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भारतसरकार
 Government of India
 विद्युतमंत्रालय
 Ministry of Power
 केन्द्रीयविद्युतप्राधिकरण
 Central Electricity Authority
 विद्युतप्रणालीयोजनाएवंमूल्यांकन -Iप्रभाग
 Power System Planning & Appraisal - I Division

To

-As per list enclosed-

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

Subject: Minutes of the 2nd meeting of Western Region Power Committee (Transmission Planning) (WRPCTP)

Sir/ Madam,

The minutes of the the 2nd meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) held on 04.09.2020 at 11:00 AM through VC(Microsoft Teams) is available on CEA website (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.

Yours faithfully,

Signature Not Verified
 Digitally signed by GOUTAM
 ROY
 Date: 2020.10.26 16:36:05 IST

(Goutam Roy)

Chief Engineer (PSP&A-I)

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List of Adresse:

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 Bhavan, 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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Minutes of the 2nd Meeting of Western Region Power Committee (Transmission Planning) held through VC on 04.09.2020.

List of participants is attached as Annexure-I

Chairperson CEA/Member (PS) CEA (Additional Charge) welcomed the participants to the meeting and stated that the meeting is being organised through Video Conferencing in view of the current pandemic situation. Chief Engineer (PSPA-I) stated that the meeting of RPC(TP) needs to be held by the end of every quarter. However, on account of adverse situations due to lockdown, the same got delayed. The agenda items were taken up for discussions.

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

1.1. Director (PSPA-I) stated that the minutes of the 1st 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/9489/2020dated 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-II**) have requested for few modifications in the minutes of the 1st 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 st 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 1X1500MVA, 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)	(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.
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 & 1x330MVAR 765kV bus reactor on second bus
4)	4.21 (vii) under Phase-II, 5.5 GW RE	220 kV line bays for interconnection of solar projects (25	220 kV line bays for interconnection of solar projects (18 nos) implementation of which

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	injection at Khavda	nos) implementation of which shall be taken up as per the LTA/connectivity granted at 220 kV level	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 meeting with following breakup: 897MW with injection in WR and 980MW with drawl in WR	No modification required

1.4. Clarifications to GETCO inputs on 1stWRPC(TP) minutes are as given below:

S. No	Item No.	Para/ item as recorded in the MoM of 1 st 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 as part of associated ISTS scheme for RE integration only and not in form of regular system strengthening scheme.	MoM as per the discussion held. Deliberations on this issue done alongwith agenda item 8 and documented at para 8.3.5 to 8.3.9
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	Already covered under S.No. (1)

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			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.	
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- 1.5. In addition to the above, the bay upgradation works at Pirana (PG) and Pirana (T) would also be required to be included in the scope of works of the integration of 5.5 GW RE injection at Khavda. The scheme inter-alia includes Establishment of Ahmedabad 765/400 kV, 2X1500 MVA S/s (towards eastern side of Ahmedabad) along with associated 400 kV 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). The twin HTLS conductor for the LILO section was proposed based on the studies and it required reconductoring of the existing line also, accordingly it was included in the scope of works. However, the bay upgradation work required at Pirana (PG) and Pirana (T) was not mentioned in the scope of works.
- 1.6. CTU stated that the current (Amps) rating of the existing bays at Pirana (PG) and Pirana (T) is 2000 Amp therefore it needs to be upgraded. In addition, at the proposed Ahmedabad 765/400 kV, 2X1500 MVA S/s, 1 no. of 330 MVAR, 765 kV Bus Reactor and 1 no. of 125 MVAR, 400 KV Bus Reactor was also not mentioned in the minutes issued and the same may also be incorporated.
- 1.7. 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:

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 9th 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

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- 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 the LTA/connectivity granted at 220 kV level). Provision of 1X125 MVAR, 400 kV & 1x330 MVAR 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) with 1 no. of 330 MVAR, 765 kV Bus Reactor and 125 MVAR, 400 KV Bus Reactor along with associated 400kV interconnections (LILO of Pirana (PG) – Pirana (T) 400 kV D/c line at Ahmedabad S/s with twin HTLS along with reconductoring of Pirana (PG) – Pirana(T) line with twin HTLS conductor and bay upgradation works at Pirana (PG) and Pirana (T)).
- 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.

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- 1.8. Members confirmed the minutes of the 1st meeting of WRPCTP held on 11.01.2020 which were issued vide CEA letter No.CEA-PS-11-23(19)/1/2019-PSPA-I Division/I/9489/2020 dated 12.03.2020 along with modifications in Khavda scheme at item 1.7.
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. Director (PSPA-I) stated that in the 3rd 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.*

Gist of relevant discussion held in NCT: Director SECI, special invitee to the NCT 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, SECI 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.

Eventually, 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:

Gist of relevant discussion held in NCT: CTU stated that 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 1st 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 220 kV 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.

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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 of 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 3rd 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

- (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
 - 110 MVA, 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.

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- (ii) Khavda PS (GIS) – Lakadia PS 765 kV D/c line with 330 MVAR switchable line reactors at Khavda end..
- (iii) Lakadia PS – Ahmedabad 765 kV D/c line with 240 MVAR switchable line reactors on both ends.
- (iv) Establishment of Ahmedabad 765/400 kV, 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 and bay upgradation works at Pirana (PG) and Pirana (T)).
- (v) Ahmedabad – Indore 765 kV D/c line with 330 MVAR switchable line reactors on both ends.
- (vi) Ahmedabad – Vadodara 765 kV 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
 - 80 MVAR, 765kV single phase switchable line reactors (spare units) each at Lakadia & Ahmedabad S/s
 - 110 MVAR, 765kV single phase switchable reactor (spare unit for bus/line reactor) at Ahmedabad S/s
 - 110 MVAR, 765kV single phase switchable line reactor (spare unit) at Indore S/s

- 2.3. Chief Engineer (PSPA-I) stated that Phase-II of the Khavda scheme would be taken up for implementation only when injection at Khavda beyond 3 GW is required.
- 2.4. Director (SO), POSOCO stated that while planning the transmission system for such large scale RE generation, necessary emphasis needs to be given to reliability, resiliency and economic aspects. He stated that in order to assess the adequacy and reliability of the proposed system, it is important that at least 16 scenarios (4 points on load curve for each season) on all India case be simulated and studied. The load-generation balance for all these 16 scenarios shall first be finalized and any regional study shall be carried out on this finalized LGB by CTU as well as STUs. He further stated that STATCOMs at three locations in Rajasthan have been planned under transmission system for Ph-I and Ph-II REZs. However, no such reactive power planning has been carried out for western region. In view of significant RE generation envisaged in Gujarat in near future, necessary reactive power planning may be carried out.
- 2.5. CEA stated that the above scheme was agreed in the 1st meeting of WRPC (TP) and has been included for information of the members, as it has been modified by the NCT. The suggestions of simulating multiple scenarios as well as provisions for STATCOM

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would be studied while planning additional transmission system for evacuation of power from Khavda region.

- 2.6. Director (SO), POSOCO made the following suggestions while planing for additional evacuation system from Khavda SEZ:
- i) To address various issues associated with RE high penetration in the grid such as sudden decline in generation due to cloud cover, decline in inertia and short circuit levels, high voltages during night hours etc., the possibility of installing Synchronous Condensers may also be studied for arriving at the best possible alternative.
 - ii) With such high concentration of RE in small pockets, it becomes necessary to simulate the behaviour of the system in case of any delayed clearance of fault (stuck breaker condition at one end) as there might be possibility of losing a large quantum of generation under such conditions.
 - iii) The existing planning criteria was revised long back in January 2013 and pooling of RE generation to the extent of 3-4 GW at one location was not anticipated at that time. Therefore, N-1 compliance of 400/220 kV ICTs at RE pooling station (immediate connectivity) is not mandated in the existing Transmission Planning Criteria. Now, with the target of integrating 175 GW RE by 2021-22, the N-1 criteria at RE pooling stations needs to be reviewed as, currently, any outage may result in loss of significant generation and can adversely impact the grid security.
 - iv) The countries with significant RE generation have in past experienced oscillations because of underground cables within the generation switchyard. This aspect may also be studied in detail and solar plant developers may be asked to share requisite details for study purpose.
- 2.7. CEA stated that the issue of inclusion of N-1 criteria at RE pooling stations in the Transmission Planning Criteria, could be looked into by the committee constituted for the review of the Transmission Planning Criteria.
- 2.8. CTU stated that the suggestions made by POSOCO would be studied while planning additional transmission system for evacuation of power from Khavda potential REZ.
- 2.9. CTU observed that as per the scheme approved by NCT, under Phase-I, injection at Khavda P.S. at 220 kV level has been restricted upto 1000 MW. However, in the 50th meeting of Western region Constitutents regarding connectivity/LTA applications held on 31.08.2020, it was observed that M/s Adani desired connectivity at 220 kV level in batches of 500 MW from its 2500 MW manufacturing linked Solar project. CTU opined that a separate meeting with all prospective generators that would be setting up their plants in Khavda area may be called up to decide how their injections would be integrated at Khavda P.S. This would assist in deciding the number of 400 kV bays and 220 kV bays required at Khavda. As of now, the transmission scheme approved by NCT may be taken up.
- 2.10. NTPC stated that total 25 GW RE capacity has been identified at Khavda and several developers/implementing agencies have applied for land in that area. However, allocation of land is not yet finalized and is under review. It seems that there would be several developers that would come up in different areas/locations in Khavda and a single ISTS pooling station may not be able to cater to evacuation requirement of all the developers. On account of different locations, developers would find it difficult to construct dedicated line upto ISTS Pooling stations. Accordingly, an integrated plan for evacuation of 25 GW from Khavda REZ is required wherein several pooling stations may be anticipated in Khavda area. NTPC agreed with CTU's view of conducting a separate meeting with all concerned stakeholders in Khavda area.

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- 2.11. SECI stated that CTU has already received connectivity applications in the planned system for evacuation of 8 GW from Khavda REZ and the scheme has also been approved by NCT. Accordingly, a separate meeting with concerned stakeholders and GPCL to finalise the location of proposed pooling station in Khavda may be held. With final allotment of land in Khavda area, if the need is felt for planning several pooling stations, the future integration planning may be done by CTU/CEA.
- 2.12. Members noted the Transmission Scheme for evacuation of 8 GW RE power from potential RE zones in Khavda region approved by NCT in its third meeting.
- 2.13. Regarding location of the Khavda pooling station (8 GW), it was agreed that the same would be decided in a separate meeting in consultation with stakeholders. Transmission Planning for further evacuation of power from Khavda region would also be taken up in consultation with stakeholders.

3. Modification in future space provision at Kallam PS under the transmission scheme “Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra.”

- 3.1. CEA stated that the Transmission system associated with RE generations of 2 GW from potential wind energy zones in Osmanabad area of Maharashtra was agreed in the 1st WRSCT meeting held on 05.09.2018. Subsequently, in the 2nd WRSCT meeting held on 21.05.2019, the capacity of the Kallam 400/220 kV pooling station planned under ISTS was reduced to 1000 MW (from 2000 MW already planned) as the evacuation system for 1 GW RE projects being planned under state by MSETCL. Erstwhile National Committee on Transmission (NCT) in its 4th meeting held on 31.07.2019 approved the following package to be implemented through TBCB route:

Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 2x500MVA, 400/220kV near Kallam PS Space for future Provisions 400/220 kV ICTs along with bays: 4 nos. 400 kV line bays: 6 nos. 220kV line bays: 7 nos. 400 kV bus reactor along with bays: 1 no.	2x500MVA, 400/220kV 400kV ICT bay-2 220kV ICT bay-2 400kV line bay-4 220kV line bay- 4
2	1x125MVAr bus reactor at Kallam PS	1x125 MVAr 400kV reactor bay -1
3	LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS	10km
4	Provision of new 50MVAr switchable line reactor with 400 ohms NGR at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line	2x50 MVAr 400kV Reactor bays -2

Note:

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1. The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- 3.2. Subsequently, Ministry of Power vide Gazette notification dated 24.01.2020 has notified the scheme with RECTPCL as BPC. The scheme is currently under bidding. Taking into consideration the fact that the total nos. of 220 kV line bays including present and future are 11, based on the requirement of CEA Transmission Planning Criteria, the space for the future provisions as incorporated in the RfP document of the scheme is as follows:

Future Space Provision at Kallam PS as per existing RfP of the scheme (inclusive of amendments as per clarifications to bidder queries)
<p>Space for future Provisions:</p> <p>400/220 kV ICTs along with bays: 4 nos. 400 kV line bays: 6 nos. 220kV line bays: 7 nos. 400 kV bus reactor along with bays: 1 no. 220kV Bus section bay: 2 nos. (1 no. for each Main Bus) 220kV Bus Coupler bay: 1 no. 220kV Transfer Bus Coupler bay: 1 no.</p> <p>Note:</p> <p>(i) Space for future provisions for 400 kV line bays to kept including the space for switchable line reactors.</p> <p>(ii) TSP shall maintain provision & space for 220kV Bus Sectionalizer bays such that: a. 220kV bays for 3 nos. of 500 MVA, 400/220kV Transformers (Present+ Future) are on each Bus Section b. 6 nos. of 220kV line bays (Present + Future) are on one Bus Section and 5 nos. of 220kV line bays (Present + Future) are on another Bus Section. c. 1 no. of 220kV Transfer Bus Coupler Bay & 1 no. of 220kV Bus Coupler Bay are on each bus section</p>

- 3.3. To review and optimise the space requirement at Kallam PS for future 400/220kV ICTs & 220 kV bays, a virtual meeting was held on 11.06.2020 with CTU, SECI, MSETCL and RECTPCL In the meeting MSETCL has indicated that there was no drawal requirements from the Kallam pooling station. In the meeting, the following optimised future space provision at Kallam PS was agreed:

Future Space Provision at Kallam PS
<p>Space for future Provisions:</p> <p>400/220 kV ICTs along with bays: 2 nos. 400 kV line bays including the space for switchable line reactors: 6 nos. 220kV line bays: 4 nos. 400 kV bus reactor along with bays: 1 no.</p>

The rest of the scope of works would remain the same as notified by MoP in Gazette of India notification dated 24.01.2020.

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- 3.4. MSETCL stated that in the 1st WRSCT meeting alongwith the Osmanabad scheme, it was also agreed that scheme shall be taken up only upon receipt of Stage-II connectivity/LTA applications. However, the same was not reflected in the minutes of the 2nd WRSCT meeting. The scheme was recommended for implementation through TBCB route in the 2nd meeting of erstwhile NCT with the condition that its implementation would be taken up only after receipt of connectivity/LTA applications from RE developers/SECI. This condition still needs to be applied before taking up the implementation and must be noted down.
- 3.5. The scope of works for the transmission scheme “Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra” incorporating the modified future space provisions is as given below:

Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1.	Establishment of 2x500MVA, 400/220kV near Kallam PS Space for future Provisions 400/220 kV ICTs along with bays: 2 nos. 400 kV line bays including the space for switchable line reactors: 6 nos. 220kV line bays: 4 nos. 400 kV bus reactor along with bays: 1 no.	2x500MVA, 400/220kV 400kV ICT bay-2 220kV ICT bay-2 400kV line bay-4 220kV line bay- 4
2	1x125MVA bus reactor at Kallam PS	1x125 MVA 400kV reactor bay -1
3	LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS	10km
4	Provision of new 50MVA switchable line reactor with 400 ohms NGR at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line	2x50 MVA 400kV Reactor bays -2

Note:

The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.

Implementation of the scheme to be taken up after receipt of connectivity/ LTA applications from RE generation developers/SECI.

- 3.6. Members agreed with the modifications in future space provisions at Kallam pooling station.
- 4. Evacuation system for Singrauli STPP Stage III (2x800 MW) of M/s NTPC**
- 4.1.1. CEA stated that NTPC is implementing Singrauli STPP Stage III generation within the existing Singrauli TPS complex in UP and NTPC has commitment for purchase of 85% of power from UP. To discuss the evacuation system for Singrauli STPP-III (2x660 MW), a meeting was held in CEA on 07.05.2018, wherein, keeping in view the high

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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.

4.1.2. 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 400 kV D/C Twin Moose line) at Singrauli Stage- III along with re-conductoring 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.

4.1.3. 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 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.

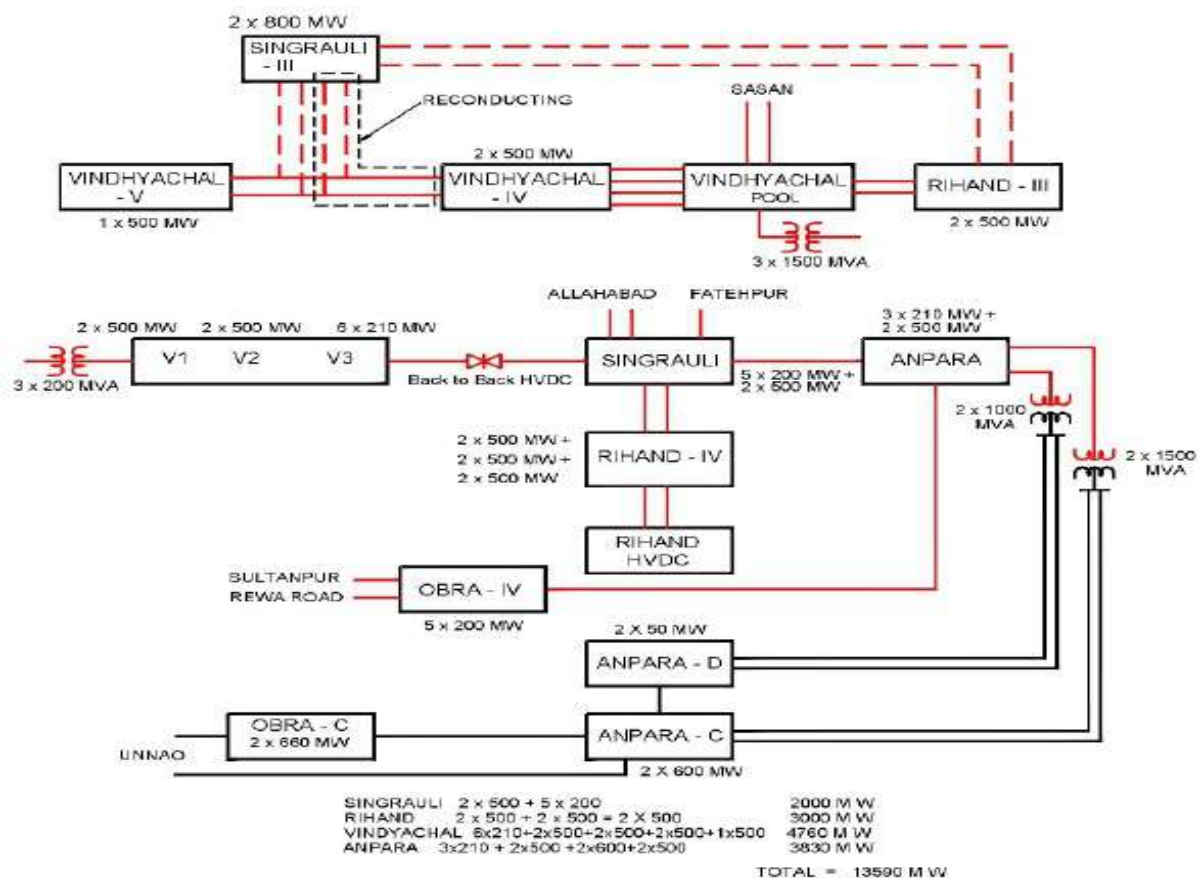
4.1.4. Accordingly, a meeting was held in CEA on 04.10.2019, wherein, following was discussed and agreed:

- (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.

