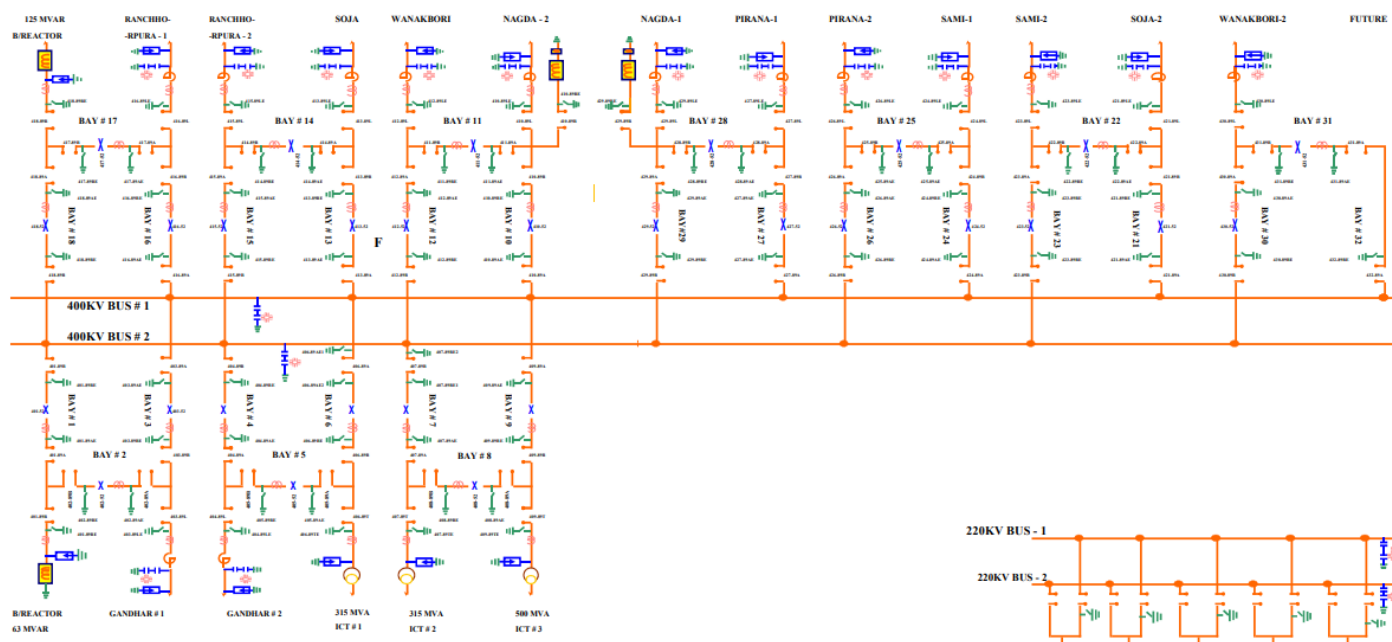
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Dehgam(PG) – Pirana 400kV D/c line) can also be brought back into service based on requirement of grid operation. After this modification the fault level at Fault level at Dehgam(PG) & Ranchhodpura(GETCO) would become as 33 kA & 39 kA respectively.

The above arrangement reduces the the fault level at Dehgam and Ranchhodpura 400 kV ss from 49 kA and 42 kA to 33 kA and 39 kA respectively. Also with bypassing the Ranchhodpura(GETCO) – Dehgam(PG) 400kV D/c line at Dehgam(PG) S/s , the high loading on Ranchhodpura – Dehgam 400kV D/c line (in high RE scenarios) is resolved and the loading on the reconfigured Ranchhodpura – Pirana 400kV D/c line is observed to be well within limits.

The SLD of Dehgam substation is given below.

SINGLE LINE DIAGRAM OF 400 / 220 KV SUB-STATION, DEHGAM



6.3. POWERGRID and GETCO to confirm the fault current ratings and conductor configuration along with design parameters of the substation and lines involved in the above proposal.

6.4. Members may deliberate.

## 7. Transmission system strengthening associated with Review of Transmission System for REZ in Gujarat

7.1. Govt. of India had set a target for establishing 175 GW renewable capacity by 2022, which includes 100 GW Solar, 60 GW Wind generation capacity. MNRE vide its order dated 08.06.2018 had constituted a Sub-Committee to identify ISTS connectivity for renewable energy projects from potential solar energy zones (SEZs) and potential wind energy zones (WEZs) of about 50 GW and 16.5 GW respectively. Out of 66.5 GW (28 GW in WR) potential RE zones, 16 GW potential RE zones have been identified in

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Gujarat. Out of 16 GW potential RE zones, transmission system for evacuation of 5.5 GW RE potential under Phase-I and transmission system for evacuation 10.5 GW RE potential under Phase-II were planned. CERC has already granted the regulatory approval the above schemes vide their order dated 10th October, 2019 in the petition No. 197/MP/2019.

Subsequently, Govt. of Gujarat has proposed for allocation of land to RE projects beyond SECI IV wind ISTS bids in Khavda area only. Therefore, the transmission system planned for evacuation of power from 10.5 GW REZ under Phase-II was reviewed. In the 1<sup>st</sup> meeting of Western Region Power Committee on Transmission Planning (WRPCTP) held on 11.01.2020, the transmission schemes for Khavda REZ (10GW) were discussed and agreed. In the meeting, it was also deliberated that overloading of intra-state elements in Gujarat due to RE capacity addition under ISTS would be taken care in future in form of system strengthening schemes.

Accordingly, agenda for the following issues has been proposed:

- i) Transmission system for evacuation of 2 GW RE potential from Khavda ( which was dropped by NCT in its 3<sup>rd</sup> meeting)
- ii) System Strengthening in Gujarat associated with integration of RE projects from Khavda potential energy zone.
- iii) Transmission system for balance 0.5GW RE wind potential at Dwarka/Jam Khambhaliya complex (1.5 GW out total 2 GW already planned).

## **7.2. Transmission system for evacuation of 2 GW RE potential from Khavda (which was dropped by NCT in its 3<sup>rd</sup> meeting)**

7.2.1. In the 1<sup>st</sup> WRSCT meeting direct injection by RE developers through their dedicated lines at Bhuj-II pooling station was agreed. However, in the 3<sup>rd</sup> NCT meeting it was observed by SECI that the distance between Khavda and Bhuj-II is appx. 90 km. Already, owing to geographical conditions of Khavda, the tariff of the RE developers would be on higher side and none of the developers would be interested in implementing the dedicated transmission line from Khavda as it would result in further increase in their generation tariff. Accordingly, had requested to review the proposed arrangement for evacuation of 2 GW out of 4.5 GW RE potential of Khavda planned under Phase-I. The alternative could be establishment of a second 400/220 kV pooling station at Khavda along with 400 kV D/c line upto Bhuj-II P.S.

7.2.2. The integration of 2 GW would be studied in a comprehensive way along with the scheme for evacuation of additional power from Khavda region.

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- 7.3. **System Strengthening in Gujarat associated with integration of RE projects from Khavda potential energy zone.**
- 7.3.1. High loadings are observed with 16 GW RE integration in Gujarat on several other Intra-state and ISTS transmission lines in Gujarat, which cater to onward dispersal of power from Western / Central Gujarat to Southern / Eastern Gujarat. Therefore, additional transmission system needs to be planned to facilitate flow of power towards load centres in southern Gujarat and Maharashtra as the HCPTC-V system (Raipur - Wardha – Aurangabad – Padghe – Kudus corridor) would no longer supply adequate power to the area under high RE scenario, with the Chhattisgarh IPP generations under reduced dispatch conditions.
- 7.3.2. Two alternatives for dispersal of power beyond Vadodara towards souther Gujarat and Maharastra under high RE conditions is proposed. One is 400 kV corridor and the second is 765 kV corridor.
- i) Vadodara (GIS)(PG) – Kosamba(GETCO) 400kV D/c line (with conductor having minimum capacity of 2100MVA per circuit at nominal voltage)\* ~ 100km.  
*\*2 nos. bays at Vadodara (PG)(GIS) S/s are already constructed as part of Transmission system for evacuation of power from DGEN Power plant (1200MW).*
  - ii) Bypassing of LILO of one circuit of Gandhar – Navsari(PG) 400kV D/c line at Vav S/s and restoring it to original configuration i.e. Gandhar – Navsari(PG) 400kV D/c line
  - iii) Utilisation of the 2 nos. 400kV bays vacated at Vav S/s (above) along with portion of LILO line (as required) for LILO of 2<sup>nd</sup> 400kV circuit of Kosamba(GETCO)– Ukai 400kV line at Vav (GETCO) S/s

(Exhibits at **Annexure-IV**)**Alternative-I:**

- i) **Kosamba(GETCO) – Vapi II (GIS) (Sterlite)** 400kV D/c line (with conductor having minimum capacity of 2100MVA per circuit at nominal voltage) ~ 110km.
- ii) **Vapi II (GIS) (Sterlite) – Kala (PG) 400kV D/c line** (with conductor having minimum capacity of 2100MVA per circuit at nominal voltage) ~ 55km.

In this alternative, a 400kV high capacity corridor (viz Vadodara (PG)(GIS) – Kosamba(GETCO) – Vapi II (GIS) (Sterlite) – Kala 400kV D/c) gets established and power is fed through this corridor directly to load centres in South Gujarat and Maharashtra area. In this case fault level of Vadodara (PG) and Asoj (GETCO) S/s would become 42 kA & 25 kA respectively. Loading on Vadodara – Kosamba 400kV D/c line is 2x987 (1288MW under N-1). No constraints are observed for evacuation of power from Asoj substation (Exhibits at **Annexure-V**).

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However, loading on Vadodara – Jambui 220kV D/c line remains high and is N-1 non-compliant. Suitable strengthening needs to be planned.

### **Alternative-2:**

- i) Establishment of new 2x1500MVA, 765/400kV substation near Vapi (Vapi-III) (GIS)
- ii) Vadodara – Vapi III 765kV D/c line ~ 250km.
- iii) Vapi III – Padghe 765kV D/c line ~ 140km.
- iv) Vapi III – Vapi(PG) 400kV D/c line (with conductor having minimum capacity of 2100MVA per circuit at nominal voltage) ~ 10km.

In this alternative, a 765kV high capacity corridor (viz Vadodara(PG)(GIS) – Vapi III (GIS) – Padghe 765kV D/c) gets established and power is fed through this corridor directly to load centres in South Gujarat and Maharashtra area. Loading on Vadodara – Kosamba 400kV D/c line reduces significantly to 2x568MW (considering scheme at Sl. 2 Alternative 1) as compared with the alternative of constructing a 400kV corridor instead of 765kV corridor. Further, the 400/220kV ICTs at Vadodara also become N-1 compliant. In this case fault level of Vadodara (PG) and Asoj (GETCO) S/s would become 39 kA & 32 kA respectively (Exhibits at **Annexure-VI**).

7.3.3. With the above proposed system, all the overloadings in Gujarat system are also significantly relieved except Kasor – GPEC – Gandhar 400kV S/c line corridor which is getting overloaded primarily due to Intra state RE injection of Dholera (1000MW) and other RE injection which are getting pooled at Fedra (GETCO) S/s and heavy power flow is observed on Fedra (GETCO) – Kasor(GETCO) 400kV D/c (Quad) line. Adequate Intra-state strengthening by Gujarat is required to be taken up. It may be noted that with the 765kV corridor proposed at Alternative-2, loadings on Kasor – GPEC – Gandhar 400kV S/c line corridor are marginally lower (by upto 100MW).

### **7.4. Transmission system for balance 0.5GW RE wind potential at Dwarka/Jam Khambhaliya complex (1.5 GW out total 2 GW already planned).**

7.4.1. While evolving the transmission system for REZ in the vicinity of Jam Khambhaliya (Dwarka) under Phase-I, it was mentioned that the planned system shall be able to cater RE injection to the tune of 1500MW in Dwarka area (under 80% dispatch scenario). During studies, it was observed that although Jam Khambhaliya – Lakadia 400kV D/c (triple) line has sufficient capacity to evacuate 1500MW power. However, on account of the low fault level at Jam Khambhaliya PS (4400MVA at 400kV level (SCR of only ~3 considering full dispatch and ~3.7 considering 80% despatch), voltage at Jam Khambhaliya PS collapses in case of outage of one circuit of Jam Khambhaliya – Lakadia

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400kV D/c (triple) line as injection goes beyond 1200MW and the load flow case does not converge. The angular difference also exceeds 30° in above scenario. Since, 80% peak dispatch from wind projects was assumed in the above exercise, following transmission system was evolved for evacuation of 1500MW generation capacity (considering maximum dispatch of 80% of 1500MW, i.e, 1200 MW) in Dwarka area:

- Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) along with 1x125MVAr, 420kV Bus reactor
- Extension of Essar–Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS with 63MVAr switchable Line Reactor at both ends of Lakadia - Jam Khambhaliya 400kV D/c line
- The existing line reactor (63MVAr) on Bhachau end of EPGL – Bhachau line shall be converted into switchable Line Reactor.

7.4.2. While planning the transmission system under phase-II, full capacity of 2 GW was considered (considering maximum dispatch of 80% of 2000MW, i.e, 1600 MW) which included Jam Khambhaliya PS – Lalpur (Jamnagar) SEZ PP – Rajkot – Ahmedabad 400kV corridor. With review of the Phase-II system, Jam Khambhaliya PS – Lalpur (Jamnagar) SEZ PP – Rajkot – Ahmedabad 400kV corridor has been dropped.

7.4.3. It may be noted that till date, only 50.6MW LTA and 851.4MW Stage-II connectivity has been received at Jam Khambhaliya PS and the applications have stopped coming after GoG decision regarding allocation of revenue land to RE projects beyond SECI IV wind ISTS bids only in Khavda area.

7.4.4. The Jam Khambhaliya pooling station is currently under implementation by Jam Khambhaliya Transmission Ltd. with SCOD of Mar'21.

7.4.5. For RE injection beyond 1200 MW at jam Khambhaliya pooling station, additional system needs to be planned.

7.4.6. Members may deliberate.

#### **8. Connectivity to 325 MW Wind Project of M/s SBESS Services Projectco Pvt Ltd at 220 kV level of existing Indore (PG) S/s:**

8.1. SBESS Services Projectco Two Pvt. Ltd. applied for Stage-I / Stage-II connectivity for its 325MW wind project at Indore (existing) S/s of POWERGRID in the month of Oct'19. The sequence of events/deliberations held in chronological order with respect to grant of connectivity to M/s SBESS Services Projectco Pvt Ltd is tabulated below:

S.no	Meetings held	Decision taken
1.	42nd Western Region constituents meeting regarding Connectivity/LTA Applications held on 26.11.2019	MPPTCL raised objection over injection of 325MW power at 220 kV level of Indore (PG) S/s as it was causing overloading of 220kV lines emanating from Indore S/s and insisted that M/s

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		SBESS must pay the STU transmission charges for use of the Intra State transmission system
2.	Joint meeting amongst CEA, CTU, MPPTCL and SBESS held on 20.12.2019	The Stage-I / Stage-II connectivity was agreed to be granted to SBESS at 220kV level of Indore (PG). It was opined that Applicability of the transmission charges and losses would be governed by applicable CERC/SERC regulations. Ms SBESS was directed to apply for LTA and the same was applied by M/s SBESS on 31.12.2019
3.	1st WRPC (TP) meeting held on 11.01.2020	<ul style="list-style-type: none"> <li>• Various alternatives to relieve overloading of 220kV lines emanating from Indore S/s after considering SBESS 325 MW wind project injection at 220kV level of Indore (PG) S/s were suggested. MPPTCL agreed for Indore-Indore (MP) 220kV 2<sup>nd</sup> D/c line and confirmed regarding availability of 220kV bays at Indore-II (MP) S/s.</li> <li>• MPPTCL stated that any augmentation required at 220kV level for grant of LTA to M/s SBESS would be carried out by MPPTCL and the cost of the same would be borne by the generation developer and applicant shall also have to bear the STU transmission charges for the quantum of power injected into the STU system.</li> <li>• It was decided that the matter regarding connectivity to M/s SBESS shall be deliberated in a separate meeting.</li> </ul>
4.	44 & 45th meetings of WR constituents for Connectivity & LTA Applications held on 28.01.2020 & 28.02.2020	LTA application of SBESS for 324.4MW was discussed, However, owing to MP's reservations, the same could not be granted.

8.2. The matter was once again discussed in a joint meeting amongst CEA, MNRE, MPNRED, MPPTCL,RUMS and SECI on 30.03.2020 wherein after deliberations, following was decided w.r.t. LTA application of SBESS:

- CTU may proceed with grant of connectivity to 325 MW Wind Project of M/s SBESS Services Projectco Pvt Ltd at 220 kV level of existing Indore (PG) S/s.

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- This would require Implementation of Indore-Indore (PG) 2nd 220 kV D/c line for effecting the LTA that may be taken up as ISTS. Alternatively, since overloading of downstream network is involved in this case, the modalities of implementing 400/220 kV transformer and directly connecting the generator to 400 kV bus of Indore (PG) S/stn could be explored.
- Any decision in this regard would require approval of the Western Regional Power Committee on Transmission Planning (WRPCTP)
- MPPTCL's concerns regarding applicability of STU transmission charges and losses on portion of power flowing from the generation project into Madhya Pradesh system is a commercial issue, which need to be addressed at appropriate forum

8.3. Subsequently, MPPTCL vide e-mail dated 18.05.2020 had sent their observations on the minutes of meeting held on 30.03.2020 wherein it was stated that, Central Electricity Authority has been vested with the powers to resolve the dispute related with Generation, Transmission and distribution amongst the stakeholders through different associated committees constituted under CEA and is presumed to be the appropriate forum to take decision on the concerned issue. Therefore, addressing the issue at appropriate forum other than CEA does not appear to be significant. Also in the 47th and 48th meeting of Western Region Constituents regarding Connectivity and LTA applications in Western region convened by CTU on 06.05.2020 and 30.06.2020 respectively, MPPTCL once again raised its concerns regarding applicability of State transmission charges & losses for additional power flowing through STU network if LTA was allowed with injection at 220 kV level.

8.4. In view of above developments, an e- meeting at the Principal Secretary (Energy), MP level was held on 15.07.2020 to discuss Connectivity Issues at 220 kV voltage level with ISTS Sub-stations in MP. The minutes of the meeting is enclosed as Annexure-VII. In the meeting the following Stage-II connectivity/LTA for M/s SBESS Services Projectco Pvt Ltd was decided:

S. No	RE developer	Connectivity point	LTA system
	M/s SBESS Services Projectco Pvt Ltd : Stage-II Connectivity for 324.4 MW already granted at existing 220 kV bus of Indore.  LTA for 324.4 already applied	220 kV level of existing Indore (PG) 765/400/220 kV S/s.  Connectivity system under ISTS scope:  i) 220 kV bus extension of Indore 765/400/220 kV substation.  ii) 220kV Hybrid /MTS line bay	i) 1x500MVA, 400/220kV ICT (3rd) at Indore S/s along with associated ICT bays (400kV AIS & 220kV Hybrid/MTS)with 220kV ICT bay on extended bus. ii) Bus sectionaliser (Hybrid/MTS) between extended and existing 220 kV bus at Indore S/s [so that the 220kV bus section with dedicated line of SBESS as well as 3rd ICT may be segregated from

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			the existing 220kV bus at Indore S/s, whenever required, in order to control the overloading of 220kV outlets from Indore S/s depending on the injection of power from SBESS]
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8.5. Members may concur the same.

## 9. Intra-state proposal received from MPPTCL

The following agendas are received from MPPTCL vide letters dated 21.07.2020, 28.07.2020 and 13.08.2020 (Annexure-VIII)

### 9.1. LILO of both circuit of Itarsi (PGCIL) to Bhopal (MPPTCL) 400kV D/C line (on Twin Moose) at Mandideep 400kV GIS Substation (Distt-Bhopal) to be constructed under TBCB process.

9.1.1. MPPTCL has informed that the demand of Madhya Pradesh has reached 14555MW in FY 2019-20 and expected to grow upto 18000MW approximately by year 2022-23. Accordingly, system studies have been carried out to evolve transmission system requirement for the end of 13<sup>th</sup> Plan period considering load demand of Madhya Pradesh as 18000MW. It is also intimated that at present, MPPTCL is having only one 400kV substation at Bhopal. The 220kV substations Bhopal, Mandideep and Hoshangabad are being fed from Itarsi (PGCIL) 400kV substation as well as Bhopal(MPPTCL) 400kV substation through a 220kV DCDS line. Bhopal 400kV substation is also feeding the load of Beragarh, Vidisha, Mugaliyachhap, Adampur and Shujalpur 220kV substations of MPPTCL. Presently total transformation capacity of Bhopal (MPPTCL) 400kV substation is 4x315MVA i.e. 1260MVA. The maximum load recorded during 2019-20 on Bhopal 400kV substation is 1013MVA (80.40%). As the Bhopal is the Capital City of the Madhya Pradesh State, it is expanding very rapidly and entire supply of Bhopal City is dependent upon only one 400kV substation.

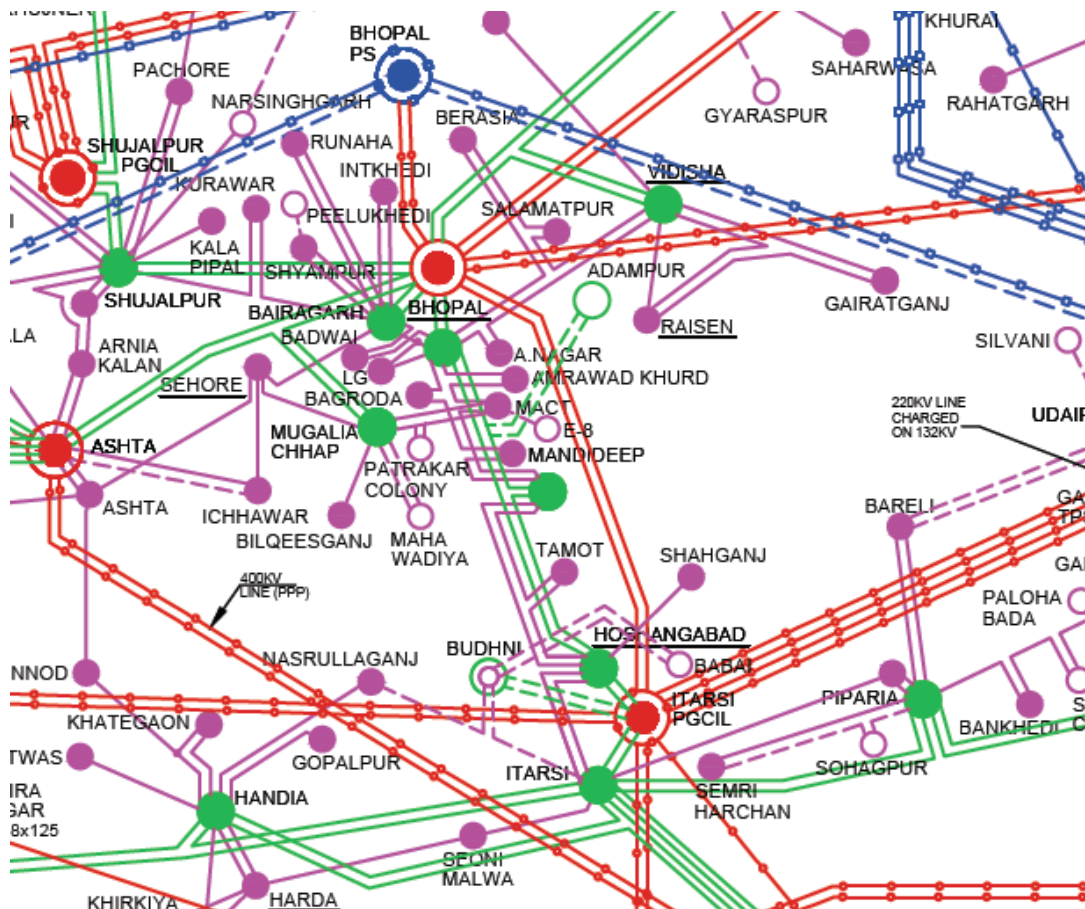
9.1.2. In order to meet the future load growth of the Bhopal City and to cater the load of Mandideep industrial area, it is proposed to create a new 400/220/132/33kV GIS substation at Mandideep under TBCB route with intra-state transmission works as given hereunder:

- (i) Establishment of 400/220/132/33kV GIS substation at Mandideep with (2x500MVA,400/220kV) + (2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers and 1x125MVAR Bus Reactor
- (ii) LILO of both circuit of Itarsi (PGCIL) - Bhopal 400kV line (Twin Moose) at Mandideep 400kV GIS substation (2x10Km)



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- (iii) LILO of both circuits of Hoshangabad - Mandideep - Adampur 220kV line at Mandideep 400kV GIS substation (2x10Km)
- (iv) LILO of Mandideep132 - Bagroda 132kV line at Mandideep 400kV GIS substation (10Km)
- (v) LILO of Mandideep220 - MACT Bhopal 132kV line at Mandideep 400kV GIS substation (10Km)



9.1.3. POWERGRID to intimate regarding provision of any existing line reactors in the Itarsi-Bhopal 400 kV D/C line.

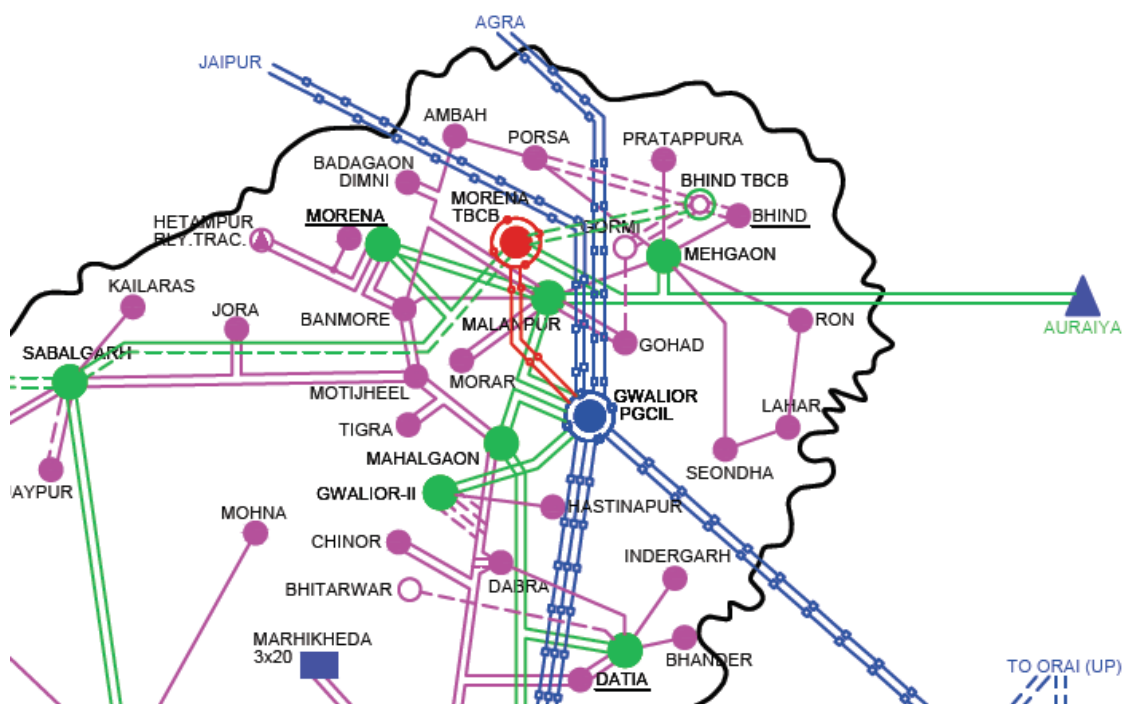
## 9.2. LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation.

