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भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन - I प्रभाग

Power System Planning &amp; Appraisal - I Division

To

01/09/2020

-As per list enclosed-

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

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

Sir/ Madam,

The 2<sup>nd</sup> meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) is scheduled to be held on Friday, 04.09.2020. The agenda note for the meeting has been already circulated vide letter dated 26.08.2020 and additional agenda note is also available on CEA website ([www.cea.nic.in](http://www.cea.nic.in)) at the link: <http://cea.nic.in/compsplanningwr.html> i.e. Home page - Wings - Power Systems -PSP&A-I - Standing Committee on Power System Planning Western Regions is also attached herewith.

Yours faithfully,

(Goutam Roy)

Chief Engineer (PSP&amp;A-I)

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## List of Addressees:

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

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**Additional Agenda note for the 2<sup>nd</sup> Meeting of Western Region Power Committee (Transmission Planning) (CTU) scheduled to be held on Friday, 04.09.2020.**

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

- 1.1.** MPPTCL vide its letter dated 25.08.2020 (attached as Annexure-I) has intimated that installation of 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. Further, 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 2<sup>nd</sup> WRST approved transmission element.

MPPTCL, has requested that in view of the space constraint at Sagar 400kV S/s for installation of additional 50 MVAR line reactor, WPRC (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.

- 1.2.** The deliberations held in the 2<sup>nd</sup> WRST meeting held on 21.05.2019 is as given below:

14.1 .....

*Accordingly, in the 1st meeting of WRST held on 05.09.2018, CTU had proposed the following reactive compensation on the Bina-Sagar-Satna 400 kV line:*

- (i) Installation of 50MVAR switchable line reactor at Sagar(MP) end of Satna(PG) - Sagar(MP) 400kV line – Under scope of MPPTCL*
- (ii) Installation of 125MVAR bus reactor at Sagar (MP) S/s – Under scope of MPPTCL*
- (iii) Conversion of 50MVAR fixed line reactor at Bina PG) end of Sagar (MP)- Bina(PG) 400kV line into switchable line reactor. – Under scope of ISTS*

*In the 1st meeting of WRST, MPPTCL had stated that 125 MVAR bus reactor at 400 kV Sagar (MP) was already under implementation, as such adequate reactive compensation would be available at Sagar, Bina and Satna S/s and there would be no requirement of 50MVAR switchable line reactor at Sagar (MP) end of Sagar (MP) – Satna(PG) 400kV line. Also, there is space constraint at Sagar S/s for installation of switchable line reactor. In the meeting, it was agreed that CTU would carry out the studies with CEA and MPPTCL and the above proposal would be reviewed as per the study results.*

- 14.2** *CTU stated that it has been observed that on account of 37% compensation on Satna – Sagar 400kV line, a total rise of 12kV (11kV line rise & 1kV source rise) was observed when charging the line from Satna end. With the proposed 50MVAR Line reactor, the compensation becomes about 74% and the total voltage rise of only 4kV (4kV line rise & 0 source rise) was observed while charging the line from Satna end.*

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Similarly, while charging the line from Sagar end, the total rise observed both without and with the line reactor at Sagar end is 9kV (SR: 5kV & LR: 4kV) and 7kV (SR: 3kV & LR: 4kV) respectively.

14.3 MPPTCL stated that with 9 kV rise the line (Satna-Sagar 400 kV Line) could be charged from Sagar end and in that case, line reactors would not be required. POSOCO stated with provision of line reactor at Sagar end, there would be flexibility to the charge the line from both ends.

14.4 After further deliberations, the following was agreed:

- (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.

1.3. CTU has intimated that the proposed conversion of fixed line reactor at Bina (PG) end of Sagar (MP)- Bina(PG) 400kV line into switchable line reactor does not mention about implementing an NGR bypassing arrangement for utilization of the line reactor as bus reactor for voltage control when required. Accordingly, it has proposed to modify the scope as follows:

- Conversion of 50MVAR fixed line reactor at Bina (PG) end of Sagar (MP)- Bina(PG) 400kV line into switchable line reactor **along with NGR bypassing arrangement**

Further, CTU has proposed that in future, all conversion of fixed line reactors to switchable line reactors would have the NGR bypassing arrangement by default without taking a case to case approval.

1.4. Members may deliberate MPPTCL and CTU proposal.

## 2. Confirmation of the Minutes of the 1<sup>st</sup> WRPC(TP) meeting held on 11.01.2020

2.1. The Minutes of the 1<sup>st</sup> WRPC(TP) meeting held on 11.01.2020 were issued on 12.03.2020. Certain modifications are suggested as given below:

The following needs to be added as point (ix) of Phase-II, 5.5 GW RE injection at Khavda(under 4.21) as the bay equipments at Pirana(PG) & Pirana(Torrent) ends of Pirana (PG) – Pirana (T) 400kV D/c line need to be upgraded due to the planned reconductoring of the line:

- Upgradation of bay equipments at Pirana(PG) & Pirana(Torrent) corresponding to reconductoring of Pirana (PG) – Pirana (T) 400kV D/c line with twin HTLS conductor

**Minutes may be confirmed with the above modification.**

## 3. Transmission system strengthening beyond Kolhapur for export of power from Solar & Wind Energy Zones in Southern Region (Gadag SEZ, Karnataka)

3.1. The following transmission system was agreed in the 2<sup>nd</sup> SR Standing Committee on Transmission held on 10.06.2019 for evacuation of power from Phase-II Solar Energy Zone in Gadag, Karnataka:

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**Gadag SEZ (2500 MW)**

- i. Establishment of 400/220 kV, 5x500 MVA Gadag Pooling Station.
- ii. Gadag PS-Koppal PS 400 kV (high capacity equivalent to quad moose) D/C Line.
- iii. Gadag PS-Narendra (New) PS 400 kV (high capacity equivalent to quad moose) D/C Line.
- iv. 220 kV line bays for interconnection of solar projects (8 nos.)
- v. 1x125 MVA (400 kV) bus reactor at Gadag PS.
- vi. Upgradation of Narendra (New) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVA Bus Reactor.
- vii. **Upgradation of Kolhapur (PG) to its rated voltage of 765 kV level alongwith 2x1500 MVA transformer and 1x330 MVA Bus Reactor.**
- viii. **Upgradation/charging of Narendra new - Kolhapur (PG) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV along with 1x330 MVA switchable Line Reactor on Kolhapur (PG) end of each circuit.**

It was also noted that the proposed system strengthening in the inter-regional corridors and system strengthening beyond Kolhapur in Western region shall require all-India study.

- 3.2. Narendra(New) - Kolhapur has been agreed to be charged at 765kV level, system studies were carried out by CTU on the All India afternoon peak Jun 2021 case to identify transmission system strengthening requirement beyond Kolhapur to avoid any overloading in Maharashtra / Goa transmission system. In the load flow case, SR is observed to be surplus to the tune of 4500MW.

The studies indicate that the following transmission elements become N-1 insecure after Upgradation/charging of Narendra new - Kolhapur (PG) 765 kV D/c line (initially charged at 400 kV) to its rated voltage of 765 kV:

- Narendra New 2X1500 MVA, 765/400kV ICTs
- Kolhapur 2X1500 MVA, 765/400kV ICTs
- Kolhapur (PG) - Kolhapur(MSETCL) 400kV D/c line
- Kolhapur(MSETCL) - Karad(MSETCL) 400kV D/c line

Study considerations along with exhibits are attached at **Annexure-II and Annexure-III respectively.**

The following transmission strengthening options were studied in order to relieve the overloading:

Sl .	Transmission strengthening	Length (km.)	Loading on Proposed System	Loading on Kolhapur (PG) - Kolhapur(MSETCL) 400kV D/c line	Loading on Kolhapur(MSETCL) - Karad(MSETCL) 400kV D/c line	Remarks
	Base Case		-	2x1013 (N-1: 1782)	2x567	

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	Kolhapur (PG) - Pune (GIS) 765kV D/c line	270	2x948	2X584	2x378	With proposed strengthening loadings of the critical lines are generally found to be in order.
3	Kolhapur (PG) - Solapur (PG) 765kV D/c line	250	2x757	2x693	2x446	With proposed strengthening loadings of critical lines are generally found to be in order. However, more power tends to flow through 400kV network.
4	LILO of Solapur(PG) - Pune(GIS) 765kV S/c line at Kolhapur (PG)	180	1133 (Kolhapur - Pune) 480 (Kolhapur - Solapur)	2x659.5	2x429	LILO length is around 200 km, length of both the sections after LILO becomes greater than 300 km.

It may be mentioned that the option of reversal of power flow on Raigarh– Pugalur HVDC link with 2000 MW dispatch was also done, but 765/400 kV ICTs of Raigarh (Kotra) were observed to be overloaded and hence the same is not technically feasible.