4.2. In the 1st 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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- 4.3. The scheme has been included as an agenda for deliberation by the WR constituents as Singrauli power is being injected at Vindhyachal pool in Western region.
- 4.4. On members query of evacuation of Singrauli-III power through WR, POSOCO stated that in the 1st NRPCTP meeting held on 24th January 2020, NTPC had informed that award for installation of FGD at Vindhyachal -1 (1260 MW) and Singrauli (200x5 MW) units which have almost achieved 35 years of operation has been placed and units are expected to remain in service in future. Therefore, evacuation of power from Singrauli St-III generation can't be carried out with existing transmission system and additional system is required.
- 4.5. On the proposed system for evacuation of generation from Singrauli St-III, Director (SO), POSOCO stated that 400 kV Rihand III - V'chal PS D/C (765 kV line charged at 400 kV at present) may be charged at 765 kV level and Singrauli-III and Rihand-III may also be connected at 765 kV level instead of 400 kV level as currently proposed.
- 4.6. NTPC stated that space is not available at Rihand III for implementation of 765/400 kV ICT. On account of space constraints in Rihand-III, even the termination of Singrauli-III – Rihand-III 400 kV D/c line would require straightening of switchyard fence and road for creation of an additional 400 kV Dia at Rihand-III.

Further, the GIS switchyard for Singrauli Stage-III is located within the premises of existing Singrauli generation complex with limited space. Upgrading it to 765 kV voltage level would require creation of alternate voltage level of 132 kV also for auxiliary supply. Accommodation of 765 kV as well as 132 kV voltage level would technically not be feasible in the available space at Singrauli-III.

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- 4.7. CTU stated that POSOCO's suggestion to charge 400 kV Rihand III- Vindhyachal pool D/c line to 765 kV, as was originally envisaged, can be explored. However, as NTPC is confirming non availability of space at Rihand-III for implementation of 765/400 kV ICT, other alternatives like LILO of Rihand III – Vindhyachal Pool 400 kV D/c line at Singrauli STPP-III and charging of Singrauli-III – Vindhyachal Pool section at 765 kV can also be examined. However, this would require stepping up of voltage to 765 kV at Singrauli Stage-III switchyard.
- 4.8. CTU further stated that the present fault level at 765/400 kV Vindhyachal Pooling Stn at 400kV level is appx 45 kA. It is observed that with interconnection of Singrauli STPP- Stage –III to Rihand-III, the fault level at Vindhyachal pool would increase upto 50 kA. In view of the above issues, the proposal needs to be re-examined wherein various alternatives to resolve the high fault level at Vindhyachal pooling station needs to be explored. In addition, as the connectivity application of NTPC for Singrauli STPP-Stage III has been closed, NTPC needs to apply fresh application for the same and the detailed studies exploring various alternatives can then be performed in coordination with Northern Region group.
- 4.9. CEA stated that the step up voltage and evacuation system for Singrauli-III has been finalised after detailed deliberations with CTU and NTPC. As far as high short circuit at Vindhyachal pool is concerned, the Vindhyachal pooling station is designed for 50 kA short circuit current rating. However, possibility of fault current exceeding 50 kA could be studied further.
- 4.10. After further deliberations, it was agreed that considering the step up voltage of 400 kV level for Singrauli-III, studies exploring other alternatives for evacuation of power from Singrauli STPP Stage-III (2x800 MW) while taking care of high short circuit level in Singrauli-Anpara complex as well as Vindhyachal Pooling station would be done, once NTPC applies for connectivity/LTA for Singrauli STPP Stage-III.
5. **Phasing of Rajgarh Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh:**
- 5.1.1. CEA stated that the transmission scheme “**Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh**” was discussed in 2nd meeting of WRSC held on 21.05.2019 and was recommended for implementation through TBCB in the 4th meeting of erstwhile 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
- 5.1.2. 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, wherein following has been agreed:
- i) The location of Rajgarh P.S. would be shifted to Pachora, Agar.
 - ii) 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

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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.

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 capacity of 2100 MVA/ckt at nominal voltage)	400 kV line bays – 2

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)

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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 re-conductoring of Shujalpur(PG)-Shujalpur(MP) 220 kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage)*

5.1.3. The above phasing of Rajgarh scheme and shifting of the location of Rajgarh pooling station in Agar district (at Pachora) was 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).

5.2. A joint study meeting was held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO in which various alternatives were studied :

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 Pachora 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 Pachora PS along with associated ICT bays and 220 kV line bays (4 nos.)
- 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 Pachora 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

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- Reconductoring of Shujalpur (PG)-Shujalpur (MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage) or 2nd 220 kV D/C line. (Under Intrastate by MPPTCL)

Alternative III(already agreed as a part of original scheme)

- 400/220 kV, 2x500MVA ICT augmentation at Pachora PS along with associated ICT bays and 220kV line bays (4 nos.) - under ISTS
- 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 2nd 220 kV D/C line. (Under Intrastate by MPPTCL)

5.3. MPPTCL stated that in Principal Secretary level meeting held at CEA on 10.08.2020, it was conveyed by MPPTCL that Phase-II of the aforesaid scheme for evacuation of RE power from Rajgarh area needs to be taken up only after receipt of Connectivity/LTA applications beyond 1500 MW at Pachora P.S. With a simple 400/220 kV, 500 MVA ICT Augmentation at proposed Pachora Pooling Station, the scheme under Phase-I would be able to evacuate 1500 MW power. Further, the commissioning schedule of the scheme under Phase-II was stated as December 2022 i.e. at an interval of 6 months from the commissioning of Phase-I scheme (July' 2022). It was highly unlikely that in a span of 6 months, connectivity applications for 1000 MW injection would transpire, when there is no visibility as of now.

5.4. Director (PSPA-I) stated that RE potential in MP has been re-assessed by MNRE wherein the aggregate potential of Rajgarh Area has been kept to 2500 MW only. However, the same has been split as under :

- Agar-Shajapur region - new Rajgarh substation: 1000 MW
- Further potential identified by SECI in the region surrounding the new Rajgarh substation: 1500 MW

Since there is certainty with respect to 1000 MW injection from Agar-Shajapur Solar Park (implementing agency- RUMS) at the proposed Pachora pooling station, accordingly the transmission scheme proposed under Phase-I would be utilised and its bidding needs to be expedited so as to match the commissioning schedule of generation i.e July' 2022. However, since there is no visibility, as of now, with respect to RE developers in Rajgarh area for whom Phase-II of the scheme is required (1500 MW), therefore, there is possibility that proceeding with bidding of the scheme planned under Phase-II would lead to creation of unutilised asset. Accordingly, a decision needs to be taken that whether the bidding of both the phases of the “Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh” needs to be continued as is being done by M/s RECTPCL or whether it would be prudent to split the phase-wise evacuation system into two separate schemes and proceed with bidding of the scheme involving Phase-I.

MPPTCL, MPNRED and SECI were requested to apprise the possibility of coming up of RE generations beyond 1000 MW in Rajgarh area.

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- 5.5. SECI stated that in bids invited by SECI on pan-india basis, none of the successful bidders are setting up their projects in Rajgarh, as RE generation cost is higher in Rajgarh as compared to generation cost in other RE potential areas. SECI has not yet decided on taking up location specific bidding for Rajgarh/Pachora Pooling station. However, since few developers did contact SECI showing interest in setting up their projects in Rajgarh area, the bidding for Phase-II with implementation timeframe of December' 2022 may be continued alongwith Phase-I. Further with implementation of only 1000 MVA pooling station capacity at Pachora-PS under Phase-I, no margins would be available to other RE developers. If margin for additional injection beyond 1000 MW is created in the Pachora P.S. under Phase-I itself, some RE developers may show interest in setting up RE capacity in Rajgarh area.
- 5.6. CEA observed that with pan-india bidding, there is very limited possibility of RE developers setting up project in Rajgarh area. This would be the condition until the entire capacities in other potential areas with better CUF and solar irradiance than Rajgarh is developed. As suggested by MPPTCL, with an additional 400/220 kV, 500 MVA ICT (3rd) at Pachora PS, it would possible to evacuate 1500 MW power. This margin of 500 MW was sufficient to see the response of RE developers in Rajgarh area. Accordingly it is suggested that Phase-I of the scheme may be taken up for evacuation of 1500 MW power with implementation timeframe of July 2022. Phase-II of the scheme may be taken up for implementation only after receipt of connectivity/LTA applications beyond 1500 MW.
- 5.7. MPPTCL stated that Pachora SEZ PP -Bhopal (Sterlite) 400 kV D/c line (Quad/HTLS) that has been proposed under Phase-I would be able to evacuate even upto 2000 MW power for a short period of time. Accordingly, there would be adequate margin available for any additional evacuation of power beyond 1000 MW. Implementation of an additional transformer at Pachora P.S. would take appx. 12 months and could be taken up conveniently after receipt of connectivity/LTA application beyond 1500 MW. Therefore, Phase-II of the scheme can be delayed till there is no visibility of RE developers in the Rajgarh area.
- 5.8. MSETCL and GETCO agreed with MPPTCL's view that Phase-II of the scheme needs to be taken up only after receipt of connectivity/LTA applications from RE developers.
- 5.9. CTU agreed to the proposal of taking up Phase-I of the scheme for evacuation of 1500 MW RE potential and keeping the Phase-II of the scheme on hold till visibility of RE developers in Rajgarh area. Further, the possibility of revising the scope of works to be taken up under Phase-II (amongst the alternatives proposed) can be discussed, irrespective of its implementation schedule. The Alternative-I, involving Pachora PS – Ujjain (MP) 400kV D/c (Quad) line ~ 80 km would be optimal as compared to already approved Pachora – Shujalpur 400kV D/c line as it would also require 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) or 2nd 220 kV D/C line.
- 5.10. POSOCO suggested that as MP will be the main beneficiary of this solar project, it would be better if MP is able to draw power at 220 kV level from Pachora as was done in case of Rewa. This would enable utilisation of the transformers even during the night time and would eliminate the need of augmentation requirement in nearby substation. Chief Engineer (Planning), MPPTCL replied that there is no load at Pachora and power has to be taken to either Ujjain or Shujalpur, both almost same distance, and any alternative amongst connectivity to Shujalpur or Ujjain is agreeable to them.

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- 5.11. POSOCO informed that ICT overloading at 2x315 MVA, 400/220 kV Shujalpur substation during N-1 condition has been observed in the past and alternative may be finalized keeping the same in view.
- 5.12. CEA stated that Phase-II of the scheme has already been approved by NCT and notified by MoP. As far as ICT augmentation of Shujalpur (PG) S/stn is concerned, the same is otherwise also required as informed by POSOCO. With additional ICT at Shujapur, loading on the Shujalpur (PG)- Shujalpur (MPPTCL) 220 kV D/C line would further increase. Therefore, 1x500 MW, 400/220 kV ICT at Shujapur and reconductoring of Shujalpur (PG)- Shujalpur (MPPTCL) 220 kV D/C line is required to be implemented as system strengthening schemes irrespective of RE capacity addition.
- 5.13. After detailed deliberations, the following was agreed:
- I. Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh to be implemented in two phases as two different transmission packages as given below:

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

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1	Establishment of 400/220 kV, 3X500 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: 9 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 – 3 400 kV ICT bays – 3 220 kV ICT bays – 3 400 kV line bays – 2 220 kV line bays – 6 (4 nos. for Agar & Shajapur solar park interconnection & 2 nos. for other RE projects) 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 capacity of 2100 MVA/ckt at nominal voltage)	400 kV line bays – 2

Note: (i) M/s BDTCL (Bhopal Dhule Transmission Company Limited) to provide space

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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.

(iii) The implementation 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)

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

Sl. No.	Scope of the Transmission Scheme	Capacity /km
1	400/220 kV, 2x500MVA ICT augmentation at Pachora PS	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 (to be taken up as per Connectivity/LTA applications received)
2	Pachora – Shujalpur 400kV D/c line line (Quad/HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage)	Length – 80
3	2 no. of 400 kV line bays at Shujalpur for Pachora – Shujalpur 400kV D/c line line (Quad/HTLS) (with minimum capacity of 2100 MVA/ckt at nominal voltage)	400 kV line bays – 2

Note: (i) Powergrid to provide space for 2 no. of 400 kV line bays at Shujalpur for termination of Rajgarh SEZ PP – Shujalpur 400 kV D/c line.

(ii) Phase-II scheme to be taken up only after receipt of Connectivity/LTA applications beyond 1500 MW at Pachora P.S.

(iii) The schedule of implementation of Phase-II of the scheme would be matching with schedule of RE developers or 18 months from the date of transfer of SPV whichever is later.

II. System Strengthening at Shujalpur on account of operational constraints ((n-1) non compliance):

- A. ICT Augmentation of 2x315 MVA, 400/220 kV Shujalpur(PG) substation under ISTS
(i) 1x500MVA, 400/220kV ICT augmentation at Shujalpur (PG)
- B. Reconductoring of Shujalpur (PG)-Shujalpur (MP) 220kV D/c line (conductor with ampacity equivalent to ACSR twin moose at nominal voltage) under Intra-state by MPPTCL.

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

6.1.1. Director (PSPA-I) stated that 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 approved by 2nd Western Region Standing Committee on Transmission held on 21.05.2019, as given below:

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.

6.1.2. Subsequently, MNRE vide letter dated 15.04.2020 (attached as **Annexure-III**) 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

To plan the transmission system for evacuation of power from RE potential areas in Madhya Pradesh for 6.85 GW, a joint study meeting was held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO. 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 19th EPS of CEA (2021-22). Based on the discussions & past trends, for solar maximized scenario, demand has been considered as about 90% of the peak demand of 19th EPS for various regions except for Northern region where it is considered as about 95% of the peak demand. In view of the above, demand of 65 GW has been considered in Western Region.
- iii) **Study considerations:**
 - o 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.
 - o The transmission planning criteria was generally followed for transmission design considerations.

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- 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 Despatch Scenario:** During the 2nd meeting of 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 2nd WRSCT meeting, the following dispatch scenario was considered based on feedback from respective state utilities:

Gujarat	Maharashtra	Madhya Pradesh
<ul style="list-style-type: none"> • 90% Solar dispatch • 75% Wind dispatch 	<ul style="list-style-type: none"> • 80% Solar dispatch • 75% Wind dispatch 	<ul style="list-style-type: none"> • 80% Solar dispatch • 70% Wind dispatch

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

6.2. Transmission system for evacuation of power from Agar &Shajapur (1000 MW) and Rajgarh SEZ (1500 MW). Already deliberated at item no. 5.

6.3. Transmission system for evacuation of power from Khandwa SEZ (600 MW):

6.3.1. Initially SEZ potential of 2500 MW was indicated which now has been reduced to 600 MW (floating solar and others) by MNRE. 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 was under examination by RUMSL and Narmada Hydroelectric Development Corporation (NHDC) respectively. Floating solar projects at Omkareshwar reservoir are being planned in 1st Phase.

6.3.2. M/s RUMS representative stated that for 500 MW floating solar project, feasibility studies are being undertaken by World Bank. For evacuation of power from this floating solar project, M/s RUMS was planning to pool its power at existing 400/220 kV Khandwa pool (PG) through 220 kV dedicated line. As far as 100 MW floating solar project being implemented by NHDC was concerned, its power would be supplied to state primarily for irrigation purpose. Accordingly, STU would take care of its evacuation scheme .Based on the results of techno-economic feasibility studies, the capacity of these floating solar projects would be formalised within a month's time. Accordingly, RUMS would apply for 220 kV connectivity at Khandwa pool (PG).

6.3.3. CTU stated that the margin for evacuation of upto 300 MW power was available at existing Khandwa S/s (PG). Any additional injection of power beyond 300 MW

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would require system strengthening. Alternatively, RUMS can explore the possibility of pooling power of this floating solar project at Khandwa PS (Sterlite).

6.3.4. After deliberations, the following was agreed with respect to “Transmission system for evacuation of power from Khandwa SEZ (600 MW)”:

- (i) The evacuation system for 500 MW floating solar project in Khandwa, under ISTS, would be evolved after ISTS connectivity application M/s RUMS for the project. At present the project is under techno-economic feasibility study stage.
- (ii) The evacuation system for 100 MW floating solar project in Khandwa, would be evolved and implemented by MPPTCL, as intra-state system.

6.4. Transmission system for evacuation of power from Chhatarpur SEZ (1500 MW): It 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/Chhatarpur area:

Alternative-I

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

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

Alternative-II

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

** Out of Satna – Bina 2xD/c lines, one circuit of 2nd D/c line has been LILOed at Sagar (MPPTCL) substation. The proposed LILO is to be made on the other (1st) D/c line between Satna & Bina*

6.4.1. Director (PSPA-I), CEA further stated that regarding the location of Chhatarpur Pooling Station, it was observed that establishment of PS at Bijawar was most optimal and cost effective as Bijawar was located between Chhatarpur (NTPC Barethi) and LILO point and towards LILO point.

6.4.2. CTU stated that it has received Stage-I Connectivity application for 550 MW solar capacity planned by NTPC at Barethi. With receipt of Stage-II Connectivity application, the same would be granted with the system discussed under Alternative-II. CTU further stated that if MPPTCL confirms the availability of land in Bijawar, proposed Chhatarpur P.S. can be set up there. In that case, NTPC would have to construct dedicated line from Bareithy upto proposed Chhatarpur P.S.

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- 6.4.3. NTPC stated that discussions for finalisation of location of proposed Chhatarpur P.S. is being taken up amongst NTPC, RUMS and MPNRED. Also, the views of MPPTCL can be incorporated.
- 6.4.4. RUMS stated that its 950 MW solar park at Bijawar was expected to be commissioned in the timeframe of December' 2022. Within a month's time, it would apply for ISTS connectivity either for full potential of 950 MW or in batches with 500 MW in the first go. Accordingly, the implementation time schedule of the transmission scheme can be aligned to match the December' 2022 timeframe.
- 6.4.5. WRLDC enquired that whether MPPTCL was envisaging any 220 kV outlets from Chhatarpur P.S. in future. Also, the impact of LILO of one of the ckts of 400 kV Satna-Bina line at Chhatarpur PS on the loading of 400/220 kV ICTs at Satna needs to be examined.
- 6.4.6. MPPTCL stated that no 220 kV outlets are planned from the proposed Chhatarpur P.S. Further, as far as overloading of ICTs at Satna with the implementation of the proposed scheme was concerned, MPPTCL has already planned downstream network to feed load of Rewa area. At present, the load of area around Rewa is being fed with import of power from Satna. With implementation of the planned intrastate Rewa (RUMS) – Rewa (PG) 220 kV D/c line, 400/220 kV ICTs at Satna would get relieved.

On CEA's enquiry about the future provisions to be kept at proposed Chhatarpur P.S., MPPTCL stated that provision of space to accommodate 4 no. of 220 kV bays in future may be kept.

- 6.4.7. After discussions, the following was agreed:

(i) **Transmission system for evacuation of power from Chhatarpur SEZ (1500 MW):**

- i. Establishment of 3x500MVA, 400/220kV Pooling Station at Chhatarpur
- ii. LILO of Satna - Bina 400kV (1st) D/c line at Chhatarpur PS*~ 60 km
- iii. 1X125 MVAR, 420 kV bus reactor at Chhatarpur PS
- iv. 5 nos. 220 kV line bays for solar park interconnection

**Out of Satna – Bina 2xD/c lines, one circuit of 2nd D/c line has been LILOed at Sagar (MPPTCL) substation. The proposed LILO is to be made on the other (1st) D/c line between Satna & Bina.*

- (ii) Space to accommodate 4 nos. of 220 kV bays in future would be made at 400/220kV Pooling Station at Chhatarpur
- (iii) MPPTCL, MPNRED and RUMS would facilitate in providing land for the proposed Chhatarpur P.S. at Bijawar.
- (iv) Both MPNRED and NTPC would apply for Stage-II Connectivity for their respective solar plants proposed to be connected at Chhatarpur P.S.