9.2.1. MPPTCL has informed that 220/132kV Substation at Bhind (Distt-Bhind) is being created through TBCB process with (2x160)MVA,220/132kV transformation capacity and by laying a 220kV DCDS line from Morena(Adani-TBCB) 400kV S/s to Bhind 220kV S/s. M/s Powergrid-Bhind Guna Transmission Ltd. (PG-BGTL) has been selected as Transmission Service Provider (TSP) for implementation of above intra-state transmission project through TBCB process. M/s Powergrid-Bhind Guna Transmission Ltd. has started the activities and work is targeted to be completed in 36 months from Signing of Share Purchase Agreements(SPA) & Transfer of SPV i.e. from 11.09.2019.

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At present total transformation capacity of Mehgaon 220kV substation is (2x160)MVA (i.e. 320MA) and maximum load recorded during the year 2019-20 is 273MVA (85%). Moreover, due to space constraints, it is not possible to enhance the capacity at this substation. Mehgaon 220kV Substation is fed through 220kV lines connected from Auriya (UP) and Morena (Adani-TBCB) 400kV S/s and maximum load recorded during the year 2019-20 on these lines are 134MW and 231MW respectively. In case of outage of Morena (Adani-TBCB) – Mehgaon 220kV line, the Auriya(UP) – Mehgaon 220kV line gets overloaded and it is difficult to manage the loads feeding from Mehgaon 220kV S/s and reliability of supply in the area also affected.

- 9.2.2. In view of the gradual increase in load of Mehgaon 220kV S/s and overloading on Auriya(UP) – Mehgaon 220kV line during contingency condition, MPPTCL has proposed to LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation. The provision of 2 Nos. 220kV feeder bays for termination of LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation is already considered under the scope of work of TSP i.e. M/s Powergrid-Bhind Guna Transmission Ltd.



- 9.2.3. Morena 400/220 kV substation has been established by M/s Chattishgarh-WR Transmission Limited (M/s CWRTL). Space for four nos. of future 220 kV line bays has been provided in Morena 400/220 kV substation. In addition 1x500 MVA ICT augmentation has also been agreed in the 1<sup>st</sup> WRPC-TP meeting.

- 9.3. **LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation.**

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- 9.3.1. MPPTCL has informed that at present total transformation capacity of Gwalior (Mahalgaon) 220kV substation is (2x160+120) MVA (i.e. 440MA) and maximum load recorded during the year 2019-20 is 304MVA. Gwalior (Mahalgaon) 220kV substation is fed through 220kV lines connected from Bina(MP) 400kV S/s and Gwalior (PGCIL) 765kV S/s. The maximum load recorded on Gwalior(Mahalgaon) to Gwalior(PGCIL) 220kV D/C line in the year 2019-20 is 135MW & 141MW respectively. In case of outage of any one circuit, the other 220kV circuit gets overloaded and it is difficult to manage the feeding from Gwalior(Mahalgaon) 220kV S/s and reliability of supply in the area also affected.
- 9.3.2. Looking to the gradual increase in load of Gwalior (Mahalgaon) 220kV S/s and overloading on Gwalior(Mahalgaon) to Gwalior(PGCIL) 220kV D/C line during contingency condition, MPPTCL has proposed to LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation. PGCIL is requested to consider the provision for construction of 2 Nos. 220kV feeder bays for termination of LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation in the matching timeframe
- 9.3.3. The proposal involves LILO of an inter-state line. The proposal also needs to be deliberated in the WRPC-TP and NRPC-TP.
- 9.4. **Conversion of 400kV fixed line reactors as switchable line reactors installed on 400kV lines of PGCIL.**

MPPTCL has stated that 400kV bays at Bhopal & Nagda 400kV Substations of MPPTCL alongwith fixed line reactors for interconnection of following 400kV lines had been constructed by PGCIL. These 400kV bays are the property of PGCIL and are being maintained by MPPTCL at the cost of PGCIL:

Sl. No.	Name of Line	Length (in Km)	Capacity (MVAR)		Switchable (S) / Fixed (F)	
			End-1	End-2	End-1	End-2
1	400kV bay for Damoh(PGCIL) to Bhopal(MPPTCL) 400kV D/C line (Ckt-1)	214	-	1x50	-	F
2	400kV bay for Damoh(PGCIL) to Bhopal(MPPTCL) 400kV D/C line (Ckt-2)	214	-	1x50	-	F
3	400kV bay for Nagda(MPPTCL) to Dehgam(Gujrat) 400kV D/C line (Ckt-1)	331	1x50	1x50	F	F
4	400kV bay for Nagda(MPPTCL) to Dehgam(Gujrat) 400kV D/C line (Ckt-2)	331	1x50	1x50	F	F

Looking to the reliability of the system, PGCIL is requested to convert the fixed line reactors into switchable line reactors installed on above 400kV lines. It is to inform that space for providing isolator and circuit breakers is available at Bhopal (MPPTCL) & Nagda (MPPTCL) 400kV Substations.

- 9.5. **Proposed intra-state 220 kV Substations alongwith associated transmission line in Madhya Pradesh through TBCB process:**

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The following 220 kV S/s alongwith associated transmission lines are proposed by MPPTCL to be implemented through TBCB process:

Sl. No.	Name of Intra-State Transmission Work in MP through TBCB Process	Route Length (Km) / Capacity (MVA)
<b>1</b>	<b>220/132/33kV substation at Ajaygarh (District-Panna)</b>	
i	Construction of 220/132/33kV substation Ajaygarh	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satna-Chhatarpur 220kV line at Ajaygarh	2x10 Km
iii	Ajaygarh -Panna 132kV DCDS line	30 Km
iv	Ajaygarh -Luvkushnagar (Laundi) 132kV DCSS line	45 Km
<b>2</b>	<b>220/132/33kV substation at Begamganj (District-Raisen)</b>	
i	Construction of 220/132/33kV substation Begamganj	2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	Sagar - Begamganj 220kV DCDS line	70 Km
iii	Begamganj -Rahatgarh 132kV DCSS line	30 Km
iv	Begamganj -Silwani 132kV DCSS line	36 Km
v	Begamganj -Gyaraspur 132kV DCSS line	46 Km
vi	Begamganj -Gairatganj 132kV DCDS line	32 Km
<b>3</b>	<b>220/132/33kV substation at Bisonikala (District-Hoshangabad)</b>	
i	Construction of 220/132/33kV substation Bisonikala	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satpura-Itarsi-Handiya 220kV line at Bisonikala	2x5 Km
iii	LILO of Seoni Malwa-Harda 132kV S/c line at Bisonikala	5 Km
<b>4</b>	<b>220/132kV Substation at Bargawan (District-Singrauli)</b>	

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Sl. No.	Name of Intra-State Transmission Work in MP through TBCB Process	Route Length (Km) / Capacity (MVA)
i	Construction of 220/132kV substation at Bargawan	(2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers
ii	LILO of both circuits of Sidhi - Hindalco 220kV line at Bargawan 220kV S/s	2x15 Km
iii	LILO of both circuits of Rajmilan - Morwa/ Waidhan 132kV line at Bargawan 220kV S/s	2x15 Km
<b>5</b>	<b>220/132kV Substation at Khargone (District-Khargone)</b>	
i	Construction of 220/132kV substation at Khargone	(2x160MVA,220/132kV) + (1x63MVA,132/33kV) transformers
ii	LILO of both circuits of Chhegaon - Nimrani 220kV line at Khargone 220kV S/s	2x15 Km
iii	LILO of Khargone - Julwaniya(Talakpura) 132kV line at Khargone 220kV S/s	10 Km
iv	LILO of Bhikangaon - Bistan 132kV line at Khargone 220kV S/s	10 Km
<b>6</b>	<b>220/33kV substation at Shahpur (District-Betul)</b>	
i	Construction of 220/33kV substation at Shahpur	2x50MVA, 220/33kV transformers
ii	LILO one circuit of Satpura TPS-Itarsi 220 kV line at Shahpur	5 Km
<b>7</b>	<b>220/33kV substation at Manpur (Bijouri) (District-Umariya)</b>	
i	Construction of 220/33kV substation at Manpur (Bijouri)	2x50MVA, 220/33kV transformers
ii	LILO of Birsinghpur-Satna 220kV line at New S/s Manpur (Bijouri)	20 Km

**9.6. Installation of additional 1x100MVA 400/132kV Transformer (3<sup>rd</sup> ICT) and 1x125MVAR Bus Reactor at Kirnapur 400/132kV Substation of MPPTCL**

MPPTCL vide letter dated 13.08.2020 has informed that a 400/132kV substation has been commissioned at Kirnapur (Balaghat) with 2x100 MVA, 400/132kV transformation capacity. This substation is sharing the load of Balaghat, Bhanegaon, Baihar, Katangi,

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Warseoni and Lalbarra 132/33kV substations. The total installed capacity at these 132/33kV substations is 385.5MVA. After commissioning of 400/132kV substation, substantial load of aforementioned 132/33kV substations is shifted on 2x100MVA transformers installed at Kirnapur substation and maximum load recorded at this substation during last 12 months is 163 MVA. Therefore, during the (N-1) contingency condition it will become difficult to manage the load in this area.

Further, Kirnapur 400kV substation is constructed between two 765 substations at Seoni and Raipur(CG) by LILO of Bhilai-Seoni 400kV S/C line at Kirnapur. Therefore, due to 765kV substations at both the ends, Kirnapur 400kV substation is experiencing very high voltages at 400kV level. The maximum voltage recorded at Kirnapur 400kV substation is 447kV which is much beyond the standard high voltage limit of 420kV.

In view of above, it is proposed to install 1 No. 100MVA, 400/132kV additional transformer (3rd ICT) and 1 No. 125MVAR, 400kV Bus reactor at Kirnapur 400kV substation.

9.7. Members may deliberate on the above proposals of MPPTCL.

#### **10. Intra-state proposal received from MSETCL**

10.1. **Creation of 220 kV level at 765/400 kV Shikrapur (PGCIL) Substaion-** MSETCL vide their letter dated 20.07.2020 (attached as Annexure-IX) has proposed creation of 220 kV voltage level at 765/400 kV Shikrapur (PGCIL) S/s for serving 220 kV substations at Ranjangaon, Alephata, Kathapur and proposed KhedCity S/s in Pune District S/s.

The proposal consists of following elements:

A. Under ISTS:

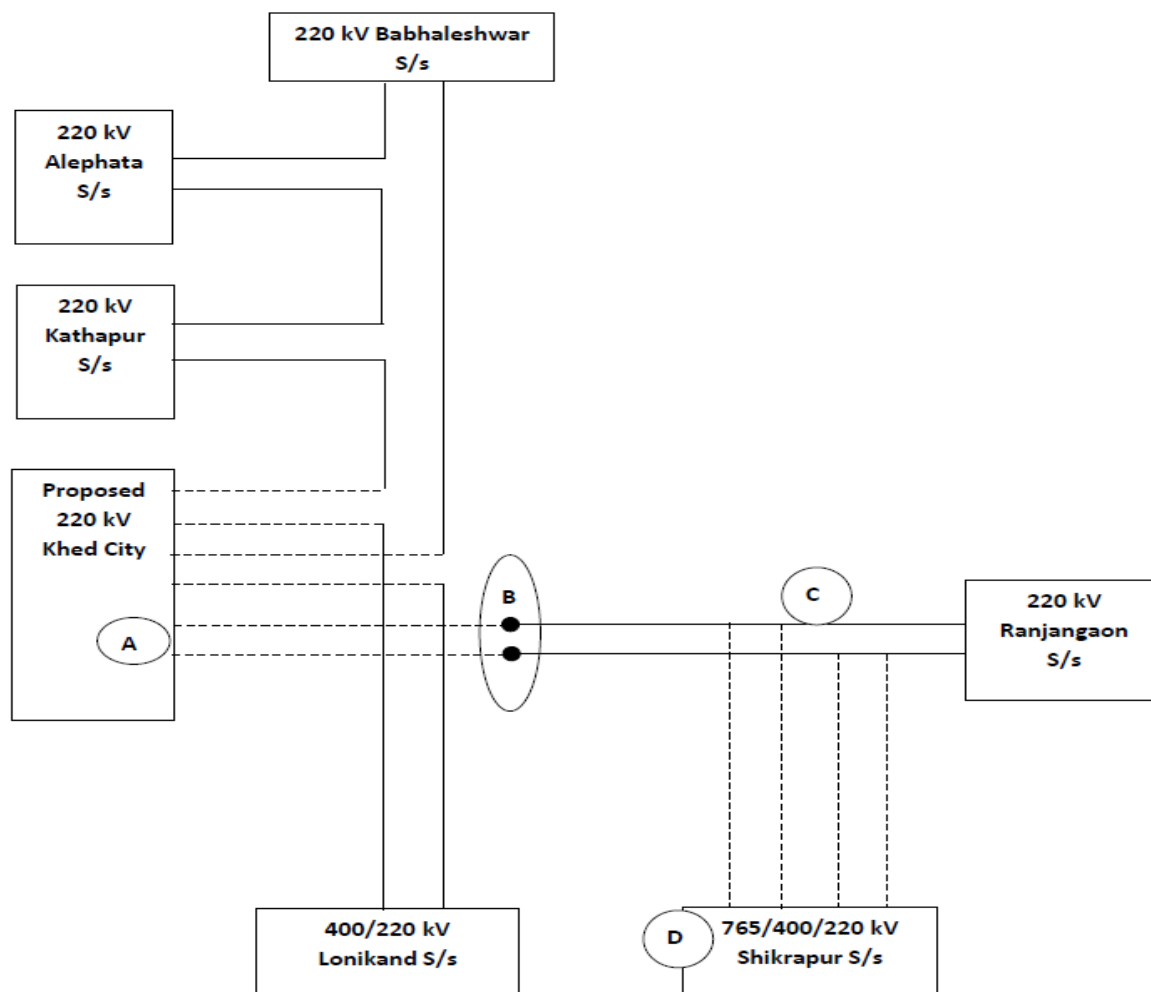
- (i) 220 kV level creation at 765/400 kV Shikrapur (PG) S/s along with 2x500MVA, 400/220kV ICT at 765/400kV Shikrapur (PG)
- (ii) 220kV line bay- 4 nos. at 765400 kV Shikrapur (PG) S/s.

B. As a part of STU system:

- (i) Reorientation and termination of 220kV Babbleshwar – Ranjangaon ckt & Lonikand –Ranjangaon ckt at Point-B.
- (ii) 220kV Khed City – Point B (Ranjangaon) D/C line – 13.5 km (STU Plan Year 2022-23)
- (iii) LILO on both ckts of 220kV Khed City – Ranjangaon D/C line at 765/400/220kV Shikrapur (PG) S/s – LILO distance 5 km. (STU Plan Year 2022-23)

SLD for proposed 220 kV Network from 765/400/220 kV Shikrapur S/s is as follows:

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Point A – Point B = 13.5 km Proposed D/C line  
 Point C – Point D = 5 km proposed M/C line

10.2. The Load Flow Studies carried out by MSETCL considering load growth scenario in the year 2022-23 with Maharashtra State Demand as 26900 MW and Pune district demand as 4500 MW. The are tabulated as given below:

**Case 1:-** Existing Scenario

**Case 1A Contingency:** Case-1 + 220 kV Babbleshwar – Ultratech Sugars line out

**Case 2:-** With 220 kV level creation at 765kV Shikrapur PG S/s

**Case 2A Contingency:** Case-2 + 220 kV Babbleshwar – Ultratech Sugars line out

Line Flows:

S.N	Name of Line/ICT/TF Power Flow	Case-1	Case-1A	Case-2	Case-2A
1	400kV Lonikand I-Talegaon S/C	461.5	492.1	326.5	335.1
2	400kV Lonikand I-Chakan S/C	285.2	313.9	160.6	168.5
3	400kV Lonikand I-Lonikand II D/C	157	179.6	38	45.1
4	400kV Karjat-Lonikand II D/C	380.6	403	354	365.6

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5	400kV TalegaonPG-Shikrapur PG QUAD CKT	2502.8	2554.8	2092.4	2097.2
6	400kV TalegaonPG-Chakan S/C	778.4	<b>816.3</b>	608.1	618.9
7	220kV Lonikand I-Ranjangaon S/C	77.3	233.4	-	-
8	220kV Lonikand II-Kathapur S/C	35.1	13.5	-	-
9	220kV Kathapur-Alephata S/C	70.7	92.4	21.1	39.2
10	220kV Alephata-Babhleshwar S/C	272.5	<b>296.3</b>	224.5	242.2
11	220kV Babhleshwar-Utec Sugar S/C	195.3	<b>Out</b>	117.2	out
12	220kV Utech Sugr-Ranjangaon S/C	191.8	0.9	-	-
13	220kV Shikrapur (PG)-Khedcity D/C	-	-	320.8	346.4
14	220V Khedcity-Lonikand I S/C	-	-	150.8	121.8
15	220kV Khedcity-Lonikand II S/C	-	-	147.4	117.7
16	220kV Shikrapur (PG)-Ranjangaon D/C	-	-	321	318
17	220kV Utec-Khedcity	-	-	116.7	0.94
18	3x315MVA,400/220kV ICT @ 400kV Lonikand I	522.3	573.9	380.4	398.4
19	2x500MVA, 400/220kV ICT @ 400kV Lonikand II	538	582.4	392	410.6
20	3x315MVA,400/220kV ICT @ 400kV Talegaon PG	681	694.5	607.2	610.8
21	1630 MVA,400/220kV ICT@400kV Babhleshwar (2x500MVA & 2x315 MVA)	1308	1224.6	1227.2	1175
22	2x500MVA,400/220kV ICT@400kV Shikrapur (PG)	-	-	630.6	668.2
23	3x315MVA,400/220kV ICT@400kV Chakan	492	501	447	450

## a.1. Bus Voltages:

S.N	Name of SS	Voltages (kV)			
		Case-1	Case-1A	Case-2	Case-2A
1	220kV Khedcity	-	-	221.2	220.9
2	220kV Alephata	214.5	214.1	218.4	218.2
3	220kV Ranjangaon	212.6	209.4	221.4	221
4	220kV Kathapur	214.4	213.6	218.5	218.2
5	220kV TalegaonPG	219.4	218.8	220.8	220.7
6	220kV Lonikand I	217.2	216.3	220.1	220
7	220kV Lonikand II	217.3	216.4	220.2	220
8	220kV Shikrapur PG	-	-	223.6	223.4

## .2. Transmission Losses:



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S.N	Particulars	Power Loss (MW)			
		Case-1	Case-1A	Case-2	Case-2A
1	Pune Zone	177.39	186.46	165.62	164.43
2	Maharashtra State	1178.1	1186.43	1152.9	1151

10.3. MSETCL has indicated the following technical benefits associated with the above proposal:

- (i) With the creation of 220 kV level at 765 kV Shikrapur PG s/s along with establishment of 2x500 MVA, 400/220 kV ICTs capacity, will relieve the loading on existing ICTs at 400/220 kV Lonikand-I, Lonikand-II, Chakan & Jejuri s/s.
- (ii) 220 kV Ranjangaon, Kathapur & proposed Khed City S/s will get strong source through 765/400/220 kV Shikrapur( PG) s/s.
- (iii) Reduction in line loading on 400 kV Talegaon – Chakan line & 220 kV Urse – Chinchwad Corridor is observed.
- (iv) 220 kV voltage level creation at 765/400 kV Shikrapur PG S/s will help to cater the fast load growth demand in Pune district & will also support 220 kV transmission network.
- (v) In the absence of Koyna Generation, 220 kV Shikrapur (PG) S/s will support the 220 kV network of 400 kV Lonikand & 400kV Chakan s/s.
- (vi) With the creation of 220 kV level at 765/400 kV Shikrapur s/s, the transmission network of Pune Ring main in Pune District will be strengthened and operational efficiency of 220kV network will improve.
- (vii) Significant improvement in the bus voltages profiles of 220 kV buses in the vicinity of Shikrapur S/s is observed.
- (viii) Total Saving in Losses:  
Pune Zone – 11.77 MW  
Maharashtra State – 25.2 MW
- (ix) With the creation of 220 kV level at 765/400 kV Shikrapur (PG) S/s, proposed 220 kV Talegaon (PG)- Khed city D/C line & 400kV Shikrapur PG –Lonikand-II DC lines can be deleted.

10.4. POWERGRID to intimate the availability of space for creation of 220 kV level at Shikrapur along with provision of 2x500 MVA, 400/220 kV ICTs.

10.5. MSETCL to present the details of their proposal alongwith studies. Members may deliberate

## 11. Progress of downstream network whose terminating bays are under construction by PGCIL

The 5.4. Proviso (iii) of Indian Electricity Grid Code (IEGC) (Fourth Amendment) Regulations, 2016, of CERC dated 06.04.2016 is as follows:

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“Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavor to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement.”

The status of the 220 kV line bays from various 400/220 kV ISTS substations as well as downstream network is updated in the table below:

Sl. No.	ISTS S/s	Voltage ratio, Trans. Cap	Unutilised bays	Status of ISTS bay	Lines for unutilised bays	Status of Lines
<b>WR</b>						
1	Mapusa (PG)	400/220kV (3x315 MVA)	2	Existin g bay	Mapusa – Cuncolin 220 kV D/c line	Anticipated Sep'20(As per WRPC held on 28.6.19) <b>DOCO</b> <b>GED may update the current status</b>
			2		Mapusa–Tuem 220 kV D/c line	The agency has been finalized for carrying out work from Mapusa to Tuem D/C line with GIS S/s at Tuem. The work will be awarded after the receipt of approval from the Govt. The completion period will be 20 months from the date of award (As per 2nd WRSCT Minutes). <b>GED may update the current status</b>
2	Navsari	400/220 kV (2x315MVA + 1x500 MVA)	2	Existin g bay	Navsari – Bhestan 220kV D/c line	M/s DGENTPL is not taking up the implementation of the scheme. Assigned to PGCIL on RTM basis. <b>PGCIL may update the current status</b>
3	Pirana	400/220kV (2x315MVA )	2	Existin g bay	Pirana – Barjadi 220 kV D/c line	December, 2020 <b>GETCO may update the current status</b>
4	Vadodara GIS	400/220 kV (2 x 500 MVA)	2	Existin g bay	220 kV Jhambua – Vadodara D/C Line	April/May, 2020 <b>GETCO may update the current status</b>
5	Betul GIS	400/220 kV (2x315 MVA)	2	Existin g bay	LILO of Sarni - Pandhurna 220kV line at Betul GIS (PGCIL)	March, 2020 <b>MPPTCL may update the current status</b>
6	Indore (PG)	400/220 kV (2 x 500	2	Existin g bay	LILO portion of 220kV line for	2 years after the award of contract. Approximate

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Sl. No.	ISTS S/s	Voltage ratio, Trans. Cap	Unutilised bays	Status of ISTS bay	Lines for unutilised bays	Status of Lines
		MVA)			Indore(NZ) 220kV S/S upto Indore(PGCIL) 765kV S/s	award schedule is April, 2020. MPPTCL may update the current status
7	Parli (PG)	400/220 kV (2x500 MVA)	2	Existin g bay	LILO of Parli – Harangul 220 kV S/c line	March, 2020 MSETCL may update the current status
8	Wardha	400/220 kV (2x315 MVA)	2	Existin g bay	Wardha – Yavatmal 220 kV D/c line	Under construction, May 20 MSETCL may update the current status
9	Solapur	400/220 kV (2x315 +1x500 MVA)	2	Existin g bay	Solapur – Bale (M) 220kV D/c line	Mar'20 MSETCL may update the current status
			2		Solapur – Narangwadi 220 kV D/c line	Mar'20 MSETCL may update the current status
10	Navi Mumbai	400/220 kV (2 x 315 MVA)	4	Existin g bay	LILO of Apta – Taloja and Apta - Kalwa section of the Apta-Taloja/Kalwa 220 kV D/c line at Navi Mumbai (PG)	Agreed to be implemented as ISTS under WRSS-XIX. Comm. Sch. - 30 months from date of transfer of SPV. SPV has already been acquired by M/s Sterlite Grid 13 Limited on 23.06.2020

**400 kV line bays:**

S. No	ISTS Substation	Proposed Bays	Commissioning Schedule	Lines emanating from Substation	Latest available status
1	Indore (PG)	2	Jul, 2018	Indore (PG) – Ujjain 400 kV D/c line	May' 2020 MPPTCL may update the current status

The current status of the various substations and associated downstream system may be updated by STUs.