Out of the three alternatives studied, maximum power flows through 765 kV network in Alternative-I as Kolhapur (PG) is getting directly connected to load centre viz. Pune. Accordingly, from techno-economic point of view Alternative-I is more prudent. Further, reconductoring of Kolhapur (PG) – Kolhapur (MSETCL) 400kV D/c line and augmentation of 1x1500 MVA, 765/400 kV ICT is required to be done at Narendra (new) ICT for meeting N-1 criteria.

**3.3.** In view of the above, the following transmission system is proposed under ISTS:

- Kolhapur(PG) - Pune (GIS) 765kV D/c line
- Reconductoring of Kolhapur (PG) - Kolhapur(MSETCL) 400kV D/c line 400kV D/c line with conductor having minimum capacity of 2100MVA per circuit at nominal voltage
- Augmentation of Narendra (New) S/s by 1x1500MVA, 765/400kV ICT

**Members may deliberate.**

#### **4. Scheme to control fault level at Indore S/s**

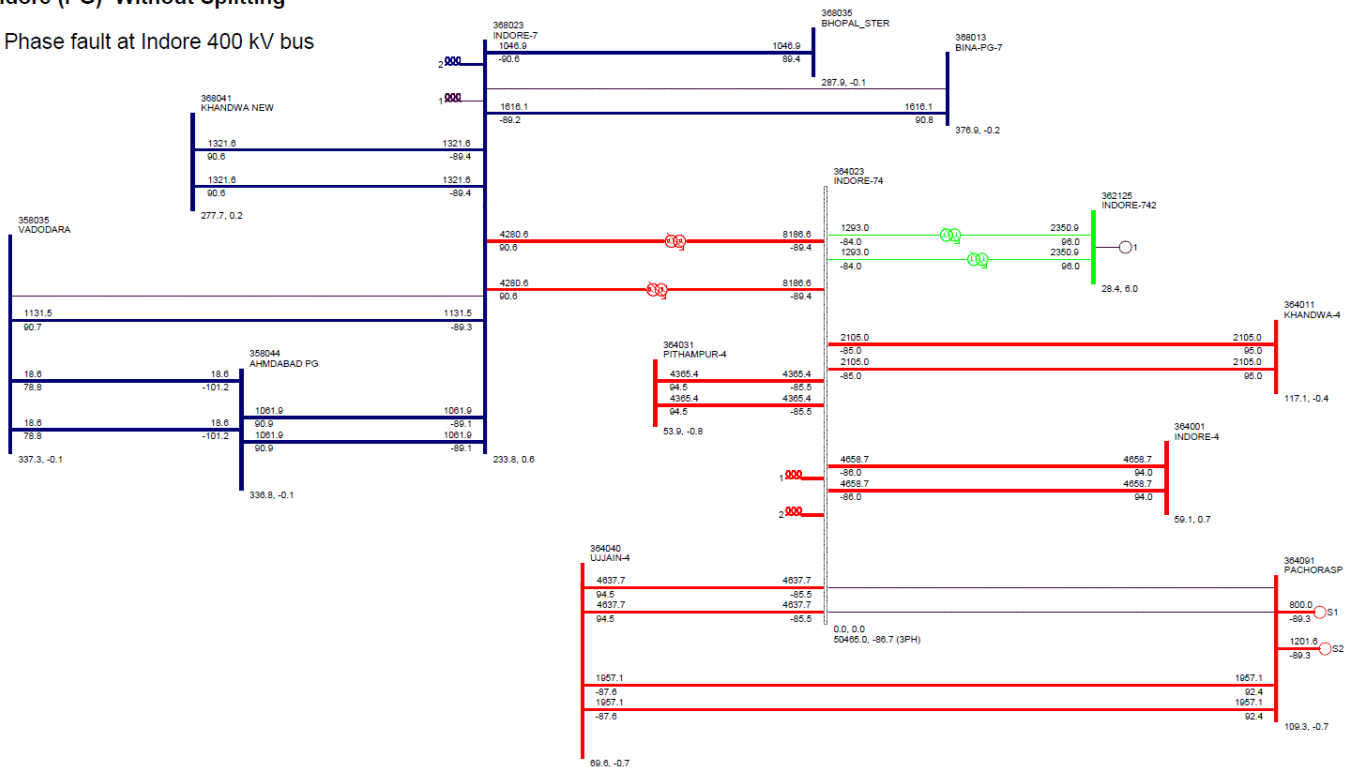
**4.1.** Indore 765/400/220 kV S/s in MP acts as a node for transfer of power from generation projects in MP and Gujarat to load centres in MP through high capacity 400kV and 765 kV networks. A large number of RE generation projects are coming up in Gujarat whose power is getting dispersed through various substations (at 765kV level) including Indore (PG) for onward transfer of power to other parts of the grid resulting in high short circuit levels of interconnected grid. **Short circuit level at Indore (PG) 400kV substation in 2021-2022 time frame crosses 50kA which is designed at 40kA. Even in the current time-frame, the fault level is about 42kA.**

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Contributions from various 400kV lines can be seen from the diagram below (for high RE scenario):

### Indore (PG) Without Splitting

3 Phase fault at Indore 400 kV bus



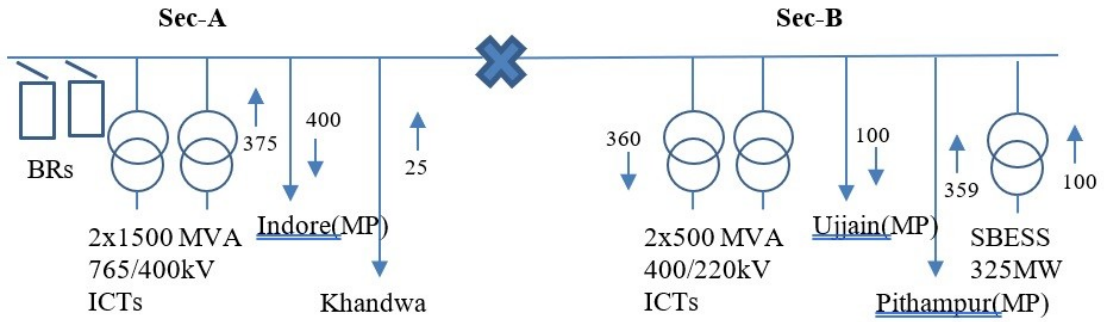
- 4.2. The system study has been carried out by CTU for 2021-22 time frame for High RE and Low RE peak scenarios to control the high fault level at Indore(PG) S/s keeping in view the fact that **765/400kV ICTs, Indore (MP), Ujjain (MP) and Pithampur (MP)** feeders are the major SC Fault contributors at Indore 400 kV (PG) S/s. Study results for various configurations are enclosed at **Annexure-IV**.

Insertion of series reactor instead of Bus splitting offers improved system reliability in view of no requirement of Bus segregation as the Bus sections remain coupled through the Series reactor. However, as per information received from Powergrid S/s, only 400kV bus splitting can be done using GIS/hybrid bays. Installation of 400kV Series reactor for Bus splitting and 400kV lines is not feasible as per site/layout constraints. Considering the same, the options studied for series bus/line reactors are not feasible to implement. Hence, it is observed that the fault level is within limits for alternatives 1, 4 & 6 (re-iterated below) along with peak short circuit values.

- **Alternative-1:** Bus Splitting without disturbing the existing lines/ICTs at Indore(PG) S/s
  - Section-A: 36kA & Section-B: 26kA

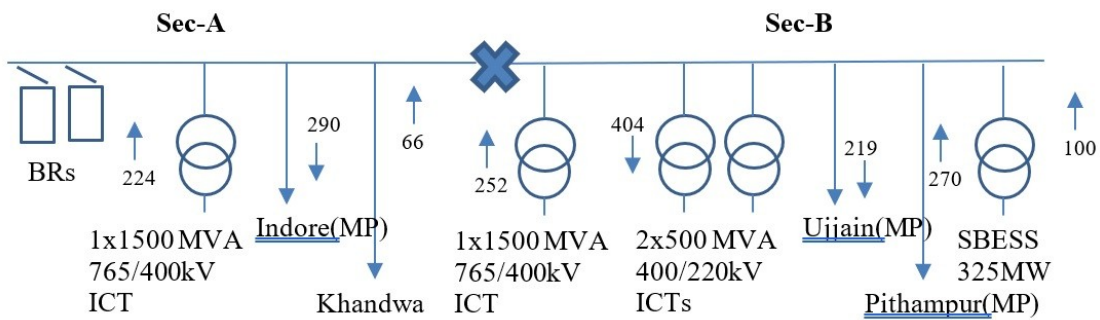
Diagram along with flows for peak load case is given below. Flow on sectionaliser when closed is **127MW**:

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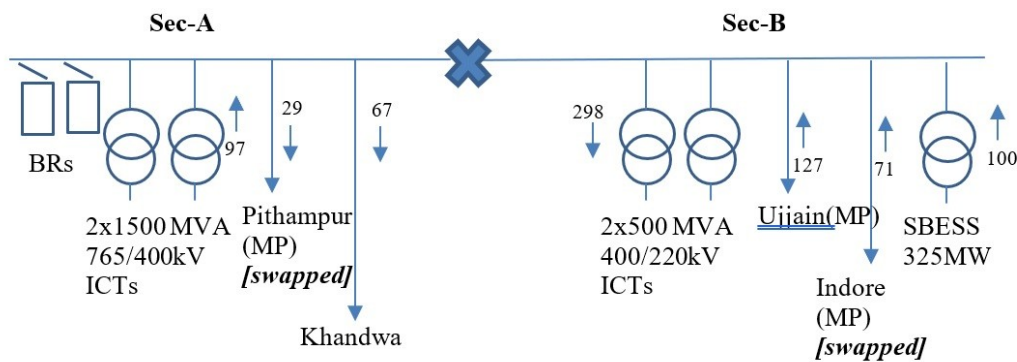
- **Alternative-4:** Bus Splitting along with shifting of 765/400 kV, 1X1500MVA ICT to Section B (through jumpering arrangement)
  - Section-A: 30kA & Section-B: 36kA

Diagram along with flows for peak load case is given below. Flow on sectionaliser when closed is **only 15MW**:



- **Alternative-6:** Bus Splitting along with swapping of Indore (PG)-Pithampur 400 kV D/c line (to Section A) and Indore (PG)- Indore(MP) 400 kV D/c line (to Section B)
  - Section-A: 34kA & Section-B: 27kA

Diagram along with flows for peak load case is given below. Flow on sectionaliser when closed is 395MW:



Among the three alternatives, power flow is balanced in both the sections in **Alternative-4** i.e. closing bus sectionaliser does not lead to significant flow from one section to another and **hence**



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**the overall flow pattern is not disturbed before and after splitting.** Further, 1X1500 MVA 765/400 kV ICT can be installed in Section-A in future for the above case. In case of outage of existing 1X1500 MVA 765/400 kV ICT on any of the sections both the sections may be interconnected as per the requirement through the bus sectionaliser.

Power flow is not well balanced in both Alternatives 1 and 6. Further, **Alternative-6** requires line shifting which would be difficult to implement due to layout constraints. **In each of the above cases, 1x125MVA bus reactor would be required in section B.**

**Members may deliberate.**

## **5. Summary of the connectivity and LTA/MTOA granted in the connectivity and LTA meetings of WR**

### **5.1. Connectivity applications from non-RE sources in Western Region**

#### **BALCO for 250MW as bulk consumer**

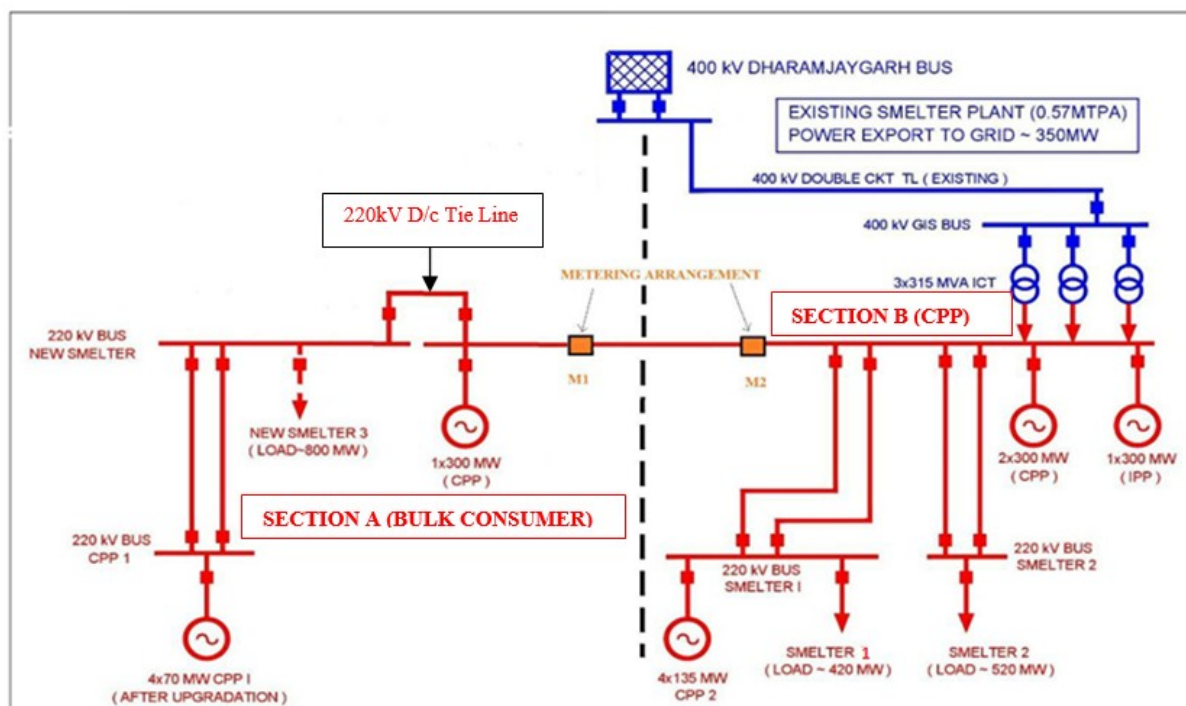
The application was discussed in the 46th meeting of WR constituents for Connectivity & LTA Applications held on 13.04.2020 in which after deliberations, following was decided:

- Connectivity shall be granted to M/s BALCO for 250MW (Bulk Consumer) through 220kV D/c tie line between BALCO (CPP/IPP) & BALCO (Bulk consumer) with suitable metering arrangement in coordination with WRLDC (under the scope of M/s BALCO) using the existing BALCO (CPP/IPP) - Dharamjaygarh 400 kV D/c line. The grant of connectivity will become effective upon physical interconnection of the new smelter load and segregation of generation switchyard into two sections as per details below:
  - **Section A (Bulk consumer- 250MW load):** 580MW [1x300MW(CPP) + 4x70MW(up gradation of 4x67.5MW) (CPP)] units along with New Smelter Load of 800MW]
    - 1x300MW(CPP) + 4x70MW(CPP) units on **Section A** will become an integral part of the load of M/s BALCO (to be connected as a bulk consumer). The details of the individual units shall be captured in the connection agreement (CON-6) to be signed by M/s BALCO.
    - **Section B:** 1440MW [1x300 (IPP) + 2x300MW (CPP) + 4x135MW (CPP)] units with existing smelter load of 940MW along with 3x315 MVA 400/220 kV transformer. The exportable capacity on this bus shall be about 385MW and the 350MW LTA [200(Tamil Nadu), 95(KSEB) & 55(CSPTTrCL)] granted to M/s BALCO shall be from this section.
      - The connectivity for 1440MW [1x300 (as IPP) + 2x300MW (as CPP) + 4x135MW (as CPP)] units on **Section B** (with existing smelter load of 940MW), shall stand revised with the above arrangement for which modified connection agreement is to be signed by M/s BALCO before effecting the connectivity of Section-A as mentioned above.
  - With above arrangement two entities shall be connected at ISTS interface point of Dharamjaygarh namely BALCO (as CPP/IPP units) and BALCO (as Bulk consumer). M/s BALCO was requested to coordinate with WRLDC to finalize the required metering

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arrangements and intimate the same to CTU upon finalization for incorporation in the connection agreement.

- M/s BALCO shall be required to intimate in advance regarding physical interconnection and segregation of the new smelter load. The final changeover of connectivity as per details mentioned above, shall be effected only upon timely confirmation regarding availability of scheduling / accounting arrangements for both the entities i.e. BALCO (as CPP/IPP units) and BALCO (as bulk consumer)
- Matter regarding provision of additional source for BALCO from reliability point of view under contingency condition shall be discussed in a separate meeting amongst CEA, CTU, NLDC, WRLDC & BALCO.