6.5. Transmission system for evacuation of power fromNeemuch Solar Park (1000 MW):In the meeting held on 10.08.2020, the following three alternatives were

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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

6.5.1. CTU informed 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 48th meeting of WR constituents for Connectivity & LTA Applications held on 30.06.2020. CTU suggested Alternative-I was more prudent from techno-economic point of view.

6.5.2. POSOCO raised the issue of (n-1) non-compliance of ICTs at Kota in case of reduced generation at KTPS with the proposed alternative-I of interconnecting Neemuch PS to Kota.

6.5.3. CEA enquired that whether the land for the remaining 500 MW potential at Neemuch has been identified by RUMS or not, as the ISTS scheme is being developed for injection of 1000 MW at Neemuch P.S.

6.5.4. RUMS stated that the proposed Neemuch P.S. would be located near Singholi village. It has already applied for Stage-I and Stage-II Connectivity for 500 MW confirmed potential of Neemuch Solar Park. This capacity would be commissioned by July' 2022. Further, it has identified land for additional 500 MW nearby Singholi and would apply for its connectivity by next month.

6.5.5. After detailed deliberations, the following was agreed:

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

- a) Establishment of 2x500MVA, 400/220kV Pooling Station at Neemuch
- b) Neemuch PS – Kota 400kV D/c line~ 70 km
- c) 1X125 MVAR, 420 kV bus reactor at Neemuch PS
- d) 4 nos. 220 kV line bays for solar park interconnection

(i) With the agreed scheme, the issue of 400/220 kV ICTs at Kota becoming N-1 non-compliant in scenario of low generation at KTPS would be studied further in coordination with NR group. The scheme would also be discussed in

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the meeting of NRPC (TP). Any additional requirement arising out of Kota 400/220 ICT overloading, would be included in the scheme. The same would be intimated to the WRPC(TP) in the next meeting.

- (ii) RUMS would apply for LTA application for its 500 MW Neemuch Solar Park (to be commissioned in July'2022 timeframe) for which Stage-II Connectivity has already been applied. Further, RUMS would also apply for Stage-II Connectivity application for additional 250 MW (out of remaining 500 MW) for which land has already been identified nearby Singoli village.

6.6. Transmission system for evacuation of power from Morena Solar Project (1250MW): In the meeting held on 10.08.2020, the various alternatives were discussed for the evacuation of RE power from Morena Solar Park. It was observed that MPPTCL being the 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. 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.

6.6.1. MPPTCL had informed that there was existing Sabalgarh 220 kV substation which was 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.

Accordingly, the following was 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.

6.6.2. CTU stated that in the proposal, 600 MW was envisaged to be evacuated under Phase-I through 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). However, it is observed that Sabalgarh being nearer to proposed Morena Solar park, Morena solar park- Sabalgarh line is getting overloaded with injection of 600 MW at Morena. Under (n-1), Morena-Sabalgarh line was carrying appx. 250 MW power. Accordingly, with the proposed LILO, not more than 350 MW can be evacuated from proposed Morena SP. Alternatively, MP may examine the option of directly connecting Morena SP to Sabalgarh S/stn.

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6.6.3. MPPTCL stated that there was no space for implementation of feeder bays at existing Sabalgarh (MP) 220 kV substation.

6.6.4. After deliberations, it was decided that MP would come up with the RE quantum that can be evacuated through intra-state network under Phase-I of the generation (Morena Solar Park). For the balance capacity, transmission could be planned in future based on the response to Phase- I development.

7. High fault level at substations in Gujarat-Vadodara (PGCIL), Dehgam (PGCIL), Ranchodpura (GETCO) and Asoj (GETCO).

7.1. Director (PSPA-I), CEA stated that the fault level of 400 kV substation in Gujarat , namely, Vadodara(PG), Asoj(GETCO), Dehgam(PG) and Ranchodpura(GETCO)) observed in the studies for 2021-22 conditions are about 46 kA, 46 kA, 49 kA and 42 kA respectively.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.

7.2. To control the fault level of Vadodara(PG) & Asoj(GETCO) S/s: In a joint study meeting held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO, the following solutions were proposed:

- 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

Bypassing 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.

7.2.1. GETCO stated that based on the internal discussions with SLDC and DISCOMS, it has transpired that on account of appx 1200-1300 MW local load at Asoj, Vadodara(PG)-Asoj (GETCO) 400 kV interconnection needs to be continued. Accordingly, other alternatives such as use of series reactor or other schemes to control fault level at these two S/stns needs to be explored.The possibility of implementing split bus to control fault level was studied but SLDC opined that it is not a long term solution. Accordingly, reconfigurations at Asoj (GETCO) and Vadodara (PG) substations, to control high fault level needs to be explored by CTU and GETCO.

7.2.2. CTU stated that as high short circuit contribution of appx 20 kA was from both the sides, therefore, insertion of series bus reactor was not a feasible alternative. Prima-facie, this leaves two options of either implementing the proposed bypass at Asoj (GETCO) or opening of Vadodara-Asoj 400 kV D/c line. Even bus splitting at either sub-stations is not a reliable solution in the present case. Accordingly, the proposal of bypass was feasible solution from both power flow as well as reliability point of view.

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Other alternatives like establishing of a new 400 kV ISTS S/stn in this area and re-alignment of the feeders needs to be explored and the results could be discussed in the next meeting of WRPC (TP).

7.2.3. WRLDC stated that that with full generation at Sardar Sarovar HEP, SSP– Kasor 400 kV S/C line and SSP–Asoj 400 kV S/C line gets over loaded. Presently SSP HEP is interconnected at 400 kV level to Kasor, Asoj, Rajgarh and Dhule. During full generation st SSP, flow flow is mostly towards Gujarat (SSP-Asoj line 650 MW, SSP-Kasor line 450 MW). Under N-1 contingency, loading on SSP-Asoj 400 kV S/c twin moose line crosses 850 MW. Moreover, these lines are with Twin Moose conductor with design temperature of 75 degree. Accordingly, the option of interconnecting SSP and Chorania could be explored.

7.2.4. POSOCO stated that the Installed capacity of SSP is 1450 MW (River Bed Power House 6x200 MW + Canal Head Power House 5x50 MW). Full generation at SSP HEP occurs only when dam overflows which happens for about 15 days in a year. Otherwise, most of the time the generation is from CHPH, which is operated in consultation and as per advice of NCA/WREB, based on irrigation requirement.

7.2.5. After deliberations, the following was decided:

- (i) Further alternatives/schemes apart from the proposed bypass at Asoj to control the fault level of Vadodara(PG) & Asoj(GETCO) S/s would be studied and taken up in the next meeting of WRPC(TP)
- (ii) The issue of overloading of SSP-Asoj 400 kV S/c line on N-1 conditions (outage of SSP-Kasor 400 kV line) during peak generation at SSP HEP would also be studied.

7.3. To control the fault level of Dehgam(PG) & Ranchhodpura(GETCO) S/s, the following was proposed : In a joint study meeting held on 10.08.2020 among CEA, CTU, POSOCO, MPPTCL & GETCO, the following solutions were 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)

Bypassing 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 & 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.

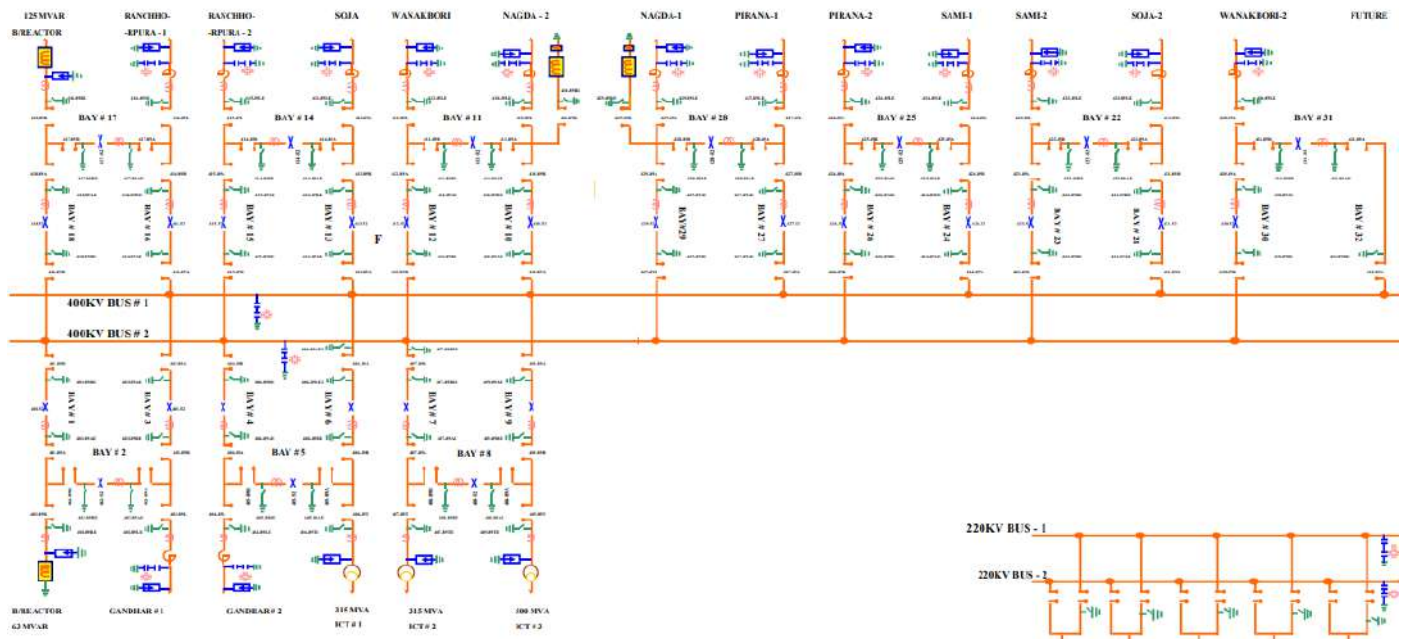
The above arrangement reduces the the fault level at Dehgam and Ranchhodpura 400 kV ss from 49 kA and 42 kA to 33 kA and 39 kA respectively. Also with bypassing the Ranchhodpura(GETCO) – Dehgam(PG) 400kV D/c line at Dehgam(PG) S/s , the high loading on Ranchhodpura – Dehgam 400kV D/c line (in high RE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

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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



7.3.1. GETCO stated that in the present proposal, after bypassing Ranchhodpura- Dehgam (PG) 400 kV D/c line at Dehgam, the resulting Ranchhodpura- Pirana 400 kV D/c line would become (n-1) non compliant. The Ranchhodpura- Dehgam (PG) 400 kV D/C line is with Twin Moose conductor with design temperature of 75 degree.

7.3.2. CTU stated that based on feedback from Dehgam S/s, it has been gathered that it is not physically possible to swap 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 on account of layout constraints. However, since the two lines are crossing right outside the boundary wall of the substation, the bypassing could be implemented from outside the substation. However, this would lead to 4 nos. 400kV bays becoming idle.

7.3.3. After detailed deliberations, it was agreed that the proposal of controlling high short circuit levels at Dehgam substations would be reviewed and taken up in the next meeting of WRPC (TP).

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

8.1. Director (PSPA-I), CEA stated that 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 Gujarat. Out of 16 GW potential RE zones, transmission system for evacuation of 5.5 GW RE potential under Phase-I and

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transmission system for evacuation 10.5 GW RE potential under Phase-II were planned and approved by WRSCT. 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 1st 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, the following issues need to be deliberated:

- i) Transmission system for evacuation of 2 GW RE potential from Khavda (which was dropped by NCT in its 3rd 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).

8.2. Transmission system for evacuation of 2 GW RE potential from Khavda (which was dropped by NCT in its 3rd meeting)

8.2.1. The transmission system for evacuation of power from Khavda agreed in the 1st WRSCT included direct injection of 2 GW RE power by RE developers through their dedicated lines at Bhuj-II pooling station, however, in the 3rd NCT meeting the same was dropped in view of SECI requested to review the proposed arrangement. The evacuation arrangement for this 2 GW would be studied in a comprehensive way along with the scheme for evacuation of additional power from Khavda region.

8.2.2. CTU stated that the determining the location of pooling station in Khavda would also require due diligence and consultation with stakeholders. There are several no-go areas in identified high RE potential Khavda region where construction of overhead line would not be possible and underground cables would be required for the portion of line passing through such no-go areas.

8.2.3. Members agreed with the proposal to take up the planning of the transmission scheme for the dropped 2 GW potential along with the planning for the next phase for evacuation of additional 10 GW from Khavda region.

8.3. System Strengthening in Gujarat associated with integration of RE projects from Khavda potential energy zone.

8.3.1. In the studies high loadings were observed with 16 GW RE integration in Gujarat on several Intra-state and ISTS transmission lines in Gujarat, which cater to onward dispersal of power from Western / Central Gujarat to Southern / Eastern Gujarat. Two alternatives for dispersal of power beyond Vadodara towards southern Gujarat and Maharashtra under high RE conditions were studied, one is 400 kV corridor and other is 765 kV corridor, as given below:

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- 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 2nd 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**).

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**).

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- 8.3.2. 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 was 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).
- 8.3.3. GETCO stated that already there was an issue of high fault level at Vadodara (PG) and Asoj (GETCO) S/stn. Now, with the proposed 400 kV interconnection of Vadodara with Kosamba, fault level at Kosamba (220kV level) would further increase. In view of the same, Vadodara (GIS)(PG) – Kosamba(GETCO) 400kV D/c line may be reviewed. Out the proposed alternatives, alternative involving 765 kV corridor was preferable. The multiple interconnections proposed in the 400 kV alternative would result in increase in short circuit level.
- 8.3.4. CTU clarified that Vadodara (GIS)(PG) – Kosamba(GETCO) 400kV D/c line was common strengthening required in both the alternatives. As far as high fault level at Kosamba was concerned the same could be studied along with the proposals for reducing Short circuit level at Vadodara (PG) and Asoj (GETCO).
- 8.3.5. CEA further stated that GETCO vide its letter dated 04.06.2020 requested CEA to incorporate the following as Corrigendum to the minutes of the 1st meeting of WRPC(TP):

S.No	Item No.	Para/ item as recorded in the MoM of 1 st WRPCTP	As per GETCO
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 as part of associated ISTS scheme for RE integration only and not in form of regular system strengthening scheme.

The proposal of GETCO to take up the intra-state strengthening schemes required on account of RE integration with ISTS as part of RE linked ISTS scheme needs further deliberation. The proposal of GETCO would result in transmission charges of such strengthening schemes being recovered through national pool.

- 8.3.6. GETCO stated that the entire power from most of the RE linked transmission schemes being developed under ISTS in Gujarat would be utilised by other beneficiaries except Gujarat. GUVNL, as of now, has no commitment for utilising this power. However, these schemes are causing constraints in Intra-state system as well as Inter-State

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systems. This requires necessary augmentation of Transmission system. The need to evolve the scheme/ alternative to reduce fault level at Vadodara (PG) has arisen on account of high capacity corridors being planned from Lakadia and Khavda upto Vadodara (PG). In view of above, GETCO's proposal to include such Inter-state strengthening schemes associated with ISTS scheme for RE integration was justified.

- 8.3.7.** CTU stated that bifurcation needs to be maintained between the Inter -state strengthening schemes required on account of RE integration under ISTS and the regular inter-state strengthening schemes to cater to increased load or high S/ckt level at sub-stations. Accordingly, case-to-case analysis needs to be done to identify the system strengthening schemes required on account of RE integration under ISTS and the same can be taken up as associated ISTS scheme for RE integration.
- 8.3.8.** MSETCL agreed with CTU's suggestion and stated that if constraints in system are observed on account of RE injection under ISTS thereby necessitating inter-state system strengthening, then such strengthening schemes needs to be taken up as RE linked ISTS scheme.
- 8.3.9.** After detailed deliberations, it was agreed that ISTS strengthening schemes in future would be analysed on case to case basis to identify the ones that would qualify to be developed as associated ISTS strengthening scheme with RE integration.
- 8.3.10.** GETCO requested to review the Transmission system for evacuation of power from Dholera UMSP (Phase I – 2GW) that has already approved in the 1st meeting of WRPC (TP) held on.11.01.2020. GETCO informed that 1 GW capacity out of the 5 GW Dholera UMSP being developed by GPCL has been awarded . With award of this 1 GW capacity, it appears that the entire potential of 5 GW Dholera UMSP would materialise in near future. Proceeding with the already approved scheme under ISTS would require planning of additional system to cater to evacuation requirement under Phase-II (2 GW) of ISTS. Accordingly, it would be prudent to revise the already approved scheme and plan a 765/400 kV pooling station at Dholera along with 765 kV outlet upto planned Ahmedabad S/stn. The line may initially be kept charged at 400 kV under Phase-I. This would result in an optimal system to cater to the total evacuation requirement of 4 GW under ISTS which is being developed in two phases with 2 GW in each phase.
- 8.3.11.** CTU stated that the approved scheme for evacuation of 2 GW potential from Dholera UMSP under Phase-I includes LILO of both circuits of Vadodara- Pirana (PG) 400 kV DC line at Dholera pooling station and involved the minimum system required to cater to evacuation needs of phase-I. For evacuation of additional 2 GW from Dholera under Phase-II, certain constraints may be observed and the same needs to be studied. Alternatively, space for upgradation of Dholera P.S. to 765 kV level may be kept and the approved scheme may be continued.
- 8.3.12.** CEA stated that prima-facie it appears that the approved LILO of both circuits of Vadodara- Pirana (PG) 400 kV Quad DC line at Dholera pooling station would be able to cater to evacuation requirement of 4 GW.CEA enquired SECI regarding the status of 4 GW capacity at Dholera UMSP being developed by SECI in phases.
- 8.3.13.** SECI stated that it has not yet issued the tender for Dholera UMSP on account of pending environmental clearance. Now, with the award of 1 GW capacity by GPCL, SECI would expedite issuance of tender. SECI earlier had phased out the development

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of Dholera UMSP into phases in order to check the responses of the developers, as generation tariff was expected to be high at Dholera as compared to other locations. Accordingly, the minimum system required for evacuation of 2 GW under Phase-I was planned and approved. Now, based on the submission of GETCO, other alternatives such as increased space in future scope or 765 kV initially charged at 400 kV level could be explored.

8.3.14. GETCO stated that SECI has yet to float the bids and sufficient time is available to revise the Transmission scheme for evacuation of power from Dholera UMSP, so as to develop an optimal system that would be able to cater to evacuation requirement of 2 GW each under phase-I and Phase-II.

8.3.15. After detailed deliberations, the following decisions were taken:

- a) The transmission system strengthening in Gujarat associated with integration of RE projects from Khavda potential energy zone, as proposed above would be further studied.
- b) GETCO' proposal to take up the inter-state strengthening schemes required on account of RE integration with ISTS as a part of associated ISTS scheme for RE integration, was agreed to by the members on case to case analysis.
- c) Transmission scheme for evacuation of power from Dholera UMSP (Phase-I: 2 GW) would be reviewed, so as to develop an optimal ISTS system that would be able to cater to evacuation requirement of 2 GW each under phase-I and Phase-II.