**12. Operational Feedback of NLDC**

The operational feedback of NLDC for the period from January' 2020 to March' 2020 is as follows:

**A. Transmission Line Constraints**

Sl.	Corridor	Season/ Antecedent	Description of the constraints

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No		Conditions	
1.	Transmission system for Koradi St-II (3x660MW) and IEPL (1x270 MW)	Koradi-II station is connected with 400 kV Koradi II-Koradi III D/C, 220 kV Koradi II-Kaulewada D/C and LILO of 400 kV Wardha – Warora one circuit (Interim arrangement).	<p><b>Constraints:</b> At present Koradi-II units (3 X 660 MW) are commissioned and managed with SPS. System is N-1 non-compliant and there is no generation at IEPL. Also, high loading of 400kV Warora-Wardha S/C is observed resulting in restricted operation of Bhadrawati HVDC &amp; Chandrapur-Padghe Bipole. Fault level of Chandrapur is 52kA. When Koradi II-Wardha and Warora-Wardha total power flow is above 1800MW, Warora-Wardha becomes N-1 non-compliant.</p> <p><b>Remedial Actions:</b> The Evacuation plan for APML, Tirora (5 X 660 MW) Rattan India Amravati (5 X 270 MW), Chandrapur Stg-II (2 X 500 MW), IEPL (1 X 270MW), and Dhariwal (1 X 300 MW) need to be studied by the STU in order to check whether the existing plan and available network will provide secure evacuation under various N-1 contingencies. HVDC Bhadrawati is operated at maximum.</p> <p><b>1<sup>st</sup> WRST:</b> - LILO of Chandrapur-I – Parli 400 kV S/c line at Warora (M) has been already planned as a part of Intra state transmission and is under implementation. MSETCL is yet to review the CTU/CEA proposal before finalization to decide LILO of one circuit of Warora PS –Parli (PG) D/c line at Warora (M) or Warora (M) – Warora Pool 400 kV D/c line.</p> <p><b>1<sup>st</sup> WRPC(TP):</b> It was agreed that the proposal of MSETCL for the LILO of both the circuits of 400 kV Chandrapur-I – Bhadravati 2xD/c line at Chandrapur-II instead of LILO of one ckt of 400 kV Chandrapur-I – Bhadravati 2xD/c line at Chandrapur-II may be studied in a Joint Study meeting along with additional outlets from Warora(M).</p>

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3.	400kV Padghe-Kalwa D/c	High loading is observed in general during High demand & Less generation in Mumbai system.	<p><b>Constraint:</b> The corridor becomes N-1 non-compliant when total loading is above 1100 MW. Many a times Chandrapur- Padghe Bipole flow is restricted to control the loading on these lines in past. Also facilitating outage in this corridor on week days is difficult. Outages are being planned only on Saturday/Sundays with planned load shedding. In few instances N-1 non compliant observed, managed by controlling the HVDC power order.</p> <p><b>Remedial Action:</b> Commissioning of 400kV Ghatkopar S/S and Padghe (GIS)-Kharghar, Padghe-Navi Mumbai-Ghatkopar and Kharghar- Ghatkopar would give additional infeed to Mumbai and relieve loading of Padghe- Kalwa D/C.</p> <p><b>Present status:</b> Above scheme <b>would be</b> implemented as ISTS under WRSS-XIX. The SPV has already been acquired by M/s Sterlite Grid 13 Limited on 23.06.2020 <b>MSETCL may update the status of Vikhroli S/s.</b></p>
4.	220 kV Navsari (PG) - Navsari (GETCO) D/c	Most of the time	<p><b>Constraints:</b> The lines become N-1 non-compliant when the total power flow is above 310 MW (Considering 250MW under N-1 contingency). For about 16% of the time during the quarter these lines were N-1 non compliant.</p> <p><b>Remedial Actions:</b> Commissioning of 400kV Vav-II S/s is planned by Gujarat by making LILO of 400kV Jhanor-Navsari one ckt &amp; Ukai- Kosamba one ckt and may relieve loading on 220kV Navsari (PG)-Navsari ckts. 220kV Navsari- Bhestan D/C was to be implemented by DGENTPL under TBCB which was not yet started and dropped.</p> <p><b>Present status:</b> 400kV Vav-II s/s of GETCO along with LILO of Jhanor-Navsari &amp; Ukai-Kosamba-1 at Vav-II first time charged on 07-Mar-20. 220kV Navsari-Bhestan D/c line would be constructed as system strengthening scheme under TBCB and assigned to PGCIL for implementation under RTM. <b>PGCIL may update the status.</b></p>
			<p><b>Constraint:</b> When total loading on these lines is 340MW and</p>

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5.	220kV Ukai-Mota D/c	When Ukai generation is high at 220kV side.	<p>above, the corridor becomes N-1 non-compliant. Constraint observed for very less time during this quarter.</p> <p><b>Remedial Action:</b> Commissioning of 400kV Vav-II S/s planned by Gujarat, by making LILO of 400kV Jhanor-Navsari one ckt &amp; Ukai- Kosamba one ckt would help in relieving the constraint.</p> <p><b>Present status:</b> Vav-II s/s of GETCO, along with LILO of Jhanor-Navsari-1 &amp; Ukai-Kosamba-1 at Vav first time charged on 07-Mar-20. <b>POSOCO may clarify that loading issue is resolved or not.</b></p>
6.	220kV Pune PG-Talegaon D/c	All the time	<p><b>Constraint:</b> When total loading on these lines is 260MW and above, (N-1 loading considered as 250MW), the corridor becomes N-1 non-compliant. For 86% of the time lines were N-1 non-compliant during the quarter.</p> <p><b>Remedial Action-</b> <b>43<sup>rd</sup> SCM:</b> 220kV Talegaon (PG)– Talegaon (M)– Urse–Chinchwad 220 kV D/C is planned &amp; is under implementation. This line has been completed up to Urse S/s. Thus, Pune (PG) and Talegaon(M) have 4 no. of 220 kV lines. However, 2 no. of Talegaon (PG) – Talegaon (M) are kept open to restrict the loading on 220kV Urse– Chinchwad. It was intimated that Urse– Chinchwad 220 kV D/C and Pune (PG)– Hingewadi 220 kV D/C would be completed by Dec, 2018.</p> <p><b>MSETCL may update the status.</b></p>

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7.	400kV Chandrapur -Chandrapur (II) D/C	When generation at Chandrapur is less and Chandrapur (II) is high	<p><b>Constraint:</b> Less generation at Chandrapur is leading to critical loading on these lines. Chandrapur-Padghe HVDC flow had to be restricted to ensure N-1 security of these lines, which reduced the operational flexibility with HVDC and also caused low voltages at Parli, Lonikhand &amp; Padghe area. For 21% of the time, lines were N-1 non-compliant during the quarter.</p> <p><b>Remedial Action</b> <b>1<sup>st</sup> WRSCT:</b> LILO of one circuit of Chandrapur-I – Bhadravati 400 kV 2xD/c line at Chandrapur-II.</p> <p><b>1<sup>st</sup> WRPC(TP):</b> To be discussed in a Joint Study meeting for over loading of Chandrapur-Chandrapur(II) and additional outlets from Warora(M).</p> <p><b>MSETCL may update the status / timeline for the implementation</b></p>
8.	220kV Itarsi PG-Itarsi D/c lines	During Rabi crop season, when demand is above 11000 MW	<p><b>Constraint:</b> When these lines are carrying more than 260MW, the system becomes N- 1 non-compliant. For 15% of the time lines were N-1 non-compliant during the quarter.</p> <p><b>43<sup>rd</sup> SCM:</b> Additional 500MVA ICT and 220kV Itarsi (PG)-Budhni D/C is planned by MP.</p> <p><b>MPPTCL may update the present status.</b></p>
9.	400kV Parli PG-Parli MS D/c line	Maharashtra drawal above 6000MW and low generation at Parli	<p><b>Constraint:</b> The lines become N-1 non- compliant when total power flow on these lines is 900MW and above. Further these line loadings were the limiting constraint for import TTC/ATC of Maharashtra.</p>
10	220kV Bhilai-Bhilai D/c line	Most of the time	<p><b>Constraint:</b> When total loading on these lines is above 300MW, the system is N-1 non-compliant. For more than 52% of the time lines were N-1 non-compliant during the quarter.</p>

**B. ICT Constraints:**

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SI No	ICT	Season/ Antecedent Conditions	Description of the constraints
1.	2x315 MVA Astha MPPTCL ICTs	During Rabi Season, with high demand of MP	<b>Constraint:</b> ICTs become N-1 non-compliant when total loading is above 380MW. About 41% & 42% of the time, ICTs were N-1 non-compliant in in Jan'20 & Feb'20 respectively.
2.	2x315MVA+ 1x500MVA 400/220kV Dhule MSETCL ICTs	When Drawl is above 7000MW	<b>Constraint:</b> ICTs become N-1(considering tripping of 500MVA) non-compliant when total loading is above 700MW. About 62% of the time, ICTs were N-1 non-compliant during the quarter.
3.	2x315MVA ICTs at Raigarh PG	Demand of Chhattisgarh above 4000MW with 1300MW drawal	<b>Constraint:</b> With the commissioning of 220kV Raigarh-Raigarh 3 <sup>rd</sup> ckt, ICTs become N-1 non-compliant when total loading is above 400MW. For 20% of the time ICTs were N-1 non compliant in Feb'20.  <b>Remedial Action:</b> Additional ICTs in Chhattisgarh along with downstream network would help Chhattisgarh system to draw more power from ISTS
4.	2x1500MVA ICTs at Ektuni	With High generation at Tirora & Koradi (II)	<b>Constraint:</b> When total loading on ICTs is above 1700MW, ICTs become N-1 non-compliant. Power flow on ICT is sensitive to generation at APML Tirora (18%) & Koradi (II) (13%). For about 35% of the time ICTs were N-1 non-compliant during the quarter.  <b>1<sup>st</sup> WRPC(TP):</b> It was agreed for Joint Study meeting to finalise additional outlets from Warora(M).
5.	2x315 MVA ICTs at NSPCL	When Chhattisgarh Demand more than 4000MW	<b>Constraint:</b> ICTs become N-1 non-compliant when total loading is above 440MW. Due to less demand in Chhattisgarh system, for about 7% of the time ICTs were N-1 non-compliant in Feb'20.  <b>Remedial Action:</b> With commissioning of 220kV Barsoor-Jagdarpur D/C and 400kV Kurud



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			<p>(Dhamtari) S/S in Dec'19, some load of Bhilai area would be met from feeders mentioned above and would relieve NSPCL ICTs to some extent. Additional ICTs in Chhattisgarh area along with downstream network would help Chhattisgarh system to draw more power from ISTS.</p> <p><b>Present Status:</b> 400/220kV Kurud S/s charged on 30-Jan-20. <b>POSOCO may clarify that loading issue is resolved or not.</b></p>
6.	2x315 MVA ICTs at Chandrapur	Increased demand in Chandrapur area with non- availability 220kV network	<p><b>Constraint:</b> When total loading is above 400MW, the ICTs become N-1 non-compliant. For very less time ICTs were N-1 non- compliant during the quarter.</p> <p><b>Remedial Action:</b> MSETCL to expedite LILO of Chandrapur (MIDC)-Tadali at Chandrapur-II. <b>MSETCL may update the present status.</b></p>
7.	2x315 MVA Akola MSETCL ICTs	Demand of Maharashtra above 21000MW & Drawal of 6500MW & less generation at Paras	<p><b>Constraint:</b> Akola ICTs become N-1 non-compliant when total loading is above 420MW. About 39% of the time, ICTs were N-1 non-compliant in Feb'20.</p> <p><b>Remedial Action:</b> Maharashtra has implemented load trimming scheme for ICT overloading. Additional ICT may be planned at Akola.</p>

### 13. Implementation issues associated with the scheme “Measures to control fault level at Wardha Substation”

13.1. The scheme “Measures to control fault level at Wardha Substation” was discussed in the 37<sup>th</sup>, 39<sup>th</sup>, 40<sup>th</sup> & 41<sup>st</sup> meetings of SCPSPWR and the following scheme involving bus splitting at Wardha with 12 Ohm fault limiting reactor to connect 400kV Bus Section A and Bus Section B of Wardha 400 kV Bus has been agreed to control the high fault level at Wardha 400 kV S/s.

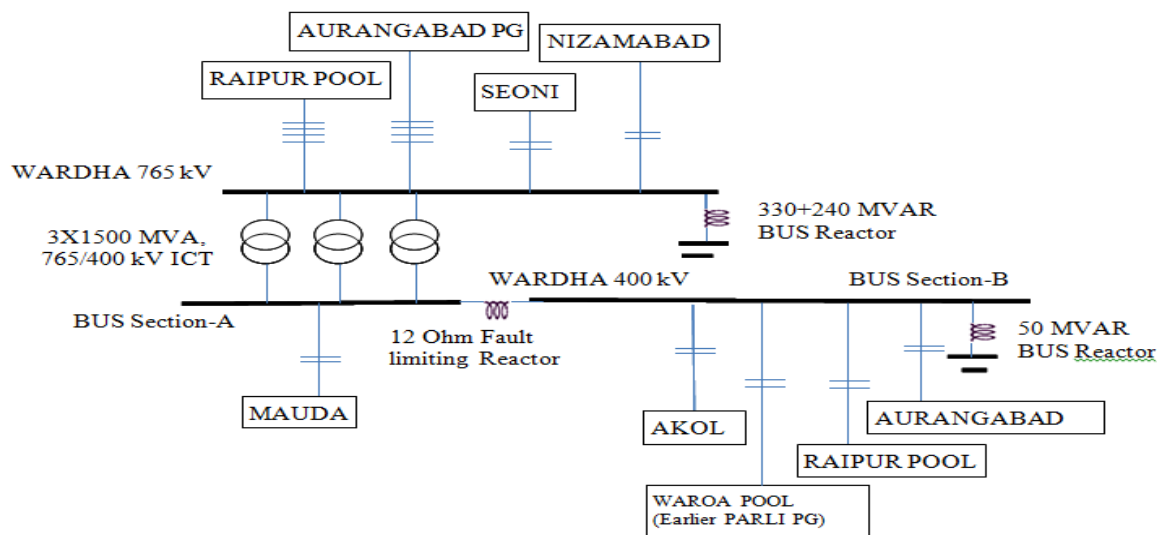
The scope of the transmission scheme is as under:

Sl. No	Scope of the Transmission Scheme	Estimated Cost (Rs. Crore)
i)	Split of 400 kV Wardha substation into two sections, Section –A and Section-B as per diagram, with necessary switching	

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	arrangement	
ii)	Interconnecting Wardha - Koradi II 400 kV quad with Warora – Wardha 400 kV (Quad) line at outskirts of Wardha substation so as to form Warora – Koradi II 400 kV (Quad) line	
iii)	All necessary arrangement for Change in termination of Warora Pool -Wardha 400 kV D/C (Quad) line by disconnecting it from Wardha 400kV BUS Section A and terminating in vacant 400 kV bays of Warora and Koradi II 400 kV (Quad) lines at Wardha 400kV BUS Section B.	75
iv)	12 Ohm fault limiting reactor to connect 400kV BUS Section A and BUS Section B of Wardha 400 kV BUS.	
v)	2x63MVAR line reactors at Wardha end of Wardha – Warora Pool 400 kV D/C (quad) line to be used as bus reactors at Wardha S/s - section A (by using the two nos. of 400 kV bays which shall be vacant in Wardha Bus Section-A after shifting of Warora pool - Wardha 400 kV D/C line from Section - A to Section-B)	
vi)	Necessary modification at Wardha sub-station like change of some elements including CTs if those are not designated for 50 kA fault level	
	<b>Total (in Crore)</b>	<b>75</b>

### Existing 765/400 kV Wardha substation



### 765/400 kV Wardha substation after bus splitting and line reconfiguration

13.2. CTU has informed that even though the scheme had been discussed and agreed in several SCM/WRSCCT meetings and agreed but the issue of ownership of the 2 nos. 400 kV line bays (MSETCL) at Wardha end, which would be used for ISTS purpose, has not been discussed in any of the SCM/WRSCCT meetings.

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- 13.3. To deliberate on the issues a meeting was held on 31.07.2020 through VC . In the meeting the following was agreed:
- Issues like ownership of 400 kV line bays at Wardha 400/220 kV substation and use of existing section( towards entry of Wardha substation) of MSETCL lines for ISTS purpose needs to be deliberated and decided bilaterally between POWERGRID and MSETCL. The decision would be put for information of the WRPC-TP members.
  - POWERGRID to intimate the details of construction of new 400 kV D/C line for establishing the bypass arrangement of MSETCL lines and shifting of Warora pool 400 kV D/C line from bus section A to bus section B alongwith the cost implications.
  - Regarding the issue of overloading of Warora- Chandrapur 400 kV D/C during N-1 conditions after bypassing arrangement Wardha raised by MSETCL, it was agreed that MSETCL would study various alternatives suggested as intra-state strengthening proposal for evacuation of power beyond Warora in the 1<sup>st</sup> WRSCT meeting held on 05.09.2018. MSETCL would come out with their proposal.
- 13.4. CTU vide its e-mail dated 13.08.2020 has intimated that under the Scheme to control fault level at Wardha S/s, following fresh construction of Transmission line and towers shall be required (Tentative Quantity based on walkover survey):

Sr. no.	Element/Scope of work	Fresh Line Length (Double Ckt)	No. of towers
1	Disconnection of Koradi II-Wardha 400 kV (Quad) line and Warora-Wardha 400 kV (Quad) Line from Wardha 400 kV bus and connecting the two lines at outskirts of Wardha substation so as to form Warora-Koradi II 400 kV (Quad) line	1.757 km	7 Nos (Tension-5 Nos. + Suspension-2 Nos.)
2	All necessary arrangement for change in termination of Warora pool-Wardha 400 kV D/c (Quad) line by disconnecting it from Wardha 400 kV Bus Section A and terminating in vacant 400 kV bays (of Warora and Koradi II 400 kV (Quad) lines of MSETCL) at Wardha 400 kV bus Section B.	1 km	5 Nos (All Tension)
	Total	2. 757 km (Approx.)	12 (Approx.)

- 13.5. POWERGRID/MSETCL to intimate the outcome of bilateral deliberations held on the issues of ownership of 400 kV line bays at Wardha 400/220 kV substation and use of existing section( towards entry of Wardha substation) of MSETCL lines by POWERGRID. Members may deliberate.
14. **Additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard BALCO**

I/11065/2020

14.1. In the 1<sup>st</sup> meeting of WRSCCT held on 05.09.2018, Agenda Item pertaining to Connectivity application of 250 MW as Bulk Consumer for BALCO TPS (4x300+4x67.5+4x135MW) was discussed and the following was decided:

- i) Connectivity to BALCO for 250 MW as a bulk consumer be granted through BALCO-Dharamjaygarh 400kV (2nd) D/c line (new) along with associated 400kV bays at both ends to be implemented by M/s BALCO at its own cost
- ii) The final arrangement of BALCO after segregation of units will be as follows:
  - 580MW [1x300MW (CPP) + 4x70MW (up gradation of 4x67.5MW) (CPP)] units on one bus with New Smelter Load of 800MW] for which BALCO now seeks connectivity to the tune of 250MW for meeting the average demand of the smelter load
  - 1440MW [1x300 (IPP) + 2x300MW (CPP) + 4x135MW (CPP)] units on the other bus with existing smelter load of 940MW. Accordingly, the exportable capacity on this bus shall be about 385MW out of which LTA of 350MW is already granted.
- iii) M/s BALCO, being a bulk consumer, may approach CERC regarding construction modalities for the 400kV D/c line.

14.2. Subsequently, M/s BALCO approached CERC and CERC vide its ROP dated 17.01.2019 constituted a Committee chaired by Member (Power Systems) CEA, and representatives of CTU, RLDC & BALCO to investigate into all aspects of construction modalities for BALCO-Dharamjaygarh 400KV 2<sup>nd</sup> D/c (new) line. The committee submitted its report on 09.05.2019, wherein the following was recommended:

- i) From optimal transmission planning point of view and to conserve scarce RoW, the connectivity to BALCO as bulk consumer for its 250 MW load may be granted through existing 400 kV D/C line between BALCO and Dharamjaygarh. Connectivity to BALCO as bulk consumer involves grant of connectivity at 220 kV bus of BALCO, which is not an ISTS point.

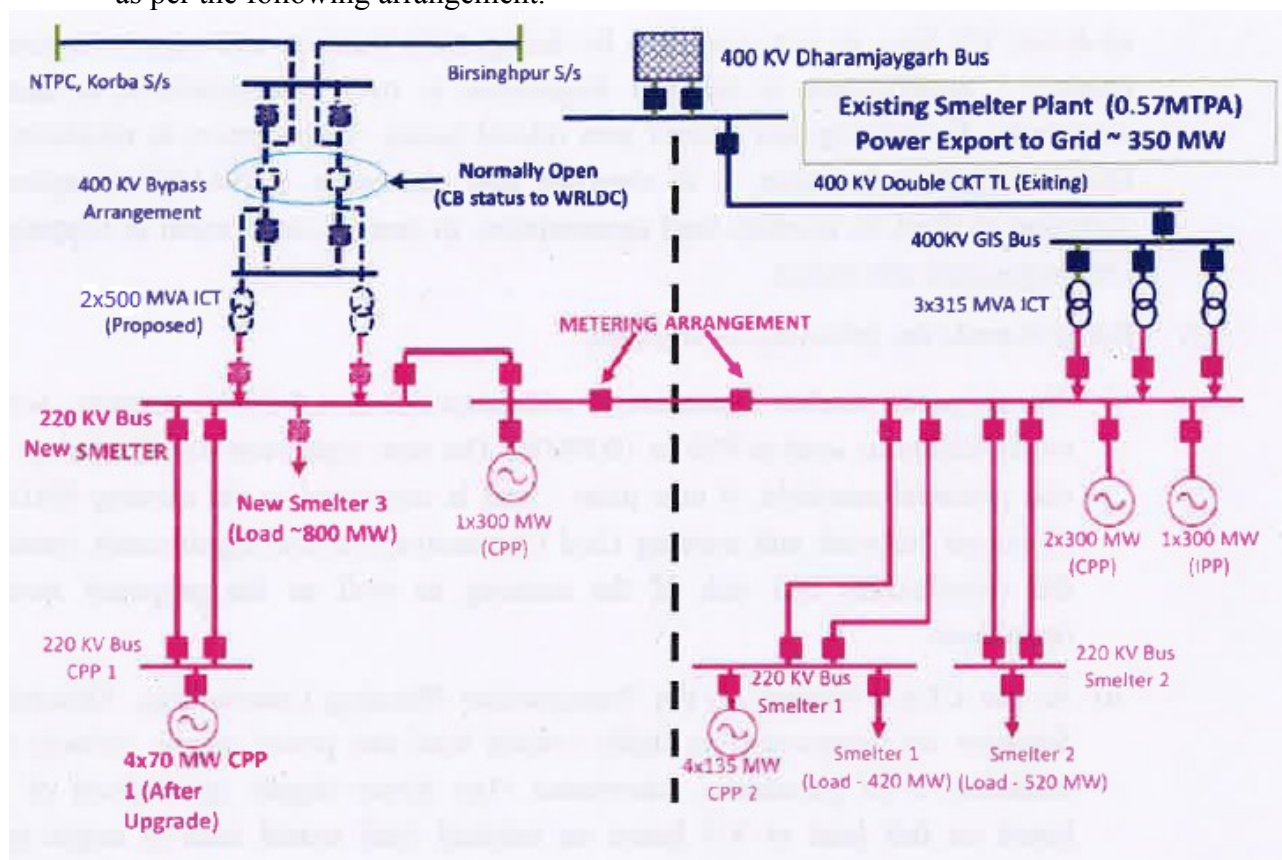
In case of emergency situation like outage of BALCO-Dharamjaygarh 400 kV D/C line (tower outage) / outage of 400 kV Dharamjaygarh bus, grid connectivity to BALCO, can be provided through LILO of 2<sup>nd</sup> ckt of Korba - Birsinghpur 400kV D/c line at BALCO switchyard (LILO section already existing as a part of earlier interim arrangement and 400 kV switchyard to be implemented by BALCO) with suitable bypass arrangement at BALCO 400 kV switchyard. The LILO would be normally remain bypassed at BALCO and in case of exigencies, as per the instructions of the Grid Operator, LILO could be utilised for extending grid connectivity to BALCO. M/s BALCO needs to submit the bypassing scheme, so that the same could be deliberated with WR constituents and finalised.

- ii) Alternatively, connectivity to BALCO for its 250 MW load may be granted through BALCO-Dharamjaygarh 400 kV D/c (2<sup>nd</sup>) line (New) along with associated 400 kV bays at both ends which would be a transmission line of dedicated nature for BALCO.

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Grid connectivity to BALCO IPP and BALCO Bulk Load, in case of outage of BALCO-Dharamjaygarh 400 kV D/C line1 and Line 2 respectively, can be provided through 220 kV interconnections arrangement. The 220 kV interconnection arrangement would be normally kept open.

- 14.3. Based on the Committee's recommendations, CERC vide order dated 29.01.2020 recommended granting Connectivity to BALCO as a bulk consumer for load of 250 MW through existing 400 kV BALCO-Dharamjaygarh D/C line with suitable metering, accounting and scheduling arrangements for the two entities namely BALCO (as captive generator) and BALCO (as bulk consumer) and also observed that the suggestion of the Committee on providing additional source to BALCO may be considered by CTU in consultation with CEA and NLDC so that required reliability is met.
- 14.4. Accordingly, a meeting through VC amongst CEA, CTU, NLDC and BALCO was held on 28.04.2020 (MoM attached as Annexure-X) to discuss the issue of provision of additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard to cater to contingency conditions. The following was decided in the meeting:
- i. Additional feed to BALCO shall be provided through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at 2x500MVA, 400/220kV BALCO (GIS) switchyard as per the following arrangement.



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- ii. Implementation of 2x500MVA, 400/220kV BALCO (GIS) switchyard and extension of LILO section up to new 400 kV GIS switchyard would be in the scope of M/s BALCO. M/s BALCO to follow all statutory and regulatory provisions.
- iii. The bypass of 400 kV LILO line would be through keeping the tie breakers of 400 kV line bays in normally open condition as indicated in the above schematic. The 400/220 kV ICTs shall be kept charged from 220kV side of BALCO switchyard.
- iv. Additional feed to BALCO would be put to use as a contingency arrangement only in case of outage of BALCO-Dharamjaigarh 400kV D/c line. M/s BALCO to request POSOCO/WRLDC for use of the contingency arrangement / scheme.
- v. The details of the bypass scheme and procedure for operationalization of the above scheme to be worked out by WRLDC, WRPC and BALCO.
- vi. The current tripping incidence on 27.04.2020 at Dharamjaigarh as well as tripping details of BALCO lines needs to be deliberated in Protection Coordination Committee of WRPC and BALCO to implement the recommendations of PCC.