Schematic for segregation of BALCO switchyard into two Sections for grant of connectivity comprising of Bulk Consumer (Section-A) and CPP (Section-B)

## 5.2. Stage-II Connectivity to RE developers in Western Region

The details of stage-II connectivity granted to RE applicants from 44<sup>th</sup> to 49<sup>th</sup> meetings of WR constituents for Connectivity & Long-term Access applications in Western Region is tabulated below:

Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	Criteria Stage II*	Proposed ISTS System for Stage-II connectivity	Dedicated Transmission System for Stage-II connectivity (under scope of applicant)
1.	Srijan Energy Systems Private Limited	1200002419	150	15/01/2021	A SECI Tr-VI (Wind)	<b>Bhuj-II PS (GIS) (New)</b> <ul style="list-style-type: none"> <li>Establishment of Bhuj II PS with at least 1x1500MVA (765/400kV), 1x500MVA (400/220kV)</li> </ul>	Srijan Energy Systems Private Limited - Bhuj-II PS 220kV S/c line along with associated line bays at generation end

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Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	Criteria Stage II*	Proposed ISTS System for Stage-II connectivity	Dedicated Transmission System for Stage-II connectivity (under scope of applicant)
						ICTs <ul style="list-style-type: none"> <li>Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line so as to establish Bhuj II –Lakadia 765 kV D/c line as well as Bhuj -Bhuj II 765kV D/c line</li> </ul>	
2.	Sherisha Rooftop Solar SPV Four Private Limited	1200002452	50	31/03/2021	A (REMCL LOA for 50MW^)	<b>Raipur (PG) S/s (existing)</b>	Sherisha Rooftop Solar SPV Four Private Limited - Raipur 220kV S/c line (capacity at least 300MW at nominal voltage) along with associated line bays at both ends
3	Adani Green Energy Four Limited	1200002437	500	01/07/2022 <sup>s</sup>	A [Solar PV Power plant (2000MW) linked with Solar PV Manufacturing Plant (500MW per annum)]	<b>Khavda PS (GIS)</b> <ul style="list-style-type: none"> <li>Establishment of Khavda 765/400kV, 1x1500MVA, 400/220kV, 1x500MVA PS (GIS)</li> <li>Khavda PS (GIS) – Bhuj PS 765 kV D/c line</li> </ul>	Adani Green Energy Four Limited - Khavda PS(GIS) 400kV S/c line (on D/c towers)* (with minimum power carrying capacity of 1250MW per ckt at nominal voltage) along with associated line bays at generation end <b>(Implementation of 400kV GIS bay at ISTS end to be under ISTS scope)</b>
3.	RSEPL Hybrid Power One Limited (RHPOL)	1200002519	75 (Hybrid: Wind-68.2MW Solar-34.4MW)	30/07/20	A [AEML LOA#]	<b>Bhuj PS (existing)</b>	RHPOL shall share and utilize the balance 75MW capacity of the dedicated transmission system of AGE(MP)L as under: <ul style="list-style-type: none"> <li>Establishment of 220kV Pooling Station near Dayapar/Ratadiya for pooling of power from AGE(MP)L's projects at Dayapar/Ratadiya, Chhugar/Atada, Murchbana/Mokhra and RHPOL's hybrid project [under the scope of AGE(MP)L]</li> <li>AGEMPL's Dayapar/Ratadiya Pooling</li> </ul>

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Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	Criteria Stage II*	Proposed ISTS System for Stage-II connectivity	Dedicated Transmission System for Stage-II connectivity (under scope of applicant)
							Station - Bhuj PS 220kV D/c line (with minimum capacity of 400MW/ckt at nominal voltage) along-with associated bays at Bhuj PS & generation switchyard [under the scope of AGE(MP)L] <ul style="list-style-type: none"> <li>AGE(MP)L shall act as lead generator and would take care of operational and commercial issues in regard to power transfer from RHPOL</li> </ul>
4.	Rewa Ultra Mega Solar Limited (Neemuch Solar Park)	1200002597	500	30/06/2022	B L&A	<b>Neemuch SEZ PP (Proposed)</b> <ul style="list-style-type: none"> <li>Establishment of 400/220 kV, 1X500 MVA Neemuch SEZ PP</li> <li>Neemuch SEZ PP – Kota 400kV D/c line</li> </ul>	RUMS (Neemuch Solar Park) - Neemuch SEZ PP 220kV 2xS/c or D/c line along with associated bays at generation end
5.	Rewa Ultra Mega Solar Limited (Agar Solar Park)	1200002600	550	30/06/2022	B L&A	<b>Pachora SEZ PP</b> <ul style="list-style-type: none"> <li>Establishment of 400/220 kV, 1X500 MVA Pachora SEZ PP</li> <li>Pachora SEZ PP</li> </ul>	RUMS (Agar Solar Park) - Pachora SEZ PP 220kV 2xS/c or D/c line* along with associated bays at generation end
6.	Rewa Ultra Mega Solar Limited (Shajapur Solar Park)	1200002601	450	30/06/2022	B L&A	<b>Pachora SEZ PP Bhopal (Sterlite)</b> 400 kV D/c line (conductor with minimum capacity of 2100 MVA/ckt at nominal voltage)	RUMS (Shajapur Solar Park) - Pachora SEZ PP 220kV 2xS/c or D/c line* along with associated bays at generation end
7.	Masaya Solar Energy Private Limited	1200002397	300	02/08/2021	A SECI Tr-VI (Solar)	<b>Khandwa (PG) (existing)</b>	Masaya Solar Energy Private Limited - Khandwa(PG) 220kV S/c line* along with associated line bay at both ends (under the scope of applicant)

**Note:**

^ LOA submitted with the application is in the name of M/s Refex Energy Limited (REL). Applicant has submitted REMCL letter dtd. 15.01.20 clarifying that above LOA (has been issued to the consortium of M/s Refex Energy Ltd. & M/s Sherisha Solar Pvt. Ltd. and for all practical and regulatory purposes, the LOA is deemed to have been issued by REMCL to 100% SPV of the consortium company i.e. M/s SRSSFPL (applicant) & can be utilized by the above SPV.

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#LOA has been issued by AEML (Distribution Licensee) to RSEPL whereas application has been submitted by RSEPL Hybrid Power One Limited (RHPOL). However, applicant has submitted AEML's letter dated 12/03/2020 stating that the LOA issued to parent company (RSEPL) may be utilised by its 100% subsidiary (RHPOL).

\$ Adani Green Energy Four Limited shall be required to complete the dedicated transmission line(s) and pooling sub-station(s) within 24 months from the date of intimation of bay allocation

\*In the event of stringing of the 2<sup>nd</sup> 400kV circuit by the applicant, when required, all liabilities shall be borne by M/s Adani Green Energy Four Limited

& RUMS is yet to confirm the configuration of dedicated transmission line (i.e. 2xS/c or D/c line)

### 5.3. LTA Applications from RE developers in Western Region

Sl.	Name of Applicant (Organization)	Stage-I Connectivity Quantum Granted (in MW)	Stage-II Connectivity Details	ISTS substation for Stage-II connectivity	Seeking LTA for (MW)	Date of Receipt of App.	Date from which LTA sought	Date upto which LTA required	Beneficiaries for LTA	LTA Application No
1	Sitac Kabini Renewables Private Limited	300	300	Bhuj-II PS	300	28/12/19	30/06/21	30/06/46	100MW-SR (Target) 200MW-NR (Target)	1200002413
2	Srijan Energy Systems Private Limited	150	150	Bhuj-II PS	50	12/03/20	15/03/21	15/03/46	Goa (WR)	1200002522
3	Masaya Solar Energy Private Limited	300	300	Khandwa (PG) (existing)	300	27/01/20	25/03/22	25/03/47	SR (Target)	1200002451

#### **Application at Sl. No. 1:**

For grant of LTA to the above applicant, the following transmission system was agreed:

- Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS)
- Reconfiguration/LILO of Bhuj PS – Lakadia PS 765kV D/c line at Bhuj-II PS so as to establish Bhuj II –Lakadia 765 kV D/c line and Bhuj-Bhuj II 765kV D/c line
- Establishment of 2x1500MVA, 765/400kV Lakadia PS
- Bhuj PS – Lakadia PS 765kV D/c line
- LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS
- Lakadia – Vadodara 765kV D/c line

**OR**

Lakadia – Banaskantha 765kV D/c line

#### **Application at Sl. No. 2:**

For grant of LTA to the above applicant, the following transmission system was agreed:

- Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS)
- Reconfiguration/LILO of Bhuj PS – Lakadia PS 765kV D/c line at Bhuj-II PS so as to establish Bhuj II –Lakadia 765 kV D/c line and Bhuj-Bhuj II 765kV D/c line

#### **Additional Common system strengthening**

- Establishment of 2x1500MVA, 765/400kV Lakadia PS

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- ii) Bhuj PS – Lakadia PS 765kV D/c line
- iii) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS
- iv) Lakadia – Vadodara 765kV D/c line

**OR**

Lakadia – Banaskantha 765kV D/c line

**Application at Sl. No. 3:**

Granted with existing system

**5.4. LTA Applications from RE developers in other regions with drawl in Western Region**

Sl. No.	Application No.	Applicant	Location	Date of Application	LTA (MW)	Beneficiaries (MW)	Date of start of LTA
1	1200002422	SBE Renewables Ten Pvt Ltd	Jaisalmer, Rajasthan	31.12.2019	450	Target (NR): 50MW Target (WR): 400MW. Subsequently firmied up as HPPC (NR): 50MW CSPDCL (WR): 400MW	07.05.2021
2	1200002477	Azure Power India Pvt Ltd	Jodhpur, Rajasthan	19.02.2020	200	MPPMCL (firm)	15.10.2020
3	1200002454	Tata Power Renewable Energy Ltd	Jaisalmer, Rajasthan	30.01.2020	150	Target (WR)	01.07.2021
4	1200002634	Renew Surya Roshni Pvt Ltd	Jaisalmer, Rajasthan	09.06.2020	400	WR (Target)-200MW NR (Target)-200MW	01.08.2022
5	1200002639	Altra Xergi Power Pvt. Ltd.	Jaisalmer, Rajasthan	09.06.2020	380	WR (Target)-330MW NR (Target)-50MW	01.08.2022
6	1200002650	NTPC Ltd	Ramagundam, Telangana	29.06.2020	100	NTPC, Kudgi NTPC Solapur NTPC Mauda	01.03.2021

**5.5. MTOA Details**

Total MTOA quantum of 200.77 MW has been granted after the 1st WRPCTP meeting with drawl in WR (MPPMCL-58MW, JITPL-142.77MW). MTOA of 13.65MW with injection in WR is granted after 1<sup>st</sup> WRPCTP meeting.