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

8.4.1. Director (PSPA-I), CEA stated that 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% dispatch), in case of outage of one circuit of Jam Khambhaliya – Lakadia 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 1x125MVA, 420kV Bus reactor
- Extension of Essar–Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS with 63MVA switchable Line Reactor at both ends of Lakadia - Jam Khambhaliya 400kV D/c line

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- The existing line reactor (63MVA) on Bhachau end of EPGL – Bhachau line shall be converted into switchable Line Reactor.
- 8.4.2.** 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.
- 8.4.3.** 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. The Jam Khambhaliya pooling station is currently under implementation by Jam Khambhaliya Transmission Ltd. with SCOD of Mar'21. For RE injection beyond 1200 MW at Jam Khambhaliya pooling station, additional system needs to be planned.
- 8.4.4.** CTU stated that at Jam Kambhanliya, 4X500 MVA ICTs are presently being implemented. However, the injection can be allowed only upto 1200 MW. Accordingly, the 4th ICT being implemented would aid in enhancing reliability and providing (n-1) compliance at immediate connectivity level.
- 8.4.5.** POSOCO stated that in the existing planning criteria N-1 compliance of 400/220 kV ICTs at RE pooling station (immediate connectivity) is not mandated. Now, with the target of integrating 175 GW RE by 2021-22, the N-1 criteria at RE pooling stations needs to be reviewed as, currently, any outage may result in loss of significant generation and can adversely impact the grid security.
- 8.4.6.** Members deliberated and agreed that 800 MW at Jam Khambhaliya shall be shifted to Khavda area and transmission system for the same shall be studied in joint study meeting proposed at 8.3.15. In future, with increase in RE injection at Jam Kambhaliya, alternatives to improve the short circuit level may also be explored.
- 9. Connectivity to 325 MW Wind Project of M/s SBESS Services Projectco Pvt Ltd at 220 kV level of existing Indore (PG) S/s:**
- 9.1.** Director (PSPA-I) stated that 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 220kV level of Indore (PG) S/s as it was causing overloading of 220kV lines emanating from Indore S/s and insisted that M/s SBESS must pay the STU transmission charges for use of the Intra State transmission system
2.	Joint meeting amongst CEA, CTU,	The Stage-I / Stage-II connectivity was

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	MPPTCL and SBESS held on 20.12.2019	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"> • 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 2nd D/c line and confirmed regarding availability of 220kV bays at Indore-II (MP) S/s. • 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. • It was decided that the matter regarding connectivity to M/s SBESS shall be deliberated in a separate meeting.
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.
5.	Joint meeting amongst CEA, MNRE, MPNRED, MPPTCL, RUMS and SECI on 30.03.2020	<p>Following was decided:</p> <ul style="list-style-type: none"> • 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) 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

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		<p>to 400 kV bus of Indore (PG) S/stn could be explored.</p> <ul style="list-style-type: none"> • 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
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9.2. 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.

9.3. 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
	<p>M/s SBESS Services Projectco Pvt Ltd : Stage-II Connectivity for 324.4 MW already granted at existing 220 kV bus of Indore.</p> <p>LTA for 324.4 already applied</p>	<p>220 kV level of existing Indore (PG) 765/400/220 kV S/s.</p> <p>Connectivity system under ISTS scope:</p> <p>i) 220 kV bus extension of Indore 765/400/220 kV substation.</p> <p>ii) 220kV Hybrid/MTS line bay</p>	<p>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.</p> <p>ii) Bus sectionaliser (Hybrid/MTS) between extended and existing 220 kV bus at Indore S/s [so that the 220kV bus section with dedicated</p>

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			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]
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- 9.4. GETCO stated that implementation of a 400/220 kV ICT at Indore S/stn under ISTS especially for granting connectivity to a dedicated RE generator at 220 kV level is not justified. Instead, the RE developer could have been asked to implement the dedicated 400/220 kV transformer and connect at 400 kV level itself. The requirement of an additional 400/220 KV ICT at Indore (PG) S/stn was only due to injection by RE developer.
- 9.5. CTU stated that after several deliberations in the meetings tabulated above, granting connectivity to M/s SBESS Projecto Pvt Ltd at 220 kV level and LTA with implementation of an additional 400/220 kV ICT under ISTS was found to be most feasible and prudent option on account of the following:
- (i) As per the RE procedure providing connectivity at 400 kV level for 325 MW injection was not justified.
 - (ii) The 400/220 kV, 1X500 MVA ICT proposed under ISTS is an alternative to the ISTS augmentation through Indore-Indore (PG) 2nd 220 kV D/c line for effecting the LTA. Moreover, this ICT could also be used for drawl purpose by MPPTCL. .
 - (iii) Already, there are space constraints at Indore (PG) s/stn. With implementation of the ICT under ISTS, additional RE injection 175 MW would be possible. In case of implementation of ICT as a dedicated 400/220 kV ICT by the RE developer, the available space would not be optimally utilised.
 - (iv) The proposed connectivity at 220 kV level with an additional ICT under ISTS has been agreed upon after weighing in other alternatives. As agreed in earlier meeting, if the developer is granted connectivity at 220 kV voltage level without ICT, it would have been necessary to implement 220 kV downstream system strengthening by MPPTCL or under ISTS. The cost for such strengthening would have been even higher on account of ROW issues in the area compared to the cost of implementation of an additional ICT under ISTS.
- 9.6. SECI stated 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 the developers have achieved financial closure, they cannot be asked for bearing any additional charges that have not been earlier mentioned in their bidding documents. Accordingly, implementation of a dedicated ICT cannot be included under their scope at this stage.

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- 9.7. MSETCL stated that if this proposed 400/220 kV ICT under ISTS is to be implemented for dedicated use of the RE developer, then there is an issue. However, if after a certain point of time, the ICT would be utilised for common purposes, the implementation of the same can be agreed.
- 9.8. GETCO stated that if MPPTCL agrees that the proposed ICT under ISTS would be used in future for drawl purposes, then there was no issues. MPPTCL agreed to the same.
- 9.9. CTU stated that the scheme includes bus sectionaliser (Hybrid/MTS) between extended and existing 220 kV bus at Indore S/s. Depending on the loading of the outgoing lines the bus sectionaliser could be kept in closed or open conditions.
- 9.10. After detailed deliberations, the following proposed Stage-II connectivity/LTA for M/s SBESS Services Projectco Pvt Ltd was agreed:

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) 220 kV Hybrid /MTS line bay	iii) 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. iv) 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 the existing 220 kV bus at Indore S/s, whenever required, in order to control the overloading of 220 kV outlets from Indore S/s depending on the injection of power from SBESS]

10. Intra-state proposal received from MPPTCL

- 10.1. **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.**

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10.1.1. MPPTCL has informed that the demand of Madhya Pradesh has reached 14555 MW 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 13th 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.

10.1.2. 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)
- (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)

10.1.3. CEA enquired POWERGRID regarding provision of any existing line reactors in the Itarsi- Bhopal 400 kV D/C line.

10.1.4. CTU stated that there are no existing line reactors in Itarsi- Bhopal 400 kV D/C line. Even after the proposed LILO of both circuit of Itarsi (PGCIL) - Bhopal 400kV line (Twin Moose) at Mandideep 400kV GIS substation (2x10Km), there would be no requirement of line reactors.

10.1.5. After deliberations, intra-state proposal of MPPTCL was agreed by the members.

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

10.2.1. MPPTCL stated that the total transformation capacity of Mehgaon 220kV substation was (2x160)MVA (i.e. 320MA) and maximum load recorded during the year 2019-20 was 273MVA (85%). Moreover, due to space constraints, it was 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 were 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 was difficult to

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manage the loads feeding from Mehgaon 220kV S/s and reliability of supply in the area also affected.

Accordingly, LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation has been proposed as an Intra state scheme. The provision of 2 Nos. 220kV feeder bays for termination of LILO of Auriya(UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation has already considered under the scope of work of TSP i.e. M/s Powergrid-Bhind Guna Transmission Ltd.

M/s Powergrid-Bhind Guna Transmission Ltd. (PG-BGTL) is the Transmission Service Provider (TSP), selected by MPPTCL through TBCB process, for implementation of 2x160 MVA,220/132kV Bhind (TBCB) substation along with 220kV DCDS line from Morena(Adani-TBCB) 400kV S/s to Bhind 220kV S/s.The commissioning schedule was 36 months from Signing of Share Purchase Agreements (SPA) & Transfer of SPV i.e. from 11.09.2019.

10.2.2. CEA stated that the proposal involves LILO of an inter-state line (WR and NR), therefore, the proposal also needs to be deliberated in the NRPC-TP. Further, M/s Chattishgarh-WR Transmission Limited (M/s CWRTL) has established that Morena 400/220 kV substation. 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 1st WRPC-TP meeting.

10.2.3. CTU stated that presently metering points are situated at Mahgan and Auriaya (UP) s/stns. With the proposed LILO of Auriya (UP) – Mehgaon 220kV line at Bhind (TBCB) 220 kV substation, the metering points would be required to be shifted to Bhind (TBCB).

10.2.4. WRLDC enquired about the bus scheme proposed at Bhind (TBCB). MPPTCL stated that the Double Main and Transfer Bus scheme is being implemented at Bhind (TBCB).

10.2.5. After deliberation,the following intra-state proposal was agreed:

- i) LILO of Auriya (UP) – Mehgaon 220kV line at Bhind (TBCB) 220kV substation- to be implemented by MPPTCL.
- ii) MPPTCL would also be put up for the concurrence NRPC (TP) as Auriya (UP) – Mehgaon 220kV line is between WR and NR.

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

10.3.1. MPPTCL stated that the transformation capacity of Gwalior (Mahalgaon) 220kV substation was (2x160+120)MVA (i.e. 440MA) against which maximum loading of 304 MVA has already been recorded during the year 2019-20. 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 was 135MW & 141MW respectively. In case of outage of any one circuit, the other 220kV circuit gets overloaded and it was difficult to manage the feeding from Gwalior(Mahalgaon) 220kV S/s and reliability of supply in the area also affected. Accordingly, LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation has been proposed. With this proposal, there would three nos. if 220 kV lines between

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Gwalior (Mahalgaon) and Gwalior (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.

10.3.2. CEA enquired about the availability of bays at Gwalior substation. CTU confirmed that space is available for implementation of 2 no of GIS bays at Gwalior (PGCIL).

10.3.3. Regarding implementation of the 2 nos. of GIS bays at Gwalior, MPPTCL confirmed that the 2 Nos. 220kV feeder bays for termination of LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765kV Substation would be implemented by them.

10.3.4. After deliberations, the following intra-state proposal was agreed:

- i) LILO of Gwalior (Mahalgaon) - Datiya 220kV line at Gwalior (PGCIL) 765/400/220 kV Substation.- to be implemented by MPPTCL.
- ii) 2 nos. of 220 kV GIS bays at Gwalior (PGCIL) 765/400/220 kV Substation – to be implemented by MPPTCL.
- iii) POWERGRID to provide space for 2 nos. of 220 kV GIS bays at Gwalior (PGCIL) 765/400/220 kV Substation.

10.4. Conversion of 400kV fixed line reactors as switchable line reactors installed on 400kV lines of PGCIL.

10.4.1. MPPTCL 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

MPPTCL requested that to convert the above fixed line reactors into switchable line reactors installed on above 400kV lines. The space for providing isolator and circuit breakers was available at Bhopal (MPPTCL) & Nagda (MPPTCL) 400kV Substations.

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10.4.2. Members enquired MPPTCL about the reason behind their proposal as generally, wherever overvoltage issues are prevalent, the proposal to convert fixed line reactors into switchable line reactors are proposed by CTU and CEA on case to case basis.

10.4.3. MPPTCL stated that as per the inputs obtained from their maintenance staff, in order to perform the maintenance of these fixed line reactors at Bhopal (MPPTCL) and Nagda (MPPTCL) end, the 400 kV lines are required to be switched off, thereby affecting the reliability. With switchable line reactors, the maintenance could be done without the need to switch off the lines.

10.4.4. After further deliberations, members requested MPPTCL to deliberate their proposal in the OCC forum of WRPC and recommendations of the OCC, if any, would then be deliberated in the WRPC (TP) meeting.

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

10.5.1. MPPTCL informed that the following 220 kV S/s alongwith associated transmission lines were proposed by them 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)
1	220/132/33kV substation at Ajaygarh (District-Panna)	
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
2	220/132/33kV substation at Begamganj (District-Raisen)	
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

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Sl. No	Name of Intra-State Transmission Work in MP through TBCB Process	Route Length (Km) / Capacity (MVA)
3	220/132/33kV substation at Bisonikala (District-Hoshangabad)	
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
4	220/132kV Substation at Bargawan (District-Singrauli)	
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
5	220/132kV Substation at Khargone (District-Khargone)	
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
6	220/33kV substation at Shahpur (District-Betul)	
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
7	220/33kV substation at Manpur (Bijouri) (District-Umariya)	

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Sl. No.	Name of Intra-State Transmission Work in MP through TCB Process	Route Length (Km) / Capacity (MVA)
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

1.1.1. Members noted the intra-state proposal of MPPTCL as given above.

10.6. Installation of additional 1x100MVA, 400/132kV Transformer (3rd ICT) and 1x125MVAR Bus Reactor at Kirnapur 400/132kV Substation of MPPTCL.

10.6.1. MPPTCL informed that 2x100 MVA, 400/132kV Kirnapur (Balaghat) substation was feeding 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. Maximum drawal recorded at Kirnapur 400/132 kV substation during last 12 months was 163 MVA. Therefore, during the (N-1) contingency condition it would be difficult to manage the load in this area.

10.6.2. Further, Kirnapur 400 kV 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, the following was proposed as a part of intra-state scheme:

- i) 1x100MVA, 400/132kV additional transformer (3rd ICT) at 400/132kV Kirnapur (Balaghat) substation.
- ii) 1x125MVAR, 400kV Bus reactor at Kirnapur 400kV substation.

10.6.3. Members agreed to the proposal of MPPTCL.

11. Creation of 220 kV level at 765/400 kV Shikrapur (PGCIL) Substation– proposal from MSETCL

11.1. MSETCL vide their letter dated 20.07.2020 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 765/400 kV Shikrapur (PG)S/s.

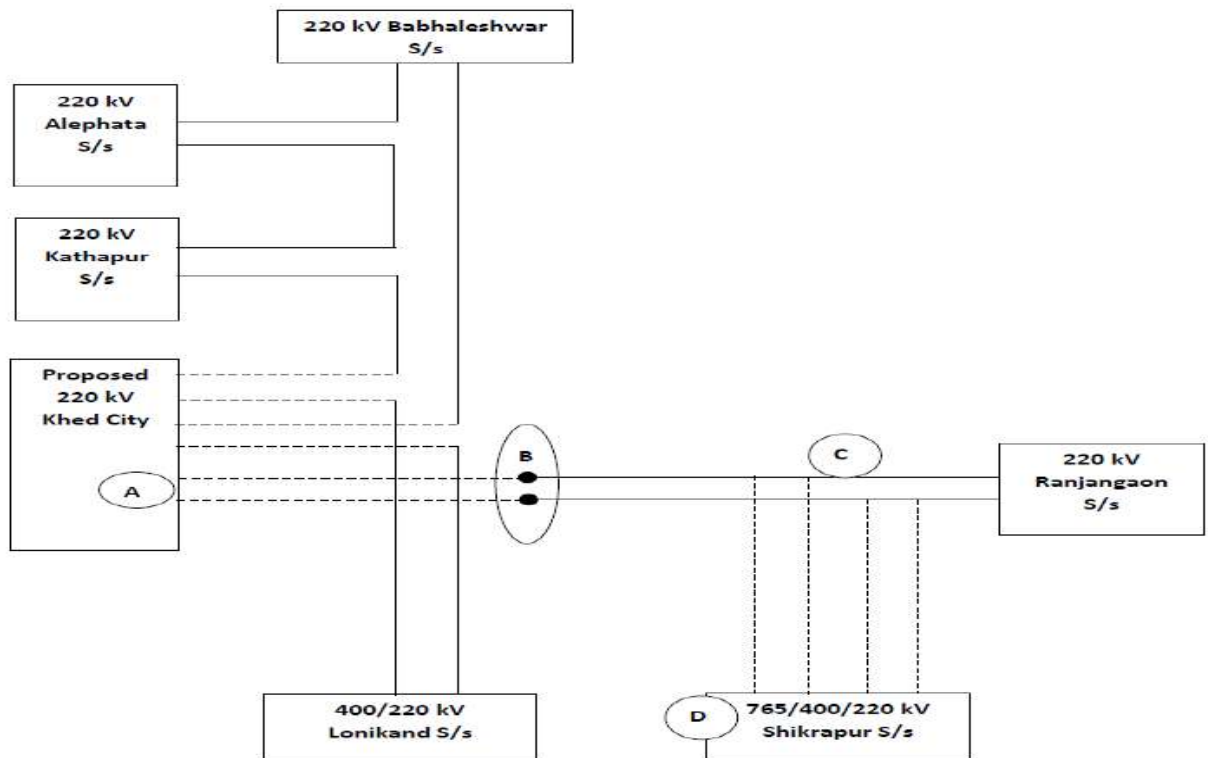
B. As a part of STU system:

- (i) Reorientation and termination of 220kV Babhleshwar–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)

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- (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 Year2022-23)

SLD for proposed 220 kV network from 765/400/220 kV Shikrapur S/s is given below:



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

The above proposal has been evolved by MSETCL for 2022-23 conditions with Maharashtra State Demand as 26900 MW and Pune district demand as 4500 MW. MSETCL has indicated the following technical benefits associated with the 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 & Jejuris/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 isobserved.
- (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 transmissionnetwork.
- (v) In the absence of Koyna Generation, 220 kV Shikrapur (PG) S/s will support the 220 kV network of 400 kV Lonikand & 400kV Chakans/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.

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- (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 – 11.77MW
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.
- 11.2.** CEA stated that the existing Pune (Shikrapur) 765/400 kV was a GIS substation and there was no 220 kV level in the substation. CEA enquired about the availability of space at Pune (Shikrapur) 765/400 kV for accommodating MSETCL proposal. CTU confirmed availability of adequate space for 2 nos. of 500MVA, 400/220 kV ICT's and 4 nos of 220 kV line bays at 765/400 kV Shikrapur (PG) Substation.
- 11.3.** CEA enquired MSETCL about the status of 400/220 kV Retwadi S/stn and 400 kV S/s Karjat substation which was part of the MSETCL State plan. Also, whether the proposed 220 kV level at Shikrapur (PG) s/stn was in addition to Karjat and Retwadi 400/220 kV substation.
- 11.4.** MSETCL stated that the upgradation of existing 220 kV Retwadi substation to 400 kV level was proposed in the past but the proposal of 400kV S/s at Retawadi has been dropped. 400 kV S/s Karjat substation was under implementation. The proposal of creation of 220 kV level at 765/400 kV Shikrapur (PGCIL) S/s was additional proposal. Currently 400 kV substations at Lonikand and Chakan S/s are feeding load in Pune area which is one of the fastest growing load pocket in Maharashtra. Further to feed industrial loads in Ranjangaon area, aforesaid proposal has been put up for approval.
- 11.5.** POSOCO advised that instead of creating 220 kV level at 765/400 kV Shikrapur (PGCIL) S/s, MSETCL can evacuate power from Talegaon 400/220 kV S/s which was under utilised and adequate 220 kV outlets were available from Talegaon 400/220 kV S/s.
- 11.6.** MSETCL clarified that alternative of evacuation of power from Talegaon 400/220 kV S/s to feed Khed City (Retawadi) S/s was evaluated . However, as Talegaon and Khed City are both geographically on opposite sides of Lonikand S/s. There would be severe RoW problems and it would be difficult to construct this line and cost incurred would be huge. Also, Shikrapur to Khed City (Retawadi) line will be mere 4 km. He also added that schemes for utilisation of Talegaon 400/220 kV S/s has been planned separately.
- 1.2.** CEA stated that as per power flow results submitted by MSETCL, drawl from 400/220 kV shikrapur ICTs would be around 600-700 MW which becomes N-1 non-compliant, hence 3rd ICT also needs to be planned.
- 11.7.** CTU stated that the studies regarding drawl and line loadings can be re-looked before arriving at conclusion. He also added that to cater n-1 non-compliance, space for additional 500 MVA 400/200 kV 3rd ICT is not available at Shikrapur 765/400 kV S/s.
- 11.8.** WRLDC, POSOCO enquired about the non-utilisation of ICT's at Solapur PG. WRLDC further enquired about the status of 400kV Solapur- Karad line restoration to its original configuration ,as N-1 non-compliance of Solapur-Kolhapur D/C has been

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observed in the past after commissioning of 2nd unit of Solapur TPP. CEA requested POSOCO to submit formal agenda point in next meeting for further deliberation.