14.5. Members may deliberate and concur the same.

# Annexure-I



## GUJARAT ENERGY TRANSMISSION CORPORATION LIMITED

Regd. Office: Sardar Patel Vidyut Bhavan,

Race Course, VADODARA – 390 007.

( CIN: U40100GJ1999SGCO36018 )

Phone No.(0265) 2353086 (D) Fax No.(0265) 2337918/2338164 (GUVNL)

Web site: [www.getco Gujarat.com](http://www.getco Gujarat.com) -Email: [stu.getco@gebmail.com](mailto:stu.getco@gebmail.com)

Ref No: CE(R&C)/STU/511/ 1

Date: 04/06/2020

To,  
Shri Goutam Roy,  
Chief Engineer (PSP&A-I),  
Central Electricity Authority,  
Power System Planning & Appraisal Division-I,  
Sewa Bhavan, R. K. Puram,  
New Delhi – 110 066.

**Sub: Transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region – Modification in MoM of 1<sup>st</sup> WRPCTP meeting thereof.**

**Ref: MoM of 1<sup>st</sup> WRPCTP meeting issued vide letter No. CEA-PS-11-23(19)/1/2019-PSPA-I Division/I/9489/2020 dated 13.03.2020.**

Dear Sir,

This has reference to the discussions held during 1<sup>st</sup> WRPCTP meeting held on 11.01.2020 at Ahmedabad, Gujarat. During the meeting, transmission system for evacuation of 10 GW RE power from potential RE zones in Khavda region were deliberated and finalized.

While going through the minutes, it is observed that GETCO views related to shifting of Bhuj-II, phasing out of schemes of Khavda region for implementation, critical loading of 400 KV / 220 KV transmission lines surrounding North / Central / South Gujarat areas due to load-generation change, etc. are recorded. However, few important points are not mentioned in the conclusion.

Therefore, we request that following points shall be covered under concluding part of the minutes:

- It is agreed that transmission scheme from Khavda region will be done in a way to have bare minimum scheme in Phase-I and shall be implemented as per LTA applications. Strengthening schemes may be bid out in next phase as per grant of LTA in future.
- It is also agreed that various 400 KV / 220 KV transmission lines of GETCO surrounding North, Central & Southern Gujarat area would be getting critically loaded (as per the load flow studies results for the Khavda system) because of huge RE integration in Western Gujarat and changed load-generation scenarios. Therefore, appropriate ISTS network strengthening as a part of RE integration will be planned at later stage matching with actual RE growth.

Also, at 4.18 it is recorded that "...The overloading of the 400 kV Intra-State lines in Gujarat may be because of backing down of conventional generation to achieve the load-generation balance. Overloading of intra-state elements due RE capacity addition under ISTS would be taken care in future in form of system strengthening schemes...."

Here, we wish to clarify that overloading of Intra-State elements includes both 400 KV as well as 220 KV elements. Further, the strengthening schemes shall be a part of associated ISTS scheme for RE integration only and not in form of regular system strengthening scheme. Alternatively, adequate strengthening schemes may be planned today itself as a part of RE integration schemes.

It is requested to amend the minutes of 1<sup>st</sup> WRPCTP meeting as above.

Thanking you,

Yours faithfully  
For Gujarat Energy Transmission Corporation Limited



(N. P. Jadav)  
Chief Engineer (R&C)

Copy to:

- 1) The Chief Operating Officer (CTU Planning), Power Grid Corporation of India Ltd., "Saudamini", Plot No-2, Sector – 29, Gurgaon, Haryana – 122 001.
- 2) The Member Secretary, Western Regional Power Committee, F-3, MIDC Area, Andheri (East), Mumbai – 400 093



367-12/2/2020-GEC  
**Government of India**  
**Ministry of New and Renewable Energy**  
(Green Energy Corridor Division)

Block 14, CGO Complex, Lodhi Road  
New Delhi-110003; dated 15.04.2020

**Shri Goutam Roy**  
Chief Engineer (PSPA-I Division)  
Central Electricity Authority  
Sewa Bhawan, R.K. Puram Sector -1  
Delhi – 110066

**Subject: Modifications in the Renewable Energy Zones identified in Madhya Pradesh under 66.5 GW ISTS scheme**

Sir,

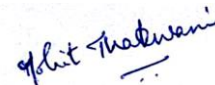
This is with reference to the meeting convened by CEA through video conference on 30.03.2020 at 3pm. As discussed during the meeting, the following potential zones have been identified in the State of Madhya Pradesh:

- a) Agar-Shajahpur region - new Rajgarh substation: 1000 MW
- b) Further potential identified by SECI in the region surrounding the new Rajgarh substation: 1500 MW
- c) Chhatarpur (Bijawar and NTPC-Barethi): 1500 MW
- d) Neemuch: 1000 MW (500 MW RfP already issued by MP in Singoli tehsil)
- e) Khandwa (floating solar power project and others): 600 MW
- f) Morena: 1250 MW - land identified in Jhiniya village

Total: 6850 MW

2. CEA is requested to consider the above identified potential regions and plan the ISTS network in consultation with the Govt. of MP in the allotted/earmarked land.
3. This has the approval of Secretary, MNRE.

Yours faithfully



**(Rohit Thakwani)**  
Scientist 'C'

Email: rohit.mnre@gov.in

Copy for information to

1. MD, SECI
2. Director (Transmission), Ministry of Power
3. COO (CTU), POWERGRID

## Annexure-III

### Dehgam(PG) & Ranchhodpura(GETCO) Fault level contribution (without rearrangement)

AT BUS 354003 [DEHGM4 400.00] AREA 3 \*\*\* FAULTED BUS IS: 354003 [DEHGM4 400.00] \*\*\* 0 LEVELS AWAY \*\*\*  
 (kV L-G) V+:/0.000/0.00 VA:/0.000/0.00 VB:/0.000/0.00 VC:/0.000/0.00  
 THEVENIN IMPEDANCE, X/R (PU) Z+:/0.002955/85.954, 14.13617  
 THEVENIN IMPEDANCE, X/R (OHM) Z+:/4.729/85.954, 14.13617

X-----THREE PHASE FAULT-----X																
X-----	FROM	-----X	AREA	CKT	I/Z	/I+/ AN(I+)	/IA/ AN(IA)	/IB/ AN(IB)	/IC/ AN(IC)	/Z+/ AN(Z+)	APP	X/R				
352003	[DEHGM2	220.00]	3	1	AMP/OHM	848.1	-85.34	848.1	-85.34	848.1	154.66	848.1	34.66	19.21	90.00	9999.999
352003	[DEHGM2	220.00]	3	2	AMP/OHM	848.1	-85.34	848.1	-85.34	848.1	154.66	848.1	34.66	19.21	90.00	9999.999
352003	[DEHGM2	220.00]	3	3	AMP/OHM	1346.2	-85.34	1346.2	-85.34	1346.2	154.66	1346.2	34.66	12.10	90.00	9999.999
354002	[GANCS4	400.00]	3	1	AMP/OHM	2526.8	-85.69	2526.8	-85.69	2526.8	154.31	2526.8	34.31	48.52	84.65	10.683
354002	[GANCS4	400.00]	3	2	AMP/OHM	2526.8	-85.69	2526.8	-85.69	2526.8	154.31	2526.8	34.31	48.52	84.65	10.683
354004	[WANAKBORI	400.00]	3	1	AMP/OHM	2765.7	-86.21	2765.7	-86.21	2765.7	153.79	2765.7	33.79	22.53	84.87	11.141
354004	[WANAKBORI	400.00]	3	2	AMP/OHM	2765.7	-86.21	2765.7	-86.21	2765.7	153.79	2765.7	33.79	22.53	84.87	11.141
354005	[SOJA4	400.00]	3	1	AMP/OHM	4101.2	-86.02	4101.2	-86.02	4101.2	153.98	4101.2	33.98	13.60	84.87	11.139
354005	[SOJA4	400.00]	3	2	AMP/OHM	4101.2	-86.02	4101.2	-86.02	4101.2	153.98	4101.2	33.98	13.60	84.87	11.139
354014	[PIRANA_P	400.00]	3	1	AMP/OHM	5093.5	-86.67	5093.5	-86.67	5093.5	153.33	5093.5	33.33	17.31	84.65	10.684
354016	[SAMI4	400.00]	3	1	AMP/OHM	1494.6	-85.25	1494.6	-85.25	1494.6	154.75	1494.6	34.75	46.97	84.65	10.683
354016	[SAMI4	400.00]	3	2	AMP/OHM	1494.6	-85.25	1494.6	-85.25	1494.6	154.75	1494.6	34.75	46.97	84.65	10.683
354017	[RANCHODPURA	400.00]	3	1	AMP/OHM	5036.4	-85.82	5036.4	-85.82	5036.4	154.18	5036.4	34.18	19.25	84.65	10.687
354017	[RANCHODPURA	400.00]	3	2	AMP/OHM	5036.4	-85.82	5036.4	-85.82	5036.4	154.18	5036.4	34.18	19.25	84.65	10.687
354101	[NICOL TORREN	400.00]	3	2	AMP/OHM	5380.5	-86.67	5380.5	-86.67	5380.5	153.33	5380.5	33.33	7.73	84.66	10.689
364005	[NAGDA-4	400.00]	3	1	AMP/OHM	1736.5	-85.12	1736.5	-85.12	1736.5	154.88	1736.5	34.88	102.59	84.65	10.676
364005	[NAGDA-4	400.00]	3	2	AMP/OHM	1736.5	-85.12	1736.5	-85.12	1736.5	154.88	1736.5	34.88	102.59	84.65	10.676
	TO FIXED SHUNT			1	AMP/OHM	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00			
	TO FIXED SHUNT			2	AMP/OHM	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00			
	INITIAL SYM. S.C. CURRENT(I''k) (RMS) AMP					48837.1	-85.95	48837.1	-85.95	48837.1	154.05	48837.1	34.05			

AT BUS 354017 [RANCHODPURA 400.00] AREA 3 \*\*\* FAULTED BUS IS: 354017 [RANCHODPURA 400.00] \*\*\* 0 LEVELS AWAY \*\*\*  
 (kV L-G) V+:/0.000/0.00 VA:/0.000/0.00 VB:/0.000/0.00 VC:/0.000/0.00  
 THEVENIN IMPEDANCE, X/R (PU) Z+:/0.003415/85.906, 13.97102  
 THEVENIN IMPEDANCE, X/R (OHM) Z+:/5.464/85.906, 13.97101

X-----THREE PHASE FAULT-----X																
X-----	FROM	-----X	AREA	CKT	I/Z	/I+/ AN(I+)	/IA/ AN(IA)	/IB/ AN(IB)	/IC/ AN(IC)	/Z+/ AN(Z+)	APP	X/R				
352017	[RANCHDPR	220.00]	3	1	AMP/OHM	1074.3	-86.13	1074.3	-86.13	1074.3	153.87	1074.3	33.87	19.21	90.00	9999.999
352017	[RANCHDPR	220.00]	3	2	AMP/OHM	1074.3	-86.13	1074.3	-86.13	1074.3	153.87	1074.3	33.87	19.21	90.00	9999.999
352017	[RANCHDPR	220.00]	3	3	AMP/OHM	1074.3	-86.13	1074.3	-86.13	1074.3	153.87	1074.3	33.87	19.21	90.00	9999.999
352017	[RANCHDPR	220.00]	3	4	AMP/OHM	1074.3	-86.13	1074.3	-86.13	1074.3	153.87	1074.3	33.87	19.21	90.00	9999.999
354003	[DEHGM4	400.00]	3	1	AMP/OHM	5972.4	-85.55	5972.4	-85.55	5972.4	154.45	5972.4	34.45	19.25	84.65	10.687
354003	[DEHGM4	400.00]	3	2	AMP/OHM	5972.4	-85.55	5972.4	-85.55	5972.4	154.45	5972.4	34.45	19.25	84.65	10.687
354006	[CHORN4	400.00]	3	1	AMP/OHM	4048.2	-85.60	4048.2	-85.60	4048.2	154.40	4048.2	34.40	31.83	84.65	10.683
354006	[CHORN4	400.00]	3	2	AMP/OHM	4048.2	-85.60	4048.2	-85.60	4048.2	154.40	4048.2	34.40	31.83	84.65	10.683
354024	[BACHAU	400.00]	3	1	AMP/OHM	2011.6	-86.79	2011.6	-86.79	2011.6	153.21	2011.6	33.21	77.39	85.97	14.204
354024	[BACHAU	400.00]	3	2	AMP/OHM	2011.6	-86.79	2011.6	-86.79	2011.6	153.21	2011.6	33.21	77.39	85.97	14.204
354036	[HALVAD NEW	400.00]	3	1	AMP/OHM	3136.9	-86.03	3136.9	-86.03	3136.9	153.97	3136.9	33.97	37.09	84.65	10.685
354036	[HALVAD NEW	400.00]	3	2	AMP/OHM	3136.9	-86.03	3136.9	-86.03	3136.9	153.97	3136.9	33.97	37.09	84.65	10.685

354136	[BANASKANTHA 400.00]	3	1	AMP/OHM	3558.4	-86.04	3558.4	-86.04	3558.4	153.96	3558.4	33.96	38.63	84.65	10.684
354137	[SANKHARI 400.00]	3	2	AMP/OHM	4075.7	-86.13	4075.7	-86.13	4075.7	153.87	4075.7	33.87	31.67	84.87	11.144
INITIAL SYM. S.C. CURRENT(I''k) (RMS) AMP					<b>42268.3</b>	-85.91	42268.3	-85.91	42268.3	154.09	42268.3	34.09			

### Vadodara(PG) and Asoj(GETCO) Fault level contribution (without rearrangement)

AT BUS 354001 [ASOJ4 400.00] AREA 3 \*\*\* FAULTED BUS IS: 354001 [ASOJ4 400.00] \*\*\* 0 LEVELS AWAY \*\*\*  
(kV L-G) V+:/0.000/0.00 VA:/0.000/0.00 VB:/0.000/0.00 VC:/0.000/0.00  
THEVENIN IMPEDANCE, X/R (PU) Z+:/0.003130/86.581, 16.73682  
THEVENIN IMPEDANCE, X/R (OHM) Z+:/5.009/86.581, 16.73682

X-----THREE PHASE FAULT-----X																	
X-----	FROM	X	AREA	CKT	I/Z	/I+/	AN(I+)	/IA/	AN(IA)	/IB/	AN(IB)	/IC/	AN(IC)	/Z+/	AN(Z+)	APP	X/R
352001	[ASOJ2 220.00]	3	1	AMP/OHM	1636.5	-85.68	1636.5	-85.68	1636.5	154.32	1636.5	34.32	12.10	90.00	9999.999		
352001	[ASOJ2 220.00]	3	2	AMP/OHM	1636.5	-85.68	1636.5	-85.68	1636.5	154.32	1636.5	34.32	12.10	90.00	9999.999		
352001	[ASOJ2 220.00]	3	3	AMP/OHM	1636.5	-85.68	1636.5	-85.68	1636.5	154.32	1636.5	34.32	12.10	90.00	9999.999		
352001	[ASOJ2 220.00]	3	4	AMP/OHM	1031.0	-85.68	1031.0	-85.68	1031.0	154.32	1031.0	34.32	19.21	90.00	9999.999		
354004	[WANAKBORI 400.00]	3	1	AMP/OHM	4755.0	-85.46	4755.0	-85.46	4755.0	154.54	4755.0	34.54	25.33	84.87	11.145		
354006	[CHORN4 400.00]	3	1	AMP/OHM	2459.9	-85.54	2459.9	-85.54	2459.9	154.46	2459.9	34.46	59.00	84.87	11.143		
354006	[CHORN4 400.00]	3	2	AMP/OHM	2623.0	-85.54	2623.0	-85.54	2623.0	154.46	2623.0	34.46	55.33	84.87	11.144		
354011	[SSP4 400.00]	3	1	AMP/OHM	4320.8	-85.38	4320.8	-85.38	4320.8	154.62	4320.8	34.62	27.67	84.87	11.148		
354029	[KOSAMBA 400.00]	3	1	AMP/OHM	3246.3	-85.59	3246.3	-85.59	3246.3	154.41	3246.3	34.41	40.67	84.87	11.142		
354035	[VADODARA 400.00]	3	1	AMP/OHM	9579.1	-88.12	9579.1	-88.12	9579.1	151.88	9579.1	31.88	3.80	86.67	17.196		
354035	[VADODARA 400.00]	3	2	AMP/OHM	9579.1	-88.12	9579.1	-88.12	9579.1	151.88	9579.1	31.88	3.80	86.67	17.196		
364001	[INDORE-4 400.00]	3	1	AMP/OHM	1757.4	-85.17	1757.4	-85.17	1757.4	154.83	1757.4	34.83	96.33	84.87	11.144		
364001	[INDORE-4 400.00]	3	2	AMP/OHM	1860.4	-85.17	1860.4	-85.17	1860.4	154.83	1860.4	34.83	91.00	84.87	11.145		
INITIAL SYM. S.C. CURRENT(I''k) (RMS) AMP					<b>46109.6</b>	-86.58	46109.6	-86.58	46109.6	153.42	46109.6	33.42					

AT BUS 354035 [VADODARA 400.00] AREA 3 \*\*\* FAULTED BUS IS: 354035 [VADODARA 400.00] \*\*\* 0 LEVELS AWAY \*\*\*  
(kV L-G) V+:/0.000/0.00 VA:/0.000/0.00 VB:/0.000/0.00 VC:/0.000/0.00  
THEVENIN IMPEDANCE, X/R (PU) Z+:/0.003168/87.074, 19.56519  
THEVENIN IMPEDANCE, X/R (OHM) Z+:/5.069/87.074, 19.56519

X-----THREE PHASE FAULT-----X																	
X-----	FROM	X	AREA	CKT	I/Z	/I+/	AN(I+)	/IA/	AN(IA)	/IB/	AN(IB)	/IC/	AN(IC)	/Z+/	AN(Z+)	APP	X/R
352210	[VADODARAPG 220.00]	3	1	AMP/OHM	1767.6	-85.54	1767.6	-85.54	1767.6	154.46	1767.6	34.46	12.10	90.00	9999.999		
352210	[VADODARAPG 220.00]	3	2	AMP/OHM	1767.6	-85.54	1767.6	-85.54	1767.6	154.46	1767.6	34.46	12.10	90.00	9999.999		
354001	[ASOJ4 400.00]	3	1	AMP/OHM	10191.7	-85.57	10191.7	-85.57	10191.7	154.43	10191.7	34.43	3.80	86.67	17.196		
354001	[ASOJ4 400.00]	3	2	AMP/OHM	10191.7	-85.57	10191.7	-85.57	10191.7	154.43	10191.7	34.43	3.80	86.67	17.196		
354111	[DHOLERA4 400.00]	3	1	AMP/OHM	3136.8	-87.24	3136.8	-87.24	3136.8	152.76	3136.8	32.76	29.14	86.42	15.978		
354111	[DHOLERA4 400.00]	3	2	AMP/OHM	3136.8	-87.24	3136.8	-87.24	3136.8	152.76	3136.8	32.76	29.14	86.42	15.978		
358035	[VADODARA 765.00]	3	1	AMP/OHM	7692.1	-89.36	7692.1	-89.36	7692.1	150.64	7692.1	30.64	54.62	90.00	9999.999		
358035	[VADODARA 765.00]	3	2	AMP/OHM	7692.1	-89.36	7692.1	-89.36	7692.1	150.64	7692.1	30.64	54.62	90.00	9999.999		
INITIAL SYM. S.C. CURRENT(I''k) (RMS) AMP					<b>45556.0</b>	-87.07	45556.0	-87.07	45556.0	152.93	45556.0	32.93					



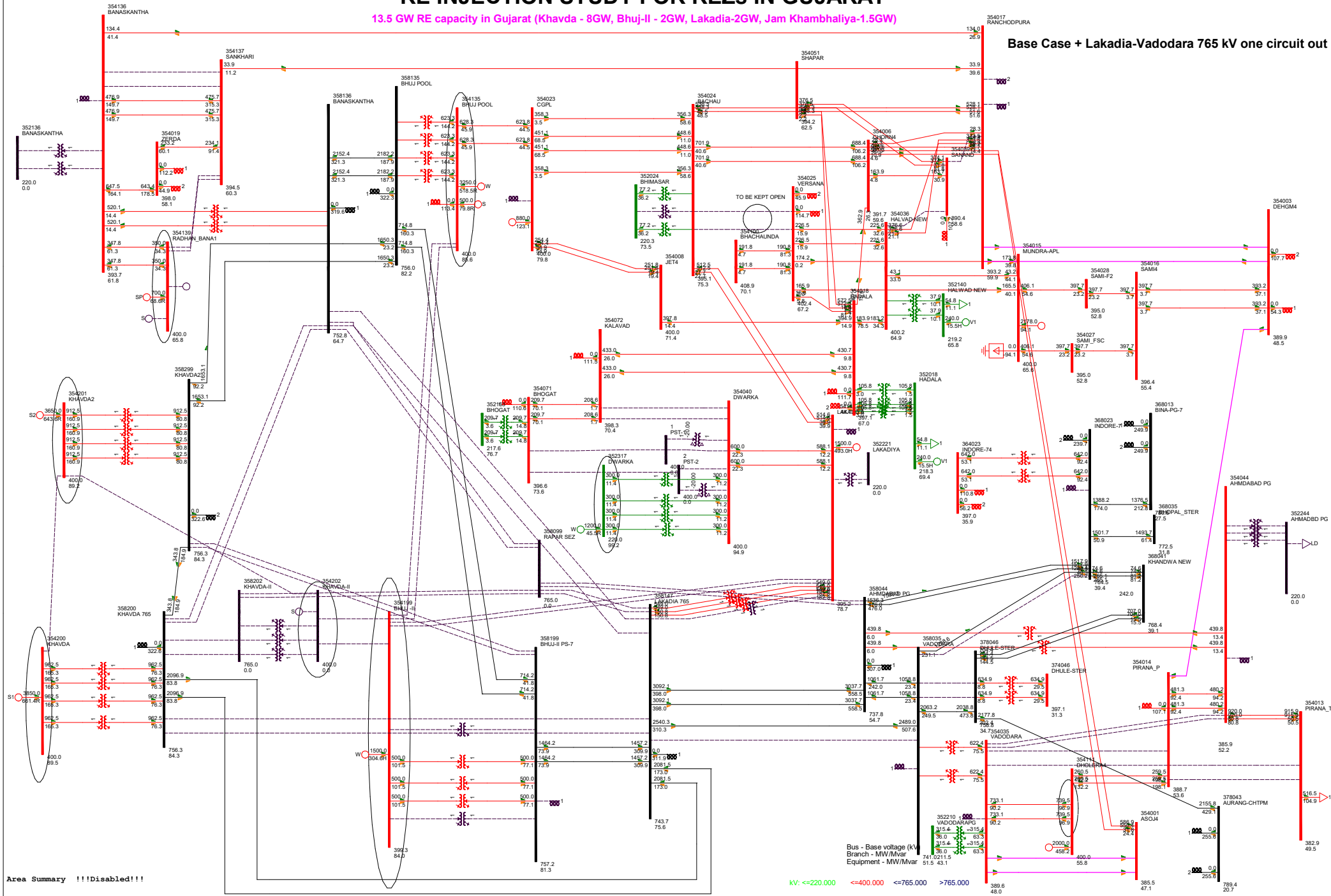


# RE INJECTION STUDY FOR REZs IN GUJARAT

Annexure-IV

13.5 GW RE capacity in Gujarat (Khavda - 8GW, Bhuj-II - 2GW, Lakadia-2GW, Jam Khambhaliya-1.5GW)

Base Case + Lakadia-Vadodara 765 kV one circuit out

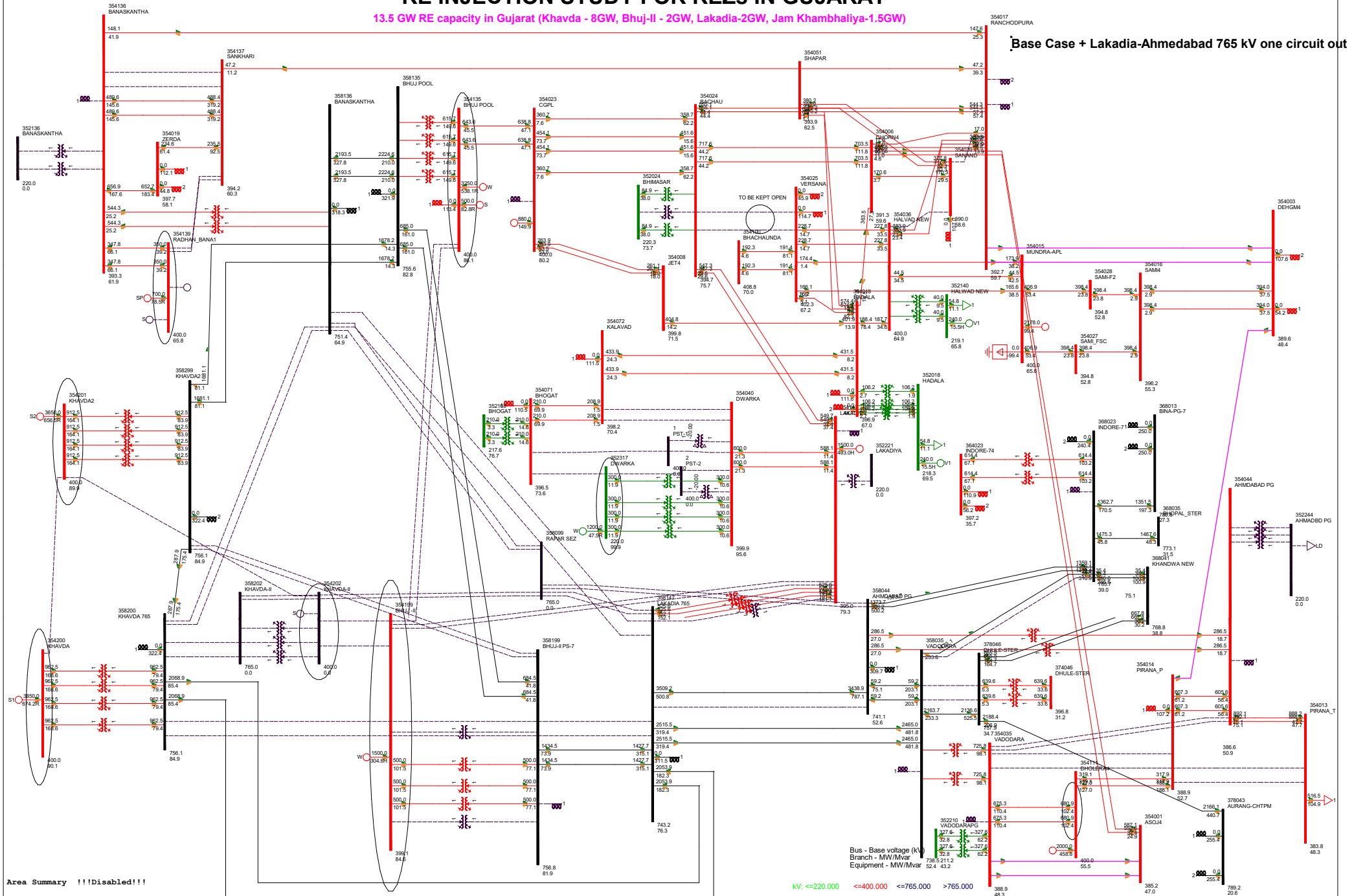


# RE INJECTION STUDY FOR REZs IN GUJARAT

Annexure-IV

13.5 GW RE capacity in Gujarat (Khavda - 8GW, Bhuj-II - 2GW, Lakadia-2GW, Jam Khambhaliya-1.5GW)

Base Case + Lakadia-Ahmedabad 765 kV one circuit out



Area Summary !!!Disabled!!!