**5.6. Offering the Stage-II connectivity grantees at Bhuj-II PS an opportunity to get connected at Bhuj PS [44th WR Conn/LTA meeting held on 28.01.2020]**

In the 44th WR Conn/LTA meeting held on 28.01.2020, It was informed that CERC vide common order dated 13.01.2020 in the Petition Nos. 56/MP/2019, 57/MP/2019 & 58/MP/2019 filed by M/s Vaayu Renewable Energy (Sironj) Private Ltd., M/s Vaayu Renewable Energy (Kaveri) Private Ltd. & M/s Vaayu Renewable Energy (Krishna) Private Ltd. respectively has

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directed to revoke the Stage-II connectivity granted to the 3 nos. projects of Vaayu (Sironj: 300MW, Kaveri: 250MW & Krishna: 300MW). Accordingly, the Stage-II connectivity granted to the above projects has been revoked vide letters dated 17.01.2020. With this, 3 nos. 220kV bays (Nos. 222, 223 & 231) are now available at Bhuj PS.

In this regard, it was informed that some Stage-II connectivity grantees at Bhuj-II PS had initially requested for connectivity grant at Bhuj PS but were instead granted connectivity at Bhuj-II PS on account of technical/physical limitations in providing additional connectivity at Bhuj PS. With the availability of 3 nos. 220kV bays at Bhuj PS, it was proposed to offer the Stage-II connectivity grantees at Bhuj-II PS an opportunity to get connected at Bhuj PS through a joint exercise based on their willingness & as per priority defined by the date of Stage-II application.

Out of the various grantees at Bhuj-II PS, only M/s Netra showed willingness to get connected at Bhuj PS keeping all other terms and conditions of the earlier connectivity / LTA grants unchanged. M/s NWPL also requested that the 220kV bay at Bhuj PS end may be implemented under ISTS and the same was agreed in the meeting. The transmission system for LTA was also modified with the above change in connectivity point from Bhuj-II PS to Bhuj PS as per details given below:

<b>Transmission system required for LTA as per original intimation dated 06.03.2019</b>	<b>Revised Transmission system required for LTA (after shifting of connectivity point from Bhuj-II PS to Bhuj PS)</b>
<p><b>Transmission system strengthening at Bhuj-II PS:</b></p> <ol style="list-style-type: none"> <li>1. Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS)</li> <li>2. Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line at Bhuj-II PS so as to establish Bhuj II – Lakadia 765 kV D/c line and Bhuj PS -Bhuj II PS 765 kV D/c line.</li> </ol> <p><b>Western Region Strengthening Scheme-21 (WRSS-21)</b></p> <p><b>PART-A</b></p> <ol style="list-style-type: none"> <li>i) Establishment of 2x1500MVA, 765/400kV Lakadia PS</li> <li>ii) Bhuj PS – Lakadia PS 765kV D/c line</li> <li>iii) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS</li> </ol>	<ol style="list-style-type: none"> <li>i) Establishment of 2x1500MVA, 765/400kV Lakadia PS</li> <li>ii) Bhuj PS – Lakadia PS 765kV D/c line</li> <li>iii) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS</li> <li>iv) Lakadia – Vadodara 765kV D/c line (Time-line as per TSA: Dec-20)</li> </ol> <p><b>OR</b></p> <p>Lakadia – Banaskantha 765kV D/c line (Time-line as per TSA: Jun-21)</p>

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Transmission system required for LTA as per original intimation dated 06.03.2019	Revised Transmission system required for LTA (after shifting of connectivity point from Bhuj-II PS to Bhuj PS)
<b>PART-B</b> iv) Lakadia – Vadodara 765kV D/c line	

**Members may deliberate/note.**



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

(A wholly owned Govt. of Madhya Pradesh Undertaking)

CIN: U40109MP2001SGC014880

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

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



No. 04-02/N-171/

1395

Jabalpur, Date: 25.8.2020

To,

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

Fax No.: 011-26102045  
-26175921

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

Ref: CEA Email dated 07.07.2020

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

**(A) Permission for Charging of 125MVAR switchable bus cum line reactor at Sagar 400kV substation of MPPTCL:**

With the upgradation of 220kV Substation at Sagar to 400kV level under Green Energy Corridor Phase-I scheme, installation of 1x125MVAR, 400kV bus reactor at Sagar 400/220kV (upgradation) Substation was proposed by MPPTCL. In the 1<sup>st</sup> meeting of WRSCCT held on 05.09.2018, CTU has informed that after implementation of LILO arrangement at Sagar 400kV S/s, the line lengths of Satna(PGCIL) – Sagar (MP) 400kV line would become 223.35km, therefore a switchable 50MVAR line reactor is required to be installed by MPPTCL at Sagar 400kV S/s.

In this context MPPTCL has appraised to the WRSCCT committee & CTU that, there is space constraint at Sagar 400kV S/s for installation of switchable 50MVAR line reactor and with proposed 125MVAR bus reactor adequate reactive compensation can be available at Sagar, Bina(PGCIL) and Satna(PGCIL) Substations.

The matter was again discussed in 2<sup>nd</sup> meeting of WRSCCT held on 21.05.2019, wherein CTU stated that there would be around 9kV voltage rise in the line at the receiving end, if the line is charged from Satna(PGCIL) end. Therefore, installation of 50MVAR line reactor on Satna(PGCIL) - Sagar 400kV line section shall be necessary. In view of this, implementation of 50MVAR switchable line reactor on Satna(PGCIL) - Sagar 400kV line was agreed. Later on, as agreed in the 2<sup>nd</sup> WRSCCT meeting due to space constraint, arrangement for converting 125MVAR bus reactor to switchable line reactor has been made at the Sagar 400kV Substation with NGR and its bypassing arrangement so that bus reactor can also be used as line reactor at the time of switching.

It is to mention that MPPTCL has completed installation of the switchable 125MVAR bus cum line reactor on the Satna(PGCIL) - Sagar(MP) 400kV line and it has been test charged as bus reactor on 04/03/2020. Further, a request has been made to WRLDC for charging this reactor as line reactor but WRLDC has not issued the charging permission citing the reason that it was a deviation from 2<sup>nd</sup> WRSCCT approved transmission element. A copy of correspondence with WRLDC is enclosed as Annexure-I.

In view of above, it is requested to that looking to the space constraint at Sagar 400kV S/s committee 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 directives may be given to WRLDC to issue the charging permission of this transmission element.

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

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

**Assumptions considered for preparation of load generation scenarios for integration of RE in 2021-22**

1. Time frame : 2021-22
2. Scenarios : Total 9 nos, June, 2021, August, 2021 and February, 2022, for afternoon peak, evening peak and night off-peak scenarios
3. Load Demand : as per the 19<sup>th</sup> EPS (WR –71020 MW, All India –225751 MW)
4. Demand factors : as per CEA report dated 30.01.2020 (same have been apportioned as per all-India peak)