- 11.9. After deliberation, the scheme for creation of 220 kV level at 765/400 kV Shikrapur (PGCIL) Substation was agreed in principle by the members. However, the scheme would be further studied and finalised in the next WRPC(TP) meeting.

12. **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:

“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
WR						
1	Mapusa (PG)	400/220kV (3x315 MVA)	2	Existing bay	Mapusa – Cuncolin 220 kV D/c line	Anticipated DOCO Sep'20(As per WRPC held on 28.6.19) 2nd WRPC(TP): GED not attended the meeting
			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). 2nd WRPC(TP): GED not attended the meeting
2	Navsari	400/220 kV (2x315MV A + 1x500 MVA)	2	Existing 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. 2nd WRPC(TP): PGCIL updated Jan,2021 as expected completion schedule
3	Pirana	400/220kV (2x315MV)	2	Existing bay	Pirana – Barjadi 220	December, 2020 2nd WRPC(TP): GETCO updated March,2021 as

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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
		A)			kV D/c line	expected completion schedule
4	Vadodara GIS	400/220 kV (2 x 500 MVA)	2	Existing bay	220 kV Jhambua – Vadodara D/C Line	April/May, 2020 2nd WRPC(TP): GETCO updated Dec,2020 as expected completion schedule
5	Betul GIS	400/220 kV (2x315 MVA)	2	Existing bay	LILO of Sarni – Pandhurna 220kV line at Betul GIS (PGCIL)	March, 2020 2ndWRPC(TP): MPPTCL informed that line has already been charged on 10.07.2020 .
6	Indore (PG)	400/220 kV (2 x 500 MVA)	2	Existing bay	LILO portion of 220kV line for Indore(NZ) 220kV S/S upto Indore(PGCI L) 765kV S/s	2 years after the award of contract. Approximate award schedule is April, 2020. 2ndWRPC(TP): MPPTCL stated that the line has not yet awarded . Also informed that severe RoW problem is there.
7	Parli (PG)	400/220 kV (2x500 MVA)	2	Existing bay	LILO of Parli – Harangul 220 kV S/c line	March, 2020 2ndWRPC(TP): MSETCL has informed that line has already been charged on 09.10.2019 .
8	Wardha	400/220 kV (2x315 MVA)	2	Existing bay	Wardha – Yavatmal 220 kV D/c line	Under construction, May 20 2nd WRPC(TP): MSETCL updated March,2021 as expected completion schedule
9	Solapur	400/220 kV (2x315 +1x500 MVA)	2	Existing bay	Solapur – Bale (M) 220kV D/c line	Mar'20 2ndWRPC(TP): MSETCL updated Dec,2021 as expected completion schedule as severe RoW problem is there. Also updated that Karjat S/s would be commissioned by March'22
					Solapur – Narangwadi 220 kV D/c line	Mar'20 2nd WRPC(TP): MSETCL updated Dec,2020 as expected completion schedule
10	Navi Mumbai	400/220 kV (2 x 315 MVA)	4	Existing bay	LILO of Apta – Taloja and Apta - Kalwa section of the Apta-Taloja/ Kalwa 220	Agreed to be implemented as ISTS under WRSS-XIX. Comm. Sch. - 30 months from date of transfer of SPV. 2nd WRPC(TP): CEA informed that SPV has acquired by M/s Sterlite Grid 13 Limited on 23.06.2020

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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
					kV D/c line at Navi Mumbai (PG)	and the SCoD is 22.12.2022

400 kV line bays:

S. No.	ISTS Substation	Proposed Bays	Commissioning Schedule	Lines emanating from Substation	Status of lines
1	Indore (PG)	2	Jul, 2018	Indore (PG) – Ujjain 400 kV D/c line	May' 2020 2 nd WRPC(TP): MPPTCL informed that expected schedule of completion is June'21 or delayed due to severe Row problem

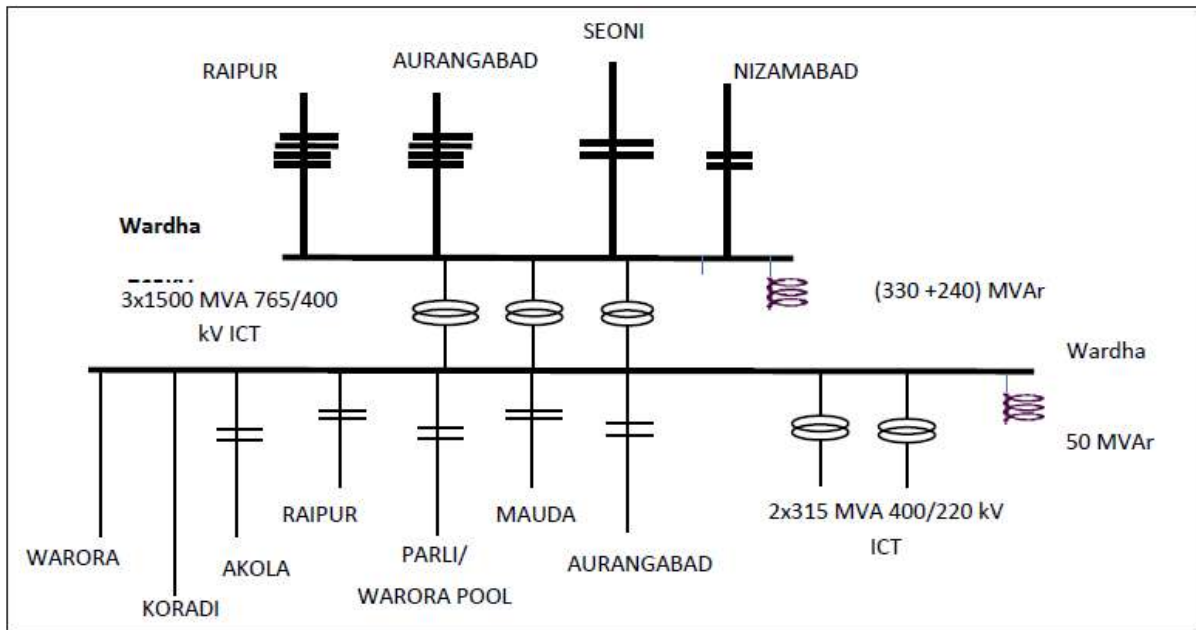
13. Implementation issues associated with the scheme “Measures to control fault level at Wardha Substation”

13.1. CEA stated that the scheme “Measures to control fault level at Wardha Substation” was discussed in the 37th, 39th, 40th& 41st 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.

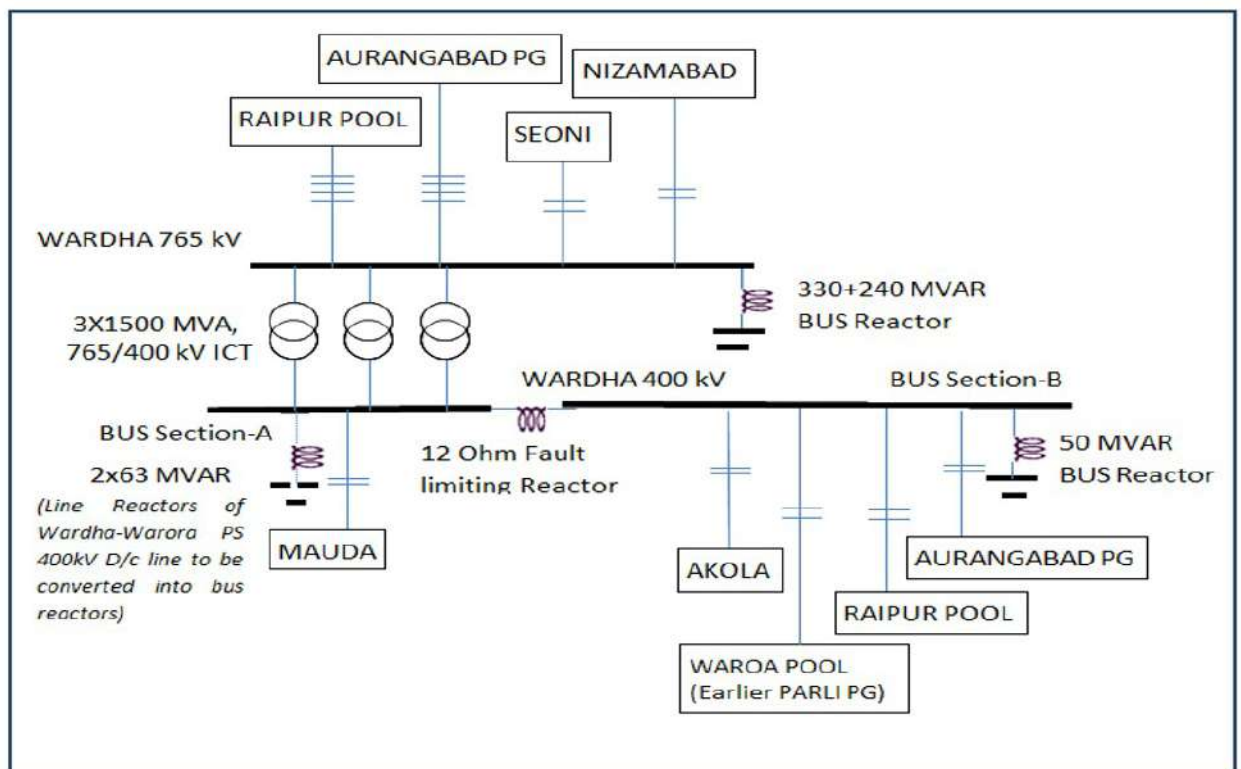
The scope of the transmission scheme is as under:

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 arrangement	75
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.	
iv)	12 Ohm fault limiting reactor to connect 400kV BUS Section A and BUS Section B of Wardha 400 kV BUS.	
vi)	Necessary modification at Wardha sub-station like change of some elements including CTs if those are not designated for 50 kA fault level	
	Total (in Crore)	75

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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/WRST 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/WRST meetings. Accordingly, to deliberate on the issues a meeting was held on 31.07.2020 through VC. In the meeting the following was agreed:

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- i) 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.
- ii) 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.
- iii) 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 1st WRSCT meeting held on 05.09.2018. MSETCL would come out with their proposal.

13.3. CEA requested MSETCL and PGCIL to update the progress made on the issue associated with Wardha substation bus splitting scheme.

13.4. CTU stated that as per information received from POWERGRID, following fresh construction of Transmission line and towers shall be required under the Scheme to control fault level at Wardha S/s (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. WRPC stated that the bypassing of 400kV Koradi-Wardha and Warora-Wardha at Wardha PG requires some portion of MSETCL lines and 400 kV bays at Wardha to be utilised as ISTS. He opined that ownership issue of 2 nos. of 400 kV line bays at Wardha and some section of MSETCL lines (owned by MSETCL but to be used as ISTS bay) is commercial and needs to be addressed mutually between POWERGRID and MSETCL.

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- 13.6. MSETCL stated that there were two issues to be addressed, commercial and technical issues associated with bypass scheme at Wardha. As far as commercial issue is concerned, the same has already been taken up with their management. A meeting will be arranged soon amongst Director (Finance), MSETCL, Director (Operation), MSETCL and PGCIL. The commercial issues of ownership of 2 nos. of vacant bays will be discussed and sorted out in this meeting.

As far as technical issues are concerned, with implementation of bypass arrangement, overloading is observed in Warora (MSETCL)- Chandrapur-II 400 kV D/C quad line during outage of one circuit. To overcome the same, for evacuation of power beyond Warora, following transmission system strengthening, as a part of intra-state, was proposed:

- a) LILO of one D/c line out of Chadrapur-I - Bhadrawati 2xD/c lines at Chandrapur-II will solve overloading problem of Chandrapur-I - Chandrapur-II as there will be 4 ckts between Chandrapur-I & Chandrapur-II- To overcome N-1 non compliance of Chandrapur-I to Chandrapur-II 400 kV D/C line.
 - b) After bypassing Koradi – Wardha 400 kV line and Wardha - Warora line at Wardha, the overloading of Warora- Chandrapur-II was observed which could be solved by LILO of 1 ckt of Koradi-II –Warora (M) at Warora (PG). Wardha – Warora Pool 400 kV D/c line to be kept normally open.
 - c) LILO of both circuit of Warora Pool – Parli (PG) 400 kV D/c quad line at Parli (M) – to overcome the N-1 constraint observed on Parli (M)-Parli (PG) 400 kV D/ C line during outage of one circuit.
- 13.7. CTU stated that LILO of 1 ckt of Koradi-II –Warora (M) at Warora (PG) will eventually end up increasing the short circuit level at Warora (M) & Warora (PG) and it does not serve the purpose. He further added that another solar park is planned, wherein power will be evacuated through LILO of Wardha (PG)- Warora (PG) 400 kV D/c line so Wardha – Warora Pool 400 kV D/c line can not be kept open.
- 13.8. POSOCO informed that the scheme needs to be implemented immediately as the Short circuit current at 400 kV Wardha was about 79 kA at present. CTU informed that scheme would be implemented by Mar'22.
- 13.9. WRLDC stated that MSETCL proposal of LILO of both circuit of Warora Pool – Parli (PG) 400 kV D/c quad line at Parli (M) and LILO of both circuits of Chadrapur-I - Bhadrawati D/C line at Chandrapur-II would overcome the operational constraints of restriction in ATC/TTC of MSETCL and N-1constraint respectively.
- 1.3. CEA suggested that after bypassing arrangement at Wardha S/s, issue of overloading of Warora (M) – Chandrapur-II 400 kV D/C during N-1 conditions, additional circuit (2nd) between Warora (M)- Chandrapur-II can be planned so that it will provide additional outlet for flow of power beyond Warora (M). Further, with implementation of additional 220 kV outlets from Koradi-II 400/220 kV substation, drawl from Koradi-II would increase and the power flow on Warora (M) - Chandrapur-II would get reduced. Also MSETCL is advised to look for various alternatives to relieve overloadings of ICT's at 765/400 kV Ektuni S/s, 400/220 kV Akola S/s and 400 kV Tiroda S/s. MSETCL proposal of LILO of 1 ckt of Koradi-II –Warora (M) at Warora

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(PG) was not providing any additional evacuation outlet from Warora(M) under intra-state.

13.10. MSETCL stated that they would further study the CEA proposal of (2nd) 400 kV line between Warora (M)- Chandrapur-II and requested that other two proposals can be agreed as it would help in overcoming the operational constraint.

1.4. After deliberation the following proposals were agreed:

- i) MSETCL to inform the outcome of bilateral meeting between MSETCL and POWERGRID to address the various commercial issues.
- ii) LILO of one D/c line out of Chadrapur-I - Bhadrawati 2xD/c lines at Chandrapur-II – Implementation by MSETCL
- iii) LILO of both circuits of Warora Pool – Parli (PG) D/c line at Parli (M) – Implementation by MSETCL.
- iv) Construction of additional 400 kV transmission lines of about 3 kms for establishing the bypass arrangement at Wardha as a part of the scheme “**Measures to control fault level at Wardha Substation**”.
- v) Ownership issue of 2 nos. of 400 kV line bays at Wardha and some section of MSETCL lines (owned by MSETCL but to be used as ISTS bay to be addressed mutually between POWERGRID and MSETCL.

14. Additional feed to BALCO through LILO of 2nd circuit of Korba - Birsinghpur 400kV D/c line at BALCO along with bypass arrangement at BALCO switchyard.

14.1. CEA stated that connectivity to M/s BALCO for 250 MW as Bulk Consumer was agreed in the 1st meeting of WRSC held on 05.09.2018 through BALCO-Dharamjaygarh 400kV (2nd) D/c line (new). M/s BALCO was requested to approach CERC regarding construction modalities for the 400kV D/c line.

14.2. Accordingly, M/s BALCO had 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 2nd 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 2ndckt 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

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connectivity to BALCO. M/s BALCO needs to submit the bypassing scheme, so that the same could be deliberated with WR constituents and finalised.

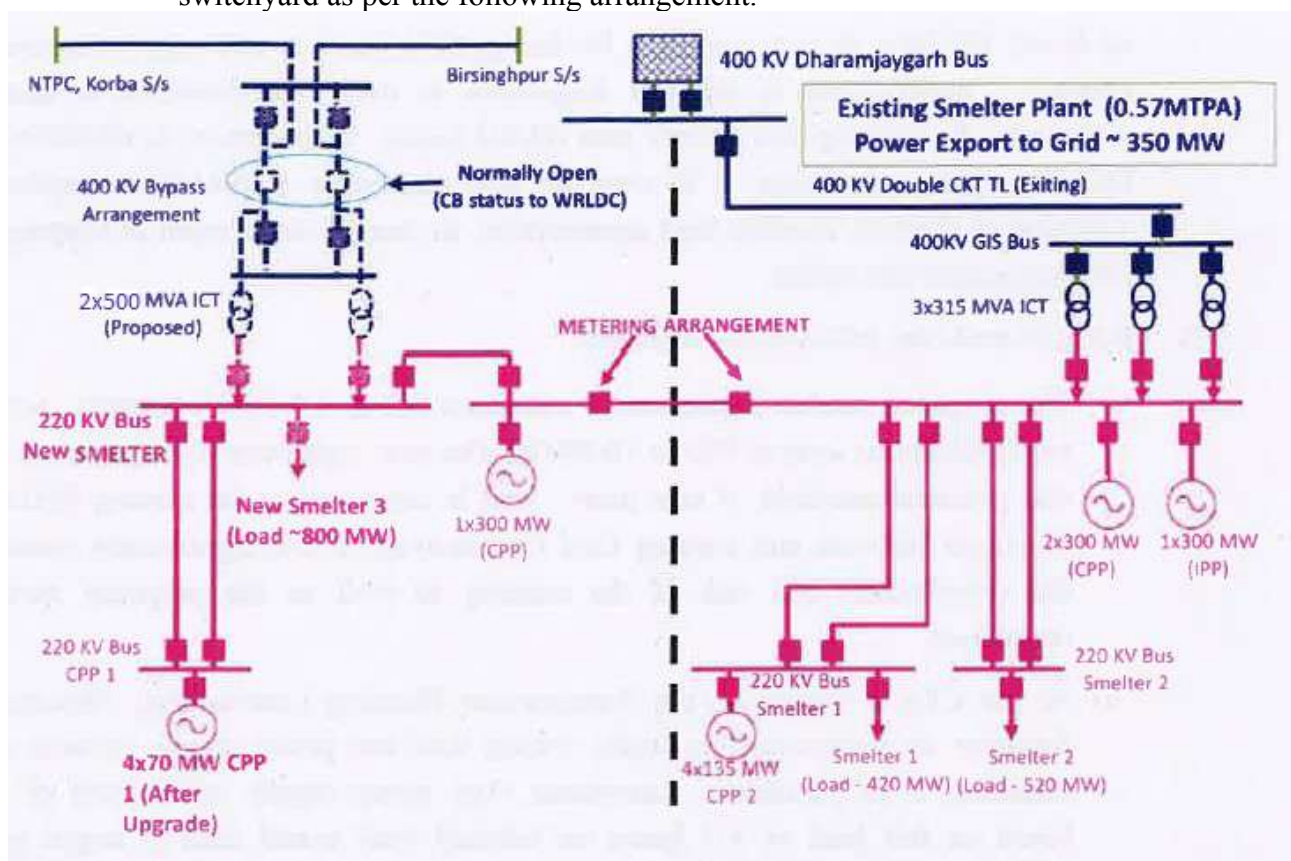
- ii) Alternatively, connectivity to BALCO for its 250 MW load may be granted through BALCO-Dharamjaygarh 400 kV D/c (2nd) line (New) along with associated 400 kV bays at both ends which would be a transmission line of dedicated nature for BALCO.