Bus - Base voltage (kV)  
Branch - MW/Mvar  
Equipment - MW/Mvar

kv: <math>\le 220.000</math> <math>\le 400.000</math> <math>\le 765.000</math> > 765.000











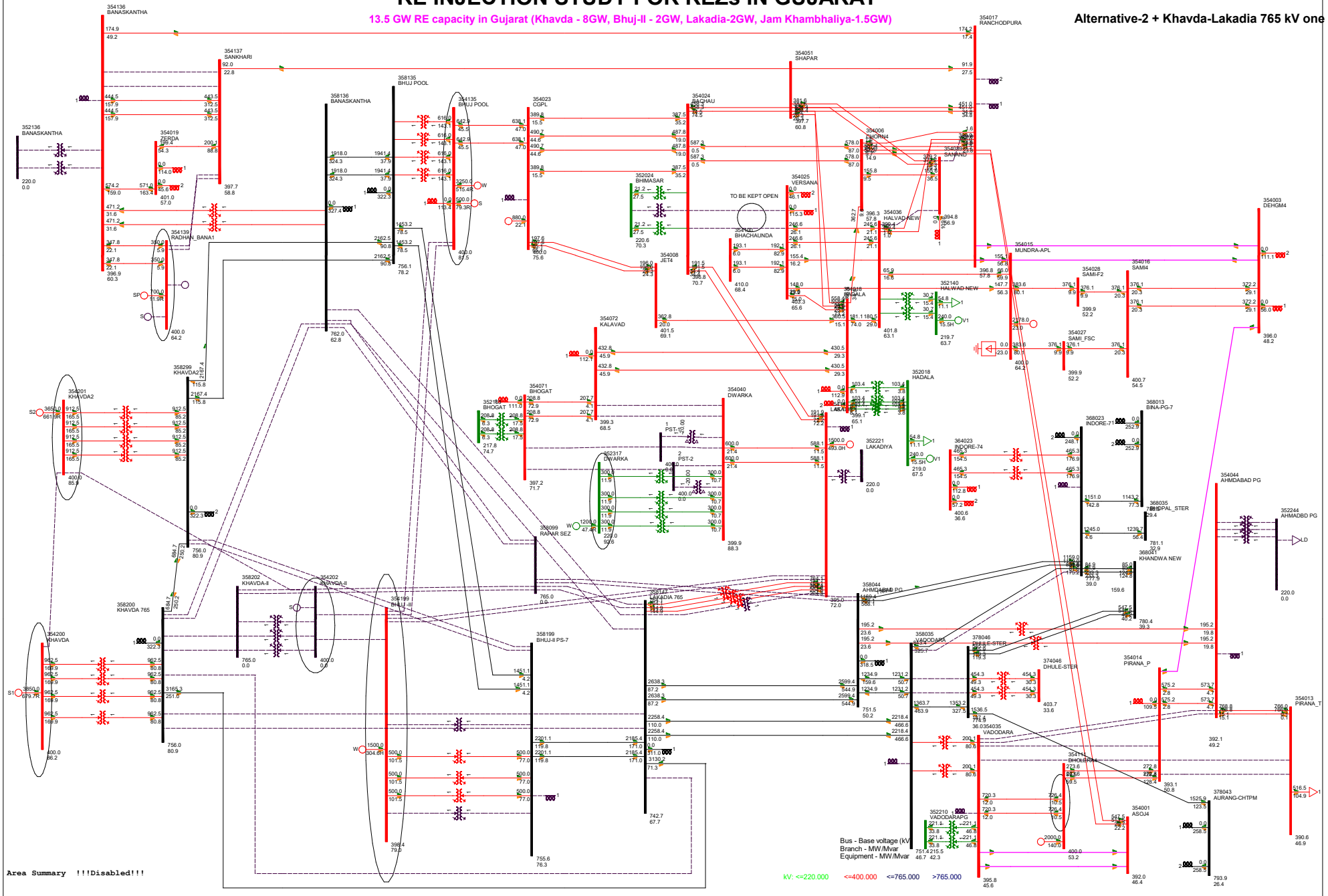


# RE INJECTION STUDY FOR REZs IN GUJARAT

13.5 GW RE capacity in Gujarat (Khavda - 8GW, Bhuj-II - 2GW, Lakadia-2GW, Jam Khambhaliya-1.5GW)

Annexure-VI

Alternative-2 + Khavda-Lakadia 765 kV one circuit out



Area Summary !!!Disabled!!!

Bus - Base voltage (kV)  
Branch - MW/Mvar  
Equipment - MW/Mvar

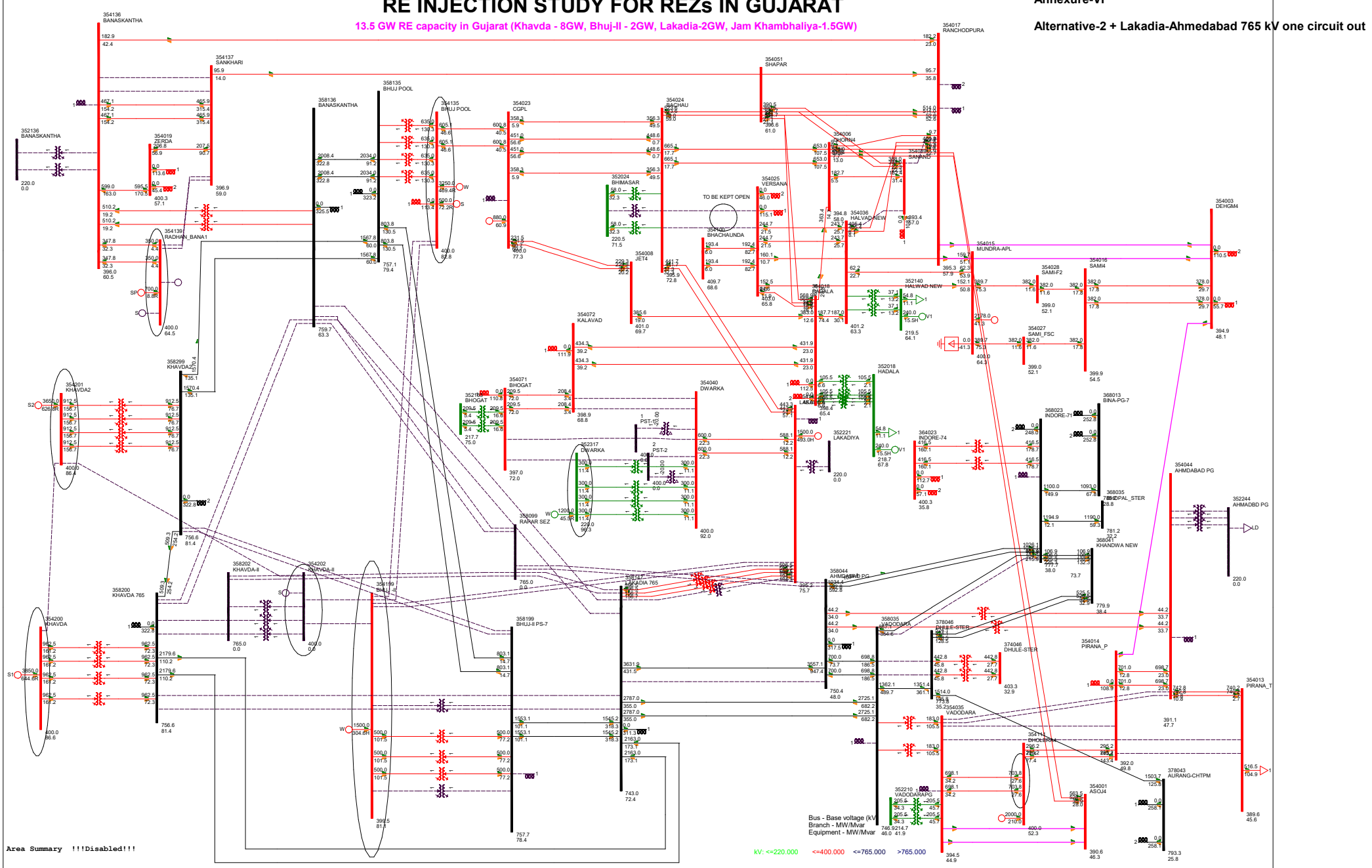
$V \le 220.000$     $220.000 < V \le 400.000$     $400.000 < V \le 765.000$     $V > 765.000$

# RE INJECTION STUDY FOR REZs IN GUJARAT

13.5 GW RE capacity in Gujarat (Khavda - 8GW, Bhuj-II - 2GW, Lakadia-2GW, Jam Khambhaliya-1.5GW)

Annexure-VI

Alternative-2 + Lakadia-Ahmedabad 765 kV one circuit out



Area Summary !!!Disabled!!!





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 &amp; Appraisal-I Division

To,

- (i) Shri Sanjay Dubey, IAS, Principal Secretaary, Energy Department, Second floor, Mantralaya, Vallabh Bhawann, Bhopal, Madhya Pradesh - 462004
- (ii) Principal Secretary (NRED), Mantralaya, Vallabh Bhawann, Bhopal, Madhya Pradesh - 462004
- (iii) Shri Sunil Tiwari, Managing Director, MPPTCL, Block no -2, Shakti Bhawan, Rampur, Jabalpur (M.P.) - 482008
- (iv) Shri Girish Kumar (Director), MNRE, Block-14, CGO Complex, Lodhi Road, New Delhi - 110003
- (v) Shri Subir Sen, COO (CTU), PGCIL, Saudamini, Plot No. 2, Sector - 29, Gurugram - 122001
- (vi) Managing Director (SECI), 1st Floor, D-3, A Wing, Prius Platinum Building District Centre, Saket, New Delhi - 110017


**Subject: Minutes of Meeting to discuss Connectivity Issues at 220 kV voltage level with ISTS Sub-stations located in Madhya Pradesh.**

महोदया / महोदय / Madam / Sir,

An e-meeting under the chairmanship of Chairperson, CEA to discuss Connectivity Issues at 220 kV voltage level with ISTS Sub-stations located in Madhya Pradesh was held on 15.07.2020.

The minutes of the meeting are enclosed herewith.

भवदीय,

  
(Goutam Roy) 4/8/20  
Chief Engineer (PSPA-I)

Copy to: PPS to Chairperson, CEA, New Delhi.



**Minutes of e- meeting held on 15.07.2020 under chairmanship of Chairperson, CEA to discuss Connectivity Issues at 220 kV voltage level with ISTS Sub-stations located in Madhya Pradesh**

List of participants is attached as Annexure

1. Chairperson, CEA welcomed the participants and stated that the meeting has been convened to resolve Connectivity Issues of RE generators at 220 kV voltage level of ISTS Sub-stations located in Madhya Pradesh. He requested the members for fruitful discussion so that the issue could be resolved in this meeting.
2. CE (PSPA-I), CEA stated that in the meeting held earlier on 30.03.2020, the following decisions were taken with respect to grant of connectivity to RE developers at 220 kV level at ISTS S/stns in MP:
  - i) M/s Masaaya Solar Energy Pvt. Ltd may be granted connectivity at 220 kV level of existing Khandwa (PG) S/stn.
  - ii) CTU may proceed with grant of connectivity to 325 MW Wind Project of M/s SBESS Services Projectco Pvt Ltd at 220 kV level of existing Indore (PG) S/s. This would require implementation of Indore-Indore (PG) 2<sup>nd</sup> 220 kV D/c line for effecting the LTA that may be taken up as ISTS. Alternatively, since overloading of downstream network is involved in this case and considering RoW issues in Indore area, the modalities of implementing 400/220 kV transformer and directly connecting the generator to 400 kV bus of Indore (PG) S/stn could be explored. Any decision in this would require approval of the Western Regional Power Committee on Transmission Planning (WRPCTP)
  - iii) MPPTCL's concerns regarding applicability of STU transmission charges and losses on portion of power flowing from the generation project into Madhya Pradesh system is a commercial issue, which need to be addressed at appropriate forum.

Subsequently, MPPTCL vide e-mail dated 18.05.2020 had sent their observations on the minutes of meeting held on 30.03.2020 wherein it was stated that, Central Electricity Authority has been vested with the powers to resolve the dispute related with Generation, Transmission and Distribution amongst the stakeholders through different associated committees constituted under CEA and is presumed to be the appropriate forum to take decision on the concerned issue. Therefore, addressing the issue at appropriate forum other than CEA does not appear to be significant.

In the 47<sup>th</sup> and 48<sup>th</sup> meeting of Western Region Constituents regarding Connectivity and LTA applications in Western region convened by CTU on 06.05.2020 and 30.06.2020 respectively, MPPTCL once again had raised its concerns regarding applicability of State transmission charges & losses for additional power flowing through STU network if LTA is allowed with injection at 220 kV level. MPPTCL vide its email dated 18.05.2020 has requested CEA to address the same. In the 48<sup>th</sup> connectivity/LTA meeting held on

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30.06.2020 MPPTCL was requested to convey their comments/observation on all the RE projects whose connectivity/LTA was under process by CTU at ISTS substations in Madhya Pradesh and a separate meeting would be held to discuss the same.

CE (PSPA-I), CEA requested MPPTCL to inform their present stand with respect to the above mentioned applications seeking connectivity/LTA at 220 kV voltage level in ISTS S/stns in MP.

3. MD, MPPTCL stated that about 43-50% power injected by the projects at Khandwa, Indore & Rajgarh S/s at 220 kV level would flow through MPPTCL (STU) network, resulting in increased loading and losses in the STU network. Accordingly, MPPTCL has been consistent in its view that STU transmission charges and losses on portion of power flowing from the generation project into Madhya Pradesh network would be applicable on the generation developer.
4. Principal Secretary (Energy), MP stated that as far as grant of connectivity at 220 kV level at Indore (PG) is concerned, on account of constraints in downstream system, CTU has come out with an option of an additional 1x500MVA, 400/220kV ICT (3<sup>rd</sup>) at Indore S/stn which would be segregated at 220 kV level to control overloading of downstream outlets. Since, with this arrangement, no additional power would flow through State network, therefore it is agreeable. However, in case of grant of connectivity at 220 kV level in Khandwa(PG) and Rajgarh S/stns, the problem of increased loading and losses in the STU network would remain. With RE expansion, this issue would be replicated in other states too. Accordingly, as a uniform approach to be followed for all future RE developers seeking ISTS connectivity, it can be agreed that either RE developers would be given the connectivity directly at 400 kV voltage level or alternatively segregated 400/220 kV transformer be implemented under ISTS at all such S/stns.
5. CTU made the following submissions over the observations and issues of MP:
  - i) In an integrated grid, power flows is through displacement. As far as total demand of MP is concerned, it remains same. With direct injection of power by RE generators at 220 kV level at Indore, Khandwa and Rajgarh 400/220 kV ISTS substations, the load of MP in the vicinity of Indore, Khandwa and Rajgarh shall be met locally and there shall be corresponding reduction in drawal of power from other ISTS substations in MP. Availability of generation near load centers would also reduce the overall loss of MP system.
  - ii) COO, CTU stated that even for Ultra mega Solar Parks at Neemuch (500 MW), Agar (550 MW) and Shajapur (450 MW) being developed by MP, M/s RUMS ( the SPPD) has applied for connectivity at 220 kV voltage level. The pooling station under ISTS at Agar/Shajapur and Neemuch has been planned with injection level at 220 kV level. It may be noted that substantial power from these Solar Parks would be utilized by State itself.

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6. CE (PSPA1), CEA stated that transmission system planning is done in a coordinated and optimal manner with an effort to utilize the available margins in the system. As far as MP's suggestion of granting ISTS connectivity to all future RE developers either at 400 kV voltage level or with implementation of segregated 400/220 kV transformers under ISTS would result in sub-optimal utilization of resources. Implementation of 400 kV bay for injection of mere 300 MW power is akin to under-utilisation of an asset. In case of injection of power at 220 kV level Indore (PG) S/stn, downstream STU network was found to be getting overloaded, so the option of either implementing the downstream system strengthening or implementing an additional 400/220 kV transformer was given. However, for Khnadwa and Rajgarh S/stn, even after RE injections at 220 kV voltage level, the downstream line loadings are well within the limits. Accordingly, it has been proposed that connectivity be granted to RE developers at 220 kV level at these substations.
7. SECI informed that these RE developers seeking connectivity at 220 kV level have come up via bidding process as per prevailing regulations. Now at this stage when financial closure has been achieved by the developers, they cannot agree for bearing any additional charges that have not been earlier mentioned in their bidding documents. Accordingly, it would not be prudent to impose upon them any additional condition to bear STU charges and losses or implement a dedicated 400/220 kV transformer at this stage.
8. Principal Secretary (Energy), MP enquired from SECI about the criteria of identifying the locations where RE bids are invited.
9. SECI informed that RE bids are floated primarily on pan-India basis. However, the list of potential locations where the transmission system gets identified in Regional Power Committees (Transmission Planning) are provided to the bidders/developers. Accordingly, the developers opt for the suitable location.
10. Principal Secretary (Energy), MP stated that considering the issue indicated by CEA, CTU & SECI, MPPTCL agrees for the connectivity of RE power of Masaaya Solar Energy Pvt. Ltd at 220 kV level of existing Khandwa (PG) S/stn and Spring energy at 220 kV level of Rajgarh S/stn. As regard to grant of connectivity at 220 kV level at Indore (PG) is concerned, CTU may proceed with grant of connectivity to 325 MW Wind Project of M/s SBESS Services Projectco Pvt Ltd at 220 kV level segregating it from the 220 kV existing Indore (PG) S/s and connecting the generator directly to 400 kV Indore (PG) bus through 400/220 kV transformer. He further stated that for any future connectivity in MP grid CTU should discuss with the STU beforehand so that the issue of overloading can be avoided.
11. MPNRED stated that they would be closing their bids for Neemuch, Agar and Shajpur Ultra Mega RE Power Parks by October' 2020. In the view of this, implementation of ISTS pooling stations in the time frame of July'2022 for evacuation of power from these Solar parks would be required. He further stated that Implementation of ISTS Transmission scheme for evacuation of power from RE projects in Rajgarh (2500 MW) has been decided to be done in phases. The transmission elements that have been formalized for evacuation of 1000 MW power from Agar and Shajapur Solar Park (1000 MW) under Phase-I comprises of establishment of Pachora 400/220 kV PS alongwith Pachora SEZ PS - Bhopal

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(Sterlite) 400 kV D/c line. However, if instead of Pachora SEZ PP – Bhopal (Sterlite) 400 kV D/c line that is proposed under Ph-I, it is agreed to implement Pachora SEZ PP-Shujalpur 400kV D/c line (planned for Ph-II), it would result in cost and time saving as the length of line would get reduced.

12. CTU stated that any injection of power at Shujalpur S/s leads to overloading of 400/220kV ICTs and Shujalpur(PG)-Shujalpur(MP) 220kV D/c line under N-1 contingency condition. Hence, the same would require additional transmission system strengthening for which additional cost shall be incurred and its implementation would require approval by WRPC (TP). Also, with implementation of Pachora SEZ PP – Bhopal (Sterlite) 400 kV D/c line under first phase, evacuation of additional 500MW (in addition to 1000 MW in Phase-I) would be possible with the augmentation of 1x500MVA ICT at Pachora PS. CTU further stated that M/s RUMS may apply for LTA for firming up the Transmission system associated with the LTA from Rajgarh and Neemuch at the earliest and they may also apply for additional 500 MW Stage-I/II connectivity at Neemuch solar park as it would be developed as 2x500 MVA 400/220 kV P.S.

13. After detailed deliberations covering all the issues, the following was agreed :

- i) The following Stage-II connectivity/LTA for RE developers were agreed :

S. No	RE developer	Connectivity point	LTA system
1	M/s Masaaya Solar Energy Pvt. Ltd Stage-II connectivity & LTA: 300MW	220 kV level of existing Khandwa (PG) S/stn.  220 kV line bay under developer scope.	Existing system
2	M/s Spring Vaayu Vidyut Pvt Ltd (300 MW): 100 MW additional LTA [Stage-II connectivity for 300MW & LTA for 200MW already granted]	220 kV level of existing Rajgarh S/s (already connected)	Existing system
3	M/s SBESS Services Projectco Pvt Ltd : Stage-II Connectivity for 324.4 MW already granted at existing 220 kV bus of Indore.  LTA for 324.4 already applied	220 kV level of existing Indore (PG) 765/400/220 kV S/s.  Connectivity system under ISTS scope: i) 220 kV bus extension of Indore 765/400/220 kV substation. ii) 220kV Hybrid	i) 1x500MVA, 400/220kV ICT (3rd) at Indore S/s along with associated ICT bays (400kV AIS & 220kV Hybrid/MTS) with 220kV ICT bay on extended bus.  ii) Bus sectionaliser (Hybrid/MTS) between extended and existing 220 kV bus at Indore S/s [so that the 220kV bus

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		/MTS line bay	section with dedicated line of SBESS as well as 3rd ICT may be segregated from the existing 220kV bus at Indore S/s, whenever required, in order to control the overloading of 220kV outlets from Indore S/s depending on the injection of power from SBESS]
4	M/s RUMS : Agar(550 MW) and Shajpur (450 MW) Solar Park  M/s RUMS has applied for Stage-I/II connectivity and the same is under process. M/S RUMS has not yet applied for LTA	Connectivity at 220kV level proposed at planned Pachora P.S	M/s RUMS may apply for LTA for firming up the Transmission system associated with the LTA.
5	M/s RUMS : Neemuch Solar park (500 MW)  M/s RUMS has applied for Stage-II connectivity and the same is under process. M/S RUMS has not yet applied for LTA	Connectivity at 220kV level proposed at envisaged Neemuch P.S.	M/s RUMS may apply for LTA for firming up the Transmission system associated with the LTA.

- ii) M/s RUMS to apply for additional 500 MW Stage-I/II connectivity at Neemuch solar park and LTA corresponding to the Stage-II quantum granted/applied for w.r.t Agar,Shajapur & Neemuch Solar Parks as mentioned in the above table.
- iii) For facilitating expeditious implementation of ISTS pooling stations at Pachora and Neemuch, MPNRED would be providing the boundary limits of the identified land for setting up the REZ pooling stations for Pachora and Neemuch RE power park complex.

Meeting ended with thanks to chair.

#### List of participants

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Sewa Bhawan, R.K Puram-I, New Delhi-110066 Email: [cea-pspa1@gov.in](mailto:cea-pspa1@gov.in) Website: [www.cea.nic.in](http://www.cea.nic.in)

I/10790/2020

Date: 15.07.2020

S.No	Name (S/Shri)	Designation	Mb. No.	Email
<b>I. CEA</b>				
1.	P.S.Mhaske	Chairperson- in chair	011-26732222	chair@nic.in
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3.	Awdhesh Kr. Yadav	Director	9868664087	awd.ceal@gmail.com
4.	Priyam Srivastava	Dy. Director	9717650473	priyam.cea@gmail.com
5.	Vikas Sachan	Asst. Director	7838263649	vikas.cea@gov.in
<b>II. Govt. of MP</b>				
6.	Sanjay Dubey	Principal Secretary (Energy Dept.) & MPNRED	0755-2708031	<a href="mailto:secyenergy@mp.gov.in">secyenergy@mp.gov.in</a>
<b>III. MNRE</b>				
7.	Girish Kumar	Scientist E	9717493267	gkumar.mnre@nic.in
<b>IV. POWERGRID</b>				
8.	Subir Sen	COO(CTU-Plg)	9650293185	subir@powergridindia.com
9.	Ashok Pal	CGM(CTU-Plg)	9910378105	ashok@powergridindia.com
10.	P.S. Das	GM, CTU	8826094863	psdas@powergridindia.com
11.	Bhaskar Wagh	Manager		bhaskarwagh@powergridindia.com
12.	Pratyush Singh	Sr. Engineer		pratyush.singh@powergridindia.com
13.	Shashank Shekhar	Engineer		shashankshekhar@powergridindia.com
<b>V. MPPTCL</b>				
14.	Sunil Tiwari	Managing Director	0761-2661234	<a href="mailto:md@mptransco.nic.in">md@mptransco.nic.in</a>
15.	M.K.Jaitwal	Chief Engineer	9425805577	ce.pnd@mptransco.nic.in
16.	Mohan Dhoke	S E	0761-2702180	<a href="mailto:se3.pnd@mptransco.nic.in">se3.pnd@mptransco.nic.in</a>
<b>VI. SECI</b>				
17.	S. K. Mishra	Managing Director		sk.mishra@seci.co.in
18.	R.K. Agarwal	Consultant	9910346333	<a href="mailto:pikabaya56@gmail.com">pikabaya56@gmail.com</a>
<b>VII. MPNRED</b>				
19.	Deepak Saxena	Add. Comm & MD	0755-2556526	<a href="mailto:mduvnb@gmail.com">mduvnb@gmail.com</a>
20.	Avaneesh Shukla	Executive Engineer	0755-2980002	<a href="mailto:avaneesh.shukla3@gmail.com">avaneesh.shukla3@gmail.com</a>

**MADHYA PRADESH POWER TRANSMISSION CO. LTD.**

(A wholly owned Govt. of Madhya Pradesh Undertaking)

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Block No.2, Shakti Bhawan, Rampur, Jabalpur (MP) 482008, Tel.:(0761) 270-2132, 2242

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No. 04-02/N-171/ 1157

Jabalpur, Date: 21-7-2020

To,

✓ **Shri Goutam Roy**  
Chief Engineer (PSP & A-I),  
Central Electricity Authority,  
Sewa Bhawan, R.K. Puram  
New Delhi – 110066.