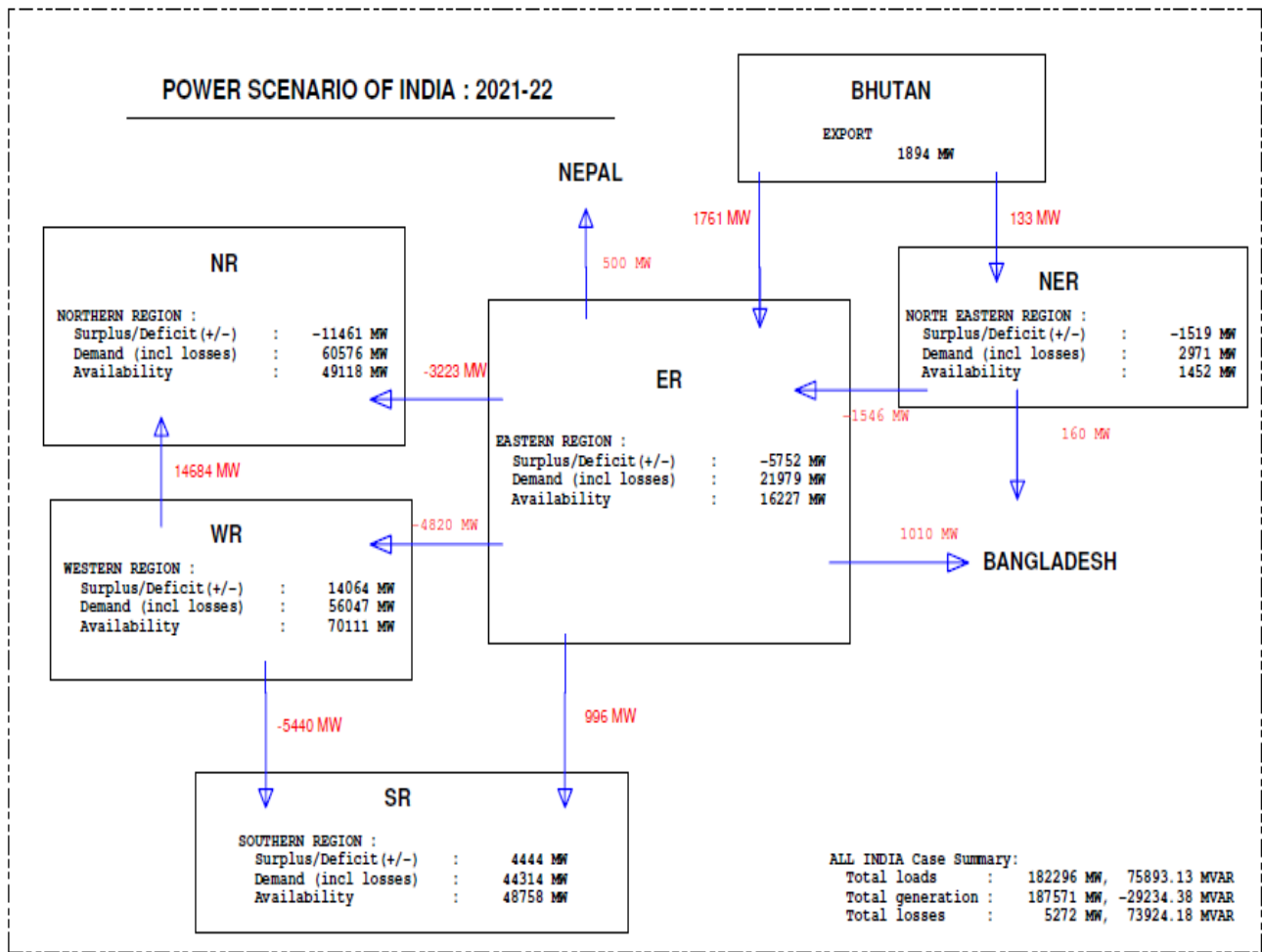
Region	February			June			August		
	Afternoon peak (%)	Evening Peak (%)	Night off peak (%)	Afternoon peak (%)	Evening Peak (%)	Night off peak (%)	Afternoon peak (%)	Evening Peak (%)	Night off peak (%)
<b>Northern</b>	70	78	48	85	97	67	82	96	72
<b>Western</b>	93	92	67	82	85	66	75	84	60
<b>Southern</b>	88	93	66	74	85	60	80	90	60
<b>Eastern</b>	68	90	55	78	95	66	75	97	70
<b>North-Eastern</b>	53	91	40	65	97	50	70	99	56
<b>All-India</b>	88	95	65	86	95	75	85	96	76

5. Generation: In order to meet the required demand of a region, RE has been considered as must-run, nuclear and hydro has been considered as per the scenario and the balance demand is met by thermal generation.
6. With respect to the thermal generation dispatches, out of the total requirement of thermal generation, 55-65% of the requirement has been met by ISGS/IPPs and balance by state generation in each scenario.
7. In case of ISGS & IPP thermal generation, plants with cheaper variable cost have been considered progressively so as to meet the requisite requirement and balance plants with costly power have been switched-off.
8. In case of state embedded thermal generation, state generation dispatch has been considered with 55% technical minimum for every thermal unit, balance units are switched off.
9. Generation capacity to be made available upon unavailability of solar generation in evening shall be met by switching on and increasing dispatch of gas based power plants and hydro power plants, keeping the same thermal generation units running in afternoon peak and evening peak scenarios.
10. For accounting the availability of solar roof-top generation, equivalent load shall be reduced from respective Regions while preparing study files.
11. Constraints are faced in export of surplus power from SR to WR under Scenario 4: Afternoon peak Jun 2021.

**Time frame: Afternoon peak Jun 2021 (LGB)**

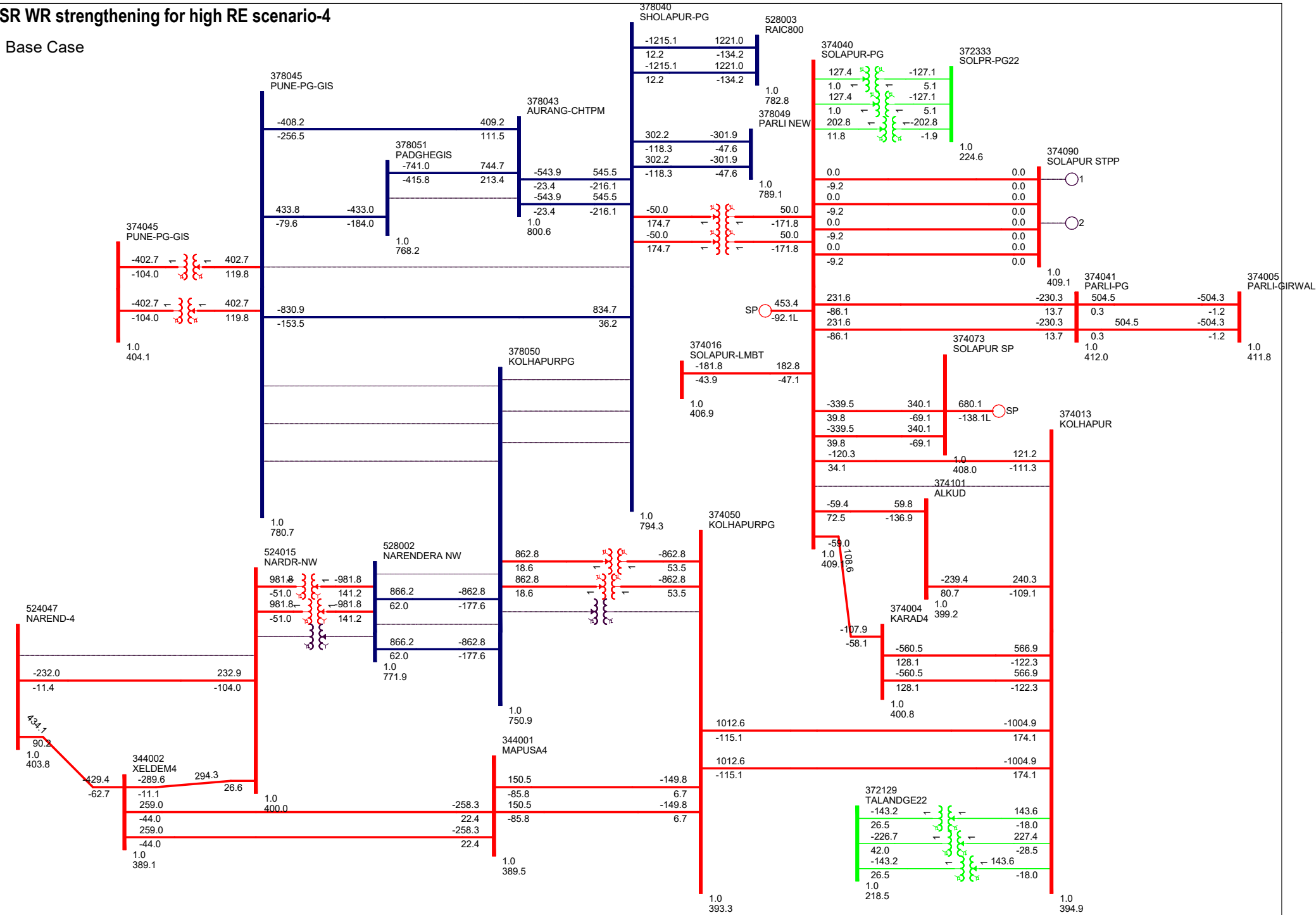
Availability	Thermal Central	Thermal State	Thermal Private	Hydro	Nuclear	Solar	Solar rooftop	Wind	Total availability	Demand Factor	Surplus / Deficit	Net Availability	Net Demand
<b>NR</b>	3614	10875	0	12984	2416	19419	2700	1290	53297	63292	-9996	50597	60592
<b>WR</b>	8448	10418	19731	2450	2592	16128	2700	10344	72811	58782	14029	70111	56082
<b>SR</b>	506	9124	726	4769	2656	18371	2700	12521	51372	47038	4334	48672	44338
<b>ER</b>	6182	2593	2090	4909	0	150	240	0	16165	22081	-5916	15925	21841
<b>NER</b>	0	0	0	1332	0	60	60	0	1452	2952	-1500	1392	2892
<b>Total</b>	<b>18750</b>	<b>33010</b>	<b>22547</b>	<b>26444</b>	<b>7664</b>	<b>54127</b>	<b>8400</b>	<b>24155</b>	<b>195097</b>	<b>194146</b>	<b>951</b>	<b>186697</b>	<b>185746</b>