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 to discuss the issue of provision of additional feed to BALCO through LILO of 2nd 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 2nd 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.** CEA requested WRPC, WRLDC and M/s BALCO to update the status subsequent to the meeting held on 28.04.2020.
- 14.6.** WRPC stated that they have not yet received any details of the bypass scheme from BALCO. Further, the tripping incidence of the BALCO lines and protection philosophy at Dharamjaigarh (PGCIL) S/s was deliberated in detail in the meeting of the Protection Coordination Committee held on 27-28 Aug'20 and several recommendations have been agreed. The recommendations specifically to be followed by BALCO would be minuted in the minutes of the PCC meeting and BALCO has to ensure its adherence.
- 14.7.** M/s BALCO stated that they have approached WRLDC with the details of bypass scheme. However, WRLDC has conveyed that any plan for operationalization of the bypass scheme can be finalised only after BALCO has entered into Connectivity Agreement with CTU.
- 14.8.** WRLDC informed that they were waiting for the connectivity agreement to be signed between M/s BALCO and CTU. Once it was done, they convene a meeting with WRPC to finalise the bypass scheme. Further, the 27.04.2020 tripping event was discussed in PCM of WR held on 27-28 Aug'20 and the following was informed in the meeting:-
- (i) PGCIL informed that the issue of non-operation of bus bar protection at Dharamjaigarh S/stn was resolved after taking up the same with OEM.
 - (ii) BALCO representative informed that they are in discussion with OEM for Islanding scheme revision for handling such contingencies and will inform the actions taken in PCM. Also, BALCO was advised to review the protection settings in coordination with PGCIL.

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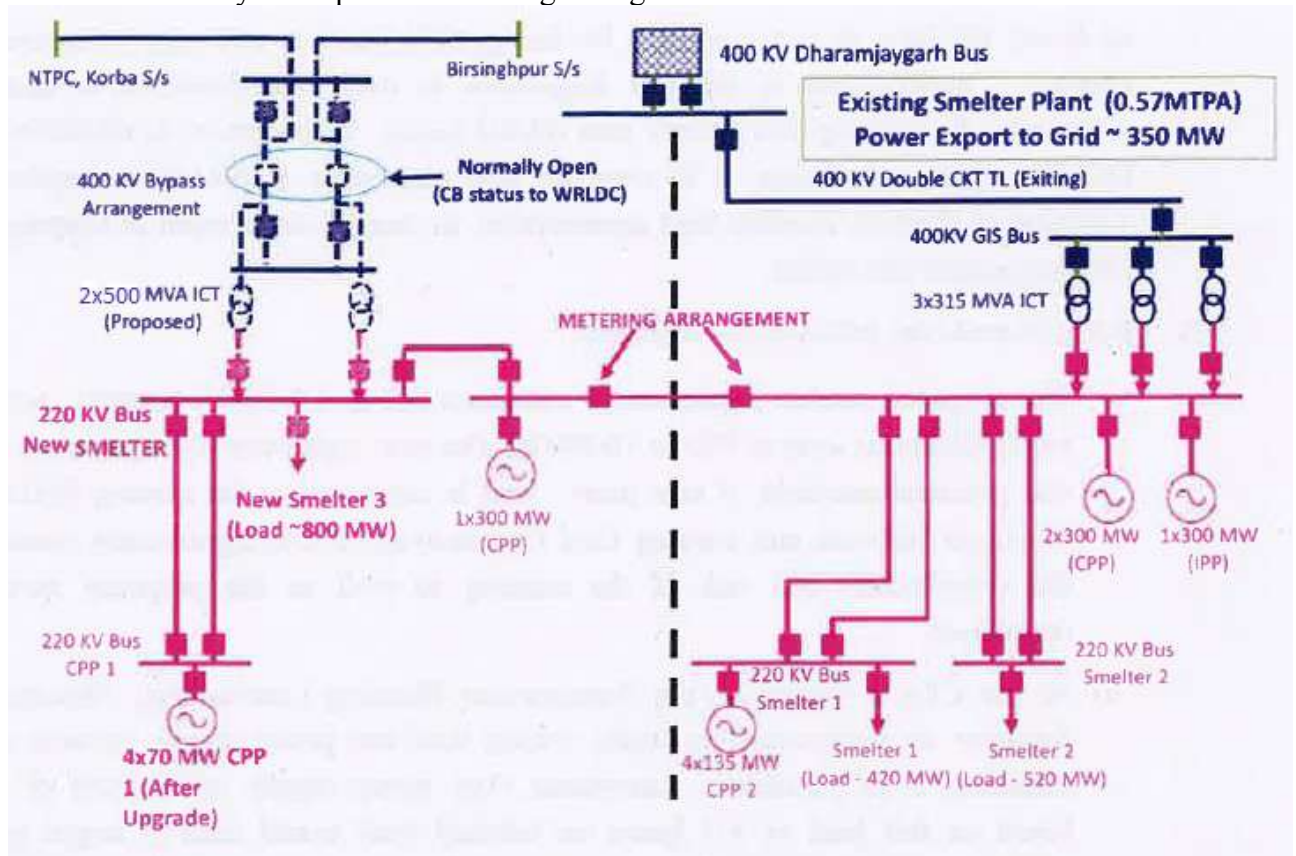
- 14.9.** CTU stated that connectivity has already been granted to M/s BALCO as bulk consumer. The connectivity intimation does not include the contingency arrangement for providing additional feed to BALCO through LILO of 2nd circuit of Korba - Birsinghpur 400kV D/c line at 2x500MVA, 400/220kV BALCO (GIS) switchyard. Once WRPC (TP) ratifies the scheme, the same would be included in the connectivity agreement (CON-6) that would be signed between CTU and M/s BALCO.
- 14.10.** CTU further stated that for establishing the contingency arrangement, extension of LILO section up to new 400 kV GIS switchyard would be required by M/s BALCO in its capacity as bulk consumer. Therefore, M/s BALCO being a bulk consumer may have to approach CERC regarding construction modalities for this 400 kV LILO section.
- 14.11.** M/s BALCO stated that CERC vide order dated 29.01.2020 has recommended granting Connectivity to BALCO as a bulk consumer for load of 250 MW through existing 400 kV BALCO-Dharamjaygarh D/C line. Further, in its order, CERC has clearly conveyed 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. The Committee's suggestion was to provide grid connectivity to BALCO through LILO of 2nd 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. Accordingly, as the LILO section already exists, BALCO is required to only build up few additional towers to terminate the LILO section at the switchyard.
- Further, the implementation of this proposed scheme is to provide reliability to the entire BALCO complex (Generator and bulk consumer) to cater to contingency condition. Therefore, BALCO as a generator would be implementing the required extension of LILO to ensure reliability of its entire generation complex as contingency arrangement.
- 14.12.** CTU stated that the connectivity has already been granted to BALCO as bulk consumer for its 250 MW load through existing 400 kV D/C line between BALCO and Dharamjaygarh. Since the proposed contingency arrangement would be implemented by BALCO on portion of the bus which has been segregated for the new smelter load for which BALCO has sought connectivity as bulk consumer, accordingly, it would qualify as being implemented by BALCO in its capacity as bulk consumer.
- However, if BALCO decided to implement the proposed contingency arrangement on generation part of the bus, then it would be implementing the same in its capacity as generator and would not require to approach to CERC.
- 14.13.** BALCO stated that the LILO of 2nd ckt of Korba - Birsinghpur 400kV D/c line is already existing as a part of earlier interim arrangement. 5 nos. towers of the existing LILO of (2nd ckt of Korba - Birsinghpur 400kV D/c line at BALCO TPS) has been utilised for BALCO-Dharamjaygarh (Urga) 400 kV D/C dedicated line. These towers will be restored by shifting the dedicated line to newly constructed towers by M/s BALCO as generator. Further few additional towers that would be required to terminate the LILO section at the new 400/220 kV switchyard will be constructed in its own premises.
- 14.14.** CTU stated that with additional feed to BALCO, two no. of dedicated lines would terminate at the generation bus, one for providing connectivity (BALCO- Urga 400

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kV D/c line) and the other for contingency arrangement (LILO of 2nd ckt of Korba-Birsinghpur 400 kV D/c line). The same would tantamount to providing additional connectivity for the same generation capacity already connected to the grid. However, since in the present case, only one dedicated line would remain connected and the one used for contingency arrangement would normally be kept open, therefore the additional feed to BALCO can be considered as a special case.

14.15. After detailed deliberations, the following was agreed:

- (i) Additional interconnection in the nature of a contingency arrangement, for reliability purposes, shall be provided to BALCO through LILO of 2nd circuit of Korba - Birsinghpur 400kV D/c line at 2x500MVA, 400/220kV BALCO (GIS) switchyard as per the following arrangement:



- (i) The above contingency arrangement dedicated in nature shall cater to the reliability of the integrated complex of M/s BALCO (i.e. Bulk Consumer & CPP/IPP units).
- (ii) Implementation of 2x500MVA, 400/220kV BALCO (GIS) switchyard would be in the scope of M/s BALCO. M/s BALCO to follow all statutory and regulatory provisions. The already existing LILO section of the earlier interim arrangement would be restored by BALCO and extended to the 400/220 kV (GIS) switchyard ensuring the additional implementation in its own premises.
- (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.

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- (v) A separate meeting would be conducted among WRPC, WRLDC and BALCO to discuss and review the islanding scheme at BALCO and to finalise the bypass scheme.
- (vi) BALCO to ensure the adherence of the recommendation made in the meeting of Protection Coordination Committee of WR held on 27-28 Aug'20.

15. Permission for Charging of 125MVAR switchable bus cum line reactor at Sagar 400kV substation of MPPTCL- Agenda by MPPTCL

- 15.1.** CEA stated that in the 2nd WRSCT meeting, the following scheme was agreed in lieu of LILO of Bina(PG) – Satna(PG) 400kV line at Sagar(MP) S/s:
- i. 50MVAR switchable line reactor at Sagar(MP) end of Satna(PG) -Sagar(MP) 400kV line – under intra-state by MPPTCL.
 - ii. Conversion of 50MVAR fixed line reactor at Bina (PG) end of Sagar (MP)-Bina(PG) 400kV line into switchable line reactor – under ISTS.

The ISTS scheme was subsequently discussed and approved in the 3rd NCT meeting held on 26.05.2020 & 28.05.2020.

- 15.2.** MPPTCL stated that 1x125MVAR, 400kV bus reactor at Sagar 400/220kV (upgradation) Substation (Green Energy Corridor Phase-I scheme) has been test charged as bus reactor on 04/03/2020. Installation to use the bus reactor as line reactor on the Satna(PGCIL) - Sagar(MP) 400kV line was also completed and a request was made to WRLDC for charging the bus reactor as line reactor. WRLDC has not issued the charging permission citing the reason that it was a deviation from 2nd WRSCT approved transmission element.

MPPTCL requested that in view of the space constraint at Sagar 400kV S/s for installation of additional 50 MVAR line reactor, WRPC (TP) may consider the installation of the switchable 125MVAR bus cum line reactor at Sagar 400kV S/s on Satna(PGCIL)-Sagar(MP) 400kV line and WRLDC may issue the charging permission of this transmission element.

- 15.3.** CEA informed that in the 2nd meeting of WRPC(TP), it was agreed that 50MVAR switchable line reactor at Sagar(MP) end of Satna(PG) - Sagar(MP) 400kV line in addition to the 125 MVAR bus reactor would be implemented by MPPTCL , to provide flexibility to charge the line from both Sagar and Satna end. However, the 50 MVAR line reactor has not been implemented by MPPTCL. CEA enquired MPPTCL the reason behind its request to charge 125 MVAR bus reactor at Sagar (MPPTCL) S/stn as switchable line reactor.
- 15.4.** MPPTCL stated that it was required to implement 125 MVAR bus reactor at Sagar 400 kV substation as well as 50 MVAR switchable line reactor at Sagar end of Satna (PG)-Sagar 400 kV line as per the approved scheme. However, during the implementation, on account of space constraints at Sagar s/stn, MPPTCL decided to implement 125 MVAR bus reactor as switchable line reactor that could be used as both the bus reactor and line reactor. This 125 MVAR bus reactor has already been test charged as bus reactor on 04/03/2020 even before the commissioning of Satna (PG)-Sagar 400 kV line. Subsequently, Satna (PG)-Sagar 400 kV line also got charged. Now, when MPPTCL approached WRLDC to grant the charging 125 MVAR Bus Reactor as switchable line reactor, it was denied by WRLDC.

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- 15.5. WRLDC stated that before granting the permission to charge any ISTS element for the first time, certain conditions are to be complied, one of them being whether the element has been approved in the meeting of RPC(TP). In the present case, the element for which charging permission was requested by MPPTCL was in deviance to the scheme approved in the 2nd meeting of WRSCT. Accordingly, MPPTCL was requested to make certain submissions such as reason behind charging the 125 MVAR bus reactor as line reactor, status of the originally approved 50 MVAR line reactor, whether system studies have been done with installation of 125 MVAR line reactor on Sagar-Satna 400 kV D/c line etc.
- 15.6. POSOCO intimated that with 125MVAR line reactor at Sagar end of 400 kV Sagar-Satna line, the line will be over compensated and may cause resonance issues in real-time.
- 15.7. CTU stated that as per the earlier studies, the approved 50 MVAR line reactor improved the compensation of Satna-Sagar 400 kV line from 37% to 74%. Even without this 50 MVAR line reactor, it was observed that the line could be charged from Sagar end with 9 kV rise in voltage and from Satna end with a total voltage rise of 12kV. Now, with MPPTCL's request to charge the 125 MVAR bus reactor as line reactor, fresh studies would be required to check for the overcompensation and resonance issues.
- 15.8. CEA enquired MPPTCL about the availability of bus reactor bays at Sagar S/stn. MPPTCL informed that there is no separate bus reactor bay. CEA stated that if MPPTCL was facing any issues in implementation of the approved scheme, it should have raised the issue in the RPC (TP) before proceeding with charging the reactor.
- 15.9. After detailed deliberations, it was agreed that MPPTCL would submit all the requisite details along with the layout design of Sagar substation for further deliberations on the issue.

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Annexure-I

**List of Participants for 2nd Meeting of Western Region Planning Committee
(Transmission Planning)**

Date: Friday, 04.09.2020.

S.No.	Name	Designation	E-mail
CEA			
1.	PS Mhaske	Chairperson	psmhaske@gmail.com
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14.	Pratyush Singh	Manager(CTU-Plg.)	pratyush.singh@powergridindia.com
15.	Shashank Shekhar	Dy. Manager(CTU-Plg.)	shashankshekhar@powergridindia.com
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33.	Shiv Shankar Mishra		
SECI			
34.	R. K. Agarwal	Consultant	pikabaya56@gmail.com
RUMS			
35.	A K Shukla	SE	
36.	Avaneesh Shukla	EE	Avaneesh.shukla3@gmail.com
BALCO (Invitee)			
37.	Devendra Patel	Associate Vice President	devendra.patel@vedanata.co.in
38.	Sangeet Kumar Sahu	Associate GM	sangeet.sahu@vedanta.co.in
39.	Nitin kumar Gupta	Associate GM	nitinkumar.gupta@vedanta.co.in
NHPC			
40.	J C Sarkar	GM	jcsarkarnhpc@gmail.com


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

 Web site: www.getco Gujarat.com -Email: 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 1st WRPCTP meeting thereof.

Ref: MoM of 1st 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 1st 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 1st 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,

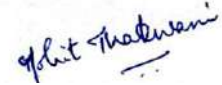
This is with reference to the meeting convened by CEA through video conference on 30.03.2020 at 3pm. As discussed during the meeting, the following potential zones have been identified in the State of Madhya Pradesh:

- 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

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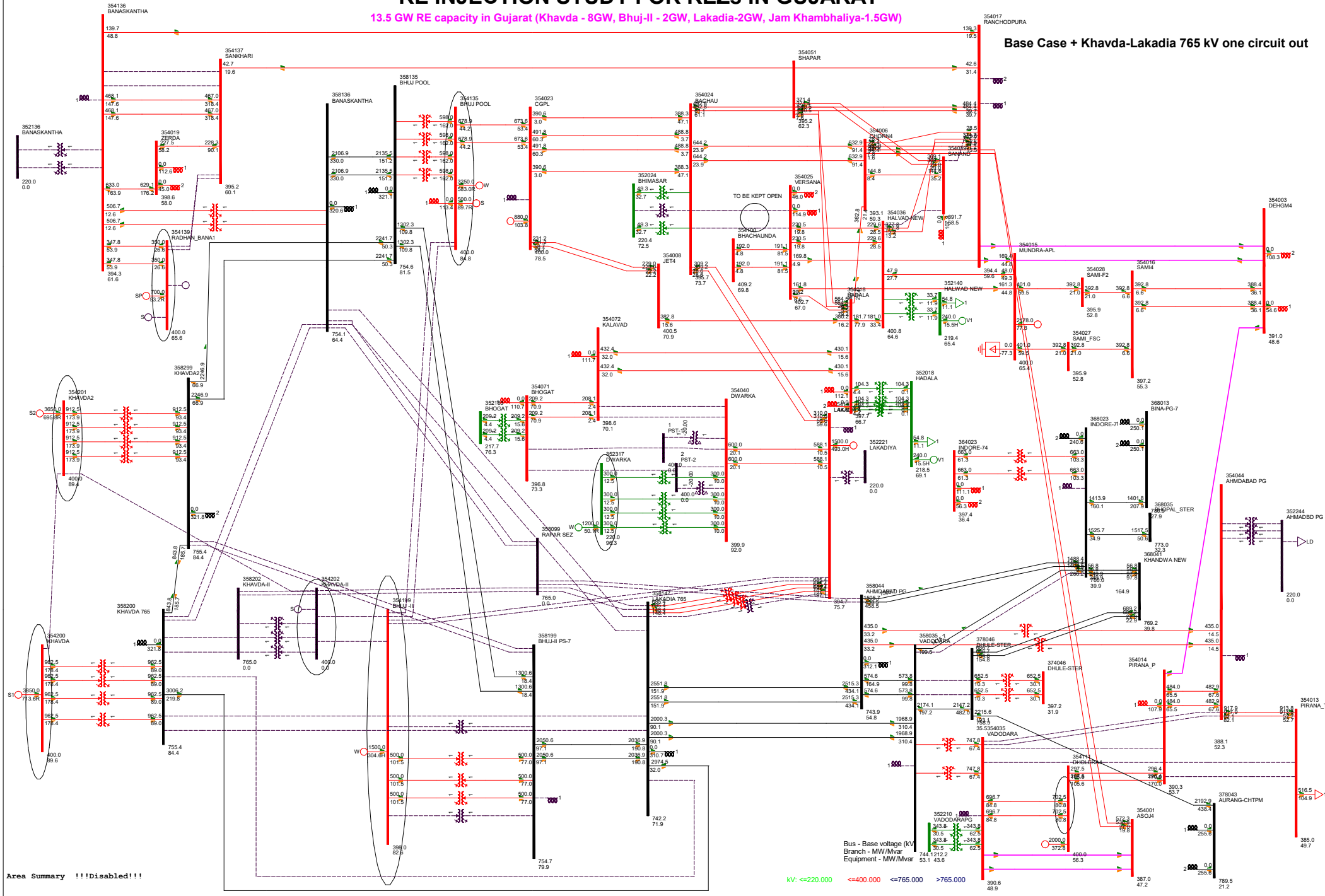
1. MD, SECI
2. Director (Transmission), Ministry of Power
3. COO (CTU), POWERGRID

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 + Khavda-Lakadia 765 kV one circuit out



Area Summary !!!Disabled!!!