Fax No.: 011-26102045  
-26175921

**Sub: Proposed agenda point of MPPTCL for inclusion in 2<sup>nd</sup> Western Region Power Committee- Transmission Planning (WRPC-TP).**

**Ref: CEA Email dated 07.07.2020**

In reference to your email cited above, the agenda point of MPPTCL proposed to be included in 2<sup>nd</sup> Western Region Power Committee - Transmission Planning (WRPC-TP) is given here under:

- (A) **LIL0 of both circuit of Itarsi (PGCIL) to Bhopal (MPPTCL) 400kV D/C line (on Twin Moose) at Mandideep 400kV GIS Substation (Distt-Bhopal) to be constructed under TBCB process.**

Demand of Madhya Pradesh has reached 14555MW in FY 2019-20 and expected to grow upto 18000MW approximately by year 2022-23. Accordingly, system studies were carried out to evolve transmission system requirement for the end of 13<sup>th</sup> Plan period considering load demand of Madhya Pradesh as 18000MW. In this context it is to intimate that at present, MPPTCL is having only one 400kV substation at Bhopal. The 220kV substations Bhopal, Mandideep and Hoshangabad are being fed from Itarsi (PGCIL) 400kV substation as well as Bhopal(MPPTCL) 400kV substation through a 220kV DCDS line. Bhopal 400kV substation is also feeding the load of Beragarh, Vidisha, Mugaliyachhap, Adampur and Shujalpur 220kV substations of MPPTCL. Presently total transformation capacity of Bhopal(MPPTCL) 400kV substation is 4x315MVA i.e. 1260MVA. The maximum load recorded during 2019-20 on Bhopal 400kV substation is 1013MVA (80.40%). As the Bhopal is the Capital City of the Madhya Pradesh State, it is expanding very rapidly and entire supply of Bhopal City is dependent upon only one 400kV substation.

Therefore, in order to meet the future load growth of the Bhopal City and to cater the load of Mandideep industrial area, it is proposed to create a new 400/220/132/33kV GIS substation at Mandideep under TBCB route with intra-state transmission works as given hereunder :

- (i) Establishment of 400/220/132/33kV GIS substation at Mandideep with (2x500MVA,400/220kV) + (2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers and 1x125MVAR Bus Reactor

- (ii) LILO of both circuit of Itarsi (PGCIL) - Bhopal 400kV line (Twin Moose) at Mandideep 400kV GIS substation (2x10Km)
- (iii) LILO of both circuits of Hoshangabad - Mandideep - Adampur 220kV line at Mandideep 400kV GIS substation (2x10Km)
- (iv) LILO of Mandideep132 - Bagroda 132kV line at Mandideep 400kV GIS substation (10Km)
- (v) LILO of Mandideep220 - MACT Bhopal 132kV line at Mandideep 400kV GIS substation (10Km)

**(B) LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation.**

Creation of 220/132kV Substation at Bhind (Distt-Bhind) is being undertaken through TBCB process with (2x160)MVA,220/132kV transformation capacity and by laying a 220kV DCDS line from Morena(Adani-TBCB) 400kV S/s to Bhind 220kV S/s. M/s Powergrid-Bhind Guna Transmission Ltd. (PG-BGTL) has been selected as Transmission Service Provider (TSP) for implementation of above intra-state transmission project through TBCB process. M/s Powergrid-Bhind Guna Transmission Ltd. has started the activities and work is targeted to be completed in 36 months from Signing of Share Purchase Agreements(SPA) & Transfer of SPV i.e. from 11.09.2019.

It is further to mention that at present total transformation capacity of Mehgaon 220kV substation is (2x160)MVA (i.e. 320MA) and maximum load recorded during the year 2019-20 is 273MVA (85%). Moreover, due to space constraints, it is not possible to enhance the capacity at this substation. Mehgaon 220kV Substation is fed through 220kV lines connected from Auriya (UP) and Morena (Adani-TBCB) 400kV S/s and maximum load recorded during the year 2019-20 on these lines are 134MW and 231MW respectively. In case of outage of Morena (Adani-TBCB) – Mehgaon 220kV line, the Auriya(UP) – Mehgaon 220kV line gets overloaded and it is difficult to manage the loads feeding from Mehgaon 220kV S/s and reliability of supply in the area also affected.

Looking to the gradual increase in load of Mehgaon 220kV S/s and overloading on Auriya(UP) – Mehgaon 220kV line during contingency condition, it is has been proposed to LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation. The provision of 2 Nos. 220kV feeder bays for termination of LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation is already considered under the scope of work of TSP i.e. M/s Powergrid-Bhind Guna Transmission Ltd..

**(C) LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation.**

It is to mention that at present total transformation capacity of Gwalior (Mahalgaon) 220kV substation is (2x160+120)MVA (i.e. 440MA) and maximum load recorded during the year 2019-20 is 304MVA. Gwalior (Mahalgaon) 220kV substation is fed through 220kV lines connected from Bina(MP) 400kV S/s and Gwalior (PGCIL) 765kV S/s. The maximum load recorded on Gwalior(Mahalgaon) to Gwalior(PGCIL) 220kV D/C line in the year 2019-20 is 135MW & 141MW respectively. In case of outage of any one circuit, the other 220kV circuit gets overloaded and it is difficult to



manage the feeding from Gwalior(Mahalgaon) 220kV S/s and reliability of supply in the area also affected.

Looking to the gradual increase in load of Gwalior (Mahalgaon) 220kV S/s and overloading on Gwalior(Mahalgaon) to Gwalior(PGCIL) 220kV D/C line during contingency condition, it is has been proposed to LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation. PGCIL is requested to consider the provision for construction of 2 Nos. 220kV feeder bays for termination of LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation in the matching timeframe.

In view of above, it is requested that aforementioned proposals of MPPTCL may please be considered as agenda items for inclusion in 2<sup>nd</sup> Western Region Power Committee- Transmission Planning (WRPC-TP) for approval of the committee.

  
Chief Engineer(Plg. & Design)  
MPPTCL-Jabalpur

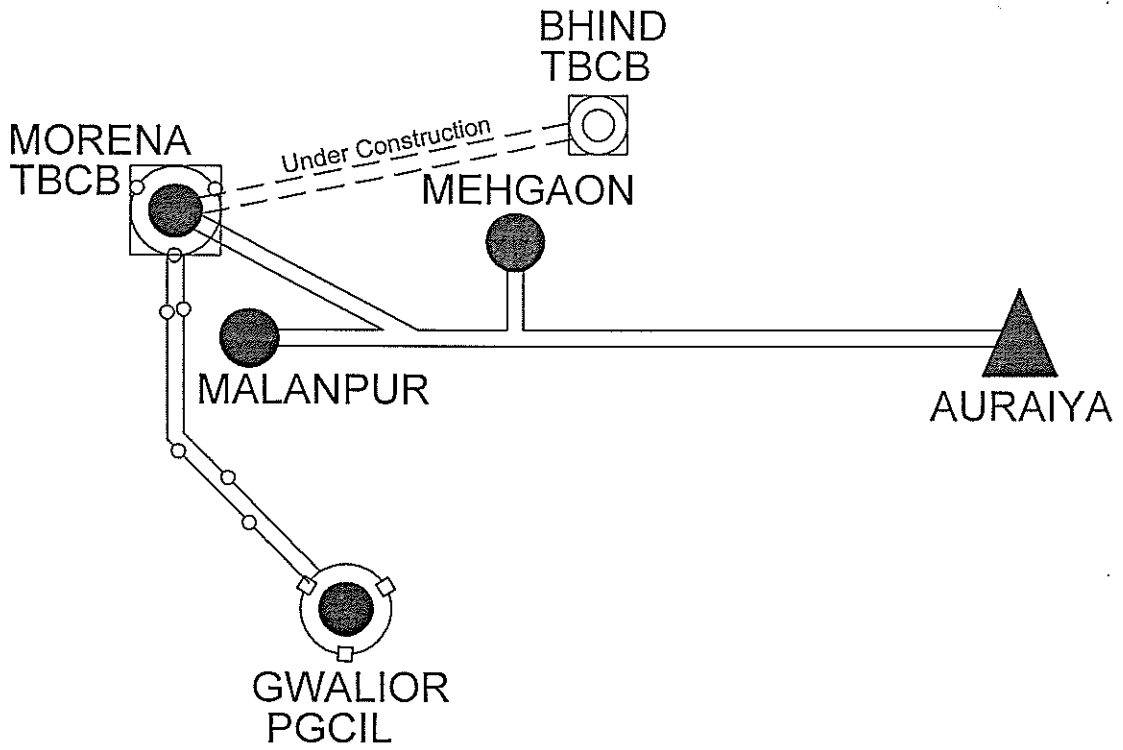
Copy to:

Staff officer, O/o Managing Director ,MPPTCL, Jabalpur

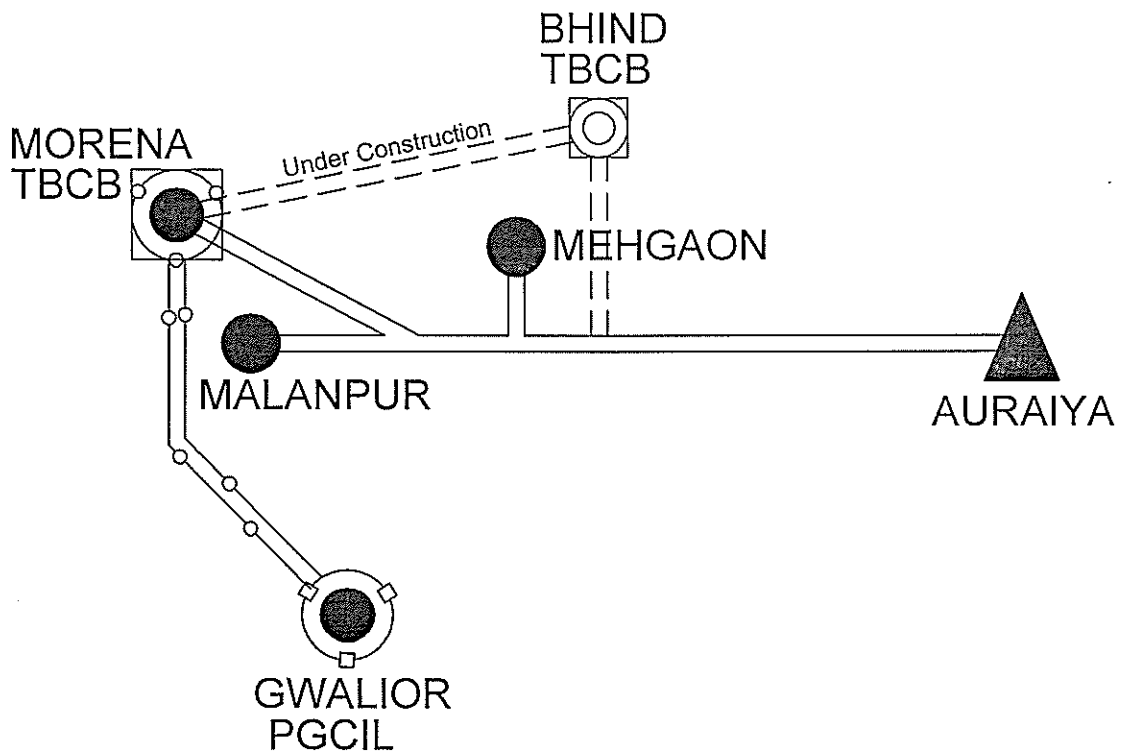
# LILO OF MAHALGAON 220KV - AURAIYA(UP) LINE AT BHIND 220KV (TBCB)

Existing Arrangement

APPENDIX-I

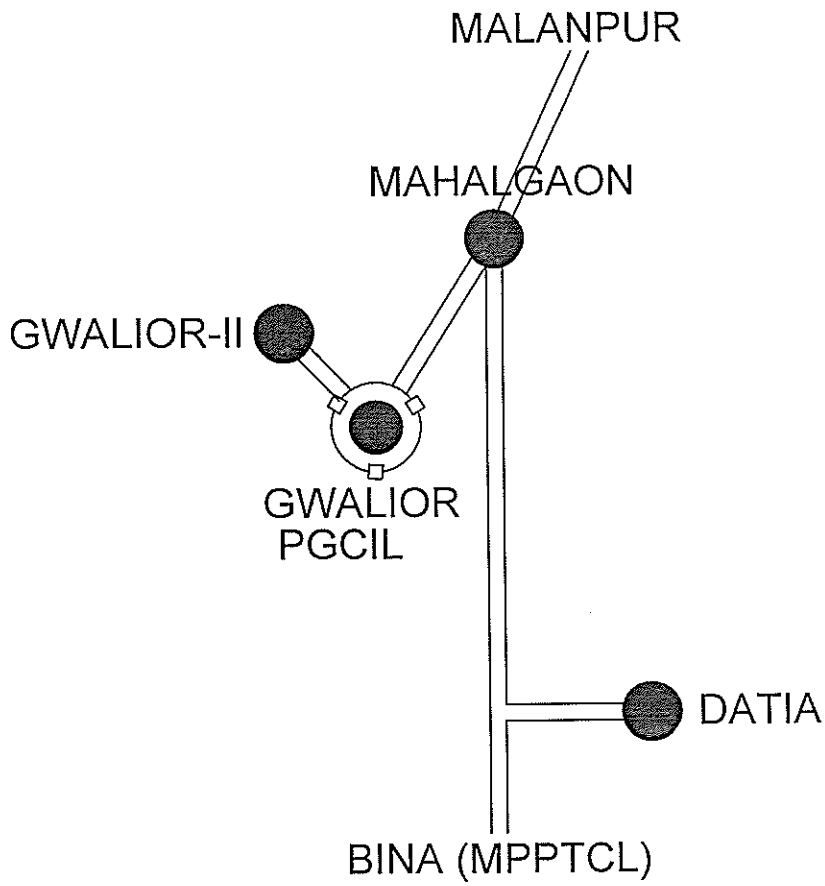


Proposed Arrangement

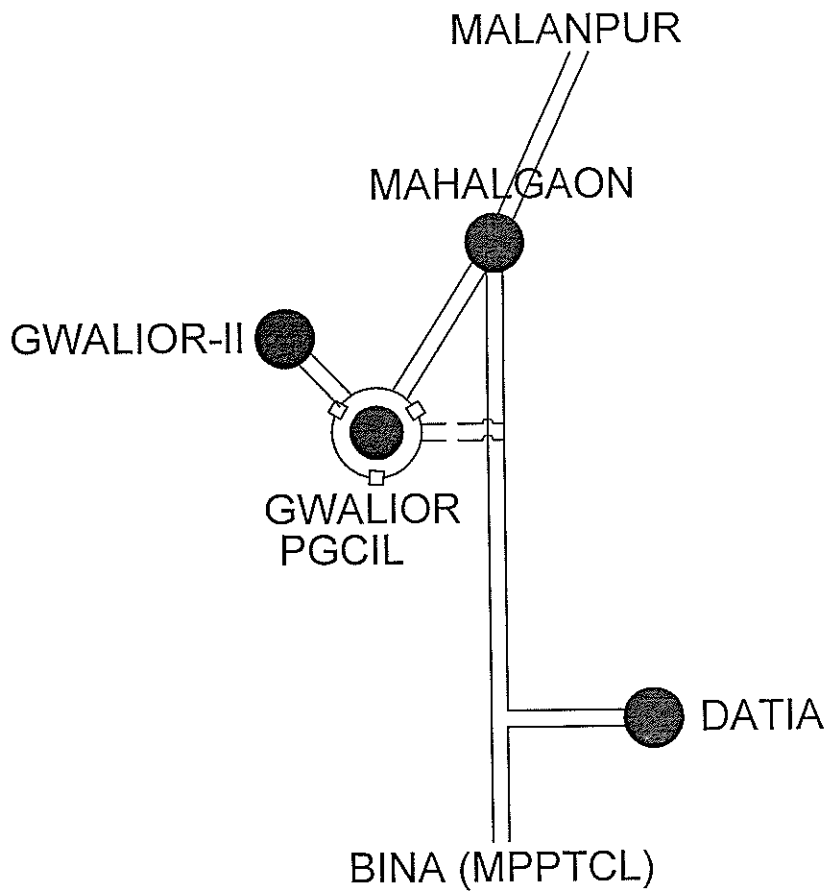


# LILO OF MAHALGAON 220KV - DATIA 220KV LINE AT GWALIOR 765KV

Existing Arrangement  
APPENDIX-II



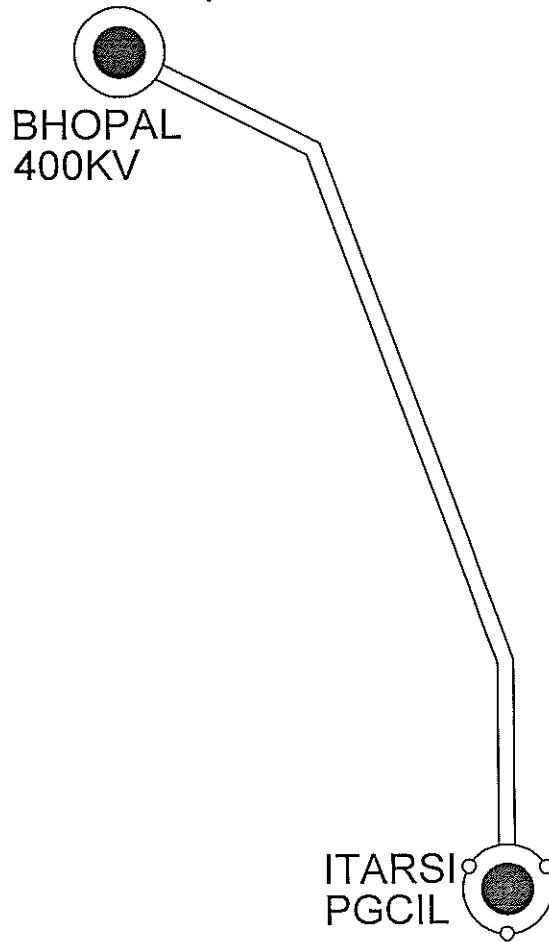
Proposed Arrangement



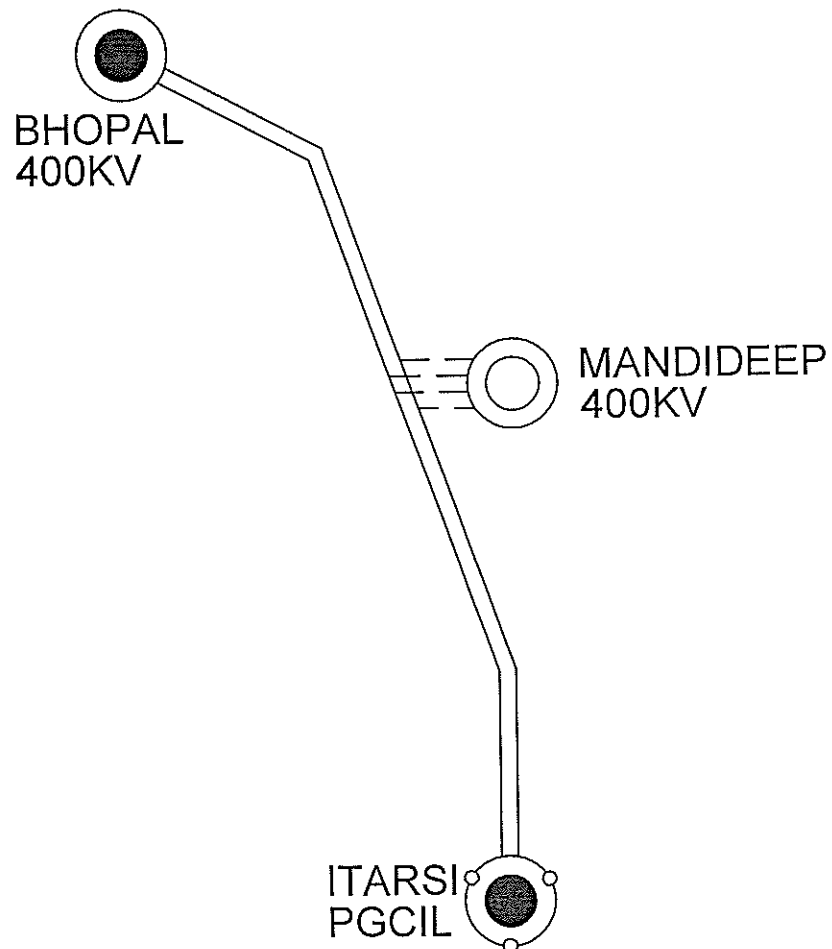
# LILO OF BHOPAL 400KV - ITARSI (PGCIL) LINE AT MANDIDEEP GIS

Existing Arrangement

APPENDIX-III



Proposed Arrangement



# MADHYA PRADESH POWER TRANSMISSION CO. LTD.

(A wholly owned Govt. of Madhya Pradesh Undertaking)

CIN: U40109MP2001SGC014880

Block No.2, Shakti Bhawan, Rampur, Jabalpur (MP) 482008, Tel.:(0761) 270-2132, 2242

Fax No.: (0761) 2660908, e-mail: cepts321@yahoo.com/ce.pnd@mptransco.nic.in



No. 04-02/N-171/

1198

Jabalpur, Date: 28-7-2020

To,

✓ Shri Goutam Roy

Chief Engineer (PSP & A-I),  
Central Electricity Authority,  
Sewa Bhawan, R.K. Puram  
New Delhi – 110066.

Fax No.: 011-26102045  
-26175921

**Sub: Proposed agenda point of MPPTCL for inclusion in 2nd Western Region Power Committee Transmission Planning (WRPC-TP).**

Ref: CEA Email dated 07.07.2020

In reference to your email cited above, the agenda point of MPPTCL proposed to be included in 2<sup>nd</sup> Western Region Power Committee - Transmission Planning (WRPC-TP) is given here under:

(A) Conversion of 400kV fixed line reactors as switchable line reactors installed on 400kV lines of PGCIL.

PGCIL has constructed 400kV bays at Bhopal & Nagda 400kV Substations of MPPTCL alongwith fixed line reactors for interconnection of following 400kV lines of PGCIL. These 400kV bays are the property of PGCIL and is being maintained by MPPTCL at the cost of PGCIL:

Sl. No.	Name of Line	Length (in Km)	Capacity (MVAR)		Switchable (S) / Fixed (F)	
			End-1	End-2	End-1	End-2
1	400kV bay for Damoh(PGCIL) to Bhopal(MPPTCL) 400kV D/C line (Ckt-1)	214	-	1x50	-	F
2	400kV bay for Damoh(PGCIL) to Bhopal(MPPTCL) 400kV D/C line (Ckt-2)	214	-	1x50	-	F
3	400kV bay for Nagda(MPPTCL) to Dehgam(Gujrat) 400kV D/C line (Ckt-1)	331	1x50	1x50	F	F
4	400kV bay for Nagda(MPPTCL) to Dehgam(Gujrat) 400kV D/C line (Ckt-2)	331	1x50	1x50	F	F

Looking to the reliability of the system, PGCIL is requested to convert the fixed line reactors into switchable line reactors installed on above 400kV lines. It is to inform that space for providing isolator and circuit breakers is available at Bhopal (MPPTCL) & Nagda (MPPTCL) 400kV Substations.

In view of above, it is requested that aforementioned proposals of MPPTCL may please be considered as agenda item for inclusion in 2<sup>nd</sup> Western Region Power Committee-Transmission Planning (WRPC-TP) for approval of the committee.

  
Chief Engineer (Plg. & Design)  
MPPTCL-Jabalpur

Copy to:

Staff officer, O/o Managing Director, MPPTCL, Jabalpur

# MADHYA PRADESH POWER TRANSMISSION CO. LTD.

(A wholly owned Govt. of Madhya Pradesh Undertaking)

CIN: U40109MP2001SGC014880

Block No.2, Shakti Bhawan, Rampur, Jabalpur (MP) 482008, Tel.:(0761) 270-2132, 2242

Fax No.: (0761) 2660908, e-mail: ce.pnd@mptransco.nic.in



No. 04-02/N-171/

1301

Jabalpur, Date: 13. 8. 2020

To,

✓ Shri Goutam Roy  
Chief Engineer (PSP & A-I),  
Central Electricity Authority,  
Sewa Bhawan, R.K. Puram  
New Delhi – 110066.

Fax No.: 011-26102045  
-26175921

**Sub: Proposed agenda point of MPPTCL for inclusion in 2nd Western Region Power Committee Transmission Planning (WRPC-TP).**

Ref: CEA Email dated 07.07.2020

In reference to your email cited above, the agenda point of MPPTCL proposed to be included in 2<sup>nd</sup> Western Region Power Committee - Transmission Planning (WRPC-TP) is given here under:

**(A) Construction of intra-state new EHV Substations alongwith associated transmission lines works in Madhya Pradesh through TBCB process :**

Madhya Pradesh government vide Gazette notification dated 08.05.2020 has decided to construct following 400kV and 220kV intra-state EHV substations alongwith associated lines through TBCB process. For execution of intra-state transmission works in MP through TBCB process, M/s REC Transmission Projects Co. Ltd. (RECTPCL), New Delhi has been appointed by GoMP as Bid Process Coordinator (BPC).