## Afternoon peak Jun 2021: Scenario



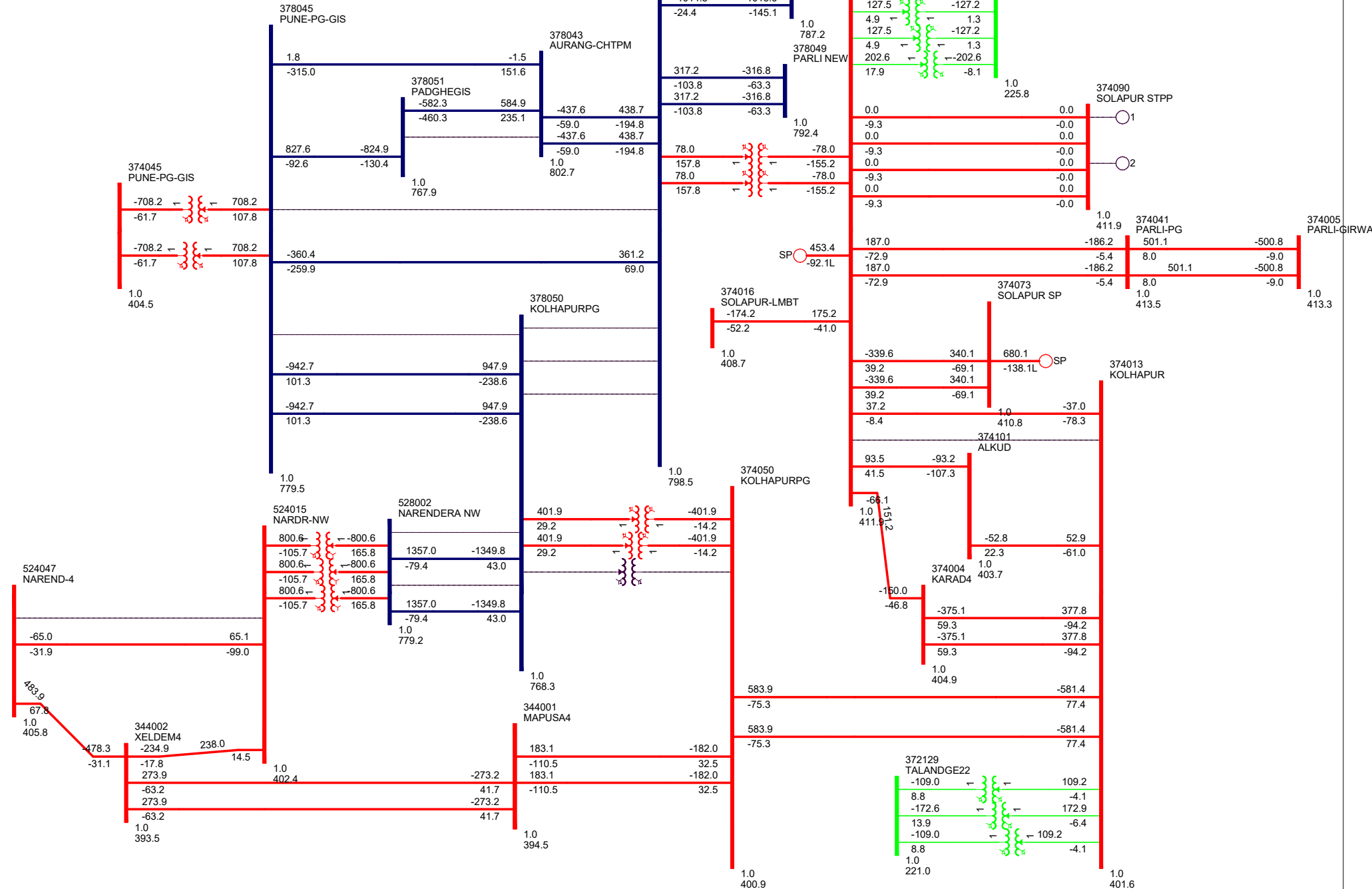
SR WR strengthening for high RE scenario-4

Base Case



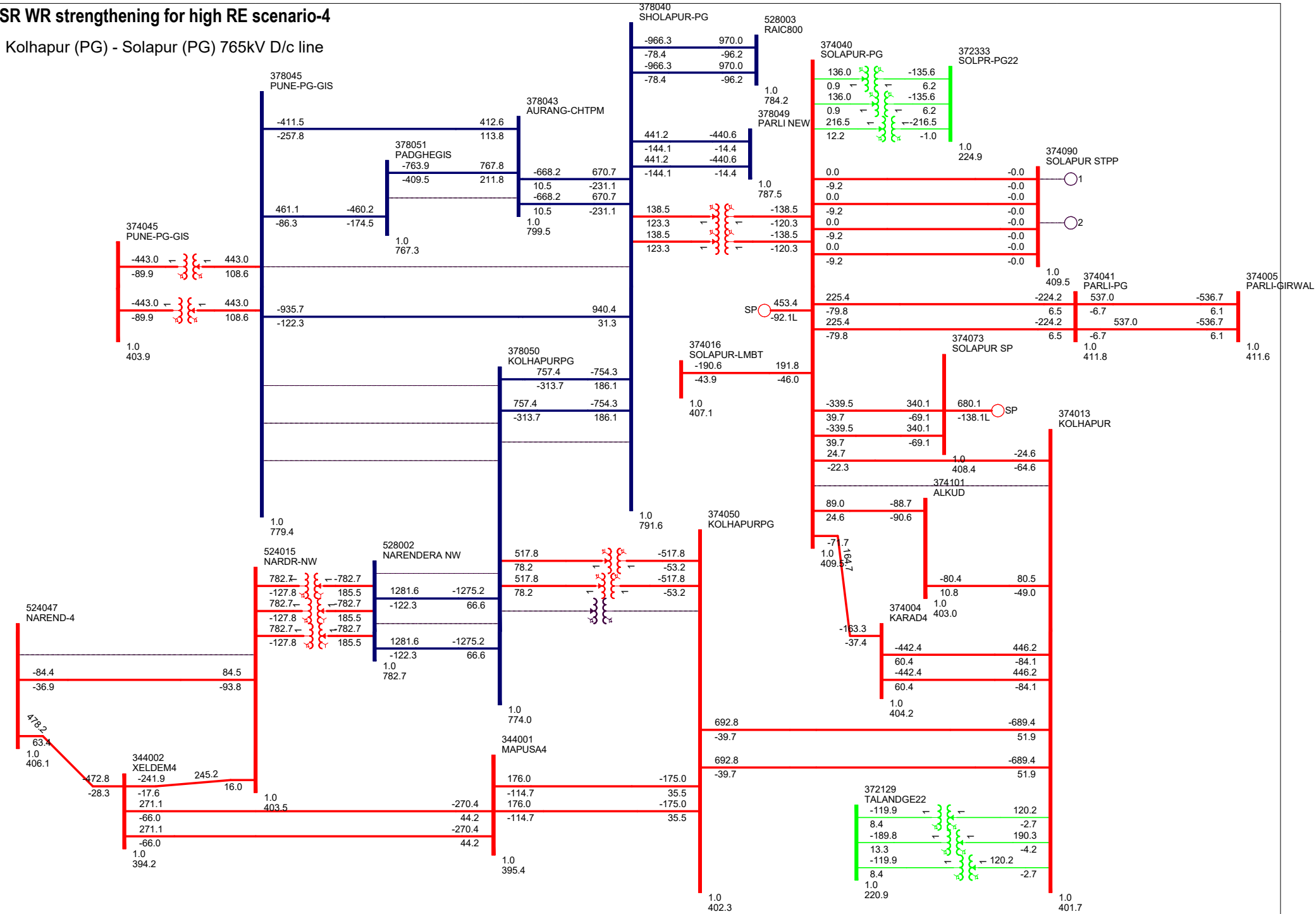
# SR WR strengthening for high RE scenario-4