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

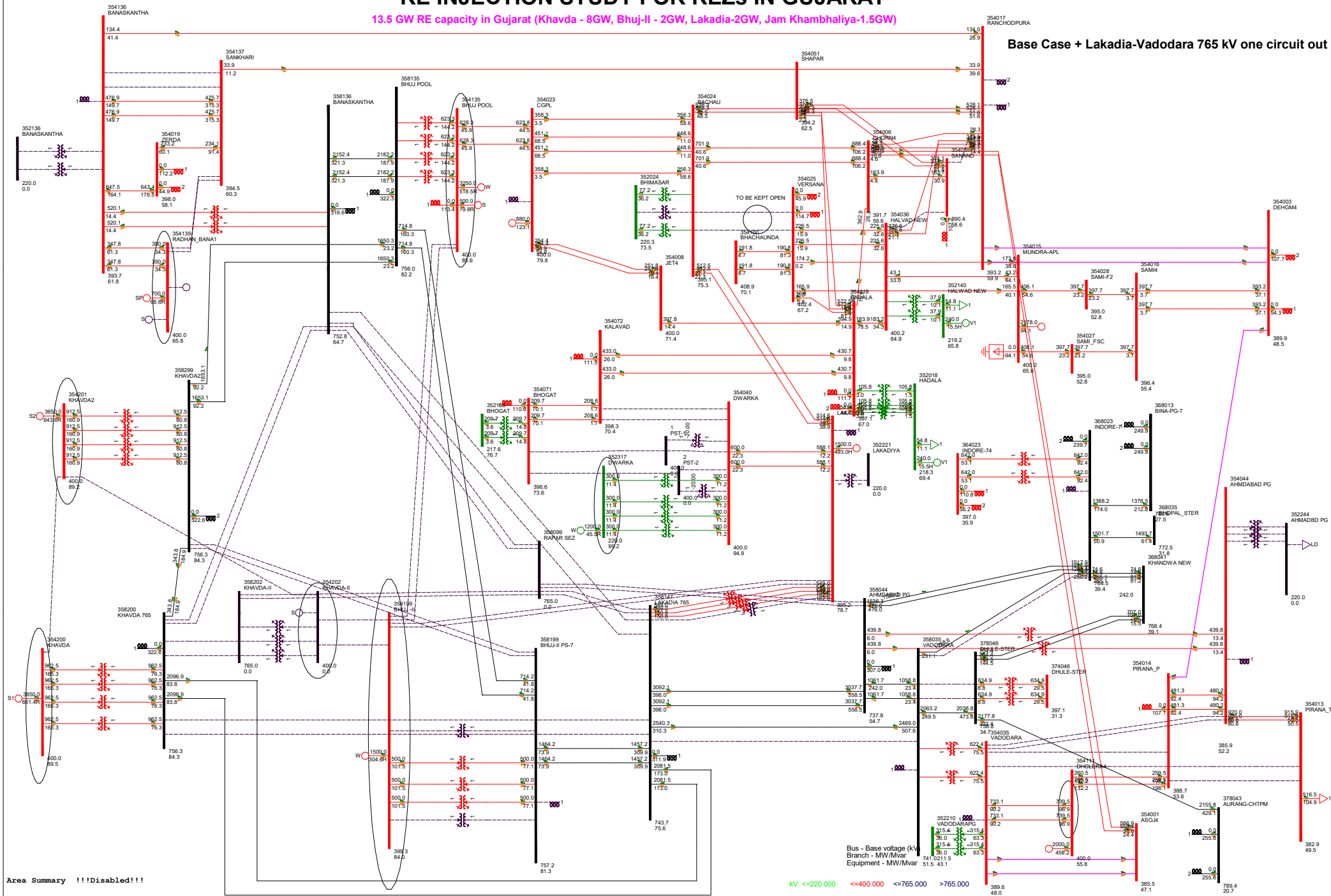
kv: <=220.000	<=400.000	<=765.000	>765.000
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RE INJECTION STUDY FOR REZs IN GUJARAT

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

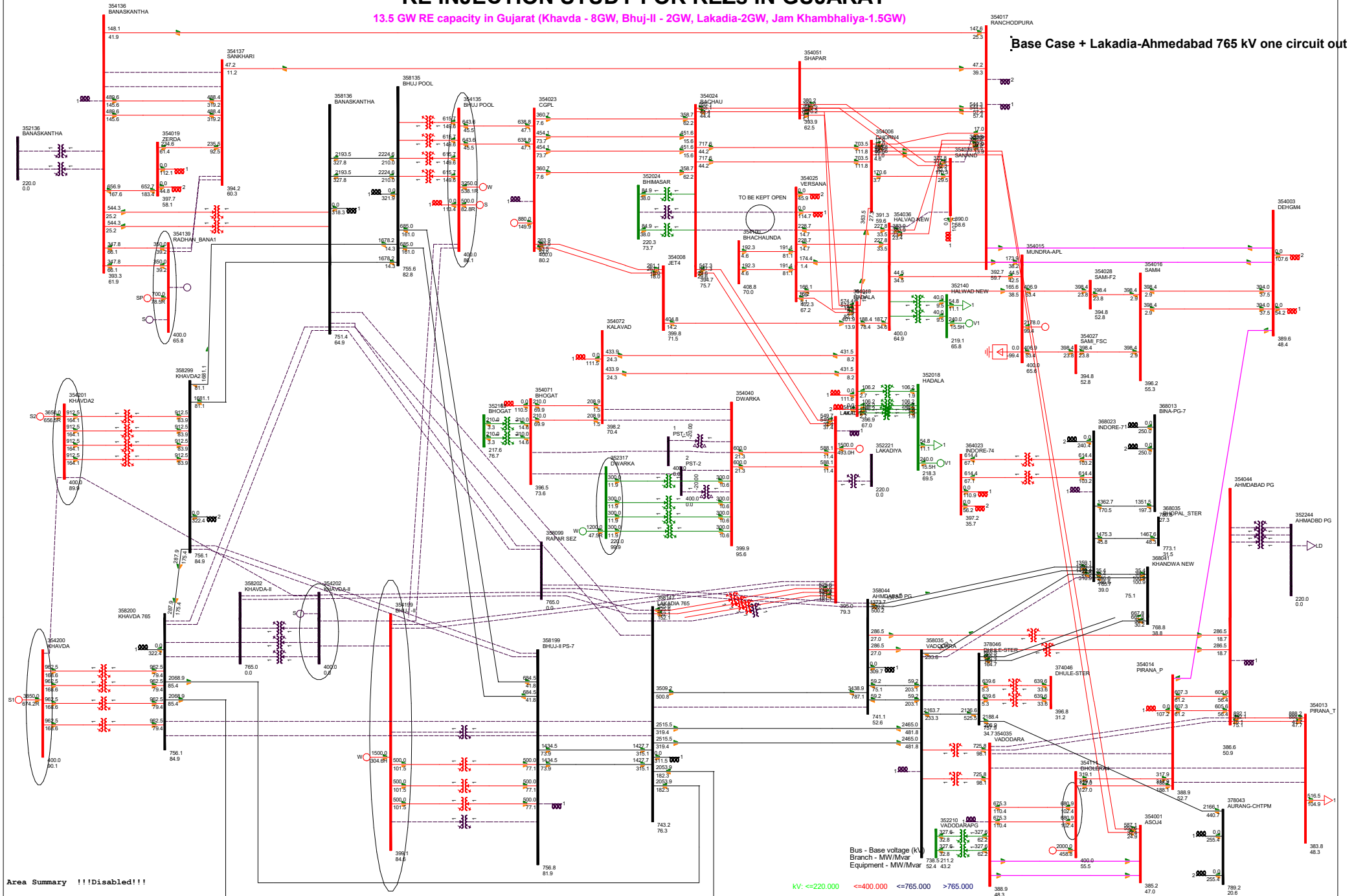


RE INJECTION STUDY FOR REZs IN GUJARAT

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

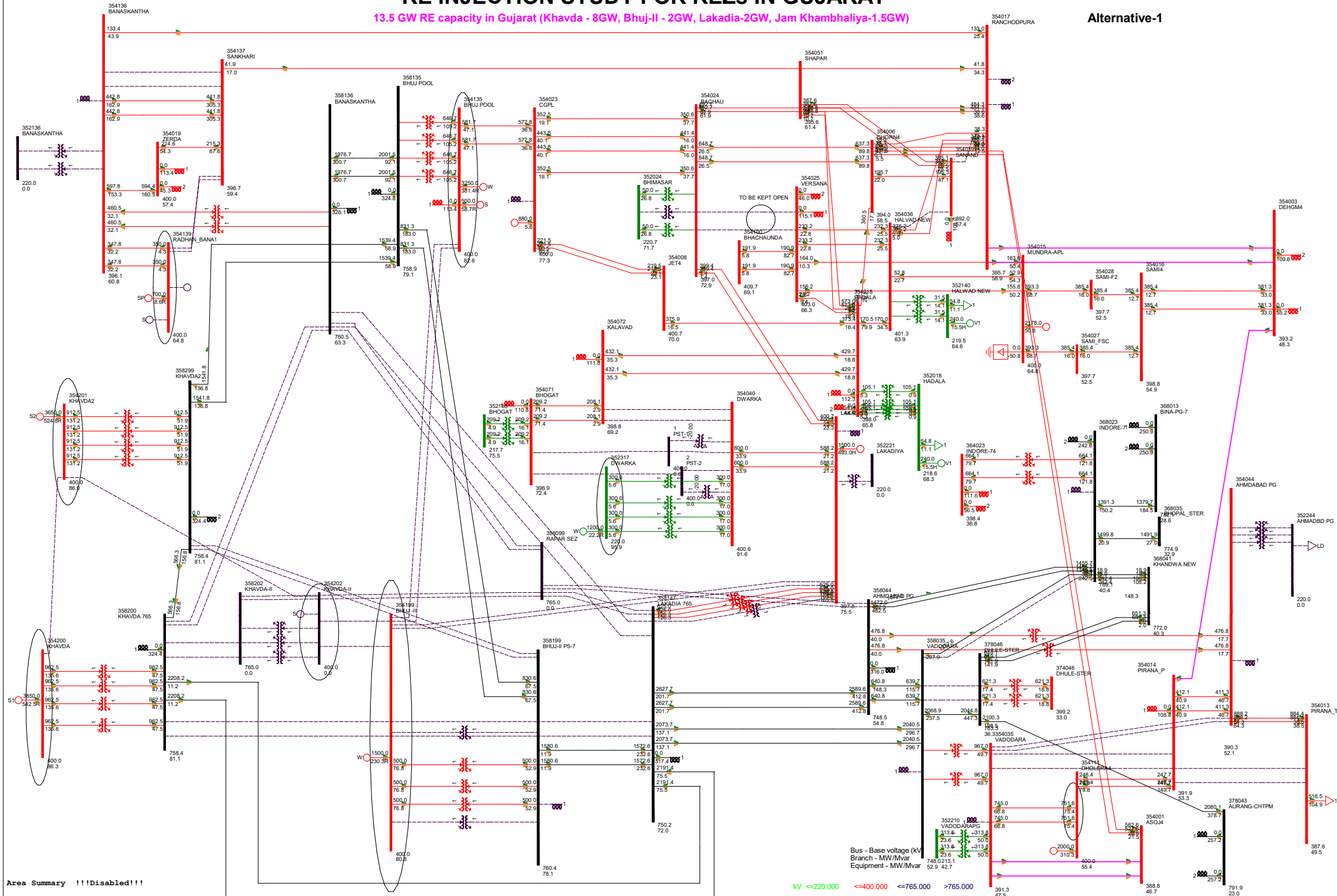


RE INJECTION STUDY FOR REZs IN GUJARAT

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

Annexure-V

Alternative-1



Area Summary !!!Disabled!!!

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

$KV \le 220,000$ $\le 400,000$ $\le 765,000$ $>765,000$

$\le 220,000$ $\le 400,000$ $\le 765,000$ $>765,000$

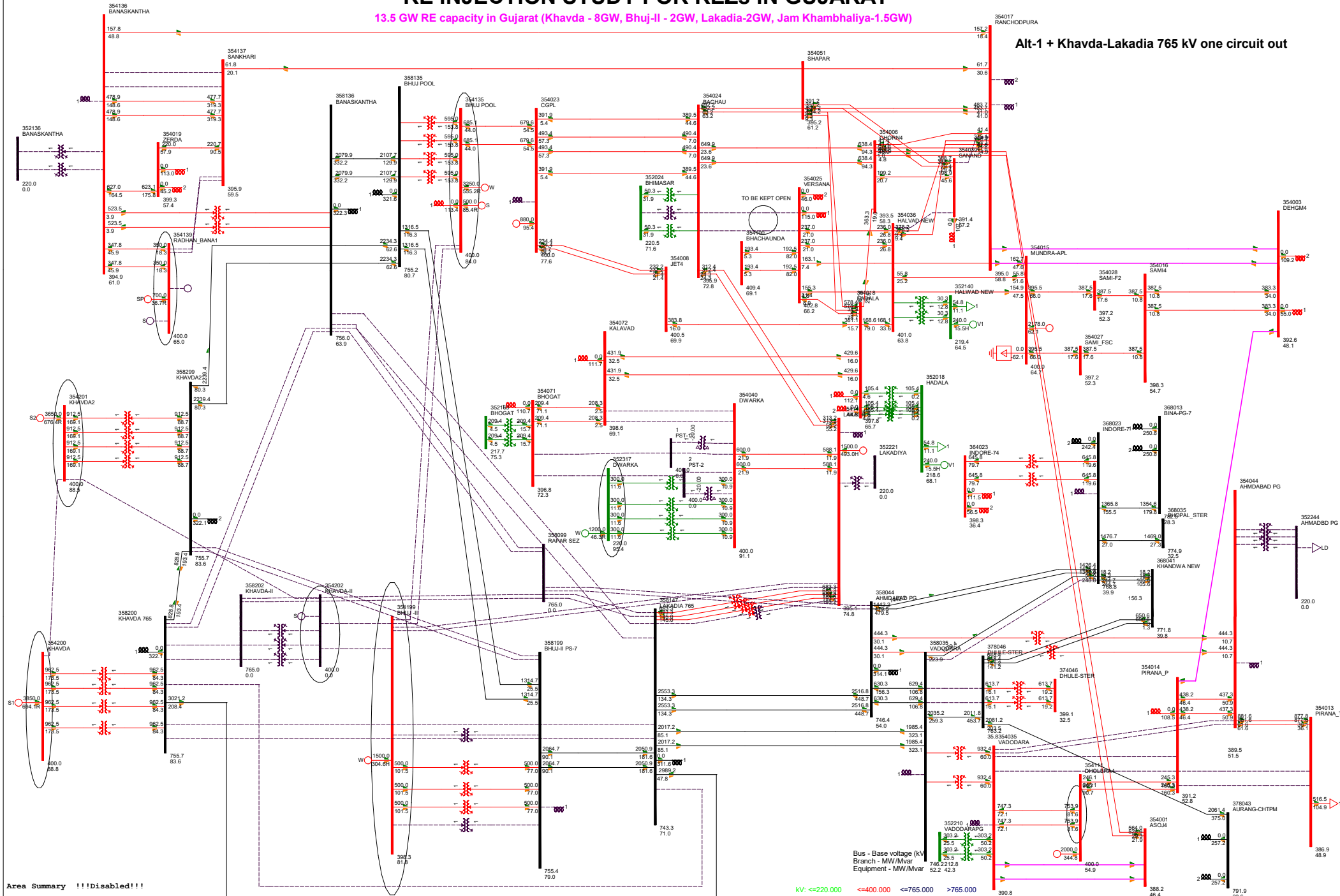
$\le 220,000$ $\le 400,000$ $\le 765,000$ $>765,000$

RE INJECTION STUDY FOR REZs IN GUJARAT

Annexure-V

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

Alt-1 + Khavda-Lakadia 765 kV one circuit out

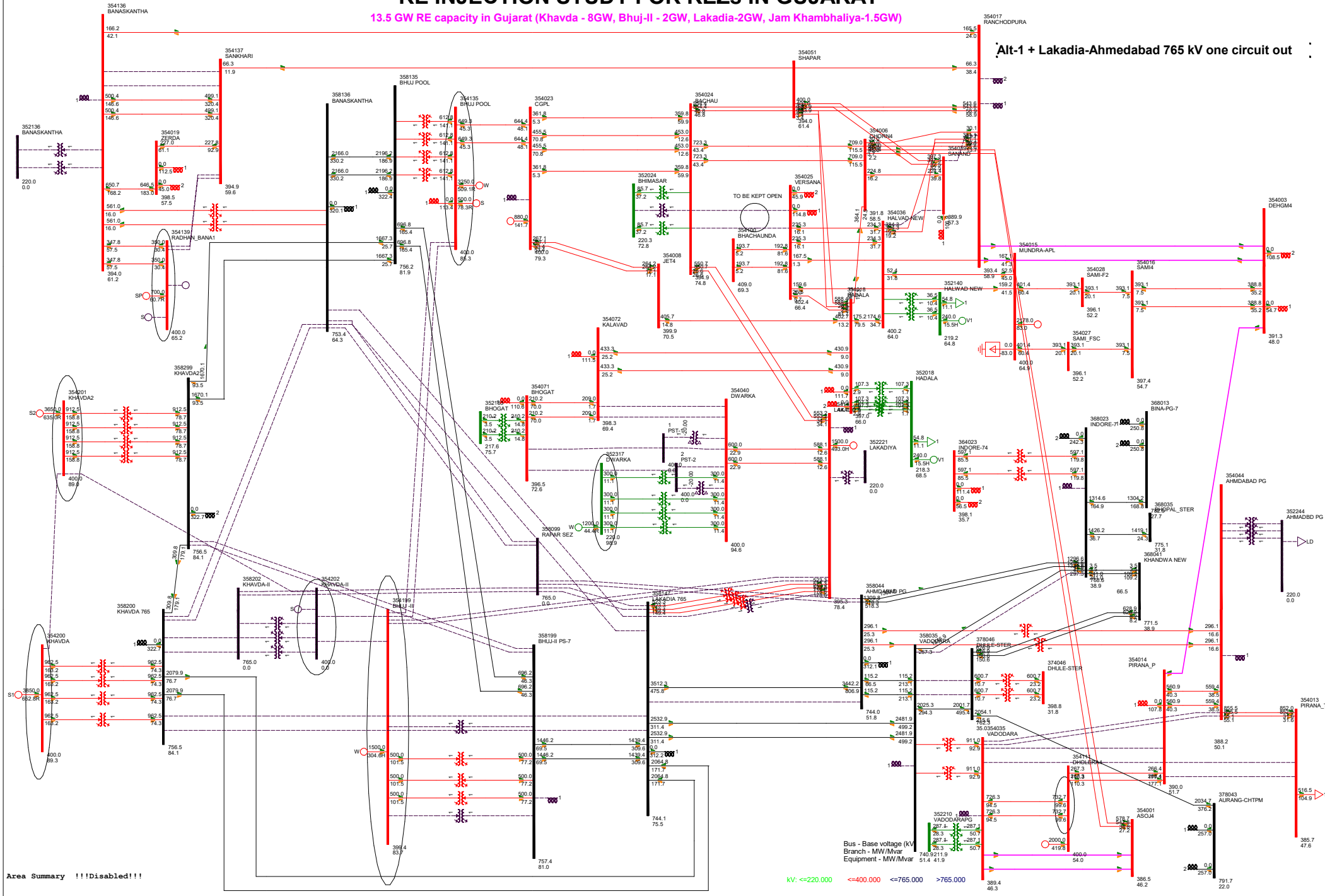


RE INJECTION STUDY FOR REZs IN GUJARAT

Annexure-V

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

Alt-1 + Lakadia-Ahmedabad 765 kV one circuit out



Area Summary !!!Disabled!!!