Sl. No.	Name of Intra-State Transmission Work in MP through TBCB Process	Route Length (Km) / Capacity (MVA)
1	400/220/132/33kV GIS Substation at Mandideep (District-Raisen)	
i	Construction of 400/220kV GIS substation at Mandideep	(2x500MVA, 400/220kV) + (2x160MVA, 220/132kV) + (1x50MVA, 132/33kV) transformers and 1x125MVAR Bus Reactor
ii	LILO of both circuit of Itarsi (PGCIL) - Bhopal 400kV line (on Twin Moose) at Mandideep 400kV GIS S/s	2x10 Km
iii	LILO of both circuits of Hoshangabad - Mandideep - Adampur 220kV line at Mandideep 400kV GIS S/s	2x10 Km
iv	LILO of Mandideep132 - Bagroda 132kV line at Mandideep 400kV GIS S/s	10 Km
v	LILO of Mandideep220 - MACT Bhopal 132kV line at Mandideep 400kV GIS S/s	10 Km

Sl. No.	Name of Intra-State Transmission Work in MP through TCB Process	Route Length (Km) / Capacity (MVA)
<b>2</b>	<b>220/132/33kV substation at Ajaygarh (District-Panna)</b>	
i	Construction of 220/132/33kV substation Ajaygarh	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satna-Chhatarpur 220kV line at Ajaygarh	2x10 Km
iii	Ajaygarh -Panna 132kV DCDS line	30 Km
iv	Ajaygarh -Luvkushnagar (Laundi) 132kV DCSS line	45 Km
<b>3</b>	<b>220/132/33kV substation at Begamganj (District-Raisen)</b>	
i	Construction of 220/132/33kV substation Begamganj	2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	Sagar - Begamganj 220kV DCDS line	70 Km
iii	Begamganj -Rahatgarh 132kV DCSS line	30 Km
iv	Begamganj -Silwani 132kV DCSS line	36 Km
v	Begamganj -Gyaraspur 132kV DCSS line	46 Km
vi	Begamganj -Gairatganj 132kV DCDS line	32 Km
<b>4</b>	<b>220/132/33kV substation at Bisonikala (District-Hoshangabad)</b>	
i	Construction of 220/132/33kV substation Bisonikala	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satpura-Itarsi-Handiya 220kV line at Bisonikala	2x5 Km
iii	LILO of Seoni Malwa-Harda 132kV S/c line at Bisonikala	5 Km
<b>5</b>	<b>220/132kV Substation at Bargawan (District-Singrauli)</b>	
i	Construction of 220/132kV substation at Bargawan	(2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers
ii	LILO of both circuits of Sidhi - Hindalco 220kV line at Bargawan 220kV S/s	2x15 Km
iii	LILO of both circuits of Rajmilan - Morwa/ Waidhan 132kV line at Bargawan 220kV S/s	2x15 Km

Sl. No.	Name of Intra-State Transmission Work in MP through TCB Process	Route Length (Km) / Capacity (MVA)
<b>6</b>	<b>220/132kV Substation at Khargone (District-Khargone)</b>	
i	Construction of 220/132kV substation at Khargone	(2x160MVA,220/132kV) + (1x63MVA,132/33kV) transformers
ii	LILO of both circuits of Chhegaon - Nimrani 220kV line at Khargone 220kV S/s	2x15 Km
iii	LILO of Khargone - Julwaniya(Talakpura) 132kV line at Khargone 220kV S/s	10 Km
iv	LILO of Bhikangaon - Bistan 132kV line at Khargone 220kV S/s	10 Km
<b>7</b>	<b>220/33kV substation at Shahpur (District-Betul)</b>	
i	Construction of 220/33kV substation at Shahpur	2x50MVA, 220/33kV transformers
ii	LILO one circuit of Satpura TPS-Itarsi 220 kV line at Shahpur	5 Km
<b>8</b>	<b>220/33kV substation at Manpur (Bijouri) (District-Umariya)</b>	
i	Construction of 220/33kV substation at Manpur (Bijouri)	2x50MVA, 220/33kV transformers
ii	LILO of Birsinghpur-Satna 220kV line at New S/s Manpur (Bijouri)	20 Km

The brief technical justification of above 400kV and 220kV intra-state transmission works is enclosed as Annexure-I alongwith a power map indicating the aforementioned intra-state EHV substations alongwith associated lines through TCB process.

**(B) Installation of additional 1x100MVA 400/132kV Transformer (3<sup>rd</sup> ICT) and 1x125MVAR Bus Reactor at Kirnapur 400/132kV Substation of MPPTCL.**


A 400/132kV substation has been commissioned at Kirnapur (Balaghat) with 2x100 MVA, 400/132kV transformation capacity. This substation is sharing the load of Balaghat, Bhanegaon, Baihar, Katangi, Warseoni and Lalbarra 132/33kV substations. The total installed capacity at these 132/33kV substations is 385.5MVA. After commissioning of 400/132kV substation, substantial load of aforementioned 132/33kV substations is shifted on 2x100MVA transformers installed at Kirnapur substation and maximum load recorded at this substation during last 12 months is 163 MVA. Therefore, during the (N-1) contingency condition it will become difficult to manage the load in this area.



Further, Kirnapur 400kV substation is constructed between two 765 substations at Seoni and Raipur(CG) by LILO of Bhilai-Seoni 400kV S/C line at Kirnapur. Therefore, due to 765kV substations at both the ends, Kirnapur 400kV substation is experiencing very high voltages at 400kV level. The maximum voltage recorded at Kirnapur 400kV substation is 447kV which is much beyond the standard high voltage limit of 420kV.

In view of above, it is proposed to install 1 No. 100MVA, 400/132kV additional transformer (3<sup>rd</sup> ICT) and 1 No. 125MVAR, 400kV Bus reactor at Kirnapur 400kV substation.

In view of above, it is requested that aforementioned proposals of MPPTCL may please be considered as agenda item for inclusion in 2<sup>nd</sup> Western Region Power Committee-Transmission Planning (WRPC-TP) for kind reference and information of the members of the committee.

  
**Chief Engineer (Plg. & Design)**  
MPPTCL-Jabalpur

Copy to:

Staff officer, O/o Managing Director, MPPTCL, Jabalpur

**Construction of intra-state EHV Substations alongwith associated transmission lines in Madhya Pradesh through TBCB process**

**1) Construction of 400/220/132/33kV GIS Substation at Mandideep (Distt-Bhopal)**

MPPTCL is having only one 400kV substation at Bhopal. The 220kV substations Bhopal, Mandideep and Hoshangabad are being fed from Itarsi (PGCIL) 400kV substation as well as Bhopal (MPPTCL) 400kV substation through a 220kV DCDS line. Bhopal 400kV substation is also feeding the load of Beragarh, Vidisha, Mugaliyachhap, Adampur and Shujalpur 220kV substations of MPPTCL. Presently total transformation capacity of Bhopal 400kV substation is 4x315MVA i.e. 1260MVA. The maximum load recorded during 2019-20 on Bhopal 400kV substation is 1013MVA. As the Bhopal is the Capital City of the Madhya Pradesh State, it is expanding very rapidly and entire supply of Bhopal City is dependent upon only one 400kV substation.

Therefore, in order to meet the future load growth of the Bhopal City, increase the reliability of the system and to cater the load of Mandideep industrial area, it is proposed to create a new 400/220/132/33kV GIS substation at Mandideep through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 400/220kV GIS substation at Mandideep	(2x500MVA,400/220kV) + (2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers and 1x125MVAR Bus Reactor
ii	LILO of both circuit of Itarsi (PGCIL) - Bhopal 400kV line (on Twin Moose) at Mandideep 400kV GIS S/s	2x10 Km
iii	LILO of both circuits of Hoshangabad - Mandideep - Adampur 220kV line at Mandideep 400kV GIS S/s	2x10 Km
iv	LILO of Mandideep132 - Bagroda 132kV line at Mandideep 400kV GIS S/s	10 Km
v	LILO of Mandideep220 - MACT Bhopal 132kV line at Mandideep 400kV GIS S/s	10 Km

**2) 220/132kV Substation at Ajaygarh (Distt.-Panna)**

At present load of Ajaygarh area is being fed from 132kV Substation Lavkushnagar (Laundi). The 33kV voltage regulation at tail end feeder are 32% & 11.21% respectively as against prescribed limit of 9%. In order to improve voltage regulation and reduce the loading of existing 33kV feeder feeding load of Ajaygarh area, a new EHV Substation is required at Ajaygarh in Panna District. On construction of new EHV substation at Ajaygarh, the load has been shifted to proposed new substation from existing Panna and Lavkushnagar 132kV Substation and voltage regulation at tail end feeders shall also be within limits. Therefore, the construction of new EHV Substation at Ajaygarh shall result in improvement in voltage regulation and quality of power supply in Ajaygarh area and also provide additional 132kV interconnection to Panna and Lavkushnagar 132kV S/s and shall improve the reliability of supply in Ajaygarh, Panna, Devendranagar, Nagod and Pawai area. Overall it will also reduce the loading of existing Satna 220kV and Chhatarpur 220kV substations.

In view of above, it is proposed to create a 220/132/33kV substation at Ajaygarh through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/132/33kV substation Ajaygarh	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satna-Chhatarpur 220kV line at Ajaygarh	2x10 Km
iii	Ajaygarh -Panna 132kV DCDS line	30 Km
iv	Ajaygarh -Luvkushnagar (Laundi) 132kV DCSS line	45 Km

### 3) 220/132kV Substation at Begamganj (Distt.-Raisen)

At present load of Begamganj area is being fed from 132kV Substation Gairatganj and the voltage regulation at tail end feeders are more than the prescribed limit of 9%. In order to improve voltage regulation and reduce the loading of existing feeders feeding load of Begamganj area, a new EHV Substation is required at Begamganj in Raisen District. The construction of proposed EHV substation at Begamganj shall result in improvement in voltage regulation and quality of supply in Begamganj area.

The location of Begamganj is very important from the Transmission System Strengthening point of view. Therefore, a 220/132kV substation may be considered at Begamganj, which will provide the 132kV interconnection to Rahatgarh, Gyaraspur, Gairatganj and Silwani 132kV substations which are being presently fed through single radial feeders. This will improve the reliability of supply in Rahatgarh, Gyaraspur, Gairatganj, Silwani and Begamganj area to a great extent. Construction of 220/132kV substation Begamganj by laying 220kV DCDS line from Sagar 400kV substation will also reduce the loading on existing Bina, Ganj Basoda and Vidisha 220/132kV substations.

In view of above, it is proposed to construct a new 220/132/33kV substation at Begamganj through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/132/33kV substation Begamganj	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	Sagar - Begamganj 220kV DCDS line	70 Km
iii	Begamganj -Rahatgarh 132kV DCSS line	30 Km
iv	Begamganj -Silwani 132kV DCSS line	36 Km
v	Begamganj -Gyaraspur 132kV DCSS line	46 Km
vi	Begamganj -Gairatganj 132kV DCDS line	32 Km

### 4) 220/132kV Substation at Bisonikala (Distt.-Hoshangabad)

At present load of Bisonikala area is being fed from 132kV Substation Seonimalwa. The voltage regulation at tail end feeders are 21.35% and 19.21% respectively as against prescribed limit of 9%. In order to improve voltage regulation and reduce the loading of existing 33kV feeders feeding load of Bisonikala area, a new EHV

Substation is required at Bisonikala in Hoshangabad District. On construction of new substation at Bisonikala, not only load has been shifted to proposed new substation from 132kV S/s Seoni Malwa but also the voltage regulation of 33kV feeders may also be within limits, which in turn results in improvement in voltage regulation and quality of supply in Bisonikala area. Construction of 220/132kV substation at Bisonikala will provide 132kV interconnection to Harda, Seonimalwa, Sodalpur and Sultanpur 132kV substations and will also reduce the loading of Itarsi and Handiya 220kV substations.

In view of above, it is proposed for construction of 220/132/33kV substation at Bisonikala through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/132/33kV substation Bisonikala	(2x160MVA,220/132kV) + (2x50MVA,132/33kV) transformers
ii	LILO of both circuits of Satpura-Itarsi-Handiya 220kV line at Bisonikala	2x5 Km
iii	LILO of Seoni Malwa-Harda 132kV S/c line at Bisonikala	5 Km

#### 5) Construction of 220/132/33kV Substation at Bargawan (Distt-Singrauli)

At present the load of Morwa, Singrauli and Waidhan area is being fed from Vindhyachal Thermal Power Station and Anuppur 220kV substation through 132kV D/C lines. At present the major power to Singrauli area is supplied from Vindhyachal TPS over a 132kV DCDS line and in case of N-1 contingency condition, it is difficult to manage power supply from Anuppur 220kV substation. Singrauli area is growing very fast due to development of number of Mega and Ultra Mega Power Projects/HT Consumers coming-up in this area. Moreover, number of coal blocks has also been allocated in this area which will start operation in coming years.

Therefore, looking to the future load growth of Singrauli area, in order to increase the reliability of supply and to reduce dependency on Vindhyachal TPS, it is proposed to construct a new 220/132/33kV substation at Bargawan through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/132/33kV substation at Bargawan	(2x160MVA,220/132kV) + (1x50MVA,132/33kV) transformers
ii	LILO of both circuits of Sidhi - Hindalco 220kV line at Bargawan 220kV S/s	2x15 Km
iii	LILO of both circuits of Rajmilan - Morwa/ Waidhan 132kV line at Bargawan 220kV S/s	2x15 Km

#### 6) Construction of 220/132kV Substation at Khargone (Distt-Khargone)

At present the load of Khargone area is being fed from Barwaha 220kV substation through 132kV DCDS line. During the last year demand of the Khargone 132kV S/s has been recorded as 117MVA. The demand of Khargone area is increasing very fast and 3Nos. 132/33kV substations at Bhikangaon, Andad and Talakpura are also receiving power from Khargone 132kV S/s. A new 132kV S/s Bistan is under construction in this area which shall be connected with Khargone 132kV S/s.

Therefore, in order to meet the load growth of this area and to increase the reliability of supply, it is proposed to create a new 220kV substation at Khargone through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/132kV substation at Khargone	(2x160MVA,220/132kV) + (1x63MVA,132/33kV) transformers
ii	LILO of both circuits of Chhegaon - Nimrani 220kV line at Khargone 220kV S/s	2x15 Km
iii	LILO of Khargone - Julwaniya(Talakpura) 132kV line at Khargone 220kV S/s	10 Km
iv	LILO of Bhikangaon - Bistan 132kV line at Khargone 220kV S/s	10 Km

#### 7) 220/33kV Substation at Shahpur (Distt.-Betul)

At present load of Shahpur area is being fed from Betul 132kV S/s and Sarni 220kV S/s. The voltage regulation at tail end of feeders works out to be 20.43%, 12.01% and 14.78% respectively as against prescribed limit of 9%. In order to improve voltage regulation and reduce the loading of existing feeders feeding load of Shahpur area, a new 132kV S/s is required at Shahpur in Betul District. On construction of new EHV substation at Shahpur, the load has been shifted to proposed new substation from 132kV S/s Chicholi, 132kV S/s Betul and 220kV S/s Sarni and voltage regulation at tail end feeders may also be within limits. The construction of new EHV substation at Shahpur shall result in improvement in voltage regulation and quality of supply in Shahpur area.

Since the Shahpur area is surrounded by dense forest from all sides and laying of 132kV line from nearest 220kV substation Sarni (Approx. 35 Kms.) through forest will involve substantial cost and time. In view of this, it would be appropriate to construct a new 220/33kV substation at Shahpur by LILO of Satpura TPS – Itarsi 220kV line which is passing nearby Shahpur area. This will reduce the line length and also minimize the involvement of forest in the line.

In view of above, it is proposed for construction of 220/33kV substation at Shahpur through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/33kV substation at Shahpur	2x50MVA, 220/33kV transformers
ii	LILO one circuit of Satpura TPS-Itarsi 220 kV line at Shahpur	5 Km

#### 8) 220/33kV Substation at Manpur(Bijouri) (Distt.-Umariya)

At present load of Manpur-Jaisinghnagar area is being fed from 132kV Substation Umariya and 132kV Substation Beohari. The voltage regulation at tail end feeder are 20.69%, and 22.83% respectively as against prescribed limit of 9%. In order to improve voltage regulation and reduce the loading of existing 33kV feeders feeding load of Manpur and Jaisinghnagar area, a new substation is required at Manpur(Bijouri) between Manpur and Jaisinghnagar in Umariya District.

On construction of new EHV substation at Manpur(Bijouri), the load has been shifted to proposed new substation from Umariya and Beohari 132kV S/s and voltage

regulation at tail end feeders may also be within limits. Construction of EHV substation Manpur(Bijouri) shall result in improvement in voltage regulation and quality of supply in Manpur and Jaisinghnagar area. However, laying of 132kV line for this substation from nearest 220kV S/s is technically not feasible due to non-availability of feederbays as well as long length of 132kV line. The nearest 220kV substation from the Manpur(Bijouri) area is Shahdol 220kV S/s. The length of 132kV line from Shahdol 220kV S/s up to Manpur(Bijouri) shall be more than 70Km. Also there will be involvement of dense forest in the route of 132kV line from Shahdol to Manpur(Bijouri).

Therefore, in order to reduce the line length and minimize the involvement of dense forest, it would be appropriate to construct a 220/33kV substation at Manpur(Bijouri) by LILO of 220kV Birsinghpur – Satna line which is passing at a distance of about 20km from proposed Manpur(Bijouri) substation. The construction of a 220/33kV substation in Manpur(Bijouri) area shall improve the voltage profile and reliability of supply in the area.

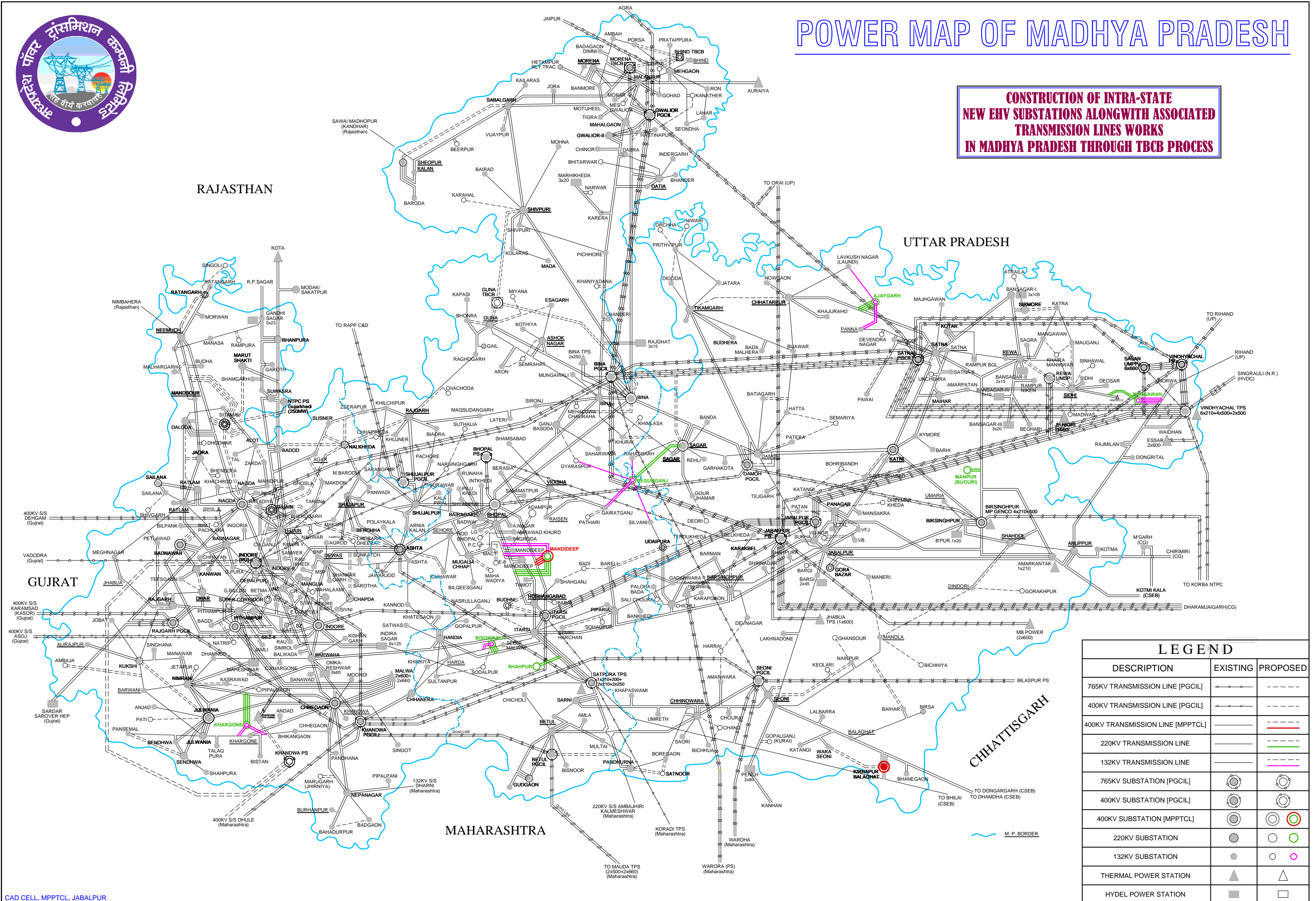
In view of above, it is proposed for construction of 220/33kV substation at Manpur (Bijouri) through TBCB route alongwith following intra-state transmission works as given hereunder :

i	Construction of 220/33kV substation at Manpur (Bijouri)	2x50MVA, 220/33kV transformers
ii	LILO of Birsinghpur-Satna 220kV line at New S/s Manpur (Bijouri)	20 Km



# POWER MAP OF MADHYA PRADESH



**CONSTRUCTION OF INTRA-STATE  
NEW EHV SUBSTATIONS ALONGWITH ASSOCIATED  
TRANSMISSION LINES WORKS  
IN MADHYA PRADESH THROUGH TBCB PROCESS**



LEGEND		
DESCRIPTION	EXISTING	PROPOSED
765KV TRANSMISSION LINE [PGCIL]	—●—●—●—	—●—●—●—
400KV TRANSMISSION LINE [PGCIL]	—●—●—●—	—●—●—●—
400KV TRANSMISSION LINE [MPPTCL]	—●—●—●—	—●—●—●—
220KV TRANSMISSION LINE	—●—●—●—	—●—●—●—
132KV TRANSMISSION LINE	—●—●—●—	—●—●—●—
765KV SUBSTATION [PGCIL]	●	●
400KV SUBSTATION [PGCIL]	●	●
400KV SUBSTATION [MPPTCL]	●	●
220KV SUBSTATION	●	●
132KV SUBSTATION	●	●
THERMAL POWER STATION	▲	▲
HYDEL POWER STATION	■	■



**MAHARASHTRA STATE ELECTRICITY TRANSMISSION COMPANY LTD.**  
CIN NO - U40109MH2005SGC153646

<b>Name of Office: Office of the Chief Engineer (STU)</b>		<b>To,</b>  <b>Chief Engineer (SP&amp;PA),</b> Central Electricity Authority, Sevabhavan, R.K.Puram, New Delhi-110066 Fax – 011 26102045
Office Address: Prakashganga, 4 <sup>th</sup> floor / 'A' Wing, Plot C -19, E - block, BKC, Bandra (E), Mumbai: - 400051.		
 (022) 2659 5176 (O)	(022) 2659 5175 (P)	
E-Mail Id: <a href="mailto:cestu@mahatransco.in">cestu@mahatransco.in</a>	 (022)2659 1222	

**Ref:** MSETCL/CO/STU/WRPCTP/Lockdown/143

**Date:** 20/07/2020

**Sub:** Proposed agenda items for 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (WRPCTP).

**Ref:** Email from CE, Power System Planning & Appraisal – I, CEA dated 07/07/2020.

Sir,

With reference to above subject, proposed Agenda point for 2<sup>nd</sup> meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) are given below.

**Proposal:** Creation of 220 kV level at 765/400 kV Shikrapur (PGCIL) S/s

**Proposed Scope of Work:**

1) **By PGCIL:-**

- a) 220 kV Level creation at 765/400 kV Shikrapur (PG) S/s along with **2x500MVA, 400/220kV ICT** at 765/400kV Shikrapur (PG)
- b) **220kV line bay- 4 nos.** at 765400 kV Shikrapur (PG) S/s.