## Kolhapur (PG) - Pune (GIS) 765kV D/c line



# SR WR strengthening for high RE scenario-4

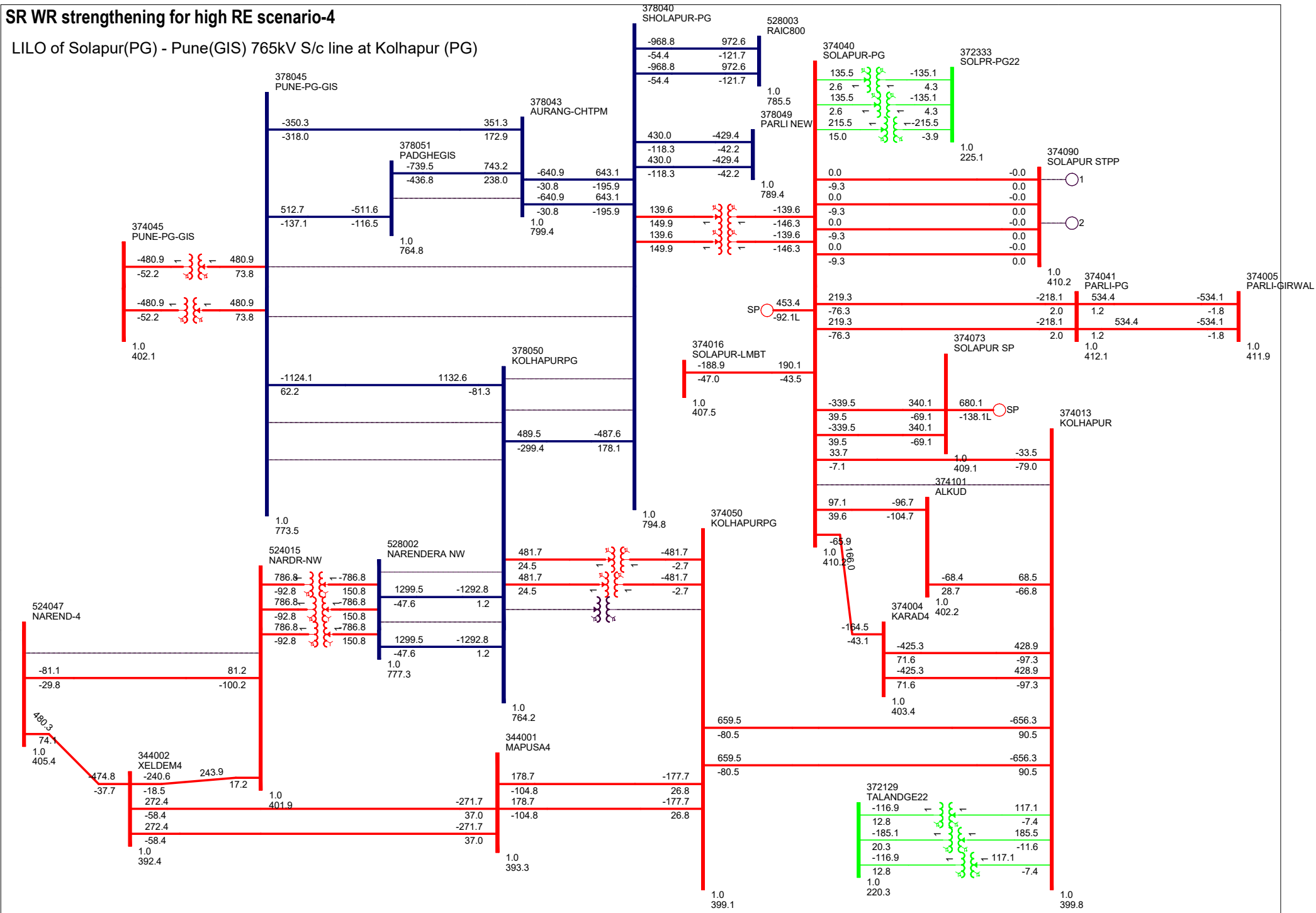
Kolhapur (PG) - Solapur (PG) 765kV D/c line





# SR WR strengthening for high RE scenario-4

LILO of Solapur(PG) - Pune(GIS) 765kV S/c line at Kolhapur (PG)



**Annexure-IV : Alternatives to control high fault current at Indore S/s**

Case	Transmission elements		High RE Scenario		Low RE peak scenario		Remarks
	Section-A	Section-B	Section-A	Section-B	Section-A	Section-B	
Base Case	1. Indore (PG)- Indore(MP) 400 kV D/c line 2. Indore (PG)-Pithampur 400 kV D/c line 3. Indore (PG)-Khandwa 400 kV D/c line 4. Indore (PG)-Ujjain 400 kV D/c line 5. 765/400 kV, 2X1500MVA ICT 6. 400/220 kV, 2X500MVA ICT 7. 1X125 MVAr and 1X63 MVAr Br 8. SBESS (324.4 MW) [at 400kV]		50051.7		51763		Design Fault Level of the S/s : 40kA
Case-1 (Bus Splitting)			35704.8	25487.4	36192.5	26219.6	In future, 765/400 KV, 1500 MVA ICT can be installed in section-B
Case-2: Case1+ with 14ohm series LR at Indore(PG) end of Indore(MP) line and 14ohm series BR			38444.9	32893.8	39204.7	33891.6	
Case-3: Case1+ with 14ohm series LR at Indore(PG) end of Indore(MP) line and Ujjain (MP) Line and 14ohm series BR	1. Indore (PG)- Indore(MP) 400 kV D/c line 2. Indore (PG)- Khandwa 400 kV D/c line 3. 765/400 kV, 2X1500MVA ICT 4. 1X125 MVAr and 1X63 MVAr Br	1. Indore (PG)- Pithampur 400 kV D/c line 2. Indore (PG)- Ujjain 400 kV D/c line 3. 400/220 kV, 2X500MVA ICT 4. SBESS (324.4 MW)	38093.5	30327.6	38910.5	31409.4	In future, 765/400 KV, 1500 MVA ICT can be installed in section-B
Case-3A: Case1+ with 18ohm series BR			-	-	41158.7	32671	
Case-3B: Case1+ with 24ohm series BR			-	-	40238.7	31383.2	
Case-4: Bus Splitting with shifting of 765/400 kV,	1. Indore (PG)- Indore(MP) 400 kV D/c line 2. Indore (PG)-	1. 765/400 kV, 1X1500MVA ICT	29666.8	34816.9	30202.9	35663.8	By jumpering 765/400kV ICT can be shifted.

Case	Transmission elements		High RE Scenario		Low RE peak scenario		Remarks
	Section-A	Section-B	Section-A	Section-B	Section-A	Section-B	
1X1500MVA ICT to Section B	Khandwa 400 kV D/c line 3. 765/400 kV, 1X1500MVA ICT 4. 1X125 MVar and 1X63 MVar Br	2. Indore (PG)-Pithampur 400 kV D/c line 3. Indore (PG)-Ujjain 400 kV D/c line 4. 400/220 kV, 2X500MVA ICT 5. SBESS (324.4 MW)					In case-4, 765/400 KV, 1500 MVA ICT can be installed in future in section-A.
Case-5: Case4+ with 14ohm series LR at Indore(PG) end of Indore-Indore line and Indore-Ujjain line alongwith 14ohm series BR			32647.9	37381.5	33401.7	38572.4	
Case-5A: Case4+ with 12 ohm series LR at Indore(PG) end of Indore-Ujjain line and Indore-Pitampur line alongwith 14ohm series BR	1. Indore (PG)-Indore(MP) 400 kV D/c line 2. Indore (PG)-Khandwa 400 kV D/c line 3. 765/400 kV, 1X1500MVA ICT 4. 1X125 MVar and 1X63 MVar Br	1. 765/400 kV, 1X1500MVA ICT 2. Indore (PG)-Pithampur 400 kV D/c line 3. Indore (PG)-Ujjain 400 kV D/c line 4. 400/220 kV, 2X500MVA ICT 5. SBESS (324.4 MW)	-	-	36305.1	37245	If Series LR on Pitampura line is removed, Section B fault level becomes 38.6kA (low RE)
Case-5B: Case4+ 18ohm series BR			-	-	35584.3	40201.6	
Case-5C: Case4+ 24ohm series BR			-	-	34506.9	39324.6	
Case-6: Bus splitting &Swapping of Indore (PG)-Pithampur 400 kV D/c line and Indore (PG)-Indore(MP) 400 kV D/c line	1. Indore (PG)-Pithampur 400 kV D/c line 2. Indore (PG)-Khandwa 400 kV D/c line 3. 765/400 kV, 2X1500MVA ICT 4. 1X125 MVar and 1X63 MVar Br	1. Indore (PG)-Indore(MP) 400 kV D/c line 2. Indore (PG)-Ujjain 400 kV D/c line 3. 400/220 kV, 2X500MVA ICT 4. SBESS (324.4 MW)	32740.5	27136.6	33920	26858	
Case-7: Case6+ with 14ohm series LR at Indore(PG) end of Indore-Pithampura			37453.3	34614.6	38395.8	34632.4	

Case	Transmission elements		High RE Scenario		Low RE peak scenario		Remarks
	Section-A	Section-B	Section-A	Section-B	Section-A	Section-B	
line alongwith 14ohm series BR							
Case-8: Case6+ with 14ohm series LR at Indore(PG) end of Indore-Pithampura line and Indore(PG)-Indore(MP) line alongwith 14ohm series BR			37161.4	32118.7	38075.9	32075.6	In future, 765/400 KV, 1500 MVA ICT can be installed in section-B