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

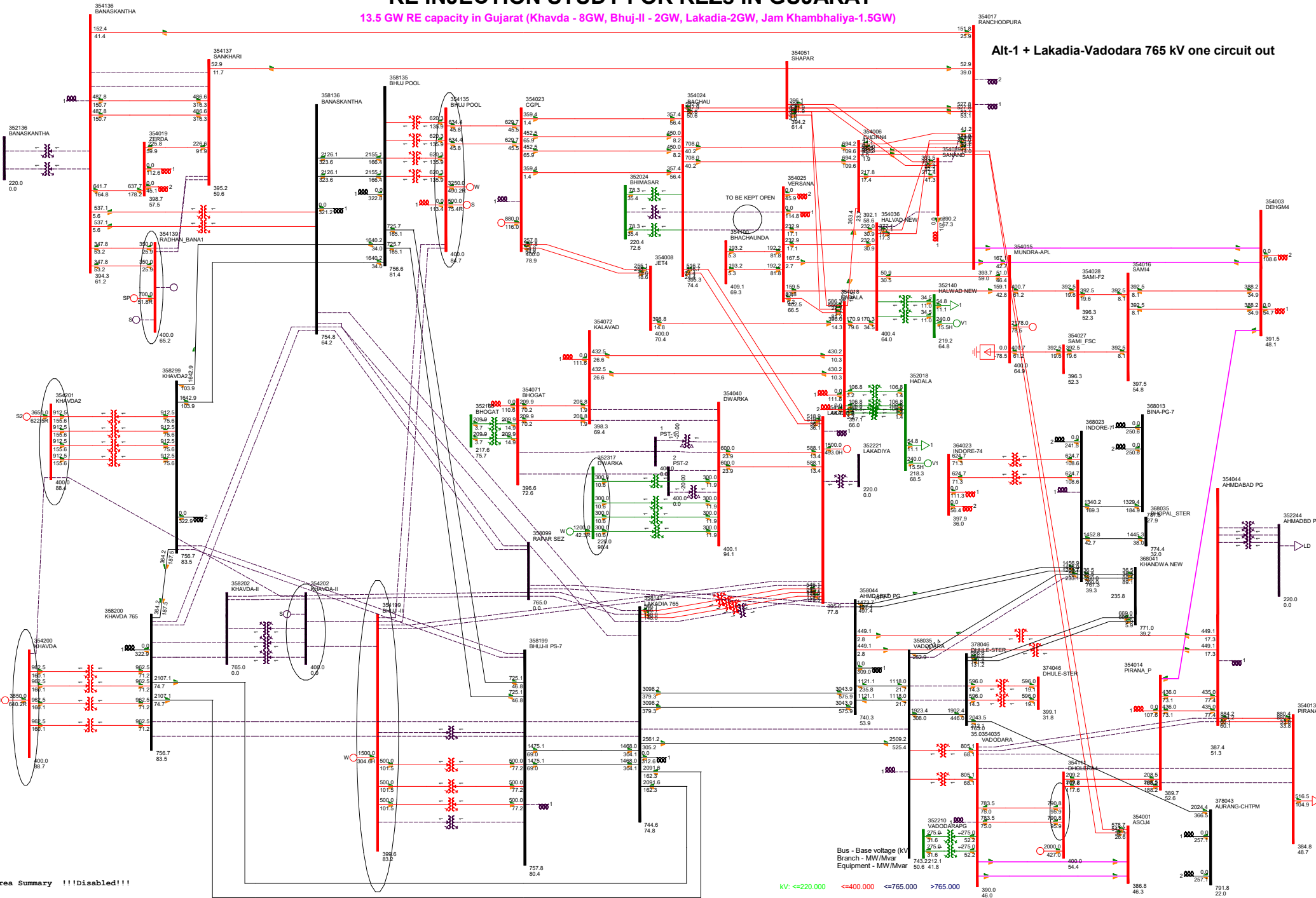
kv: <=220.000 <=400.000 <=765.000 >765.000

RE INJECTION STUDY FOR REZs IN GUJARAT

Annexure-V

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

Alt-1 + Lakadia-Vadodara 765 kV one circuit out



Area Summary !!!Disabled!!!

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

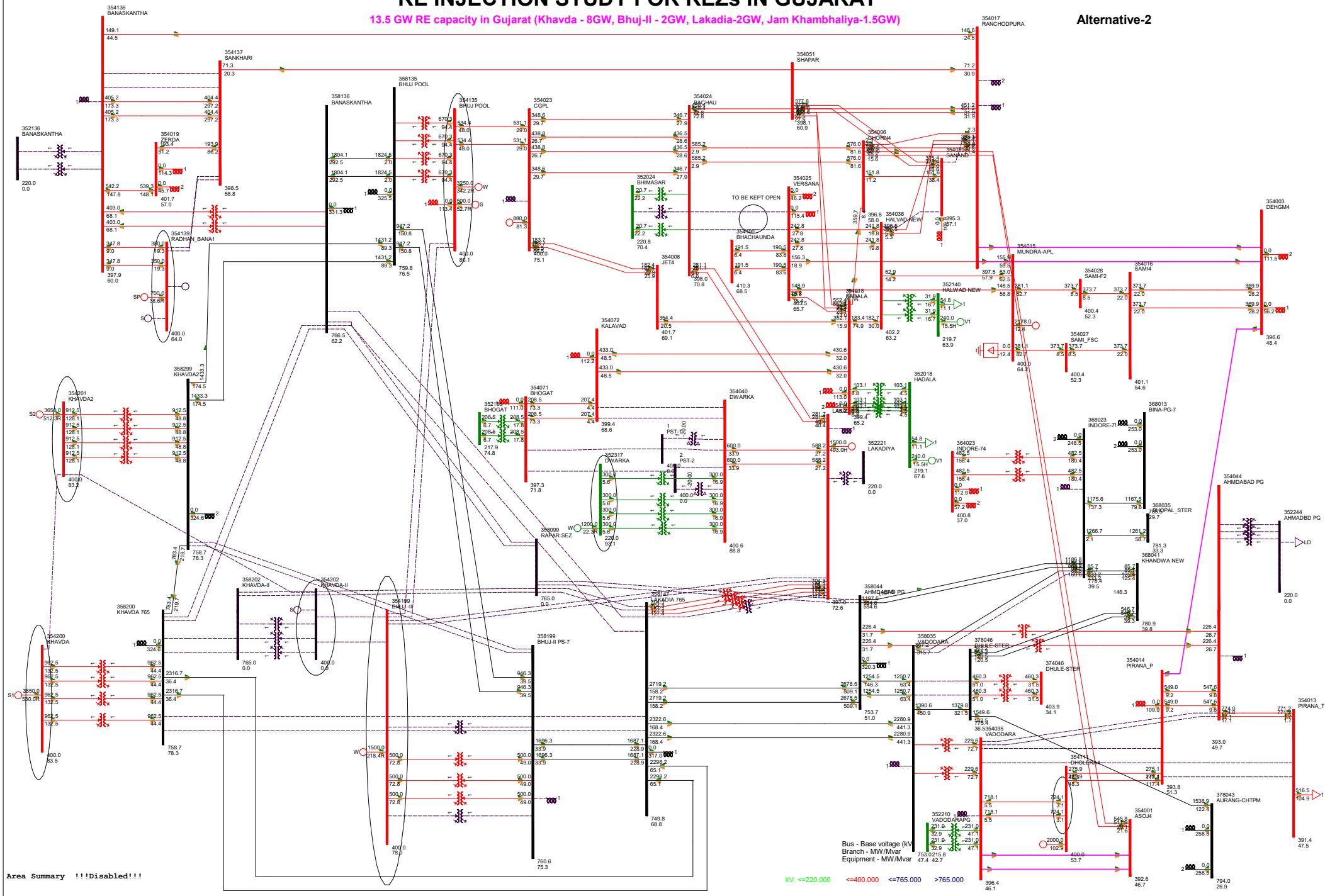
KV - $\le 220,000$ $\le 400,000$ $\le 765,000$ $> 765,000$

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



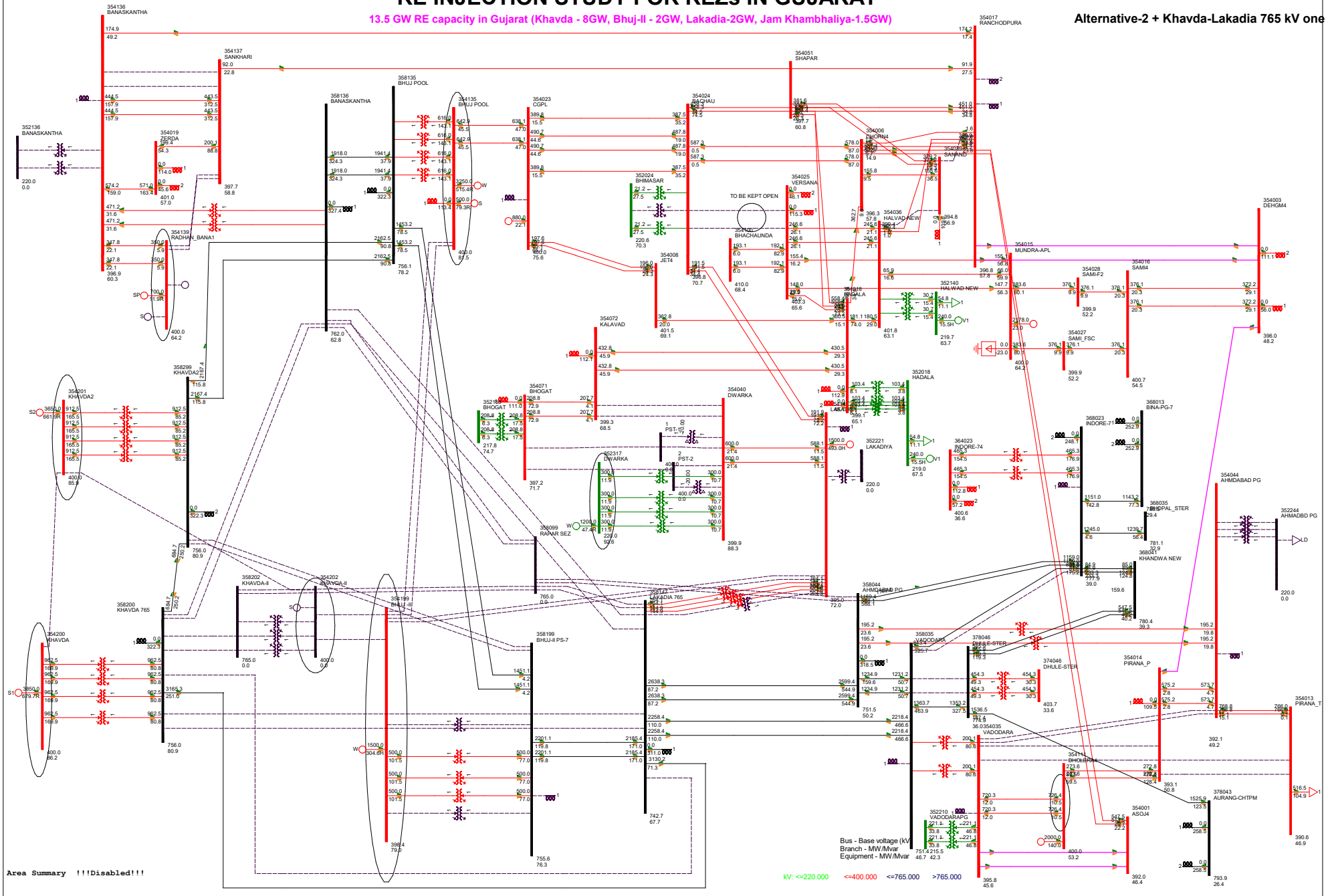
Area Summary !!!Disabled!!!

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

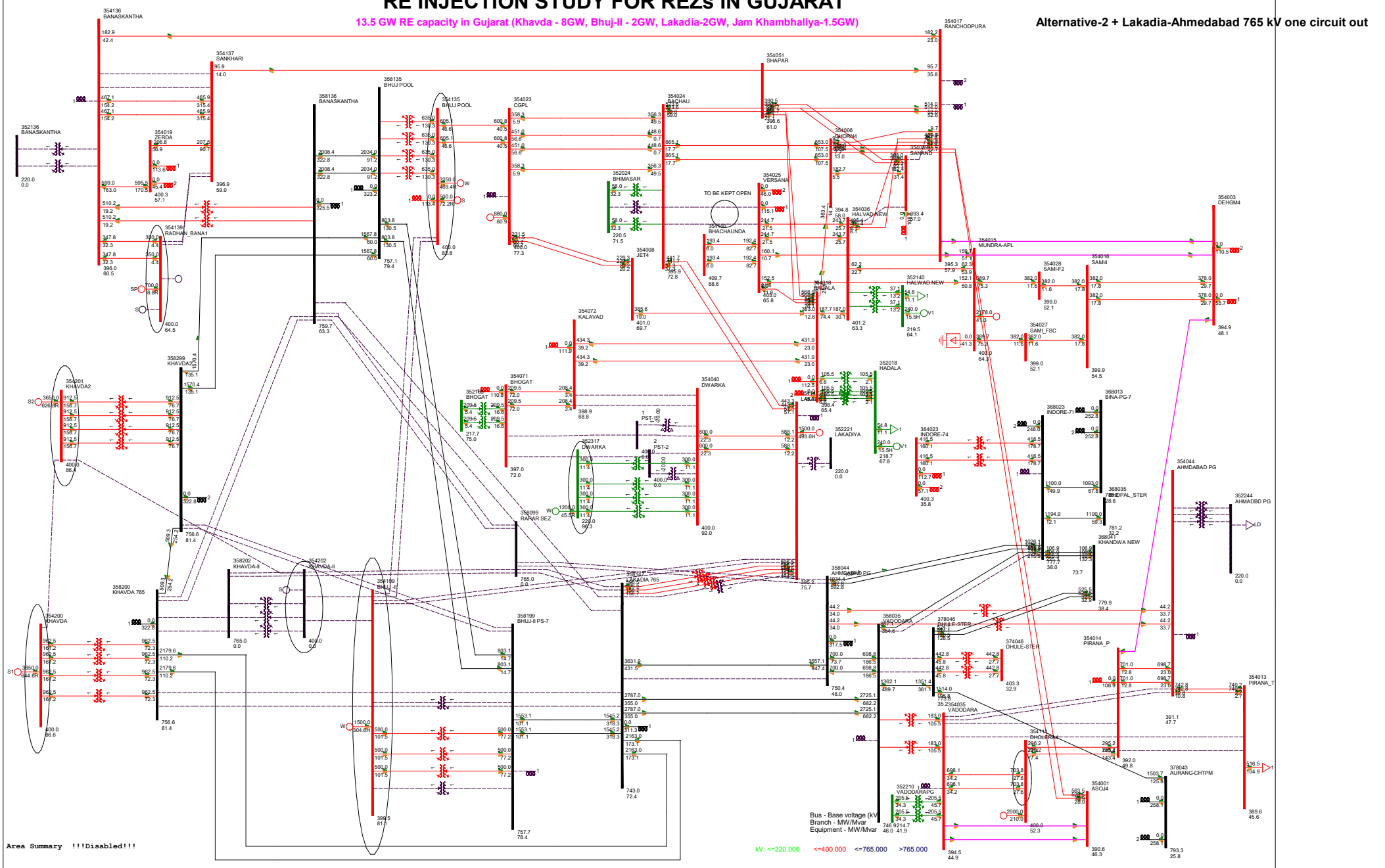
≤ 220.000 ≤ 400.000 ≤ 765.000 > 765.000

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

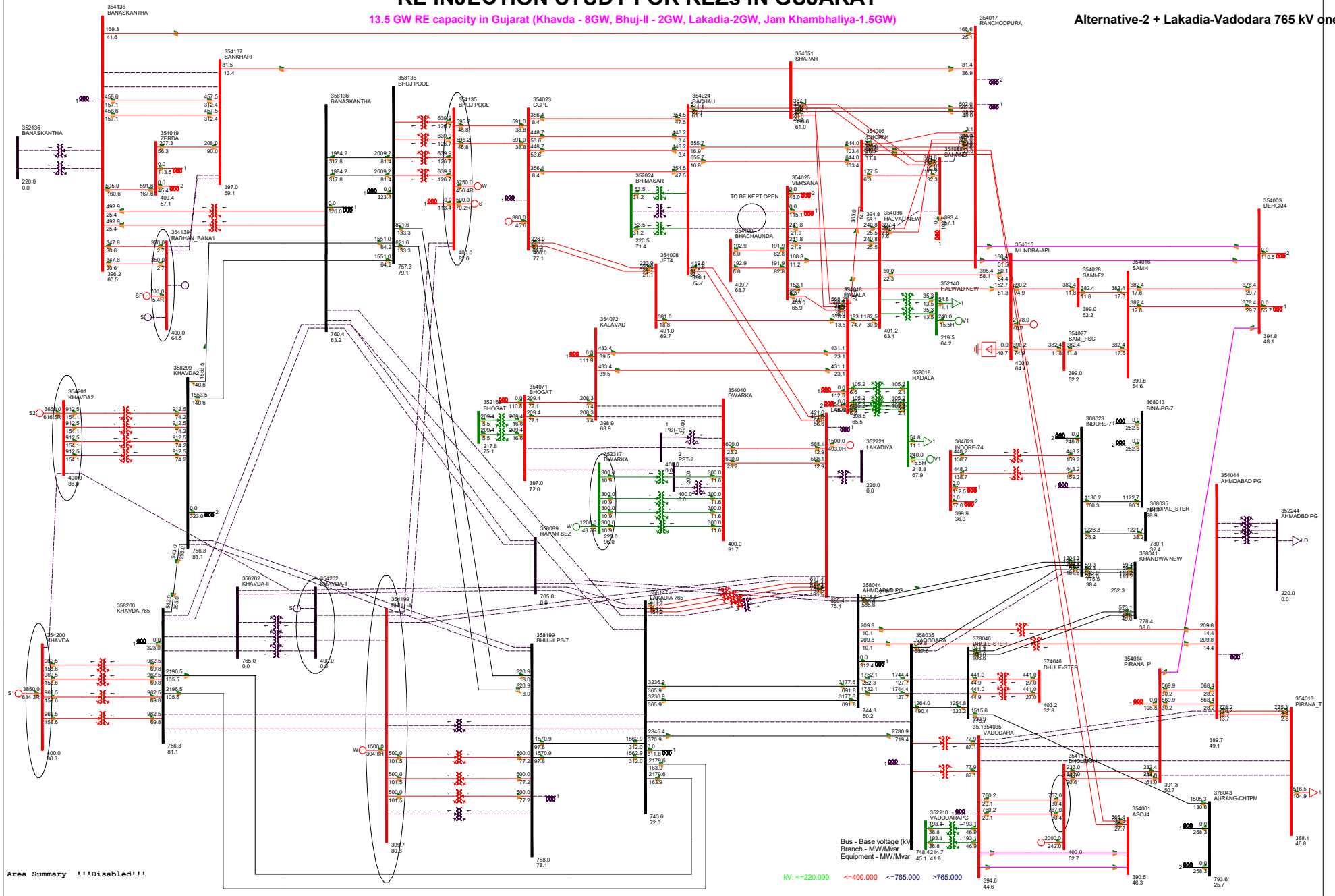


RE INJECTION STUDY FOR REZs IN GUJARAT

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

Annexure-VI

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





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 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) 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 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 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 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 48th 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 (3rd) 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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Date: 15.07.2020

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