2) **By MSETCL:-**

- a) Reorientation and termination of 220kV Babhleshwar – Ranjangaon ckt & Lonikand – Ranjangaon ckt at Point-B
- b) 220kV Khed City – Point B (Ranjangaon) D/C line – 13.5 km (STU Plan Year 2022-23)
- c) LILO on both ckts of 220kV Khed City – Ranjangaon D/C line at 765/400/220kV Shikrapur (PG) S/s – LILO distance 5 km. (STU Plan Year 2022-23)

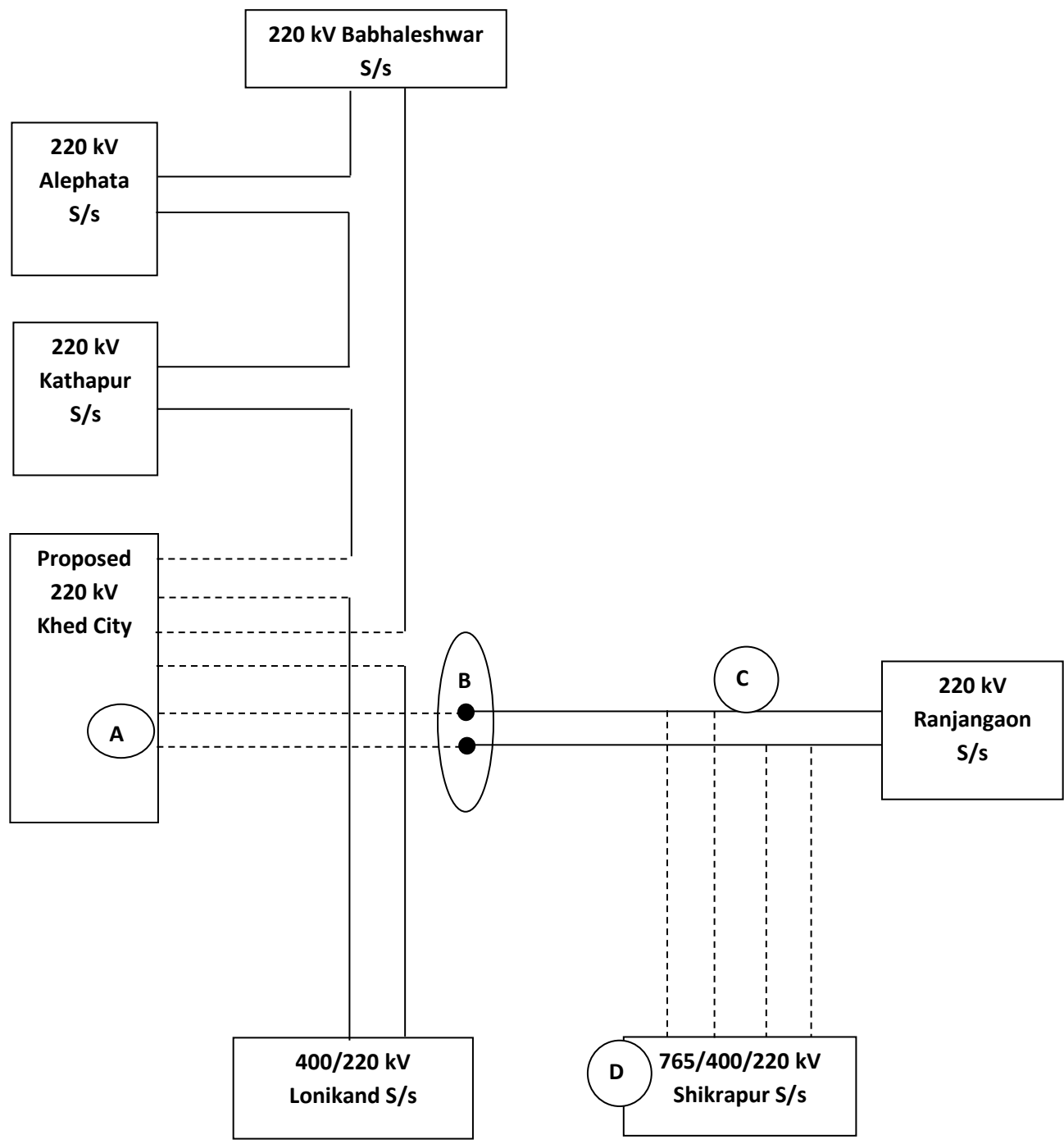
**Area To be Served:**

Pune District (220 kV Ranjangaon, Alephata, Kathapur and Proposed KhedCity S/s)



*Sub: -Proposed agenda items for 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (WRPCTP).*

**SLD for proposed 220 kV Network from 765/400/220 kV Shikrapur S/s:**



Point A – Point B = 13.5 km Proposed D/C line  
 Point C – Point D = 5 km proposed M/C line

**Sub: -Proposed agenda items for 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (WRPCTP).**

➤ **Load Flow Studies:**

**Assumptions:**

- i. The load flow study has been carried out considering load growth scenario in the year 2022-23 with Maharashtra State Demand – 26900 MW
- ii. Total Load considered for Pune District – 4500 MW

**Case 1:-** Existing Scenario (Annexure-I)

**Contingency:** Case-1 + 220 kV Babhleshwar – Ultratech Sugars line out (Annexure-II)

**Case 2:-** With 220 kV level creation at 765kV Shikrapur PG S/s (Annexure-III)

**Contingency:** Case-2 + 220 kV Babhleshwar – Ultratech Sugars line out (Annexure-IV)

➤ **Result Table:**

**Line Flows:-**

S.N	Name of Line/ICT/TF Power Flow	Case-1	Case-1A	Case-2	Case-2A
1	400kV Lonikand I-Talegaon S/C	461.5	492.1	326.5	335.1
2	400kV Lonikand I-Chakan S/C	285.2	313.9	160.6	168.5
3	400kV Lonikand I-Lonikand II D/C	157	179.6	38	45.1
4	400kV Karjat-Lonikand II D/C	380.6	403	354	365.6
5	400kV TalegaonPG-ShikrapurPG QUAD CKT	2502.8	2554.8	2092.4	2097.2
6	400kV TalegaonPG-Chakan S/C	778.4	<b>816.3</b>	608.1	618.9
7	220kV Lonikand I-Ranjangaon S/C	77.3	233.4	-	-
8	220kV Lonikand II-Kathapur S/C	35.1	13.5	-	-
9	220kV Kathapur-Alephata S/C	70.7	92.4	21.1	39.2
10	220kV Alephata-Babhleshwar S/C	272.5	<b>296.3</b>	224.5	242.2
11	220kV Babhleshwar-Utec Sugar S/C	195.3	<b>Out</b>	117.2	out
12	220kV Utech Suger-Ranjangaon S/C	191.8	0.9	-	-
13	220kV Shikrapur (PG)-Khedcity D/C	-	-	320.8	346.4
14	220V Khedcity-Lonikand I S/C	-	-	150.8	121.8
15	220kV Khedcity-Lonikand II S/C	-	-	147.4	117.7
16	220kV Shikrapur (PG)-Ranjangaon D/C	-	-	321	318
17	220kV Utec-Khedcity	-	-	116.7	0.94
18	3x315MVA,400/220kV ICT @ 400kV Lonikand I	522.3	573.9	380.4	398.4
19	2x500MVA, 400/220kV ICT @ 400kV Lonikand II	538	582.4	392	410.6
20	3x315MVA,400/220kV ICT @ 400kV TalegaonPG	681	694.5	607.2	610.8
21	1630 MVA,400/220kV ICT@400kV Babhleshwar (2x500MVA & 2x315 MVA)	1308	1224.6	1227.2	1175
22	2x500MVA,400/220kV ICT@400kV Shikrapur (PG)	-	-	630.6	668.2
23	3x315MVA,400/220kV ICT@400kV Chakan	492	501	447	450

**Sub: -Proposed agenda items for 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (WRPCTP).**

**Bus Voltages:-**

S.N	Name of SS	Voltages (kV)			
		Case-1	Case-1A	Case-2	Case-2A
1	220kV Khedcity	-	-	221.2	220.9
2	220kV Alephata	214.5	214.1	218.4	218.2
3	220kV Ranjangaon	212.6	209.4	221.4	221
4	220kV Kathapur	214.4	213.6	218.5	218.2
5	220kV TalegaonPG	219.4	218.8	220.8	220.7
6	220kV Lonikand I	217.2	216.3	220.1	220
7	220kV Lonikand II	217.3	216.4	220.2	220
8	220kV Shikrapur PG	-	-	223.6	223.4

**Transmission Loss:**

S.N	Particulars	Power Loss (MW)			
		Case-1	Case-1A	Case-2	Case-2A
1	Pune Zone	177.39	186.46	165.62	164.43
2	Maharashtra State	1178.1	1186.43	1152.9	1151

**Benefits:**

- The 220 kV level creation at 765kV Shikrapur PG s/s with establishment of 2 x 500 MVA, 400/220 kV ICTs capacity will relieve the loading on existing ICTs at 400/220 kV Lonikand-I, Lonikand-II, Chakan & Jejuri s/s.
- 220 kV Ranjangaon, Kathapur & proposed KhedCity S/s will get strong source through 765/400/220 kV Shikrapur PG s/s.
- There is reduction in line loading on 400 kV Talegaon – Chakan line & 220 kV Urse – Chinchwad Corridor is observed.
- The 220kV level creation at 765/400 kV Shikrapur PG S/s will help to cater the fast load growth demand in Pune district & support 220kV transmission network.
- In absence of Koyna Generation, 220kV Shikrapur (PG) s/s supported the 220kV network of 400 kV Lonikand & 400kV Chakan s/s.
- With establishment of 220kV Shikrapur s/s the transmission network of Pune Ring main in Pune District will be strengthened and operational efficiency of 220kV network will be improved.
- There is improvement in Bus Voltages of 220 kV buses in the vicinity of Shikrapur.
- Total Saving in Losses  
Pune Zone – 11.77 MW  
Maharashtra State – 25.2 MW
- With 220 kV level creation at 765kV Shikrapur PG S/s, proposed 220 kV Talegaon (PG)-Khed city D/C line & 400kV Shikrapur PG –Lonikand-II DC lines can be deleted.

***Sub: -Proposed agenda items for 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (WRPCTP).***

---

It is requested to include the above proposal in 2<sup>nd</sup> meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) for approval please.

Thanking You.

Yours Faithfully,

**Signed Digitally  
(S.S Jewalikar)  
Chief Engineer (STU)**

Encl.: As above.

**Copy s.w.r.s. to:**

- 1) Chairman & Managing Director, MSETCL, C.O., Prakashganga, Mumbai
- 2) Member Secretary, WRPC, MIDC Area, Marol, Andheri East, Mumbai 400 094
- 3) Director (Operations/Project), MSETCL, C.O., Prakashganga, Mumbai.
- 4) Director (Project), PGCIL, Saudamini, Plot No. 2, Sector-29, Gurgaon-122001.

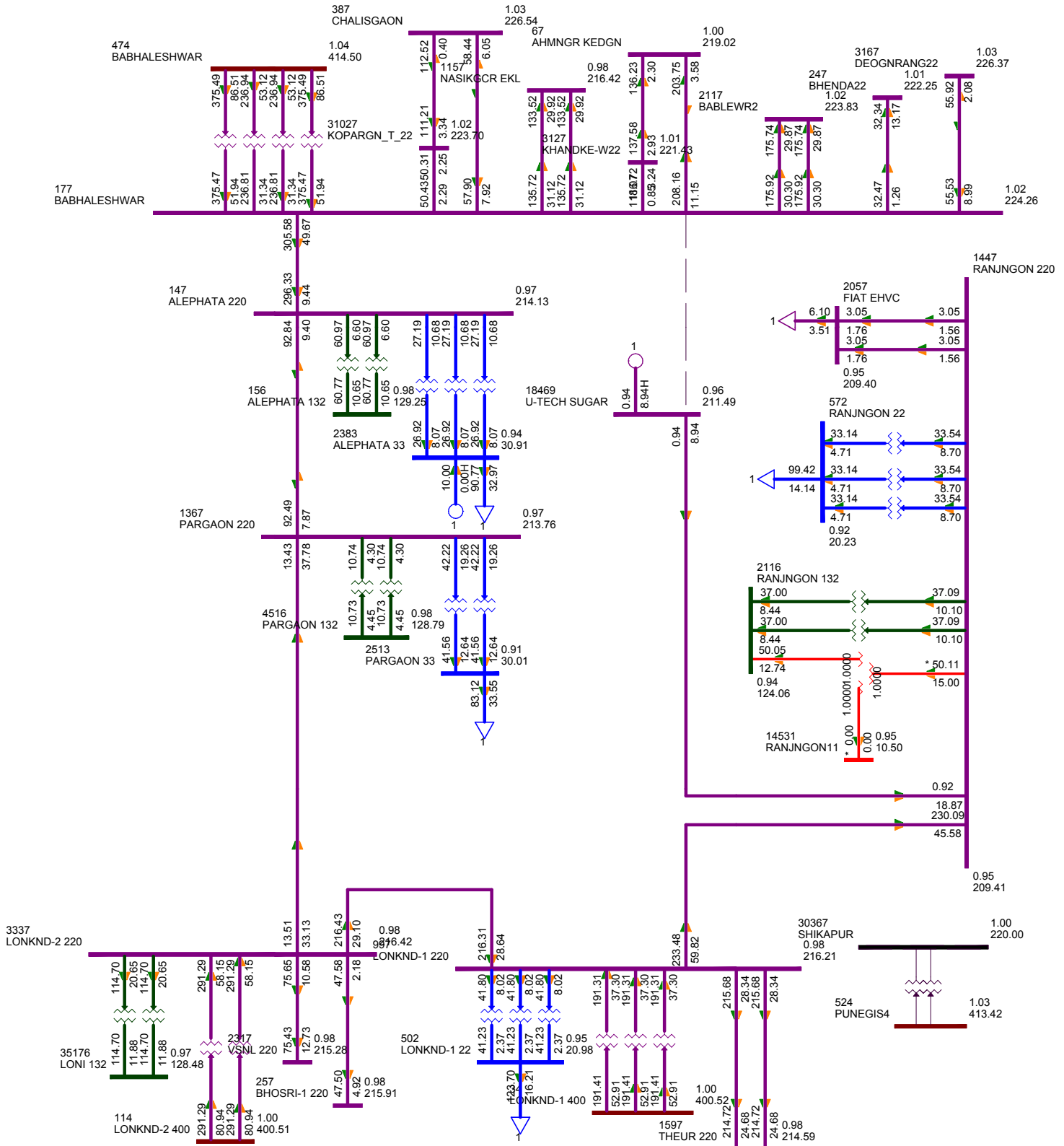
**Copy f.w.c.to:**

- 1) The Chief Engineer (Proj. Schemes/C&M), MSETCL, Prakashganga, Mumbai.
- 2) The Chief Engineer (SLDC), Airoli.
- 3) The Chief Engineer, EHV PC O&M Zone, Pune, MSETCL.



# CASE-1A: Load Flow Study Without 220 kV Level creation at 400 kV Shikrapur

Contingency: 220 kV Babhaleshwar - Ultratech Sugar line out









I/9926/2020

Annexure-X



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,**

- (i) Shri Subir Sen, COO (CTU), PGCIL, Saudamini, Plot No. 2, Sector - 29, Gurugram – 122001
- (ii) Director (SO), POSOCO, B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi – 110010
- (iii) Shri Devendra Kumar Patel, AVP (Head-Projects), Bharat Aluminium Company Limited, Cosmos Building, Balco Nagar, Korba – 495 684, Chhattisgarh, Mob. 9893122359  
Email id: Devendra.patel@vedanta.co.in, nitinkumar.gupta@vedanta.co.in

**Sub: Additional feed to BALCO to meet reliability requirements – Minutes of the Meeting**

Dear Sir,

A meeting through Video Conference among CEA, CTU, NLDC and BALCO was held on 28.04.2020 to discuss the issue of provision of additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard to cater to contingency conditions. The minutes of the meeting are attached herewith.

भवदीय,

(Goutam Roy)  
Chief Engineer(PSPA-I)

I/9926/2020

**Minutes of the meeting held on 28.04.2020 to discuss the issue of provision of additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard to cater to contingency conditions**

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The list of participants are attached as Annexure-I.

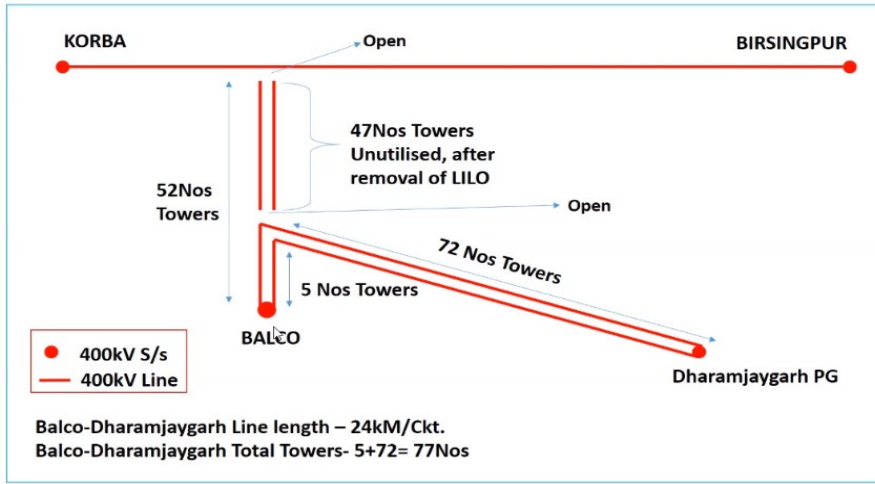
Chief Engineer (PSPA-I), CEA welcomed all the participants and stated that based on the petition of M/S BALCO for providing the BALCO - Dharamjaygarh 400kV D/c 2<sup>nd</sup> line as a bulk Consumer, CERC directed for formation of a committee under the Chairmanship of Member (PS), CEA with CTU, NLDC and BALCO to deliberate on all modalities for construction of BALCO - Dharamjaygarh 400kV D/c 2<sup>nd</sup> line as a bulk Consumer. The committee submitted its report on 09.05.2019. Subsequently, CERC in order dated 29.01.2020 in above petition agreed with recommendation of the committee with regards to providing connectivity to BALCO (250MW Bulk consumer) through existing 400 kV BALCO-Dharamjaygarh D/c line with suitable metering, accounting and scheduling arrangements for the two entities namely BALCO (as a captive generator) and BALCO (as bulk consumer) and also observed that the suggestion of the Committee on providing additional source to BALCO may be considered by CTU in consultation with CEA and NLDC so that required reliability is met. This meeting has been convened to discuss the provision of additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard to cater to contingency conditions.

CGM CTU stated that Connectivity to BALCO as bulk consumer for its 250 MW would be granted through existing BALCO-Dharamjaygarh 400 kV D/c line as agreed by CERC. The LILO line section of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line already exists as part of earlier interim connectivity arrangement except for few towers which needs to be constructed by M/s BALCO. The 400kV bypass arrangement shall have to be implemented by BALCO for which M/s BALCO needs to submit the bypassing scheme. However, for meeting reliability following two options are available which needs be deliberated and finalized:

- i. LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at existing BALCO 400 kV switchyard with suitable bypass arrangement.
- ii. LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at new 400kV switchyard along with 400/220 kV ICTs with suitable bypass arrangement. New 400kV switchyard would be implemented by M/s BALCO.

BALCO stated that no space is available in existing BALCO 400 kV switchyard for terminating LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line. The 2 nos. of 400kV bays at BALCO switchyard (associated with interim arrangement through LILO) have already been utilized for termination of the BALCO-Dharamjaygarh 400kV D/c dedicated line. For the dedicated line, few towers of LILO section have already been utilized as depicted below:

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In view of the above, termination of LILO of 2<sup>nd</sup> circuit of Korba – Birsinghpur 400 kV D/c line at existing 400kV switchyard would not be possible. For termination of LILO, a new 400/220 kV, 2x315 MVA GIS S/s has been planned. Even though this would require additional capital investment, BALCO is ready for the same as the Aluminium smelter load is a critical load. There would be 2 nos. of 400 kV S/s, one with existing smelters (for captive generators) and new GIS S/s (for Bulk consumer) with new smelter. Both substations would be located 6-7 km away from each other and would remain connected through 220 kV D/c line. He further informed that load of existing smelters is 940 MW and generation is of about 1440 MW. The load of planned smelter would be about 800 MW and generation of about 580 MW. The proposed schematic is as given below:



Existing Layout

I/9926/2020



Proposed Layout

Regarding rating of 400/220kV ICTs to be installed by BALCO, CTU suggested that considering that the drawl requirement of BALCO, which may reach more than 500MW (under contingency condition of outage of BALCO-Dharamjaygarh 400kV D/c line), So BALCO may install 2x500MVA, 400/220kV ICTs as no significant cost difference exists between 2x315MVA & 2x500MVA ICTs

Representative of BALCO agreed to look into it and assured that the contingency arrangement is not required on permanent basis. Only when the duration of outage of BALCO-Dharamjaygarh 400kV D/c line exceeds 1 hour, the additional feed shall be required to support the smelter plant.

POSOCO enquired about the following:

- i. The connectivity proposal that has been agreed for BALCO as bulk consumer.
- ii. Existence of any islanding scheme for BALCO plant in case of outage of BALCO-Dharamjaigarh 400 kV D/c line.
- iii. In case of outage of captive generators, the entire smelter load would be drawing power from ISTS grid. Scheme for taking care for this condition.

CTU clarified that the connectivity proposal of BALCO has already been deliberated by the committee constituted by CERC and CERC has already agreed with connectivity proposal of BALCO and the instant meeting is to be deliberated on the bypass arrangement for LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO, with which would utilized in case of outage of BALCO-Dharamjaygarh 400kV D/c dedicated line.

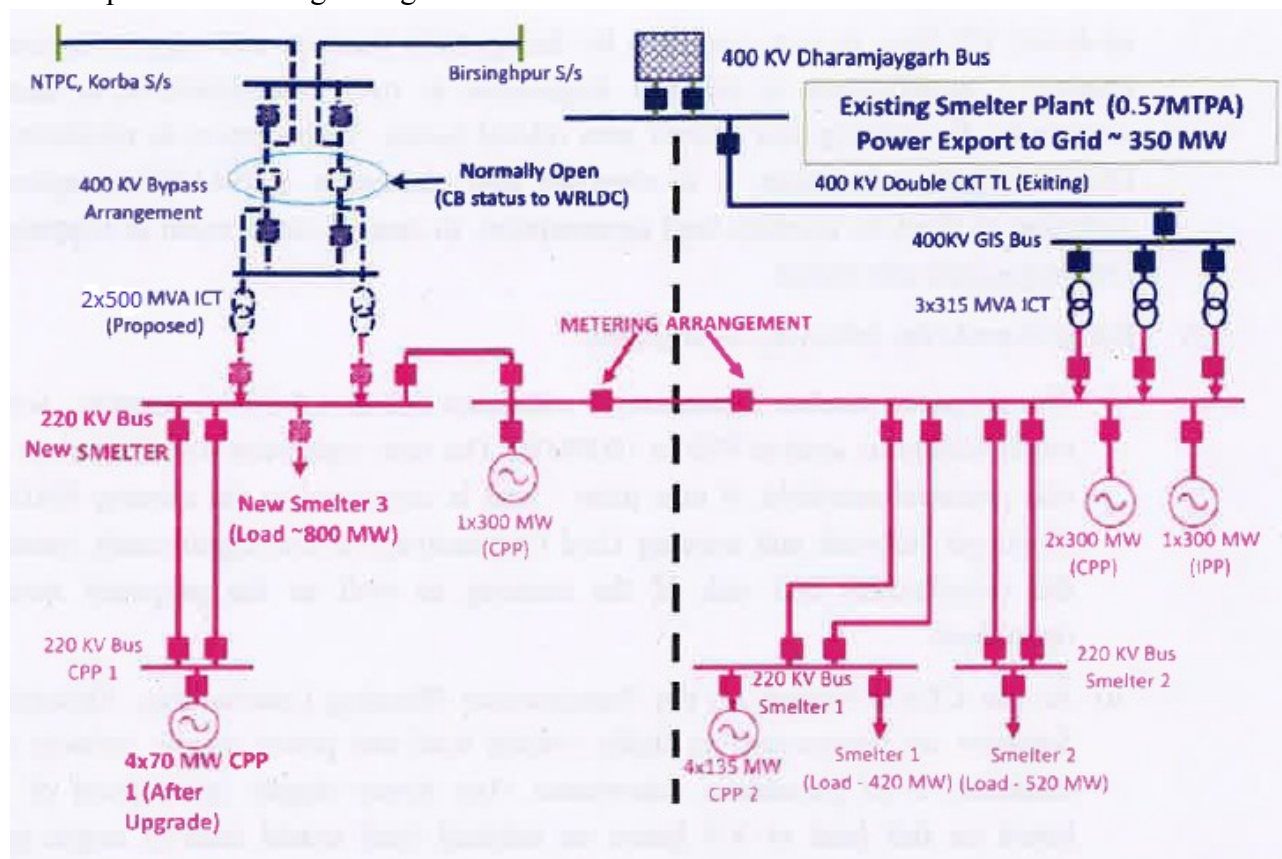
BALCO stated that islanding scheme already exists and same has operated successfully in the past. In case of outage of captive generators, they would be solely dependent on the ISTS grid for imports.

I/9926/2020

CEA stated that there would be import restrictions from the grid during such conditions (outage of BALCO captive generators) depending on margins available and import capacity of M/s BALCO. The entire smelter load cannot be fed from ISTS grid. Therefore, BALCO needs to match their smelter load to the grid imports capacity.

After further deliberations, following was agreed:

- i. Additional feed to BALCO shall be provided through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at 2x500MVA, 400/220kV BALCO (GIS) switchyard as per the following arrangement.



- ii. Implementation of 2x500MVA, 400/220kV BALCO (GIS) switchyard and extension of LILO section up to new 400 kV GIS switchyard would be in the scope of M/s BALCO. M/s BALCO to follow all statutory and regulatory provisions.
- iii. The bypass of 400 kV LILO line would be through keeping the tie breakers of 400 kV line bays in normally open condition as indicated in the above schematic. The 400/220 kV ICTs shall be kept charged from 220kV side of BALCO switchyard.
- iv. Additional feed to BALCO would be put to use as a contingency arrangement only in case of outage of BALCO-Dharamjaigarh 400kV D/c line. M/s BALCO to request POSOCO/WRLDC for use of the contingency arrangement / scheme.
- v. The details of the bypass scheme and procedure for operationalization of the above scheme to be worked out by WRLDC, WRPC and BALCO.
- vi. The current tripping incidence on 27.04.2020 at Dharamjaigarh as well as tripping details of BALCO lines needs to be deliberated in Protection Coordination Committee of WRPC and BALCO to implement the recommendations of PCC.

The meeting ends with the thanks to chair.

I/9926/2020

## Annexure-I

**List of the participants of the meeting held on 28.04.2020 through VC to discuss the issue of provision of additional feed to BALCO through LILO of 2<sup>nd</sup> circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard to cater to contingency conditions**

<b>S. No.</b>	<b>Name of the participants (Shri / Smt.)</b>	<b>Organization</b>
1.	Goutam Roy	Central Electricity Authority
2.	Awdhesh Kumar Yadav	Central Electricity Authority
3.	Priyam Srivastava	Central Electricity Authority
4.	Vikas Sachan	Central Electricity Authority
5.	Ashok Pal	Central Transmission Utility
6.	Partha Sarthi Das	Central Transmission Utility
7.	Pratyush Singh	Central Transmission Utility
8.	Rajiv Kumar Porwal	NLDC
9.	S. Usha	WRLDC
10.	Pushpa S.	WRLDC
11.	Vivek Pandey	WRLDC
12.	Pradeep Kumar Sanodiya	WRLDC
13.	Devendra Patel	BALCO
14.	Nitin Kumar Gupta	BALCO